

Chapter 16. WILDFIRE

WILDFIRE RISK RANKING	
Wharton County	Medium
City of East Bernard	Low
City of El Campo	Medium
City of Wharton	Low

<u>DEFINITIONS</u>	
Conflagration	A fire that grows beyond its original source area to engulf adjoining regions. Wind, extremely dry or hazardous weather conditions, excessive fuel buildup, and explosions are usually the elements behind a wildfire conflagration.
Interface Area	An area susceptible to wildfires and where wildland vegetation and urban or suburban development occur together. An example would be smaller urban areas and dispersed rural housing in forested areas.
Wildfire	Fires that result in uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas. Because of their distance from firefighting resources, they can be difficult to contain and can cause a great deal of destruction.

16.1 GENERAL BACKGROUND

According to the *2000 National Fire Plan*, the wildland fire risk is now considered by authorities as “the most significant fire service problem of the Century.”

A wildfire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildfires can be ignited by lightning or by human activity such as smoking, campfires, equipment use, and arson.

Fire hazards present a considerable risk to vegetation and wildlife habitats. Short-term loss caused by a wildfire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure. Vulnerability to flooding increases due to the destruction of watersheds. The potential for significant damage to life and property exists in areas designated as wildland urban interface (WUI) areas, where development is adjacent to densely vegetated areas.

Texas has seen a huge increase in the number of wildfires in the past 30 years. During the 15-year period between 2005 and 2020, Texas Forest Service (TFS) reports that over 150,00 wildfires have consumed more than nine million acres in Texas. More and more people are placing their homes in woodland settings in or near forests, rural areas, or remote mountain sites. Many of these homes are nestled along ridgelines, cliff-edges, and other classic fire-interface hazard zones. There, homeowners enjoy the beauty of the environment but they also face the very real danger of wildfire.

Years of fire suppression has significantly disturbed natural fire occurrences—nature’s renewal process. The result has been the gradual accumulation of understory and canopy fuels to levels of density that can feed high-energy, intense wildfires and further increase hazards from and exposure to interface problems.

Fire Protection in Wharton County

Fire protection in Wharton County is divided between eight volunteer fire departments – Boling Fire Department, Danevang Volunteer Fire Department (VFD), East Bernard VFD, El Campo VFD, Glen Flora VFD, Hungerford VFD, Louise VFD, and Wharton VFD, as well as TFS, Bureau of Land Management, and the U.S. Forest Service (USFS). More information about these divisions is provided in Table 16-1. The TFS administers the Community Wildfire Protection Plan (CWPP) to reduce related risks to life, property, and the environment. It's Fire Control Department provides leadership in wildland fire protection for state and private lands in Texas.

TABLE 16-1. FIRE PROTECTION SERVICES IN WHARTON COUNTY AND PARTICIPATING COMMUNITIES				
	Unincorporated Areas	City of East Bernard	City of El Campo	City of Wharton
Local Volunteer Fire Department	Yes	Yes	Yes	Yes
National Park Service	Yes	No	No	No
Bureau of Land Management	Yes	No	No	No
Texas Commission on Environmental Quality	Yes	Yes	Yes	Yes
Texas Forest Service	Yes	Yes	Yes	Yes
AgriLife	Yes	Yes	Yes	Yes
Texas Parks and Wildlife Department	Yes	Yes	Yes	Yes
Texas Interagency Coordination Center	Yes	Yes	Yes	Yes
U.S. Fish and Wildlife Service	Yes	No	No	No
U.S. Forest Service	Yes	No	No	No

Vegetation Classes in Wharton County

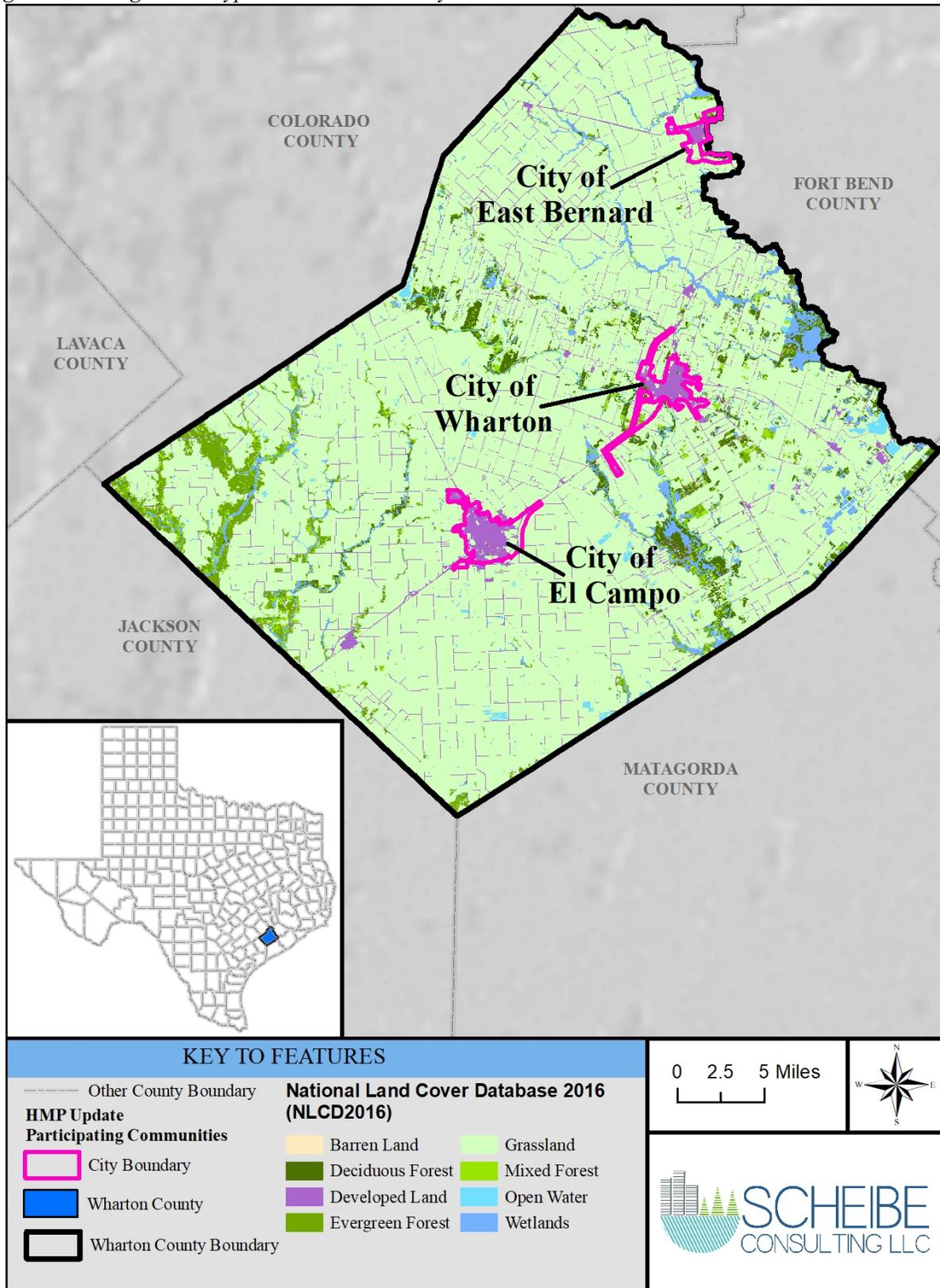
General vegetation for Wharton County and Participating Communities is described in Table 16-2 and Figure 16-1. The most common vegetation class in the county is grassland (comprising approximately 82.8% of the acreage in the county).

**TABLE 16-2.
VEGETATION CLASSES IN WHARTON COUNTY AND PARTICIPATING
COMMUNITIES**

Class	Area (acres)	% of Total Land Area
Barren Land (Rock/Sandy/Clay)	821	0.1
Deciduous Forest	21,538	3.1
Developed Land	35,685	5.1
Evergreen Forest	16,931	2.4
Grassland	579,761	82.8
Wetlands	26,445	3.8
Mixed Forest	12,757	1.8
Water	6,452	0.9
Total	700,390	100

Source: U.S. Geological Survey: National Land Cover Database

Figure 16-1. Vegetation Types in Wharton County



Note: From U.S. Geological Survey: National Land Cover Database

16.2 HAZARD PROFILE

16.2.1 Past Events

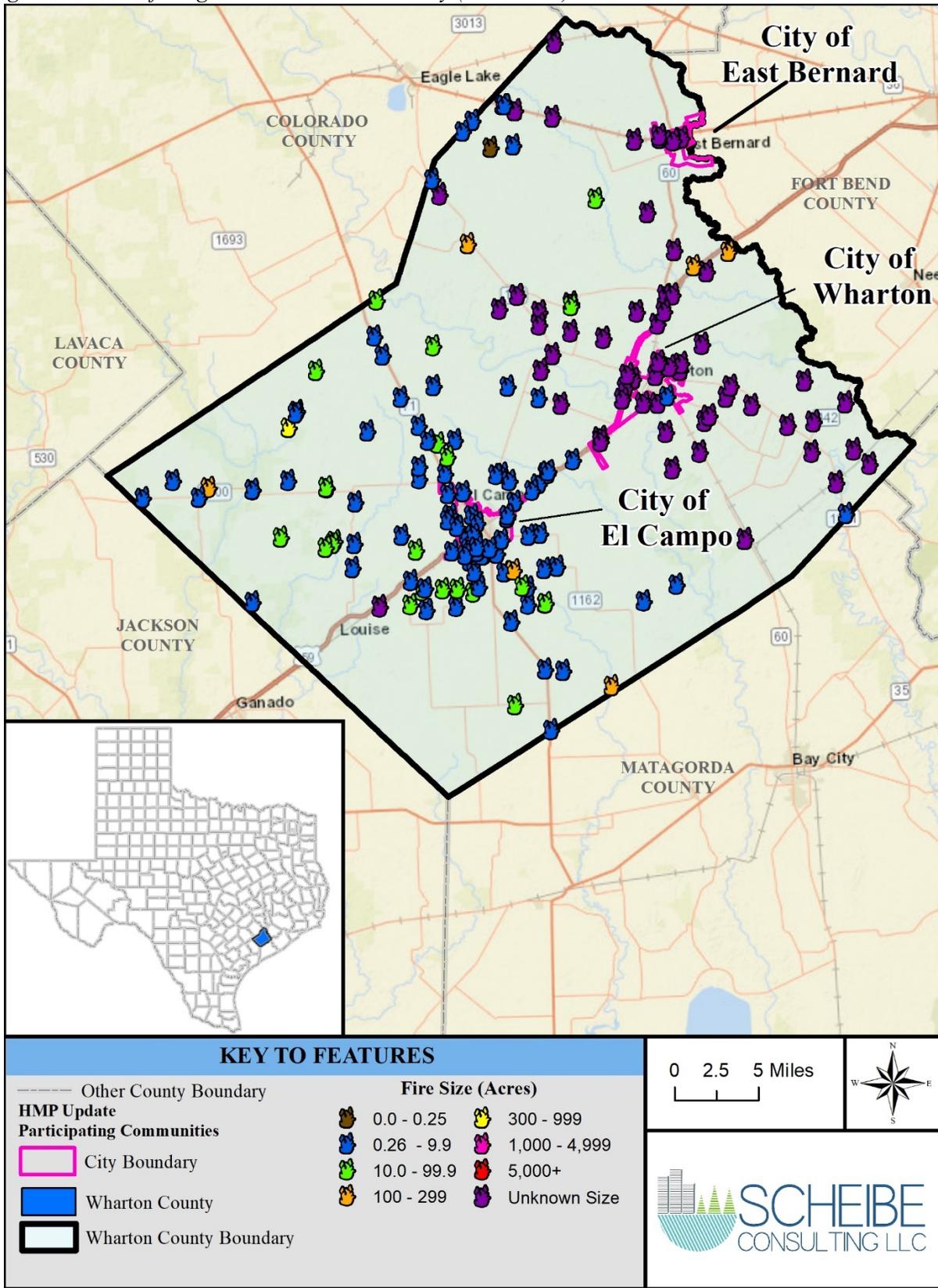
Figure 16-2 shows the locations of wildfire recorded by state and local fire department records from 2005 to 2020 collected by the Texas Wildlife Risk Assessment Portal (TxWRAP) augmented with local data for 2021 wildfires. Fires larger than fifty acres are listed in Table 16-3 for those recorded through TxWRAP. Fire size data was not available for fires documented in 2021 local records. The locations of all wildfires reported by TxWRAP and local departments for 2005 to 2021 in Wharton County and participating communities are shown in Figures 16-3 through 16-5.

**TABLE 16-3.
HISTORIC WILDFIRE EVENTS IN WHARTON COUNTY AND PARTICIPATING
COMMUNITIES
(50+ ACRES) (2005-2015)**

Fire ID	Name	Cause	Start Date	Acres
156472	16800 FM 1300	Debris burning	1/12/2008	100
156492	600 CR 301	Debris burning	1/13/2008	75
156487	3100 CR 414	Miscellaneous	1/13/2008	50
156690	2100 CR 310	Debris burning	4/6/2008	50
156771	1000 FM 441	Debris burning	5/15/2008	50
156942	13346 CR 394 (Fire)	Debris burning	8/10/2008	300
159915	11400 CR 365	Equipment use	10/1/2008	60
163929	2413 CR 408	Debris burning	11/27/2008	100
170207	3644 CR 410	Debris burning	12/6/2008	60
176710	12309 CR 360	Debris burning	1/2/2009	75
176796	300 CR 219	Debris burning	1/18/2009	100
176799	15400 FM 102	Debris burning	1/19/2009	100
176800	13600 CR 360	Debris burning	1/20/2009	50
176809	5900 FM 1161	Debris burning	1/24/2009	75
176818	2886 CR 475	Miscellaneous	1/30/2009	50
193180	3900 CR 377	Debris burning	3/21/2009	50
218780	1455 CR 450	Miscellaneous	8/17/2009	100
247366	587 FM 2546	Debris burning	3/5/2010	50
339788	East Bernard Fire	Miscellaneous	8/18/2011	200

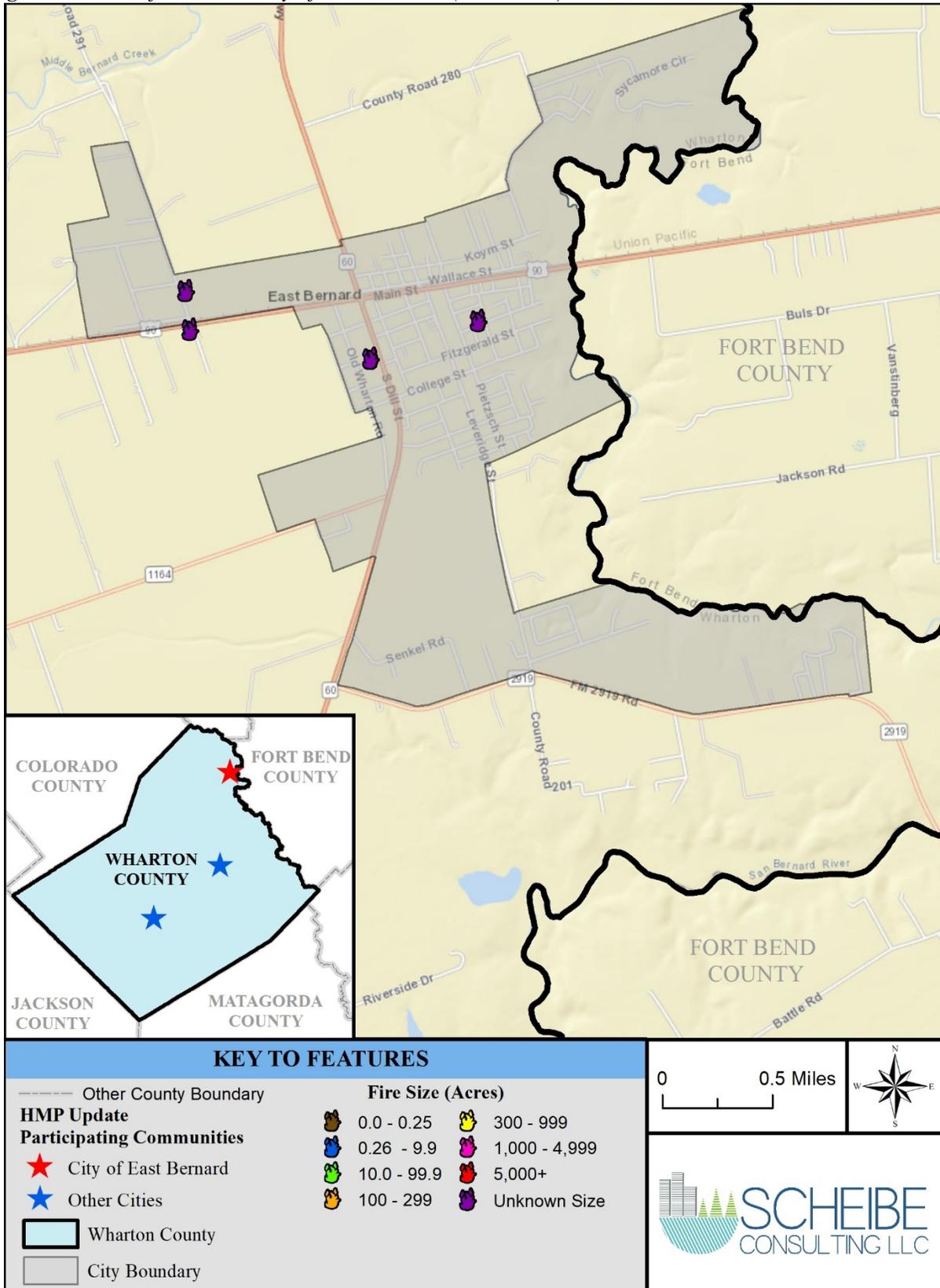
Note: From TFS-TxWRAP

Figure 16-2. Wildfire Ignitions in Wharton County (2005-2021)



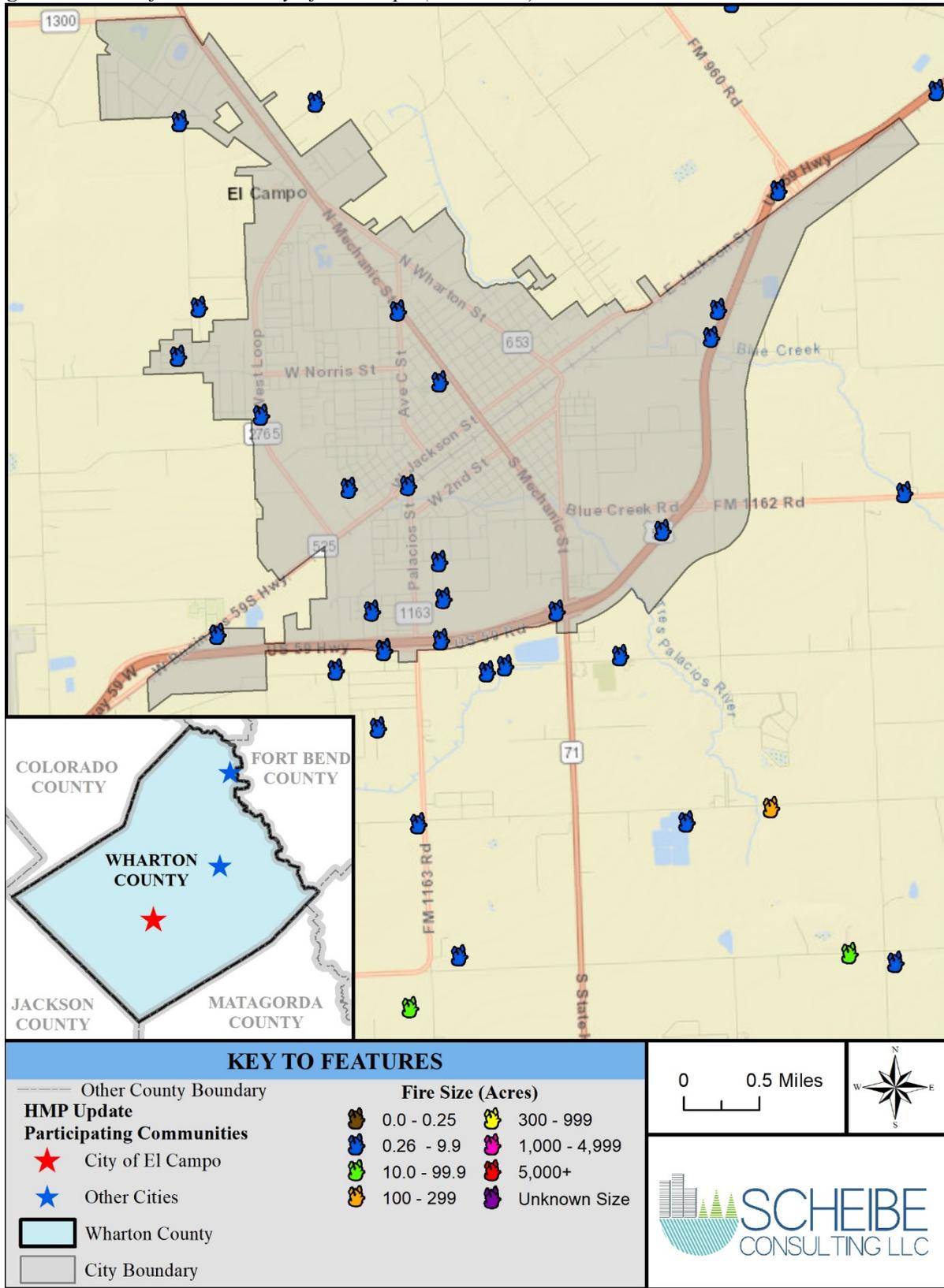
Note: From TFS-TxWRAP

Figure 16-3. Wildfires in the City of East Bernard (2005-2021)



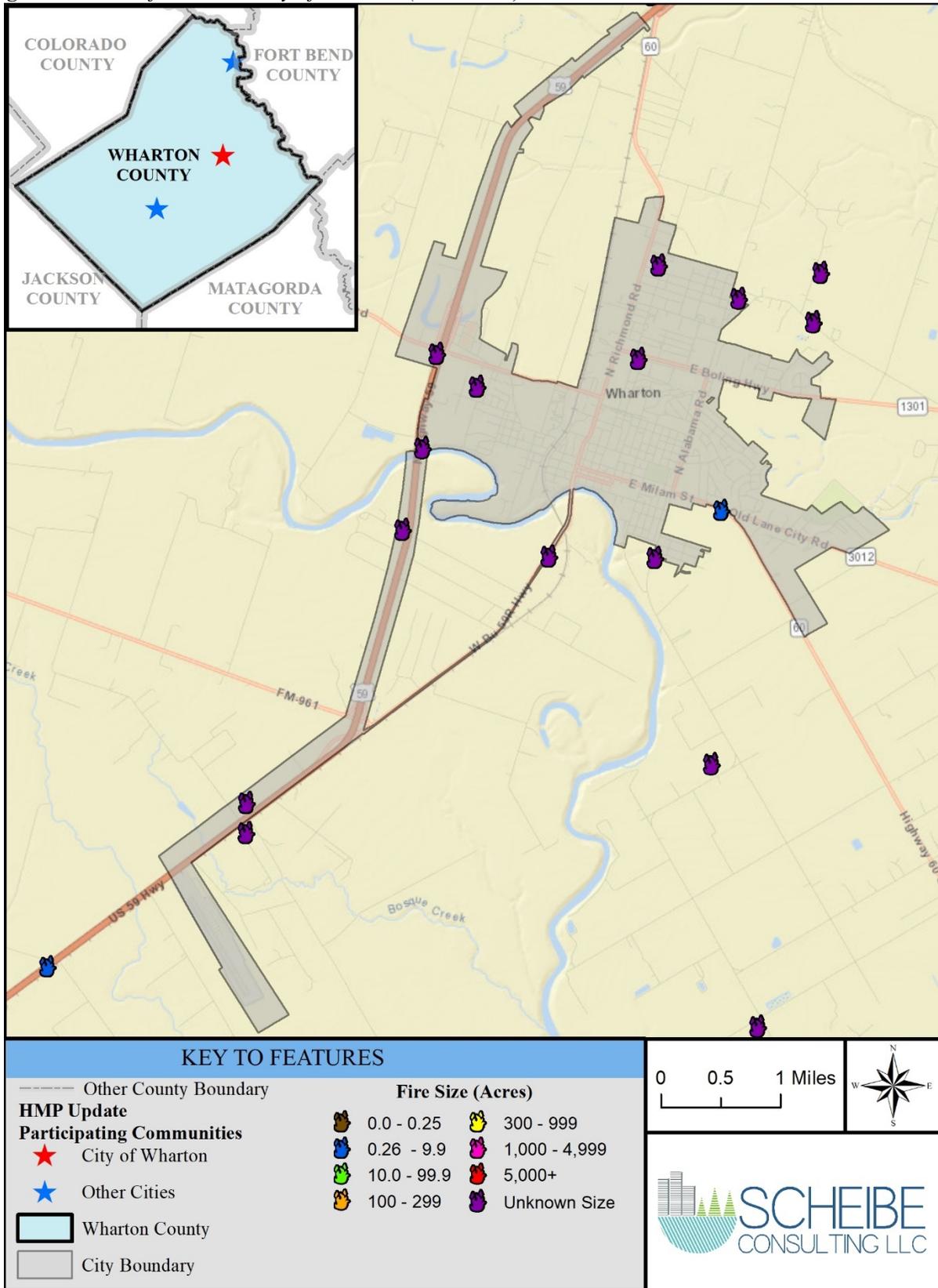
Note: From TFS-TxWRAP

Figure 16-4. Wildfires in the City of El Campo (2005-2021)



Note: From TFS-TxWRAP

Figure 16-5. Wildfires in the City of Wharton (2005-2021)



Note: From TFS-TxWRAP

16.2.2 Location

According to the TFS CWPP, 80% of wildfires in Texas occur within two miles of a community. These wildfires pose a threat to life and property. There are approximately 14,000 communities in Texas that have been identified as “at-risk” for potentially devastating fires.

Wildfire Ignition Density is the likelihood of a wildfire starting based on historical ignition patterns. Figure 16-6 shows the wildfire ignition density in Wharton County.

Texas is one of the fastest-growing states in the nation. Much of this growth is occurring in the WUI area, where structures and other human improvements meet and mix with undeveloped wildland or vegetative fuels. Population growth within the WUI substantially increases the risk of wildfires. For Wharton County, based on TxWRAP data and 2010 Census data from HAZUS-MH, an estimated 19,216 people or 47% of the total county population (41,280) live within the WUI. The WUI layer reflects housing density depicting where humans and their structures meet or intermix with wildland fuels. Figure 16-7 Shows the Wharton County housing density within the WUI.

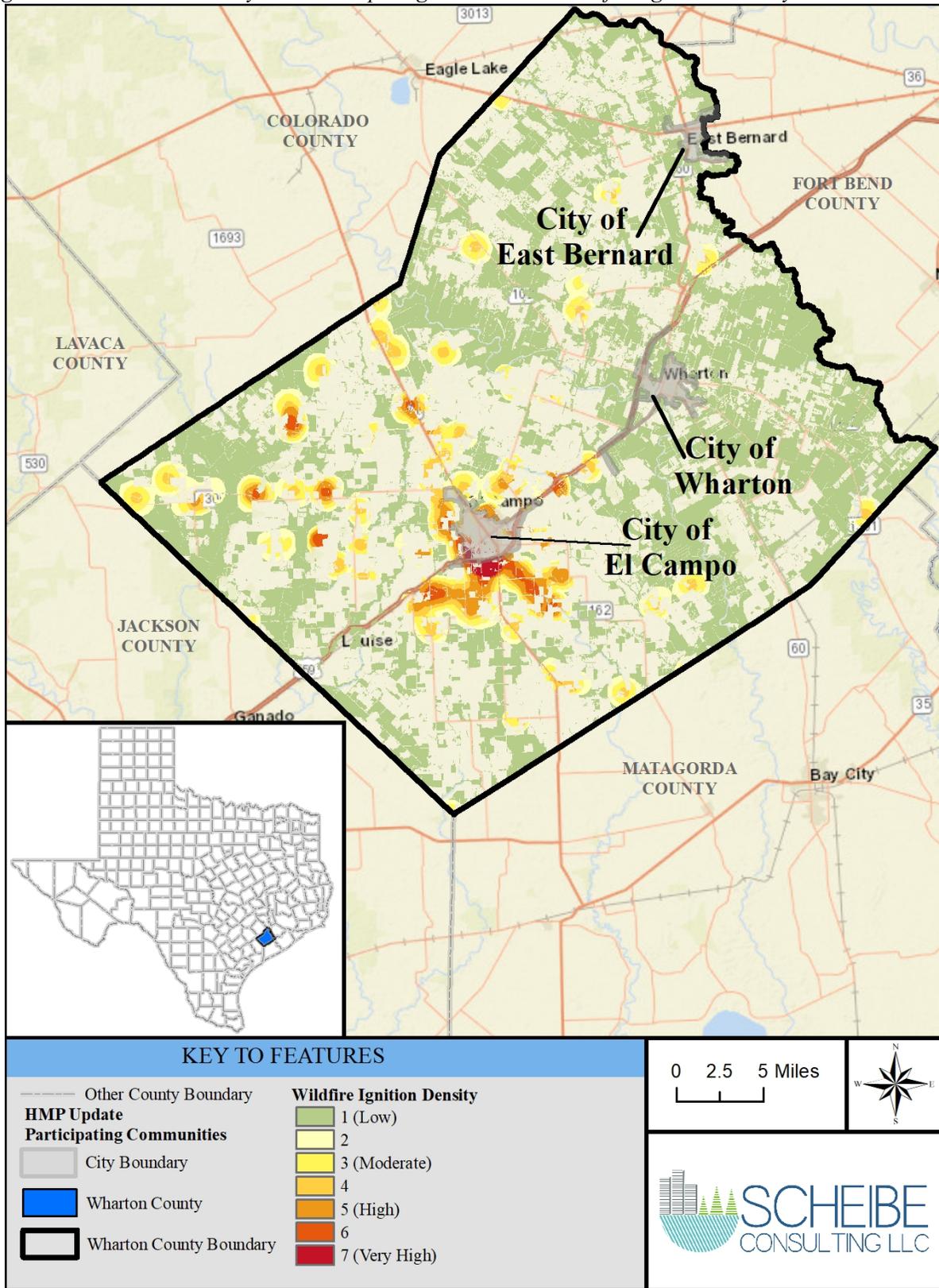
The TxWRAP report for Wharton County and the participating communities map the WUI Response Index, which is a rating of the potential impact of a wildfire on people and their homes. The key input, WUI, reflects housing density (houses per acre) consistent with Federal Register National standards (Figure 16-7). The TxWRAP report states that the location of people living in the WUI and rural areas is essential for defining potential wildfire impacts on people and homes. Figure 16-8 shows the WUI Response Index for Wharton County.

According to the TxWRAP report for Wharton County, the wildfire Values Response Index (VRI) layer reflects a rating of the potential impact of a wildfire on values or assets. The VRI is an overall rating that combines the impact ratings for WUI (housing density) and Pine Plantations (pine age) into a single measure. VRI combines the likelihood of a fire occurring (threat) with those areas of most concern that are adversely impacted by fire to derive a single overall measure of wildfire risk. Figure 16-9 shows the VRI for Wharton County.

The TxWRAP report for Wharton County maps the Community Protection Zones (CPZ), which represent those areas considered the highest priority for mitigation planning activities. CPZs are based on an analysis of the “Where People Live” housing density data and surrounding fire behavior potential. “Rate of Spread” data is used to determine the areas of concern around populated areas that are within a 2-hour fire spread distance. Figure 16-10 shows the demarcation of CPZs in Wharton County and the participating communities.

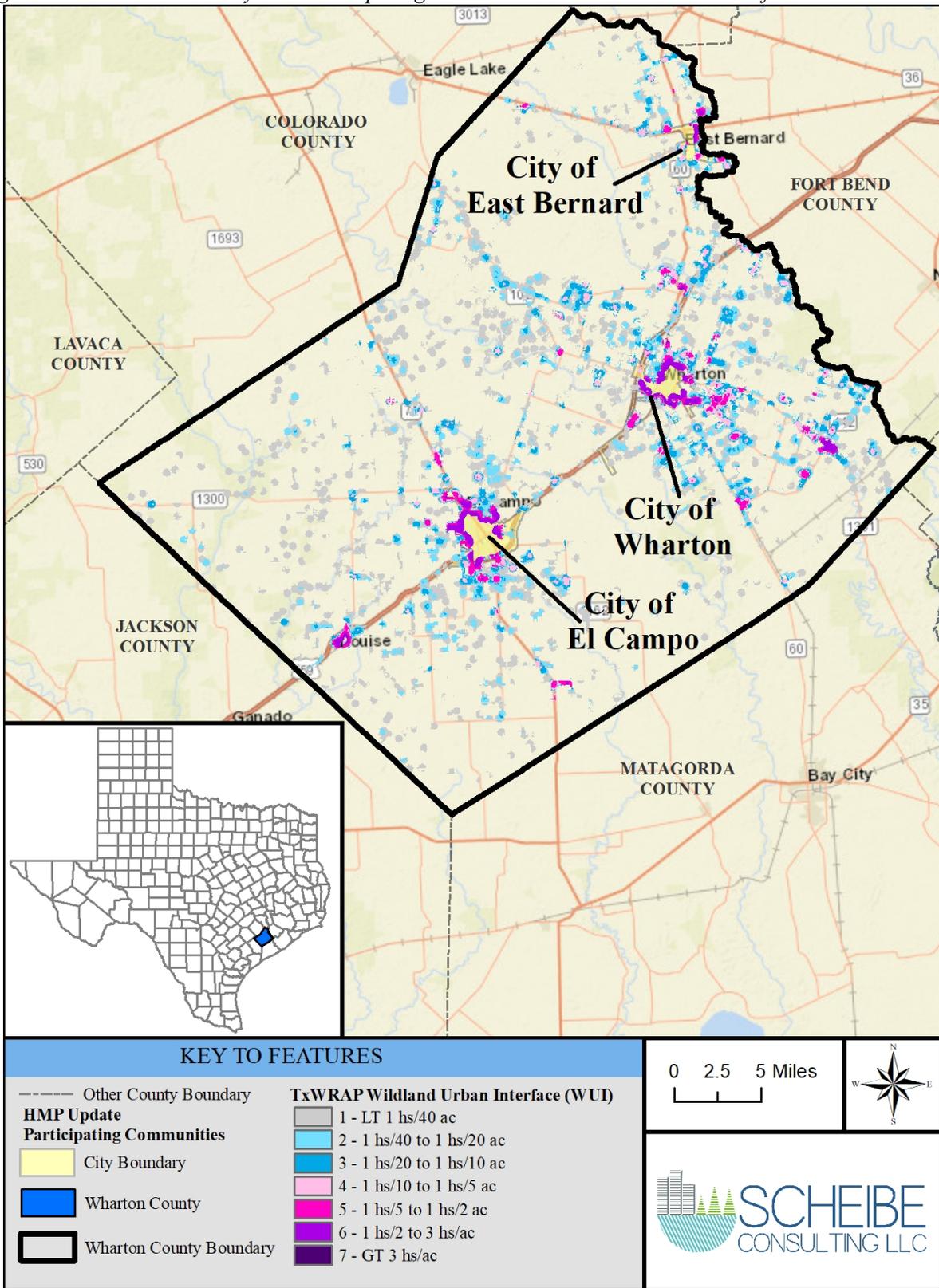
Finally, wildfire threat or Wildfire Hazard Potential (WHP) is the likelihood of a wildfire occurring or burning into an area. The threat is calculated by combining multiple landscape characteristics including surface and canopy fuels, fire behavior, historical fire occurrences, weather observations, terrain conditions, and other factors. Figure 16-11 through Figure 16-14 maps the WHP for Wharton County and the participating communities and each partner community as identified in the Wildfire Hazard Potential for the United States (270-m), Version 2020 (3rd Edition), containing data from 1992 to 2015. On its own, WHP is not an explicit map of wildfire threat or risk, but when paired with spatial data depicting highly valued resources and assets such as structures, it can approximate relative wildfire risk to those specific resources and assets. WHP is also not a forecast or wildfire outlook for any particular season, as it does not include any information on current or forecasted weather or fuel moisture conditions. It is instead intended for long-term strategic fuels management and is appropriate for regional, county, or local protection mitigation or prevention planning.

Figure 16-6. Wharton County and Participating Communities Wildfire Ignition Density



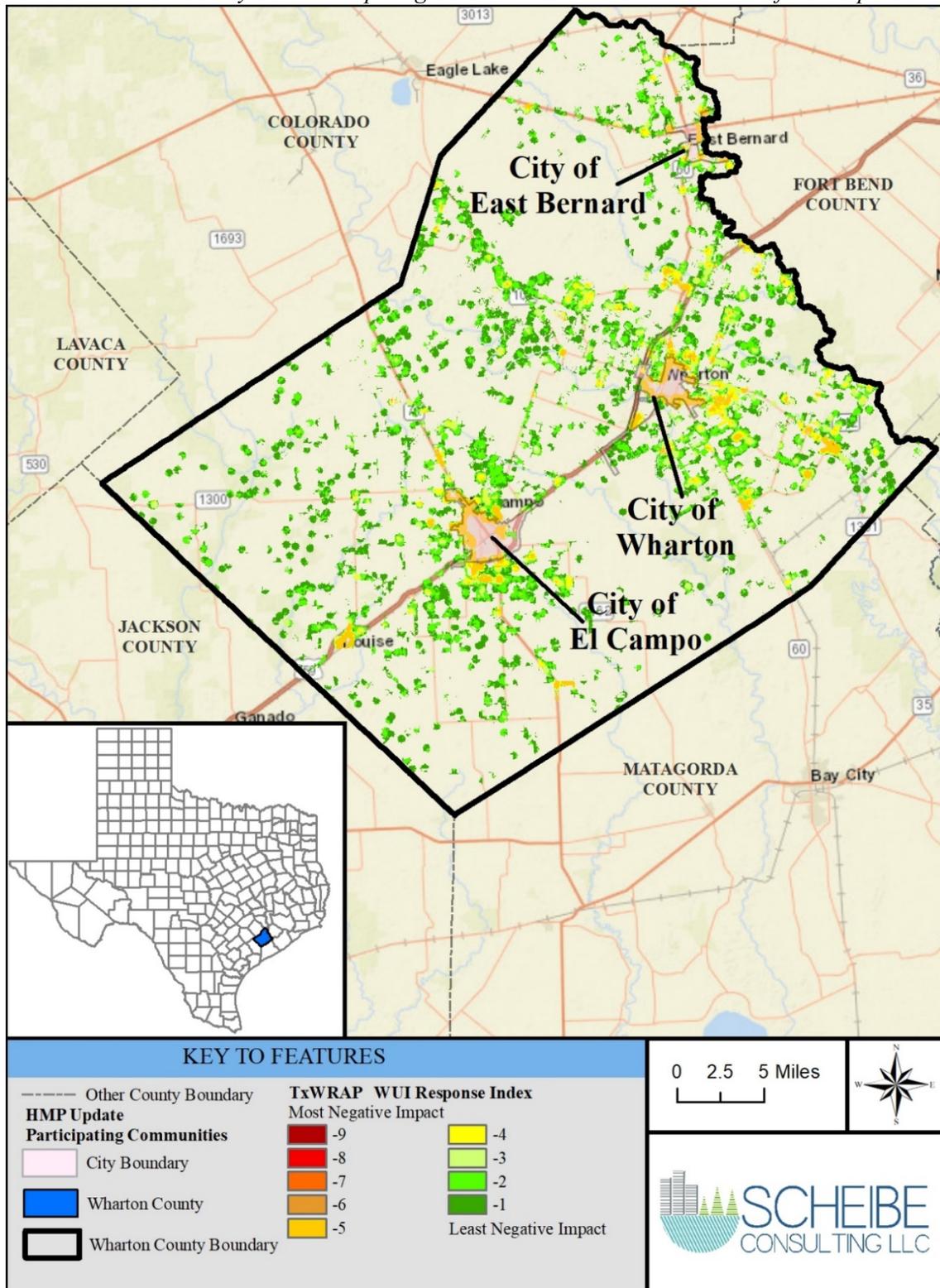
Note: From TFS -TxWRAP

Figure 16-7. Wharton County and Participating Communities Wildland Urban Interface



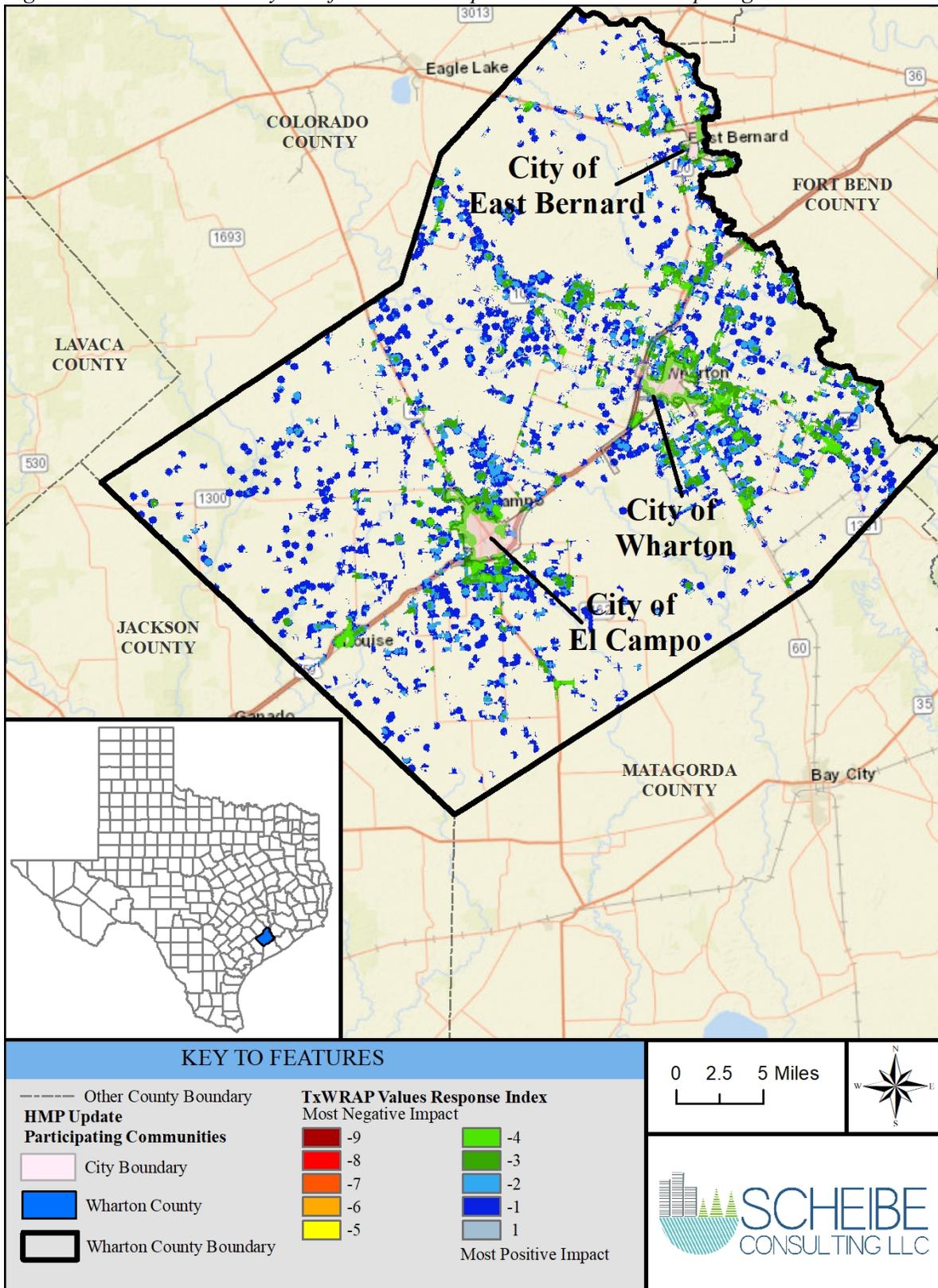
Note: From TFS-TxWRAP

Figure 16-8. Wharton County and Participating Communities Wildland Urban Interface Response Index



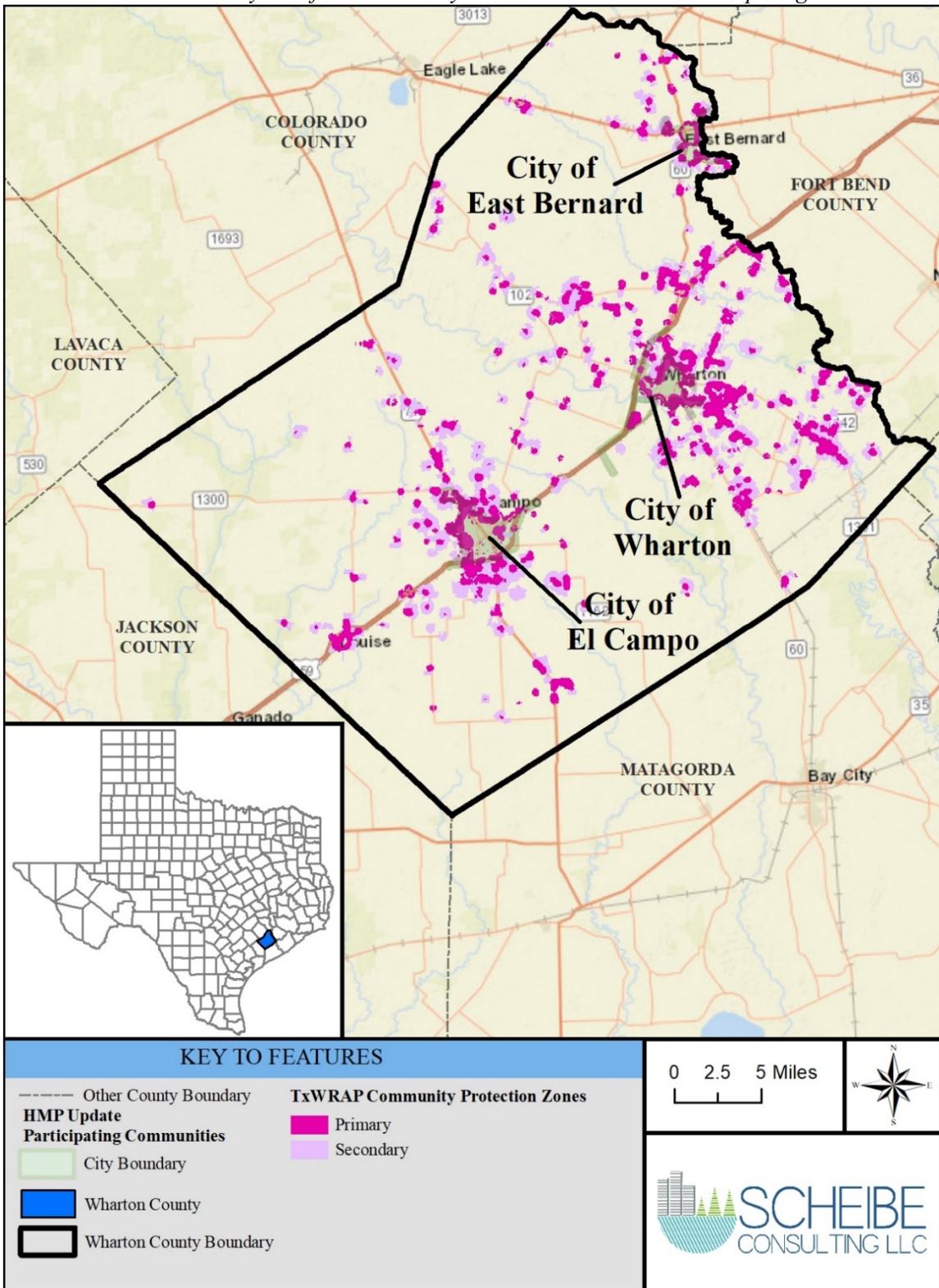
Note: From Source: TFS-TxWRAP

Figure 16-9. Wharton County Wildfire Values Response Index and Participating Communities



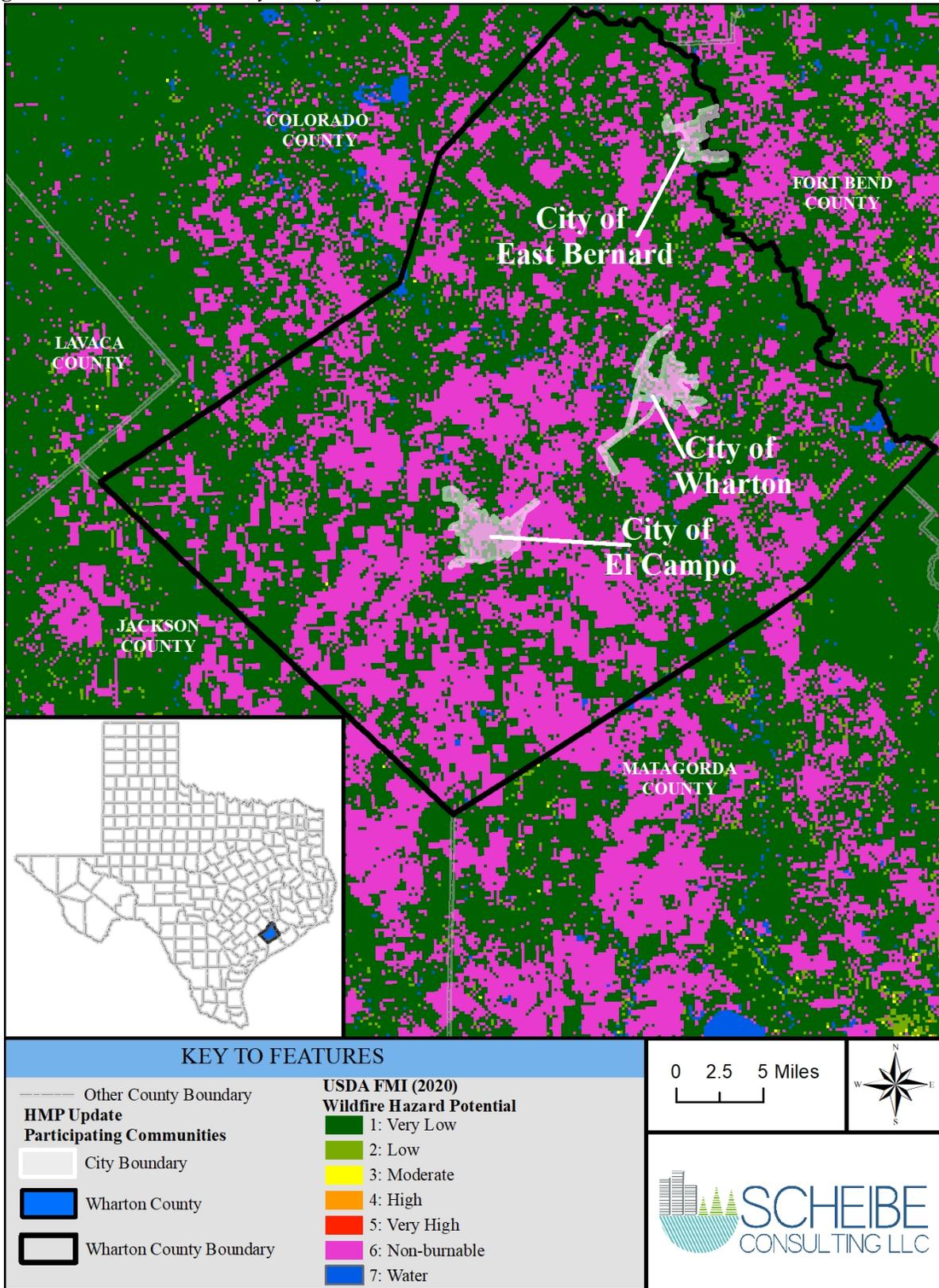
Note: From TFS-TxWRAP

Figure 16-10. Wharton County Wildfire Community Protection Zones and Participating Communities



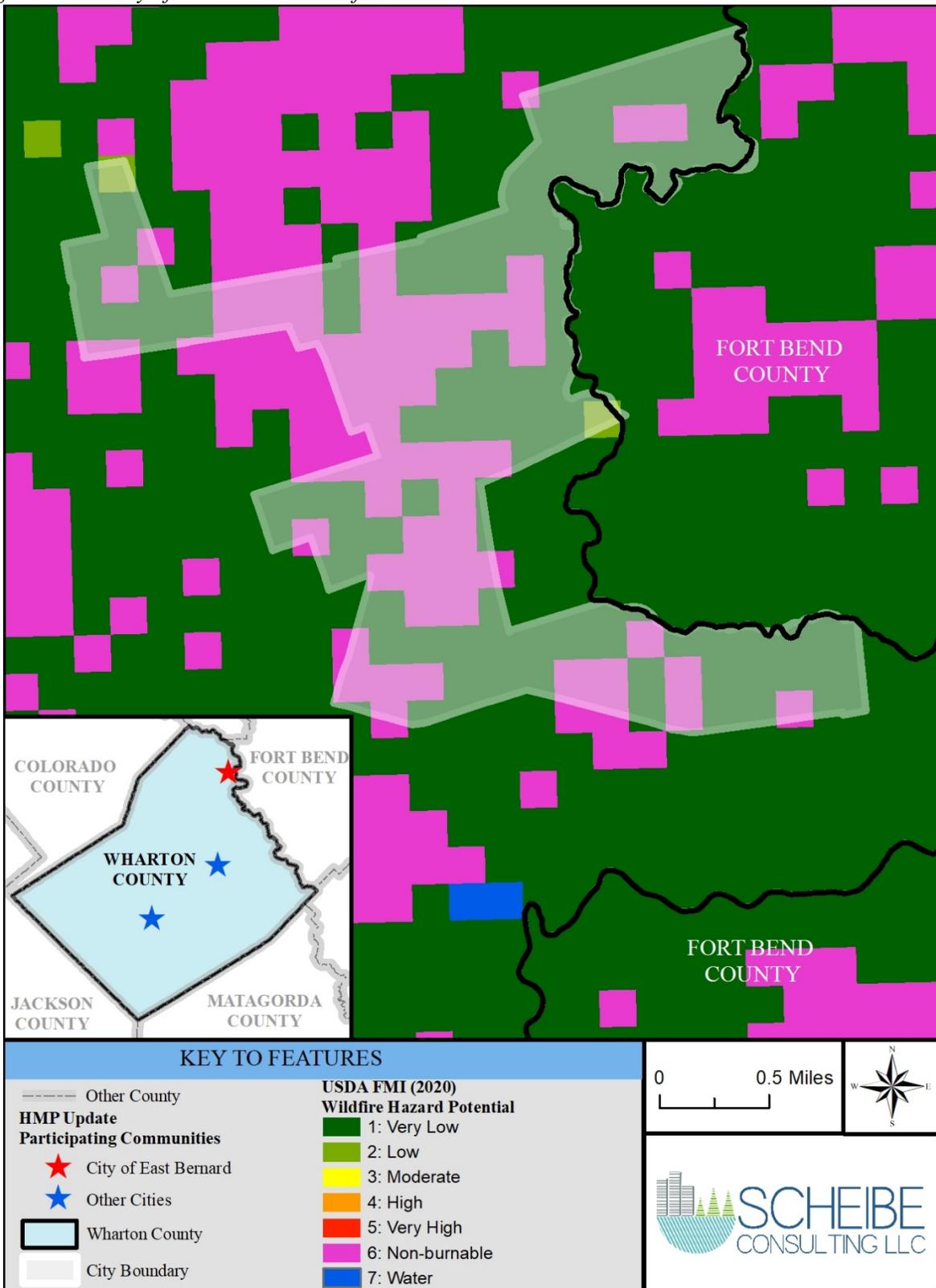
Note: From TFS-TxWRAP

Figure 16-11. Wharton County Wildfire Hazard Potential



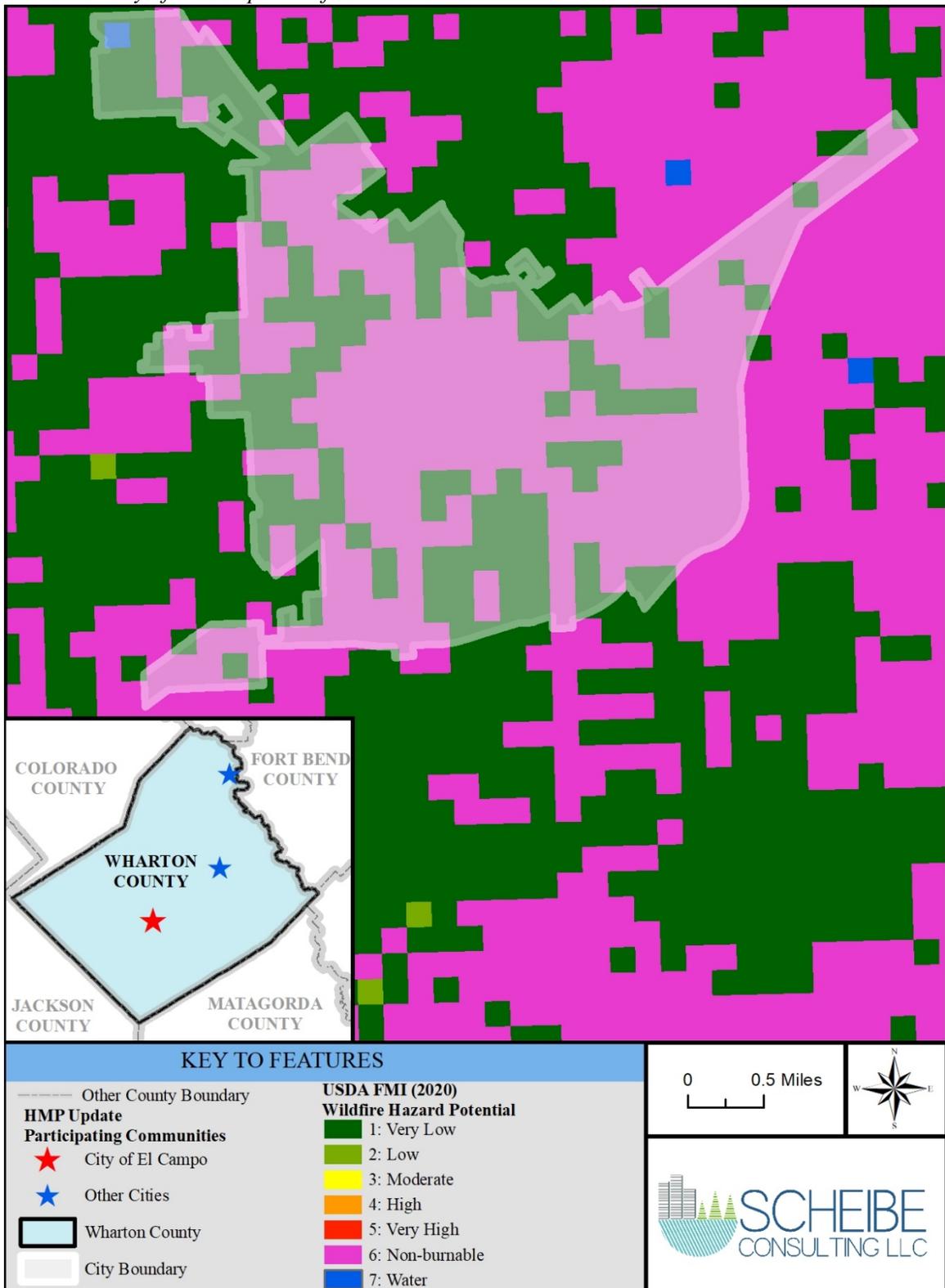
Note: From Dillon et. al. 2020

Figure 16-12. City of East Bernard Wildfire Hazard Potential



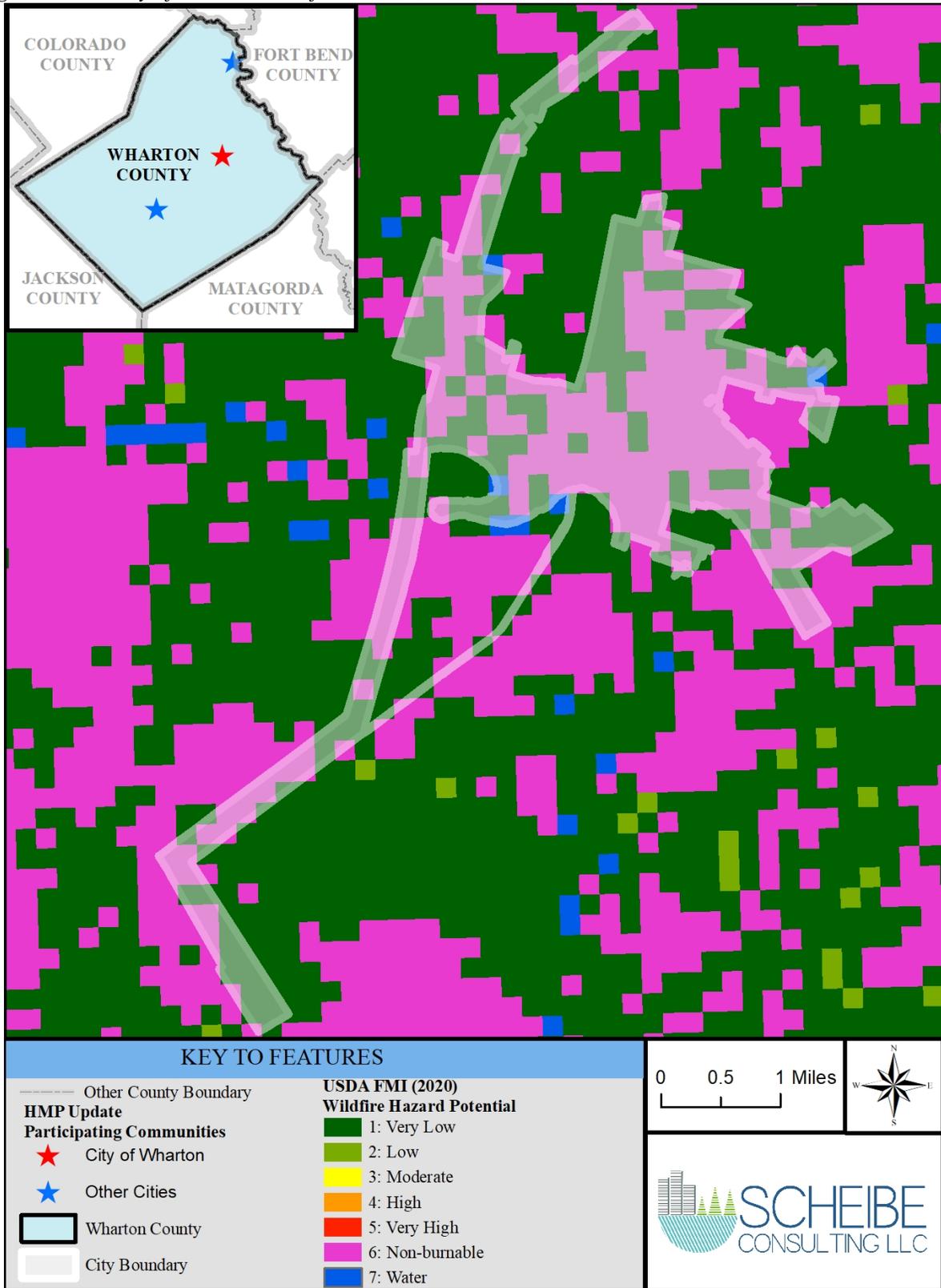
Note: From Dillon et. al. 2020

Figure 16-13. City of El Campo Wildfire Hazard Potential



Note: From Dillon et. al. 2020

Figure 16-14. City of Wharton Wildfire Hazard Potential



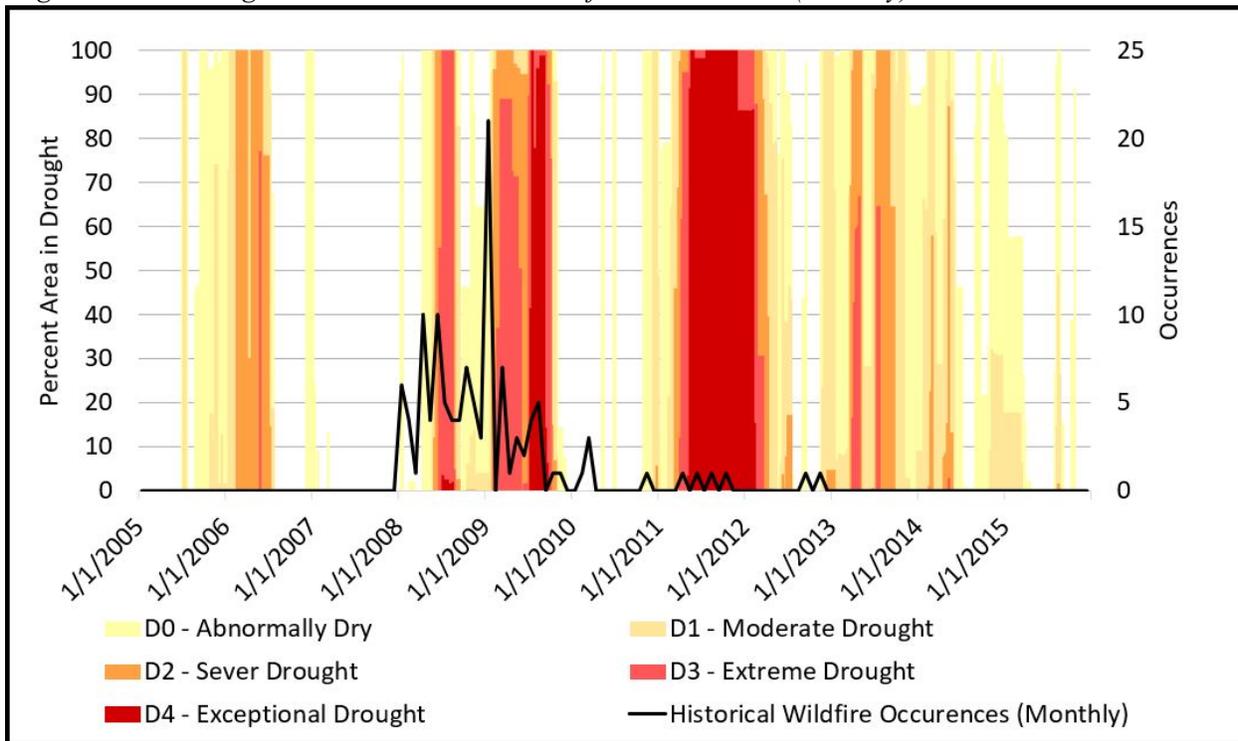
Note: From Dillon et. al. 2020

16.2.3 Frequency

Analysis of historical wildfire data indicates that each year a approximately 11 wildfires will occur each year in Wharton County. Wildfires occur throughout the year and these fires are expected to be less than 50 acres in size based on locally reported historical data. The City of East Bernard has an 19% chance of experiencing a wildfire within any given year. The City of El Campo has a 94% chance of experiencing a wildfire within any given year. The City of Wharton has a 63% chance of experiencing a wildfire within any given year. This estimate is based on voluntarily reported data through the TxWRAP database as well as 2021 data from local communities.

The frequency of wildfire is closely related to drought behavior. As described by the National Integrated Drought Information System (NIDIS), the relationship is complex and has divergent impacts. The onset of a drought allows for the drying of fuels for wildfire after abundant growth, but prolonged drought can result in a lack of fuel due to the reduction of available fuels such as grasses. A correlation between drought and historical wildfire data following this pattern can be observed between the years of 2008 to 2012 in Figure 16-15.

Figure 16-15. Drought Level and Historical Wildfire Occurrences (Monthly) Correlation



Note: From NIDIS and TFS-TxWRAP

16.2.4 Severity

The overall significance of the hazard for the Wharton County Unincorporated Area and the cities of El Camp and Wharton are considered high (event possible in the next year). The City of East Bernard risk is considered moderate (event possible in the next 10 years). Based on the information in this hazard profile, and the widespread impacts, the magnitude/severity of severe wildfires is considered moderate. Moderate

impact indicates there are few deaths or injuries; limited property damage; interruption of essential facilities and services; or economic impact of Wharton County and the participating communities.

16.2.5 Warning Time

Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. Because fireworks often cause brush fires, extra diligence is warranted around the Fourth of July when the use of fireworks is highest. Dry seasons and droughts are factors that greatly increase fire likelihood. Dry lightning may trigger wildfires. Severe weather can be predicted, so special attention can be paid during weather events that may include lightning. Reliable NWS lightning warnings are available on average 24 to 48 hours before a significant electrical storm.

If a fire does break out and spreads rapidly, residents may need to evacuate within days or hours. A fire's peak burning period generally is between 10:00 a.m. and sundown according to the USDA Fire Service. Once a fire has started, fire alerting is reasonably rapid in most cases. The rapid spread of cellular and two-way radio communications in recent years has further contributed to a significant improvement in warning time.

16.3 SECONDARY HAZARDS

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. Wildfires cause the contamination of reservoirs, destroy transmission lines, and contribute to flooding. They strip slopes of vegetation, exposing them to greater amounts of runoff. This in turn can weaken soils and cause failures on slopes. Major landslides can occur several years after a wildfire. Most wildfires burn hot and for long durations that can bake soils, especially those high in clay content, increasing the imperviousness of the ground. This increases the runoff generated by storm events, thus increasing the chance of flooding.

16.4 CLIMATE CHANGE IMPACTS

Fire in western ecosystems is affected by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot, dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Historically, drought patterns in the West and Midwest are related to large-scale climate patterns in the Pacific and Atlantic Oceans. The El Niño–Southern Oscillation in the Pacific varies on a 5- to 7-year cycle, the Pacific Decadal Oscillation varies on a 20- to 30-year cycle, and the Atlantic Multidecadal Oscillation varies on a 65- to 80-year cycle. As these large-scale ocean climate patterns vary in relation to each other, drought conditions in the U.S. shift from region to region.

Climate scenarios project summer temperature increases between 2 and 5 degrees Celsius (°C) (35.6 to 41°F) and precipitation decreases of up to 15% by 2100. Such conditions would exacerbate summer drought and further promote wildfires, releasing stores of carbon and further contributing to the buildup of greenhouse gases. Forest response to increased atmospheric carbon dioxide – the so-called “fertilization effect” – could also contribute to more tree growth and thus more fuel for fires, but the

effects of carbon dioxide on mature forests are still largely unknown. High carbon dioxide levels should enhance tree recovery after fire and young forest regrowth, as long as sufficient nutrients and soil moisture are available, although the latter is in question for many parts of the western United States because of climate change.

16.5 EXPOSURE

Since wildfire cannot be directly modeled in HAZUS-MH, annualized losses were estimated using GIS-based analysis and historical data analysis. Event frequency, severity indicators, and historical knowledge of the region were used for this assessment. The primary data source was the updated HAZUS-MH inventory data (updated with 2010 U.S. Census data and 2018 RS Means Square Foot Costs), augmented with TxWRAP and the USDA WHP data. Information for the exposure analyses provided in the sections below was based on data sources above.

16.5.1 Population

Population estimates within the WHP areas are shown in Table 16-4.

TABLE 16-4. POPULATION WITHIN WILDFIRE RISK AREAS							
Jurisdiction	Non-Burnable*	Very Low	Low	Moderate	High	Very High	Total in Risk Area
City of East Bernard	1,182	1,037	1	0	0	0	1,038
City of El Campo	8,224	3,368	0	0	0	0	3,368
City of Wharton	6,195	2,376	0	0	0	0	2,376
Unincorporated Area	7,460	10,721	125	0	0	0	10,746
Wharton County Total	23,081	12,284	126	0	0	0	12,410

Note:
* Non-Burnable classification includes developed lands, non-burnable agricultural fields, perennial snow or ice, bare ground, and permanent water areas

16.5.2 Property

Property damage from wildfires can be severe and can significantly alter entire communities. Table 16-5 through Table 16-9 display the number of structures in the various wildfire hazard zones within the planning area and their values. For all tables, property data are from the HAZUS-MH data inventory (updated with 2010 U.S. Census data and 2018 RS Means Square Foot Costs).

**TABLE 16-5.
EXPOSURE AND VALUE OF STRUCTURES IN VERY LOW WILDFIRE RISK AREAS**

Jurisdiction	Exposed Buildings	Value Exposed (\$)			% of Total Assessed Value
		Structure	Contents	Total	
City of East Bernard	403	107,481,965	60,451,647	167,933,612	45.08
City of El Campo	1,291	360,861,843	241,169,279	602,031,121	28.11
City of Wharton	896	197,391,726	126,338,215	323,729,941	22.30
Unincorporated Area	4,677	888,421,153	536,458,014	1,424,879,168	57.62
Wharton County Total	7,267	1,554,156,688	964,417,155	2,518,573,843	39.12

**TABLE 16-6.
EXPOSURE AND VALUE OF STRUCTURES IN LOW WILDFIRE RISK AREAS**

Jurisdiction	Exposed Buildings	Value Exposed (\$)			% of Total Assessed Value
		Structure	Contents	Total	
City of East Bernard	1	100,154	50,411	150,565	0.04
City of El Campo	0	0	0	0	Negligible
City of Wharton	0	0	0	0	Negligible
Unincorporated Area	53	9,423,713	5,825,329	15,249,043	0.62
Wharton County Total	54	9,523,868	5,875,740	15,399,608	0.24

**TABLE 16-7.
EXPOSURE AND VALUE OF STRUCTURES IN MODERATE WILDFIRE RISK AREAS**

Jurisdiction	Exposed Buildings	Value Exposed (\$)			% of Total Assessed Value
		Structure	Contents	Total	
City of East Bernard	0	0	0	0	0
City of El Campo	0	0	0	0	0
City of Wharton	0	0	0	0	0
Unincorporated Area	0	0	0	0	0
Wharton County Total	0	0	0	0	0

**TABLE 16-8.
EXPOSURE AND VALUE OF STRUCTURES IN HIGH WILDFIRE RISK AREAS**

Jurisdiction	Exposed Buildings	Value Exposed (\$)			% of Total Assessed Value
		Structure	Contents	Total	
City of East Bernard	0	0	0	0	0
City of El Campo	0	0	0	0	0
City of Wharton	0	0	0	0	0
Unincorporated Area	0	0	0	0	0
Wharton County Total	0	0	0	0	0

**TABLE 16-9.
EXPOSURE AND VALUE OF STRUCTURES IN VERY HIGH WILDFIRE RISK
AREAS**

Jurisdiction	Exposed Buildings	Value Exposed (\$)			% of Total Assessed Value
		Structure	Contents	Total	
City of East Bernard	0	0	0	0	0
City of El Campo	0	0	0	0	0
City of Wharton	0	0	0	0	0
Unincorporated Area	0	0	0	0	0
Wharton County Total	0	0	0	0	0

Present Land Use

Present land use for each wildfire risk area is described in Table 16-10.

**TABLE 16-10.
LAND COVERAGE FOR WHARTON COUNTY PER WILDFIRE RISK CLASS**

Present Land Cover Class	Wildfire Risk Class and Area (acres)				
	Very Low	Low	Moderate	High	Very High
Barren Land (Rock/Sand/Clay)	406	0	0	0	0
Deciduous Forest	19,997	145	11	0	0
Developed Land	17,313	147	2	0	0
Evergreen Forest	15,812	121	0	0	0
Grassland	305,043	2,916	34	0	0
Marshland	24,141	195	0	0	0
Mixed Forest	11,704	96	2	0	0
Open Water	2,770	29	0	0	0

Note: From U.S. Geological Survey: National Land Cover Database

16.5.3 Critical Facilities and Infrastructure

Table 16-11 identifies critical facilities exposed to the wildfire hazard in the county.

**TABLE 16-11.
CRITICAL FACILITIES AND INFRASTRUCTURE PER WILDFIRE RISK CLASS**

	Critical Facilities and Infrastructure per Wildfire Risk Class				
	Very Low	Low	Moderate	High	Very High
Medical and Health	0	0	0	0	0
Government Functions	1	0	0	0	0
Protective Functions	9	0	0	0	0
Schools	6	0	0	0	0
Hazardous Materials	5	0	0	0	0
Bridges	203	2	0	0	0
Water Storage	2	0	0	0	0
Wastewater	12	0	0	0	0
Power	1	0	0	0	0
Communications	2	0	0	0	0
Transportation	2	0	0	0	0
Dams	9	0	0	0	0

Note: *Protective includes, Police, Fire Safety, and Emergency Operations Centers

16.5.4 Environment

Fire is a natural and critical ecosystem process in most terrestrial ecosystems, dictating in part the types, structure, and spatial extent of native vegetation. However, wildfires can cause severe environmental impacts:

- **Soil Erosion** – The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.
- **Spread of Invasive Plant Species** – Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes, and become difficult and costly to control.
- **Disease and Insect Infestations** – Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.
- **Destroyed Endangered Species Habitat** – Catastrophic fires can have devastating consequences for endangered species.

- **Soil Sterilization** – Topsoil exposed to extreme heat can become water repellent, and soil nutrients may be lost. It can take decades or even centuries for ecosystems to recover from a fire. Some fires burn so hot that they can sterilize the soil.

Many ecosystems are adapted to historical patterns of fire occurrence. These patterns, called “fire regimes,” include temporal attributes (e.g., frequency and seasonality), spatial attributes (e.g., size and spatial complexity), and magnitude attributes (e.g., intensity and severity), each of which have ranges of natural variability. Ecosystem stability is threatened when any of the attributes for a given fire regime diverge from its range of natural variability.

16.6 VULNERABILITY

Structures, aboveground infrastructure, critical facilities, agricultural areas (crops and structures), and natural environments are all vulnerable to the wildfire hazard. There is currently no validated damage function available to support wildfire mitigation planning. Except as discussed in this section, vulnerable populations, property, infrastructure, and environment are assumed to be the same as described in the section on exposure.

16.6.1 Population

Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly, and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxins (formaldehyde, benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

Wildfires may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. The increasing demand for outdoor recreation places more people outside and in higher wildfire risk areas during holidays, weekends, and vacation periods.

16.6.2 Property

Loss estimations for wildfire hazards are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing projected damages (annualized loss) on historical events, statistical analysis, and probability factors. These were applied to the exposed values of the county and communities to create an annualized loss. Table 16-12 lists the loss estimates for the general building stock and contents for jurisdictions that have exposure to a wildfire risk category.

**TABLE 16-12.
ANNUALIZED LOSS ESTIMATES FOR WILDFIRE EVENTS**

Jurisdiction	Exposed Value	Annualized Loss	Annualized Loss Percentage
City of East Bernard	\$107,582,119	Negligible	<0.1
City of El Campo	\$360,861,843	\$435,994	0.1
City of Wharton	\$197,391,726	Negligible	<0.1
Unincorporated Area	\$897,844,866	\$602,341	0.1
Wharton County Total	\$1,563,680,554	\$1,038,335	0.1

Community Perception of Vulnerability

See the front page of the current chapter for a summary of hazard rankings for Wharton County and participating communities in this HMP update. Chapter 21 gives a detailed description of these rankings and Chapter 22 addresses mitigations actions for this hazard vulnerability.

16.6.3 Critical Facilities and Infrastructure

Critical facilities of wood frame construction are especially vulnerable during wildfire events. In the event of a wildfire, there would likely be little damage to most infrastructure. Most roads and railroads would be without damage except in the worst scenarios. Power lines are the most at risk from wildfire because most poles are made of wood and susceptible to burning. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. Wildfire typically does not have a major direct impact on bridges, but it can create conditions in which bridges are obstructed. Many bridges in areas of high to moderate fire risk are important because they provide the only ingress and egress to large areas and in some cases to isolated neighborhoods.

16.6.4 Environment

Environmental vulnerability will typically be the same as exposure (as discussed in Section 16.5).

16.7 FUTURE TRENDS IN DEVELOPMENT

The threat of wildfire is a constant in Texas. From the East Texas Piney Woods to the Davis Mountains of West Texas, wildfires burn thousands, if not millions, of acres each year. Wildfires become especially dangerous when wildland vegetation begins to intermix with homes.

With more and more people living in the WUI, it is increasingly important for local officials to plan and prepare for wildfires. CWPPs are a proven strategy for reducing the risk of catastrophic wildfires and protecting lives and property.

TFS encourages Texas counties and communities to develop and adopt CWPPs to better prepare their region and citizens for wildfires. Planning for wildfires should take place long before a community is threatened. Once a wildfire ignites, the only option available to firefighters is to attempt to suppress the

fire before it reaches a community. A CWPP is unique in that it empowers communities to share the responsibility of determining the best strategies for protection against wildfire.

The Texas CWPP calls for communities to:

- Know their environment (WUI), assets at risk, fire occurrence and behavior, and overall wildfire risks
- Adopt mitigation strategies for wildfire prevention - fuels reduction to capacity building
- Create and adopt recovery plan strategies

16.8 SCENARIO

A major conflagration in the planning area might begin with a wet spring, adding to fuels already present on the forest floor. Flash fuels would build throughout the spring. The summer could see the onset of insect infestation. A dry summer could follow the wet spring, exacerbated by dry hot winds. Carelessness with combustible materials or a tossed lit cigarette, or a sudden lightning storm could trigger a multitude of small isolated fires.

The embers from these smaller fires could be carried miles by hot, dry winds. The deposition zone for these embers would be deep in the forests and interface zones. Fires that start in flat areas move slower, but the wind still pushes them. It is not unusual for a wildfire pushed by wind to burn the ground fuel and later climb into the crown and reverse its track. This is one of many ways that fires can escape containment, typically during periods when response capabilities are overwhelmed. These new small fires would most likely merge. Suppression resources would be redirected from protecting the natural resources to saving more remote subdivisions.

The worst-case scenario would include an active fire season throughout Texas, spreading resources thin. Firefighting teams would be exhausted or unavailable. Many federal assets would be responding to other fires that started earlier in the season. While local fire districts would be extremely useful in the urban interface areas, they have limited wildfire capabilities or experience, and they would have a difficult time responding to the ignition zones. Even though the existence and spread of the fire is known, it may not be possible to respond to it adequately, so an initially manageable fire can become out of control before resources are dispatched.

To further complicate the problem, heavy rains could follow, causing flooding and landslides, and releasing tons of sediment into the Colorado River, San Bernard River, Tres Palacios River, and other creeks. This in turn could permanently change floodplains and damage sensitive habitat and riparian areas. Such a fire followed by rain could release millions of cubic yards of sediment into streams for years, creating new floodplains and changing existing ones. With the forests removed from the watershed, stream flows could easily double. Floods that could be expected every 50 years may occur every couple of years. With the streambeds unable to carry the increased discharge because of increased sediment, the floodplains and floodplain elevations would increase.

16.9 ISSUES

The major issues for wildfire are the following:

- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space, and advance identification of evacuation routes and safe zones.

- Wildfires could cause landslides as a secondary natural hazard.
- Climate change could affect the wildfire hazard.
- Future growth into interface areas should continue to be managed.
- Area fire districts need to continue to train on WUI events.
- Vegetation management activities should be enhanced.
- Regional consistency of higher building code standards should be adopted such as residential sprinkler requirements and prohibitive combustible roof standards.
- Fire department water supply in high-risk wildfire areas.
- Expand certifications and qualifications for fire department personnel. Ensure that all firefighters are trained in basic wildfire behavior, basic fire weather and that all company officers and chief level officers are trained in the wildland command and strike team leader level.
- Both the natural and man-made conditions that contribute to the wildland fire hazard are tending to exacerbate through time.
- Conservative forestry management practices have resulted in congested forests prone to fire and disease.
- The continued migration of inhabitants to remote areas of the county increases the probability of human-caused ignitions from vehicles, grills, campfires, and electrical devices.

Chapter 17. WINTER WEATHER

WINTER WEATHER RANKING	
Wharton County	Low
City of East Bernard	Medium
City of El Campo	Medium
City of Wharton	Medium

<u>DEFINITIONS</u>	
Freezing Rain	The result of rain occurring when the temperature is below the freezing point. The rain freezes on impact, resulting in a layer of glaze ice up to an inch thick. In a severe ice storm, an evergreen tree 60 feet high and 30 feet wide can be burdened with up to 6 tons of ice, creating a threat to power and telephone lines and transportation routes
Severe Local Storm	Small-scale atmospheric systems, including tornadoes, thunderstorms, windstorms, ice storms, and snowstorms. These storms may cause a great deal of destruction and even death, but their impact is generally confined to a small area. Typical impacts are on transportation infrastructure and utilities.
Winter/Ice Storm	A storm having significant snowfall, ice, or freezing rain; the quantity of precipitation varies by elevation.

17.1 GENERAL BACKGROUND

Winter/Ice storms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until the damage can be repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibility to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result in injuries and deaths.

Winter storms in Wharton County, including strong winds and ice conditions, can result in property damage, localized power and phone outages, and closures of streets, highways, schools, businesses, and nonessential government operations. People can also become isolated from essential services in their homes and vehicles. A winter storm can escalate, creating life-threatening situations when emergency

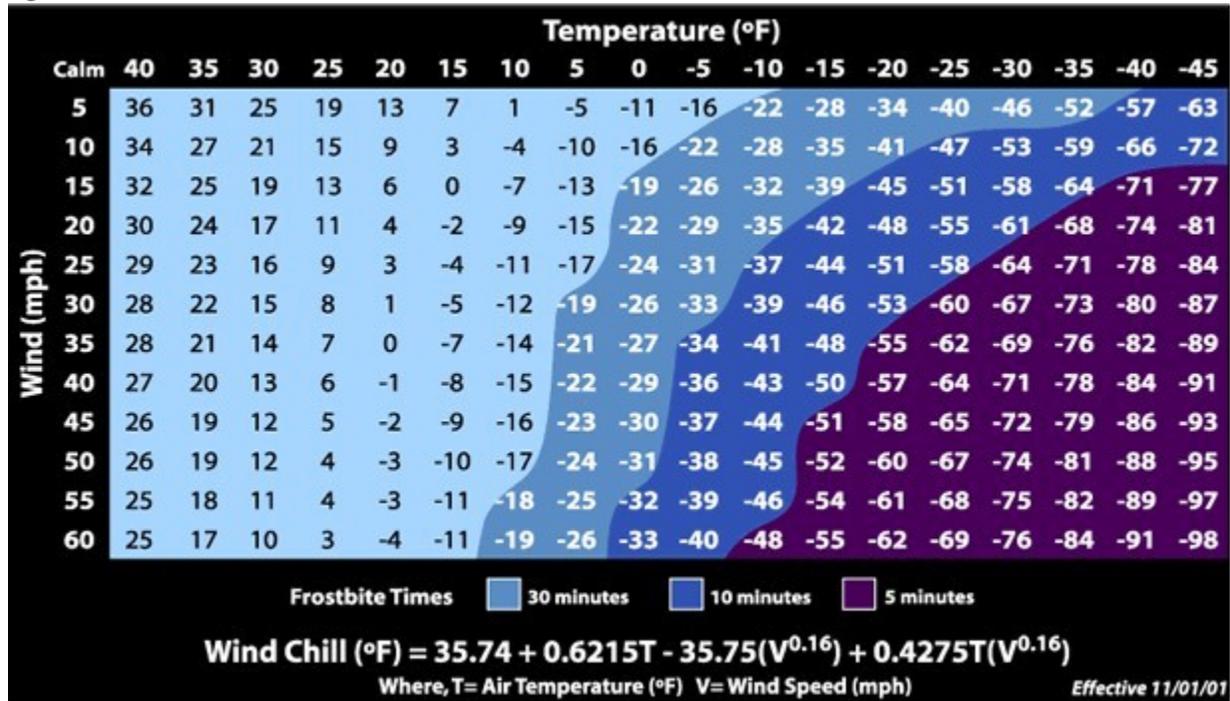
response is limited by severe winter conditions. Other issues associated with severe winter weather include hypothermia and the threat of physical overexertion that may lead to heart attacks or strokes. Snow and ice prevention as well as removal costs can impact budgets significantly.

17.1.1 Extreme Cold

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities.

In 2001, the NWS implemented an updated wind chill temperature index (see Figure 17-1). This index describes the relative discomfort or danger resulting from the combination of wind and temperature. The wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Figure 17-1. National Weather Service Wind Chill Chart



Note: From Source: NOAA, NWS

A wind chill watch is issued by the NWS when wind chill warning criteria are possible in the next 12 to 36 hours. A wind chill warning is issued for wind chills of at least -25°F on plains and -35°F in mountains and foothills.

Table 17-1 contains a summary of temperature data related to extreme cold for Wharton County from NOAA weather stations. NOAA weather data consists of information collected from May 1904 to September 2011 by Pierce 1 E (USC00417020) weather station augmented with data from October 2011

to March 2021 from El Campo (USC00412786) weather station. These temperatures apply to all of Wharton County and participating communities.

**TABLE 17-1.
MINIMUM TEMPERATURE DATA SUMMARIES**

Statistic	Years	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Record Low Minimum	1904-2021	4	8	18	28	30	50	51	40	42	27	10	7
Record Low Maximum	1904-2021	23	22	28	45	59	69	73	73	64	44	32	26
Average Minimum	1904-2021	42.0	44.5	50.5	57.9	65.1	70.7	72.4	72.1	68.1	58.9	49.8	43.5
Average Days with a minimum 32 or Below	1904-2021	6.7	3.8	1.6	0.1	0	0	0	0	0	0	1.7	5.0
Notes: Temperatures are in degrees Fahrenheit From NOAA Weather Station (May 1904 – March 2021)													

Few areas of Texas escape freezing weather in any winter. Wharton County and the participating communities receive little to no snow accumulations. More often than not, snow falling in the southern half of the state melts and does not stick to the surface; snow stays on the ground only once or twice every decade. Snowfall occurs at least once every winter in the northern half of Texas. During a winter event in the planning area, ice accumulations, as well as extreme cold, pose the most likely threat.

17.2 HAZARD PROFILE

17.2.1 Past Events

The National Climatic Data Center lists seven winter weather events that impacted Wharton County between 1996 and 2020. These events and estimated damage costs are outlined in Table 17-2. Wharton County does not experience severe winter weather events consistently, but winter storms can affect the HMP update area. Preliminary data on the historic winter storms that occurred in 2021 is included in this chapter. Since the winter events for Wharton County and participating communities occur on a zonal and regional scale, the winter events can be applied to all participating communities.

**TABLE 17-2.
HISTORIC WINTER WEATHER EVENTS IN WHARTON COUNTY
(1996-2021)**

Location	Date	Event Type	Estimated Damage Cost			
			Property	Crops	Injuries	Deaths
Wharton (Zone)	01/12/1997	Ice Storm	\$0	\$0	0	1
Wharton (Zone)	12/24/2004	Heavy Snow	\$0	\$0	0	0
Wharton (Zone)	01/16/2007	Ice Storm	\$4,000	\$0	0	0
Wharton (Zone)	12/04/2009	Winter Storm	\$0	\$0	0	0
Wharton (Zone)	02/03/2011	Ice Storm	\$0	\$0	0	0
Wharton (Zone)	01/23/2014	Winter Storm	\$0	\$0	0	0
Wharton (Zone)	12/07/17	Heavy Snow	\$0	\$0	0	0
Wharton (Zone)	01/23/2014	Winter Storm	\$0	\$0	0	0
Wharton (Zone)	02/12/2021	Ice Storm	\$0*	\$0*	0*	0*
Wharton (Zone)	02/14/2021	Winter Storm	\$0*	\$0*	0*	1*

Notes:
*Preliminary Data as of April 13, 2021
From NOAA Storm Events

Winter Storm Outbreak 2021

In February 2021 three storm systems progressed through the United States. On Sunday, February 14, 2021, a strong arctic cold front progressing through the country reached Southeast Texas. This arctic cold front brought snow, sleet, and freezing rain into counties that had been previously unaffected by extreme winter weather. This cold front was the turning point in what would unfold into a historic winter event. For the next week, the state of Texas remained under a winter storm warning with the last hard freeze warning lifted on Saturday, February 20, 2021. The subfreezing temperatures affected the state’s electricity infrastructure and left millions without power in dangerous conditions.

The historic winter temperatures created hazardous road conditions, cause at least 111 fatalities (as of April 13, 2021), overwhelmed the Texas power grid, and stressed state water supplies with many cities experiencing water outages, low pressure, and boil water notices.

Wharton and Participating Communities

Wharton county experienced below-freezing temperatures from February 14 to February 20. The lowest recorded temperature for Wharton and its participating communities was 10° F during the storm. There were hazardous road conditions and road closures throughout the remainder of the week.

Although Wharton County and its surrounding areas experienced less than 4” of snowfall on February 16, 2021, nearly 92% of all Wharton residents experienced power outages due to the extreme weather conditions in the rest of the State. As of April 13, 2021, there was one confirmed fatality in the County directly resulted from the subfreezing temperatures. A boil water notice was issued in the City of El Campo and the Boling Municipal Utility District. The City of Wharton did not issue a boil water notice

and only experienced low water pressure. Long-term analysis of this event and how it will affect hazard mitigation in the State of Texas will remain to be seen as data continues to be gathered.

17.2.2 Location

Wharton County and the participating communities are susceptible to severe winter storms; although severe winter weather or blizzard conditions are primarily in the form of freezing rain, sleet, or ice. Ice accumulation becomes a hazard by creating dangerous travel conditions. U.S. Highway 59 and State Highways 60 and 71 are important corridors to move people, supplies, and equipment into the region and to reach medical facilities outside of the counties. An accident on these roads can cause a major disruption in the flow of goods and services to the area. Wharton County is also susceptible to experiencing hazardous conditions due to extreme weather events in the State as a whole.

The record lows for Texas occur during October through March. According to data recorded by NWS between 1897 and 2014, the planning area experiences an average of 10 freezing days per year. The average first freeze in the HMP update area usually occurs in late November to early December and the last freeze occurs in late February to early March. In January 1940, Wharton County and participating communities experienced the coldest month on record with a mean temperature of about 42.6°F. The coldest recorded winter for the area was in 1979, with a mean temperature of about 46.2°F. Figure 6-4 shows the annual average minimum temperature distribution in Texas.

17.2.3 Frequency

Table 17-2 lists nine winter storms from 1996 to 2021. Therefore, on average a winter storm occurs in the county and participating communities once every 3 to 4 years. In this region, the first autumn freeze ordinarily occurs in early December, and the last frost date occurs in mid-March. On average cities in South Texas experience 10 to 20 freeze days per year. Winter events are usually zonal events and affect a large area, each participating community has the same frequency and probability of future events (once every 3 to 4 years). The strength and severity of future events will be likely in line with previous records as listed in Table 17-1 and Table 17-2. The strength and severity of the winter storm of 2021 is considered an outlier within the current record and the likelihood of its recurrence requires future observations of similar events.

17.2.4 Severity

The magnitude and severity of severe winter weather in Wharton County and the participating communities is low, resulting in minor injuries and illnesses; minimal property damage that does not severely threaten structural stability; or interruption of essential facilities and services for less than 48 hours. The reoccurrence of an extreme winter event such as the one experienced in 2021 is possible.

17.2.5 Warning Time

Meteorologists can often predict the likelihood of a severe winter storm. When forecasts are available, they can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of the storm. Some storms may come on more quickly and have only a few hours of warning time.

17.3 SECONDARY HAZARDS

The most significant secondary hazards associated with severe local storms are falling and downed trees, landslides, and downed power lines. There is also the threat of a disruption in the water supply distribution system and power outages. Heavy rain and icy conditions can overwhelm both natural and man-made drainage systems, causing overflow and property destruction. Landslides occur when the soil on slopes becomes oversaturated and fails. Additionally, the storms may result in closed highways and blocked roads. It is not unusual for motorists and residents to become stranded. Annually, icy conditions and frozen pipes cause damage to residences and businesses. Late-season winter events will typically cause some plant and crop damage.

17.4 CLIMATE CHANGE IMPACTS

Climate change presents a significant challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily over the last century. Nationally, the number of weather-related disasters during the 1990s was four times that of the 1950s and cost 14 times as much in economic losses. Historical data shows that the probability of severe weather events increases in a warmer climate (see Figure 14-13). The changing hydrograph caused by climate change could have a significant impact on the intensity, duration, and frequency of storm events. All of these impacts could have significant economic consequences.

17.5 EXPOSURE

Because winter weather cannot be directly modeled in HAZUS-MH, annualized losses were estimated using GIS-based analysis, historical data analysis, and statistical risk assessment methodology. Event frequency, severity indicators, expert opinions, and historical knowledge of the region were used for this assessment. The primary data source was the updated HAZUS-MH inventory data (updated with 2010 U.S. Census data and 2018 RS Means Square Foot Costs) augmented with state and federal data sets as well as the NOAA National Climatic Data Center Storm Event Database.

17.5.1 Population

It can be assumed that the entire planning area is exposed to severe winter weather events to some extent. Certain areas are more exposed due to geographic location and local weather patterns.

17.5.2 Property

According to the HAZUS-MH inventory data (updated with 2010 U.S. Census data and 2018 RS Means Square Foot Costs), there are 16,979 buildings within the census blocks that define the planning area with an asset replaceable value of almost \$3.9 billion (excluding contents). About 91% of these buildings (and 75% of the building value) are associated with residential housing. Other types of buildings in this report include agricultural, education, religious, and governmental structures. See hazard loss tables for community-specific total assessed numbers (e.g., Table 17-5). Table 17-3 lists the exposed structures and population for the participating communities.

Residents within a city or municipality are governed by building codes and ordinances. Buildings and land in unincorporated areas of the county are not governed by building codes. Because of the less stringent regulations, all of these buildings are considered to be exposed to severe winter weather, but

structures in poor condition or particularly vulnerable locations (located on hilltops or exposed open areas) may risk the most damage. The frequency and degree of damage to a building will depend on specific locations.

**TABLE 17-3
EXPOSED STRUCTURES AND POPULATION**

Jurisdiction	Residential	Commercial	Other *	Total Structures	Total Population
City of East Bernard	909	62	43	1,014	2,272
City of El Campo	4,465	352	200	5,017	11,602
City of Wharton	3,299	321	138	3,758	8,832
Unincorporated Area	6,799	210	181	7,190	18,574
Wharton County Total	15,472	945	562	16,979	41,280

Note: *Other includes industrial, agricultural, religious, governmental, and educational classifications.

17.5.3 Critical Facilities and Infrastructure

All critical facilities are likely exposed to winter weather events. The most common problems associated with this hazard are utility loss. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water, and sewer systems may not function. Roads may become impassable due to ice or snow. Ice accumulation on roadways can create dangerous driving conditions. Several county roads are available to move people and supplies throughout the region.

17.5.4 Environment

The environment is highly exposed to severe weather events. Natural habitats such as streams and trees risk major damage and destruction. Flooding events caused by snowmelt can produce river channel migration or damage riparian habitat.

17.6 VULNERABILITY

Although a winter storm is a slow onset hazard with generally six to twelve hours of warning time, utility disruptions from winter storms can severely impact the delivery of services. Water pipes can freeze and crack in sub-freezing temperatures. Ice can build up on power lines and cause them to break under the weight or ice on trees can cause tree limbs to fall on the lines. These events can disrupt electric service for long periods.

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

All populations, buildings, critical facilities, and infrastructure in the planning area are vulnerable to severe winter events. People and animals are subject to health risks from extended exposure to cold air.

Elderly people and economically disadvantaged populations in the planning area are at greater risk of death from hypothermia during these events. According to the U.S. Center for Disease Control, every year hypothermia kills about 600 Americans, half of whom are 65 years of age or older.

17.6.1 Population

Vulnerable populations are the elderly, low-income, linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life-threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure during severe winter weather events and could suffer more secondary effects of the hazard. Commuters who are caught in storms may be particularly vulnerable. Stranded commuters may be vulnerable to carbon monoxide poisoning or hypothermia. Additionally, individuals engaged in outdoor recreation during a severe winter event may be difficult to locate and rescue. Table 17-4 contains more specific jurisdictional information.

Jurisdiction	Youth Population (< 16)	% of Total Population	Elderly Population (> 65)	% of Total Population	Economically Disadvantage (Income < \$20,000)	% of Total Population
City of East Bernard	638	28.07	342	15.05	129	5.68
City of El Campo	3402	29.33	1648	14.21	992	8.55
City of Wharton	2317	26.23	1288	14.58	1251	14.17
Unincorporated Area	4,715	25.39	2,741	14.76	1,537	8.28
Wharton County Total	11,072	26.82	6,019	14.58	3,910	9.47

17.6.2 Property

All property is vulnerable during severe winter weather events, but properties in poor condition or in particularly vulnerable locations may risk the most damage. Those that are located under or near overhead lines or large trees may be vulnerable to falling ice or may be damaged in the event of a collapse.

Loss estimations for severe winter weather are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing projected damages (annualized loss) on historical events, statistical analysis, and probability factors. These were applied to the participating communities' reported event damages and exposed values for structures and content to create an annualized loss. Annualized losses of 'negligible' are less than \$50 annually. The annualized loss estimated for winter storm events is shown in Table 17-5.

**TABLE 17-5.
LOSS ESTIMATES FOR WINTER STORM EVENTS**

Jurisdiction	Exposed Value	Annualized Loss	Annualized Loss Percentage
City of East Bernard	\$391,249,566	Negligible	Negligible
City of El Campo	\$2,159,712,947	Negligible	Negligible
City of Wharton	\$1,416,664,643	Negligible	Negligible
Unincorporated Area	\$2,255,940,086	\$316	<0.01
Wharton County Total	\$6,233,567,243	\$316	<0.01

Vulnerability Narrative

Each community’s vulnerability to winter weather events are described below.

- **City of East Bernard** - Winter storms in the City of East Bernard would expose the residents to high utility bills. Roads become dangerous to travel on because of icy conditions. This can lead to schools and businesses being shut down for a day or two. Communities that implement comprehensive outreach programs to educate residents on the risks and hazards associated with severe winter weather reduce their vulnerability.
- **City of El Campo** - The City of El Campo is at a greater risk of rolling blackouts during a winter weather event due to high usage. This can expose the elderly and economically disadvantaged residents to prolonged periods of cold without heating and high utility bills. Roads become dangerous to travel on because of icy conditions. This can lead to schools and businesses being shut down for a day or two. Homes built without proper building codes could suffer from a lack of insulation and may experience deteriorating infrastructure, physical harm, and property damage.
- **City of Wharton** - Winter storms in the City of Wharton would expose the residents to high utility bills. Roads become dangerous to travel on because of icy conditions. Communities that implement alternate power sources for critical facilities impacted during a winter storm help to mitigate the risk associated with increased wait times for residents in need.
- **Wharton County (Unincorporated Area)** – Wharton County Unincorporated Areas are at a greater risk of rolling blackouts during a winter weather event due to high usage from other areas of the electrical grid. The more rural areas of Wharton County could experience longer wait times for emergency response actions. This could expose them to hazards such as prolonged periods of cold without heating. Also, this would have a greater effect on the young, elderly, and economically disadvantaged that may not have the means to respond to such an event.

Community Perception of Vulnerability

See the front page of the current chapter for a summary of hazard rankings for Wharton County and participating communities in this HMP update. Chapter 21 gives a detailed description of these rankings and Chapter 22 addresses mitigations actions for this hazard vulnerability.

17.6.3 Critical Facilities and Infrastructure

Incapacity and loss of roads are the primary transportation failures resulting from winter weather, mostly associated with secondary hazards. Snowstorms can significantly impact the transportation system and the availability of public safety services. Of particular concern are roads providing access to isolated areas and to the elderly. Prolonged obstruction of major routes can disrupt the shipment of goods and other commerce. Large, prolonged storms can have negative economic impacts on an entire region.

Severe windstorms, downed trees, and ice can create serious impacts on power and above-ground communication lines. Freezing of power and communication lines can cause them to break, disrupting electricity and communication. Loss of electricity and phone connection would leave certain populations isolated because residents would be unable to call for assistance.

17.6.4 Environment

The vulnerability of the environment to winter weather is the same as the exposure, discussed in Section 17.5.4.

17.7 FUTURE TRENDS IN DEVELOPMENT

All future development will be affected by winter storms. The vulnerability of community assets to severe winter storms is increasing over time as more people enter the planning area. The ability to withstand impacts lies in sound land-use practices and consistent enforcement of codes and regulations for new construction. The planning partners have adopted the International Building Code. This code is equipped to deal with the impacts of severe weather events. Land-use policies identified in general plans within the planning area also address many of the secondary impacts (flood and landslide) of the severe weather hazard. With these tools, the planning partnership is well equipped to deal with future growth and the associated impacts of severe weather.

17.8 SCENARIO

Although severe local storms are infrequent, impacts can be significant, particularly when secondary hazards, such as floods or erosion occur. A worst-case event would involve prolonged high winds during a winter storm accompanied by thunderstorms. Such an event would have both short-term and longer-term effects. Initially, schools and roads would be closed due to power outages caused by high winds and downed tree obstructions. In more rural areas, some subdivisions could experience limited ingress and egress. Prolonged rain could produce flooding, overtopped culverts with ponded water on roads, and erosion on steep slopes. Flooding and landslides could further obstruct roads and bridges, further isolating residents.

17.9 ISSUES

Important issues associated with a winter storm in the planning area include the following:

- The older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to winter weather, particularly freezing temperatures, high winds, and ice.
- The redundancy of the power supply must be evaluated.

- The capacity for backup power generation is limited.
- Future efforts should be made to identify populations at risk and determine special needs during a winter storm event.

Chapter 18. PANDEMIC

PANDEMIC RANKING	
Wharton County	High
City of East Bernard	High
City of El Campo	High
City of Wharton	High

<u>DEFINITIONS</u>	
Pandemic	An outbreak of a disease that occurs over a wide geographic area, such as multiple countries or continents, and typically affects a significant proportion of the population.
Outbreak	The sudden rise in the incidence of a disease.
Vector	Living organisms that can transmit infectious pathogens between humans, or from animals to humans
Common Vehicle	Disease transmitted by a common inanimate vehicle resulting in multiple infections; most commonly food or water.

18.1 GENERAL BACKGROUND

Infectious disease outbreaks occur from the presence of a pathogenic microbial agent. The level of infection determines the classification of the event as either an endemic, epidemic, or pandemic. An endemic classifies infections disease which is present at all times, but a low frequency. An epidemic is the sudden outbreak of the disease in a specified area, such as a city, country, or region. A pandemic is a result of an epidemic becoming more widespread. More specifically, a pandemic is an outbreak of a disease that occurs over a wide geographic area, such as multiple countries or continents, and typically affects a significant proportion of the population.

Diseases can spread through a population in a multitude of ways such as contact (direct and/or indirect), droplet, airborne, vector, and common vehicle. According to FEMA, endemic and epidemic infectious diseases are the leading cause of death worldwide (FEMA, n.d.). As the world continues to become more interconnected via travel, the threat of a rapidly spreading disease increases. Growing populations contribute to more densely populated areas causing an increase in the risk of exposure and allowing for the rapid spread of a potentially infectious disease. This, coupled with the increase in travel, creates a system capable of facilitating a pandemic.

Although the direct effects of the infectious disease during a pandemic are of great significance to human health, the effects on the economy and society can be far-reaching as well, as seen by the recent COVID-19 pandemic (see 18.2.1). A pandemic can cause major disruptions to daily lives through issued quarantines, and lockdowns among other non-pharmaceutical measures to prevent the spread of the infectious disease. The healthcare industry can become overwhelmed causing supply issues, strained medical workers, and neglected patients with other diseases or health problems. Economically,

manufacturing delays may cause supply chain disruptions, both national and international businesses can experience a downturn, and companies can experience a decrease in revenue growth creating a downward turn in the national and global economy. A society can also see far-reaching social implications such as the service sector being unable to operate, the disruption of cultural celebrations and religious festivities, as well as a rise in stress among the population (Haleem et. al., 2020).

18.2 HAZARD PROFILE

18.2.1 Past Events

Since the founding of Wharton County in 1846, there have been multiple pandemics that have occurred according to the Center for Disease Control (CDC). Although variants of the influenza virus have accounted for the majority of pandemics that have occurred in the United States, there have been other pandemics that have been caused by other infectious diseases. Some of these include the coronaviruses and human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS). Some of the more substantial pandemics which have affected the United States and therefore Wharton County since the founding are discussed below.

1918 Flu Pandemic

Considered one of the most severe pandemics in recent history, the flu pandemic of 1918 spread throughout the world from 1918 to 1919. Although the origin of the H1N1 influenza virus of the 1918 pandemic was never identified, the infection spread to the United States in the spring of 1918. At the time, no vaccine existed to guard the population from the rapidly spreading flu. This was accompanied by a lack of treatment options for secondary bacterial infections associated with flu infections. This resulted in limited control efforts such as isolation, quarantine, good personal hygiene, use of disinfectants, and limitation of public gatherings. By the end of the pandemic, it was estimated that approximately 500 million people, one-third of the world's population at the time, had been infected with the virus resulting in 50 million deaths worldwide, 675,000 of which occurred in the United States (CDC, 2018). Texas accounted for approximately 2,100 of the deaths in the United States, of which most occurred during September and October of 1918. Major urban areas of the state, such as Houston, issued bans on gatherings to help mitigate the spread of the virus during this time (Sault, 2020).

2003 Severe Acute Respiratory Syndrome (SARS)

Often noted as the first pandemic of the 21st century, SARS was first reported in Asia in February of 2003. The coronavirus illness (SARS-CoV) spread throughout more than two dozen countries, including the United States, and four continents before being contained. According to World Health Organization (WHO) data, in total 8,098 cases were reported, eight of which occurred in the United States. In each of the eight lab-confirmed cases in the United States, patients had traveled to locations where an outbreak was occurring. The pandemic resulted in 774 deaths, at a 9.6% mortality rate, none of which were in the United States. Since 2004 there have been no reported cases of SARS, but the six-month outbreak is estimated to have cost \$40 billion globally (CDC, 2016).

2019-Present Coronavirus Disease (COVID-19)

The coronavirus disease 2019 (COVID-19) was first identified in Wuhan, China in December of 2019. This disease is also known as the novel (or new) coronavirus as it has not previously been seen in humans. Like the coronavirus which spread during the 2003 SARS pandemic, the COVID-19 virus is a

respiratory disease caused by SARS-CoV-2. Since the virus was new when it first emerged, there were no available treatments or natural immunity to the pathogen resulting in a rapid spread from host to host.

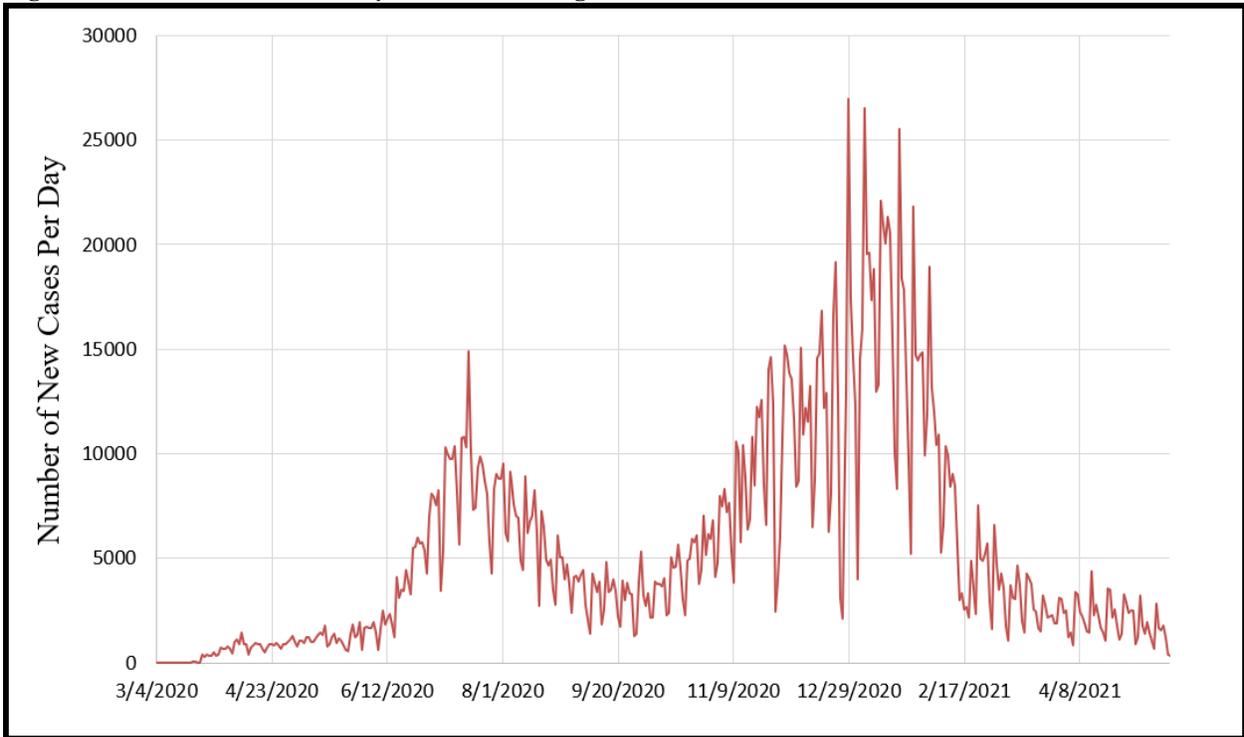
In the United States, the first confirmed case of COVID-19 occurred on January 21, 2020, in a person having recently traveled back to the U.S. from the epicenter, Wuhan, China. By January 31st the global number of cases hit 9,800 with more than 200 deaths causing WHO to issue a Global Health Emergency. This was soon followed by the U.S. declaring a public health emergency on February 3rd. The first major outbreak in the U.S. occurred on March 6th with 21 passengers on a California cruise ship testing positive for COVID-19. By March 11th, WHO had officially declared COVID-19 a pandemic closely followed by a National Emergency declaration being issued in the U.S. two days later (AMJC, 2021).

COVID-19 quickly spread to every state in the U.S. after the first outbreak reporting in March. Figure 18-1 and Figure 18-2 illustrate the reported number of cases in Texas and Wharton County, respectively, since the beginning of the pandemic in March 2020 to May 2021.

In an effort to reduce the spread of the virus, multiple non-pharmaceutical measures were put in place throughout the country while medical professionals worked to produce a vaccine. By March 11th, most universities in Texas had switched to online learning, and on March 13th Texas declared a statewide emergency. On March 19th the governor of Texas issued an executive order closing all bars, restaurants, and schools. Soon after many counties issued stay-at-home orders and elective medical procedures were halted in most major counties to help relieve stress on the healthcare system. In a little over two weeks from the first major outbreak and the first executive order, the number of Texans filing for unemployment jumped 860%. Over the coming months, the reopening of industries began in a phased approach accompanied by the issuing of a mask mandate on July 2nd. Finally, on December 14th, the first doses of the COVID-19 vaccine arrived in Texas.

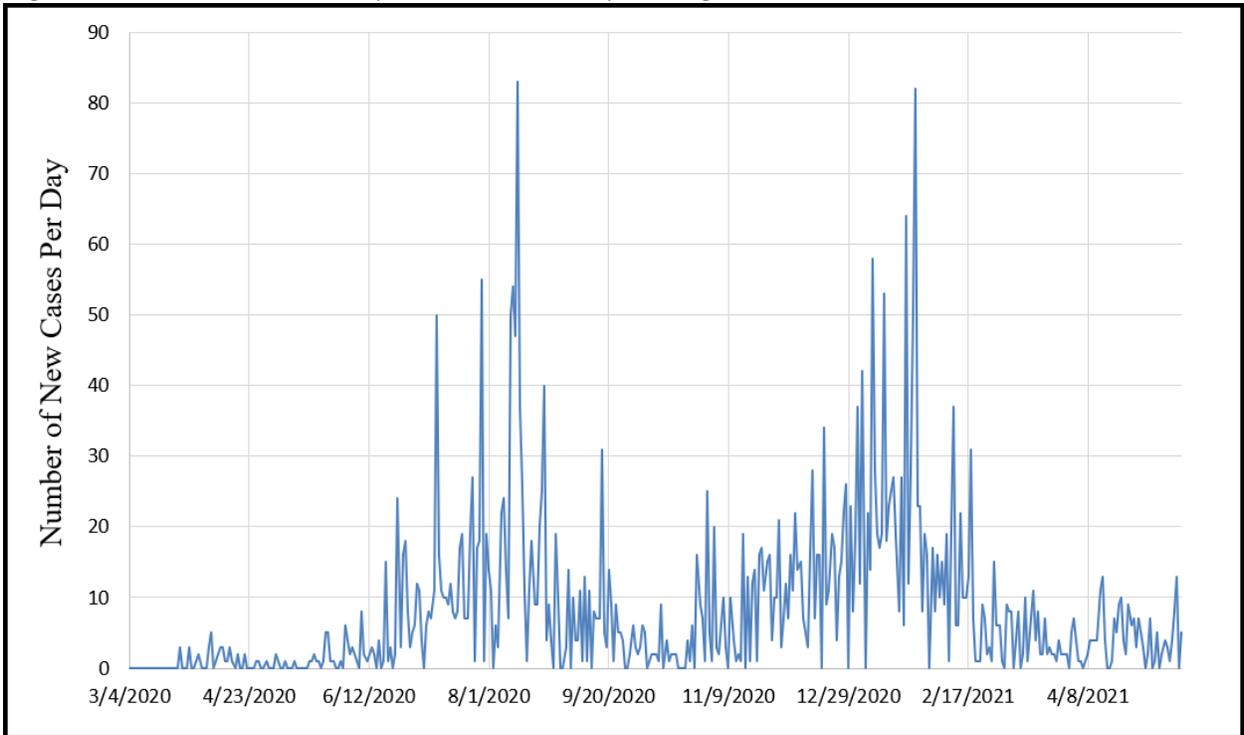
Over a year after the pandemic began, Texas officially reopened all businesses and lifted mask mandates on March 2, 2021. From March 2020 to May 2021, the Department of Health Services has reported 2,498,217 confirmed COVID-19 cases in Texas resulting in 49,900 deaths. Out of this Wharton County accounts for 3,693 cases and 116 deaths (Texas HHS, 2021). Confirmed cases of COVID-19 continue to occur throughout the country as the pandemic continues. As of May 18, 2021, there have been 163,312,429 confirmed cases of COVID-19 including 3,386,825 deaths (WHO, 2021). These numbers continue to rise as the COVID-19 pandemic continues into 2021.

Figure 18-1. New Cases Per Day in Texas During COVID-19 Pandemic Thus Far



Note: From Texas HHS

Figure 18-2. New Cases Per Day in Wharton County During COVID-19 Pandemic Thus Far



Note: From Texas HHS

18.2.2 Location

The origin of pandemics is random. Although Wharton County might not be the origin of a pandemic, by definition, this hazard usually encompasses the entire globe or extensive portions of it. If a pandemic were to reach any part of the United States, it is highly likely that it would reach Wharton County due to the interconnectivity of the country, but is variable based on disease transmission type. The more densely populated areas, such as the cities of East Bernard, El Campo, and Wharton, would be at the greatest risk for initial transmission. Although the unincorporated areas of Wharton are not as densely populated, the interconnectivity of the county's population both in industry and social gatherings would allow for further transmission. There are no distinct geographical boundaries for infectious diseases, therefore, they can occur throughout the planning area.

18.2.3 Frequency

The frequency of pandemics is unpredictable, but as noted by the Cleveland Clinic, intervals between pandemics are becoming shorter. A multitude of pandemics have been documented throughout human history at different severity levels. Since the turn of the 21st century, there have been multiple notable pandemics including but not limited to the 2003 SARS, 2009 Swine Flu, and COVID-19. It is expected that a pandemic will be experienced in the planning area within the next 10 years at some level of severity (see 18.2.4).

18.2.4 Severity

Pandemics have the potential to impact the planning area population as well as the economy at a variety of severity levels. From the population perspective, a pandemic can be evaluated based on the impact the disease has on those who have been infected, or the death toll to which is attributed to the pandemic. A common measure is the Pandemic Severity Index (PSI), which uses the case fatality ratio as the critical driver for categorizing the severity of a pandemic as shown in Table 18-1. This ranks a pandemic on Level 1 to Level 5, with Level 1 being least severe and Level 5 most severe. Based on the pandemic level of an area, varying non-pharmaceutical measures are suggested to mitigate transmission. These suggested measures could in turn have negative impacts on the economy such as those experienced during the start of the COVID-19 pandemic (Javaria, 2020).

Category	Case Fatality Ratio	Example
1	Less than 0.1%	Seasonal Flu
2	0.1 - <0.5%	Asian Flu and Hong Kong Flu
3	0.5 - <1%	Pandemic H1N1 (2009)
4	1.0 - <2.0%	Lassa Fever
5	2.0% or higher	1918 Flu Pandemic

Note: Data from Javaria 2020

18.2.5 Warning Time

Very little to no warning can occur during the outbreak of a pandemic. With a vastly connected globe, an infectious disease can travel throughout the world in a matter of hours.

18.3 SECONDARY HAZARDS

Beyond the actual risk of an infectious disease are many other impacts. Pandemics can cause an increase in morbidity and mortality within a population, especially for lower-income citizens. Mitigation measures can cause significant social and economic disruption leading to individual behavioral changes and negative economic growth. These hazards can have lasting implications on the society for which it affects (Madhav et al, 2017).

18.4 CLIMATE CHANGE IMPACTS

Although climate change does not have a direct impact on a pandemic, climate and natural disasters can play a role in the spread of infectious diseases. As climate change continues to increase the frequency of weather events such as hurricanes and droughts, the possibility of disease-spreading events increases. As described by Michaela Gack, Ph.D., Director, Cleveland Clinic’s Florida Research and Innovation Center:

In some cases, it can displace certain animal species and thereby bring them in closer contact with humans, either directly with humans or via domestic animals, and this then facilitates cross-species transmission so that viruses can be transmitted from these wild animal species onto humans and thereby cause outbreaks.

Specifically, Dr. Gack notes “in the past 20 years, several viral outbreaks have been linked to a combination of human and environmental factors, including SARS, MERS, and Ebola.” (Cleveland Clinic, 2021).

18.5 EXPOSURE AND VULNERABILITY

While the entirety of the planning area is exposed to a pandemic hazard, potential loss estimates to the built environment are difficult to calculate. Generally, the most significant losses are experienced by the population and the healthcare network. The vulnerability of the population and critical facilities/infrastructure is unpredictable due to the varying nature of infectious diseases.

18.5.1 Population

It can be assumed that the entire planning area is exposed equally to the risk of a pandemic. Certain areas of higher population density have an increased risk of transmission throughout the community at a higher rate, but lower population density areas remain at equal risk of infection. The most vulnerable demographics during a pandemic will typically be the economically disadvantaged population areas, children under 16 years of age, and the elderly. Economically disadvantaged families and those living on a fixed income may not have the financial means to adequately deal with the effects of an event and not take the necessary steps to mitigate the spread of infectious diseases. The youth and elderly population may require further assistance as dependents if an event were to occur and tend to have weaker immune systems more susceptible to disease. Table 18-2 shows vulnerable populations per participating community.

**TABLE 18-2
MOST VULNERABLE POPULATION**

Jurisdiction	Youth Population (< 16)	% of Total Population	Elderly Population (> 65)	% of Total Population	Economically Disadvantage (Income < \$20,000)	% of Total Population
City of East Bernard	638	28.07	342	15.05	129	5.68
City of El Campo	3402	29.33	1648	14.21	992	8.55
City of Wharton	2317	26.23	1288	14.58	1251	14.17
Unincorporated Area	4,715	25.39	2,741	14.76	1,537	8.28
Total	11,072	26.82	6,019	14.58	3,910	9.47

18.5.2 Critical Facilities and Infrastructure

Although all critical facilities and infrastructure in the planning area will be exposed equally to the risk of a pandemic, healthcare facilities will likely experience the greatest burden. If healthcare facilities and staff do not have the means to provide for the infected, further loss can be experienced by the community. Other critical infrastructures may also be limited by an infectious disease event such as emergency services, utility services, water services, and telecommunications. This can be caused by a lack of staffing or supplies necessary to provide the services (Madhav et al, 2021).

18.6 FUTURE TRENDS IN DEVELOPMENT

As the population of Wharton County and its participating communities continues to increase so does the risk of transmission associate with an infectious disease. Although pandemics are unpredictable, keeping the community informed with the most up-to-date information during an event is key. One of the most cost-effective strategies for increasing pandemic preparedness is consistently investing in critical facilities and infrastructure. Creating a scalable contingency plan for future outbreaks of varying sizes and severity is ideal for planning for future pandemics.

18.7 SCENARIO

Although pandemics with lasting and extensive impacts are not common, they are possible in the planning area. A worst-case scenario would involve an extremely contagious infectious disease that infects a large portion of the planning area and world. If the disease has a high mortality rate, PSI level 5, the high death rate could cripple the local and global economy. This would in turn disrupt supply chains to the county potentially resulting in food and basic necessity shortages. Critical facilities and infrastructure could become overburden or fail. This level of event could result in lasting damage to the planning areas' population, economy, and social structure.

18.8 ISSUES

The major issues for a pandemic are the following:

- Pandemics are unpredictable and can spread fast leaving little time to react and mitigate an outbreak.
- An increase in population density and connection of population centers both economically and socially to other areas increase the possibility of transmission of an infectious disease if an outbreak occurs.
- The creation of a scalable pandemic prevention and action plan for the county and participating communities is advised.

Chapter 19.

HAZARDOUS MATERIALS

HAZARDOUS MATERIALS RANKING	
Wharton County	High
City of East Bernard	High
City of El Campo	High
City of Wharton	High

DEFINITIONS	
Hazardous Materials	Matter (solid, liquid, or gas) or energy that when released is capable of creating harm to people, the environment, and property, including weapons of mass destruction

19.1 GENERAL BACKGROUND

According to the NFPA, a hazardous material (HAZMAT) is defined as “matter (solid, liquid, or gas) or energy that when released is capable of creating harm to people, the environment, and property, including weapons of mass destruction” (FEMA, 2019). HAZMAT incidents can cause significant impacts such as death, long-lasting health effects, or damage to buildings, infrastructure, and the environment.

HAZMATs vary greatly in the types of health risks they pose to humans, according to FEMA (2019). The risk to human health can vary from thermal, radiological, asphyxiation, chemical, etiological (biological), and mechanical harm:

- Thermal harm results from exposure to temperature extremes.
- Radiological harm results from exposure to radioactive materials.
- Asphyxiation results from exposure to materials that reduce oxygen levels that may cause suffocation.
- Chemical harm results from exposure to chemicals, including poison and corrosives.
- Etiological (Biological) harm results from exposure to biological materials, which include bacteria, viruses, and biological toxins.
- Mechanical harm results from exposure to, or contact with, fragmentation or debris scattered because of pressure release, explosion, or boiling liquid expanding vapor explosion.

HAZMAT incidents can happen during production, storage, transportation, use, or disposal (*Hazardous Materials Incidents*, 2021). During transportation, the method of transport could become involved in a traffic accident that would cause the material to be released. HAZMATs can also be released while being stored and handled due to poor packaging and nonsecure transportation.

19.2 HAZARD PROFILE

HAZMAT incidents can be a secondary hazard to natural hazard events such as floods, hurricanes, tornadoes, and earthquakes. Not only can these hazards cause an incident, but they can also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills, and a variety of other environmental pollutants causing widespread concern.

Weather conditions will directly affect how a HAZMAT incident develops. The micro-meteorological effects of buildings and terrain can alter the travel and duration of agents. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features can substantially increase the damage from a HAZMAT release. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and wildlife. These factors contribute to the importance of maintaining an effective response team at all times.

Commercial Facilities Hazard

The EPA regulates hazardous chemicals used in commercial facilities and sets the limits of exposure to hazardous materials within the workplace. Chemical manufacturing, metal production, metal fabrication, and petroleum processing are four industries “responsible for approximately 90% of all industrial materials and waste generated”, including hazardous materials (EKU, 2020). Exposure to hazardous materials at these facilities comes in four forms (gases or vapors, liquids, dust, and solids) and can result in a variety of health issues or even death. In the event of a spill, leak, or exposure, appropriate safety equipment should be utilized to mitigate the effects.

Some HAZMATs are not as heavily regulated but can be just as dangerous under the right conditions. Ammonium nitrate, a chemical commonly used as fertilizer, is non-reactive under most conditions; however, when stored improperly can become destructive. When exposed to extreme heat, ammonium nitrate can be destabilized and make a fire burn even hotter or cause an explosion. If the destabilized chemical were confined or contaminated, there is a greater risk of explosion (Wertz, 2020).

Two incidents of note are the Beirut, Lebanon storage facility explosion and the West, Texas fertilizer plant explosion which were directly caused by the chemical ammonium nitrate:

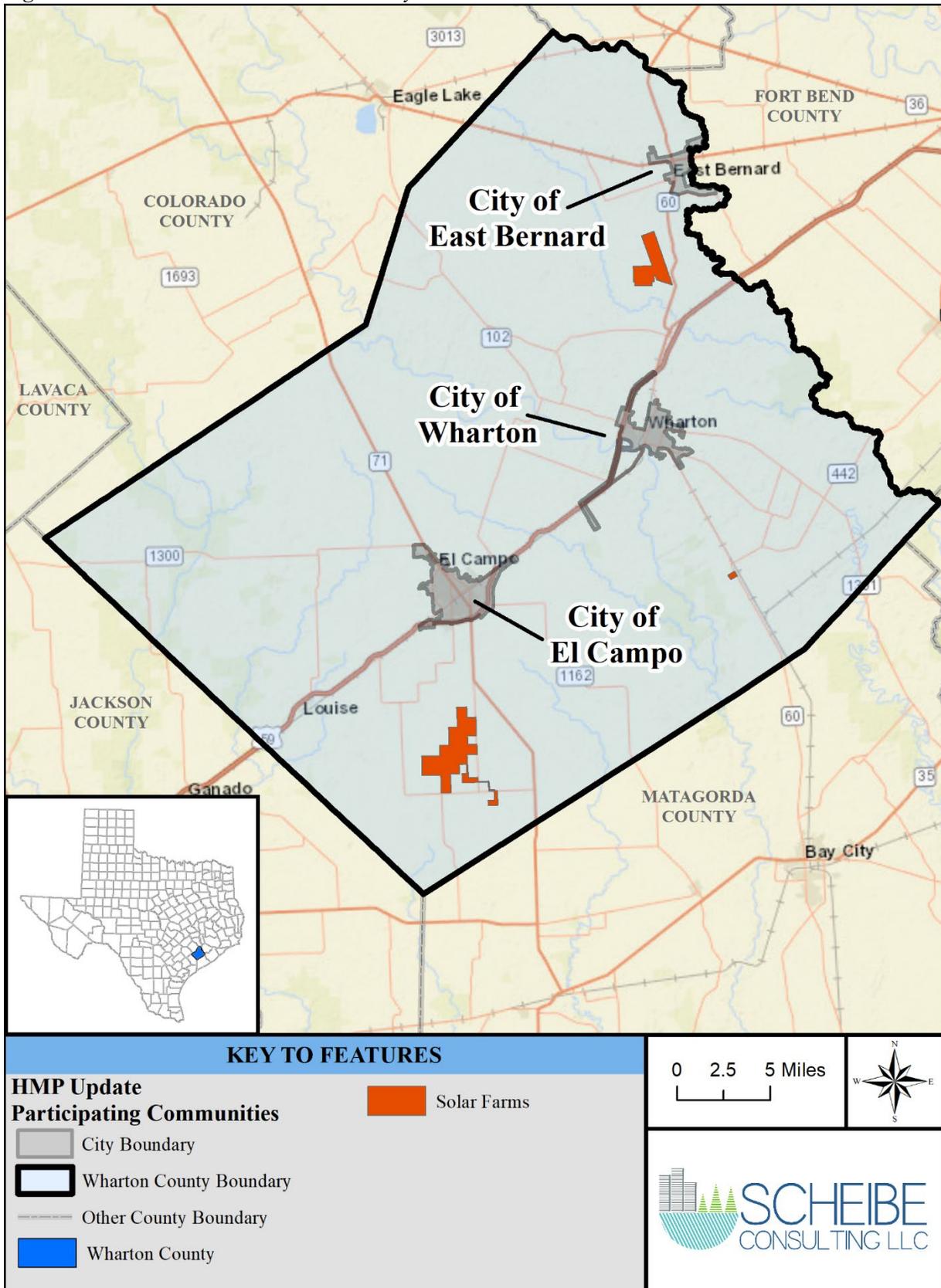
In the port city of Beirut, on August 4, 2020, the improper storage of ammonium nitrate led to a major explosion. The explosion killed over 200 people and destroyed over 77,000 homes. The damage resulted in major, long-lasting critical infrastructure damage as well as the city and countries economy. (Fakih, 2021). The United National Development Program has estimated that the cost of cleaning up the environmental degradation from the explosion will be over \$100 million.

In West, Texas on April 17, 2013, an explosion occurred at the West Fertilizer Company. A fire started at the plant leading to an explosion of the ammonium nitrate storage. The explosion resulted in 15 deaths, approximating 200 injuries, and 350 damaged homes. Local community structures, as well as private residents, were heavily damaged or destroyed during the explosion leading to long-lasting impacts on the community (ABS Consulting, 2015).

Solar Farms Hazard

Solar farms expose the environment to multiple hazardous materials. The panels used to convert sunlight to electricity utilize toxic materials that can be leached into the environment. Issues may arise from the disposal of old solar modules. The Electric Power Research Institute conducted a study on solar panels which concluded that the disposal of solar panels in landfills is not recommended due to the potential for modules to break causing a release of toxic materials into the environment, specifically the soil). Solar panels often contain lead, cadmium, and other toxic chemicals which can leach into the environment unless disposed of properly (Shellenberger, 2019. Figure 19-1 identifies three solar farms that are operating or in the development stage within the planning area.

Figure 19-1. Solar Farms in Wharton County



Lithium Battery Hazard

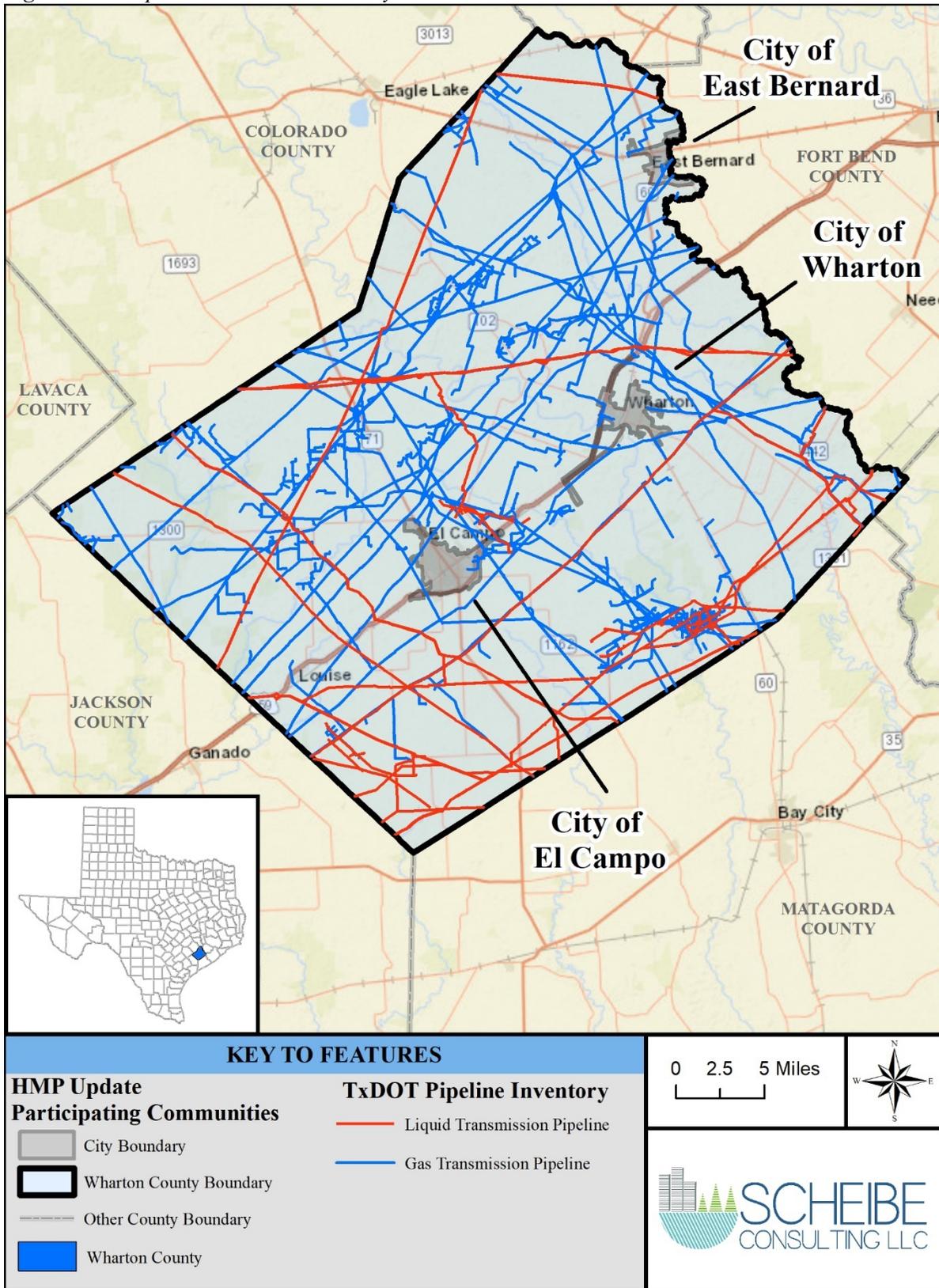
Lithium batteries are considered hazardous material and must be transported following regulations established by the U.S. Department of Transportation's Hazardous Materials Regulations. Lithium-ion batteries contain highly flammable solvents separated by a thin plastic film (Phelan, 2020). If there is an issue with the plastic film and the solvents combine, a fire or explosion can occur, potentially releasing toxic gases.

Pipeline Hazard

The Pipeline and Hazardous Materials Safety Administration (PHMSA) regulates and ensures the safe and secure movement of hazardous materials through pipelines (PHMSA, 2021). Many factors can contribute to pipeline safety issues such as “manufacturing issues, external weather and environmental issues, and age-related integrity issues” (PHMSA, 2019). Hazardous liquid lines transport crude oil, refined liquid product, liquid carbon dioxide, liquid anhydrous ammonia, and highly volatile liquids. Pipelines also serve as the major mode of transportation for natural gas as well as other hazardous gases in the United States.

These pipelines create a web throughout the United States spanning approximately 2.6 million miles with diameters ranging from 2 to 48 inches. According to the PHMSA, “43 percent of all hazardous liquid pipelines were installed prior to 1970”. In recent decades, many improvements have been made to pipeline manufacturing and construction. Pipelines constructed prior to 1970 are “vulnerable to seam-quality issues” (PHMSA, 2019). The transportation of HAZMATs through pipelines is considered low risk for an exposure incident but can result in high consequences should an incident occur. Figure 19-2 identifies the locations of all pipelines in Wharton County according to Texas Department of Transportation (TxDOT) records. These records identified approximately 548 miles of liquid transmission pipeline and 1,550 miles of gas transmission pipelines are within Wharton County.

Figure 19-2. Pipelines in Wharton County

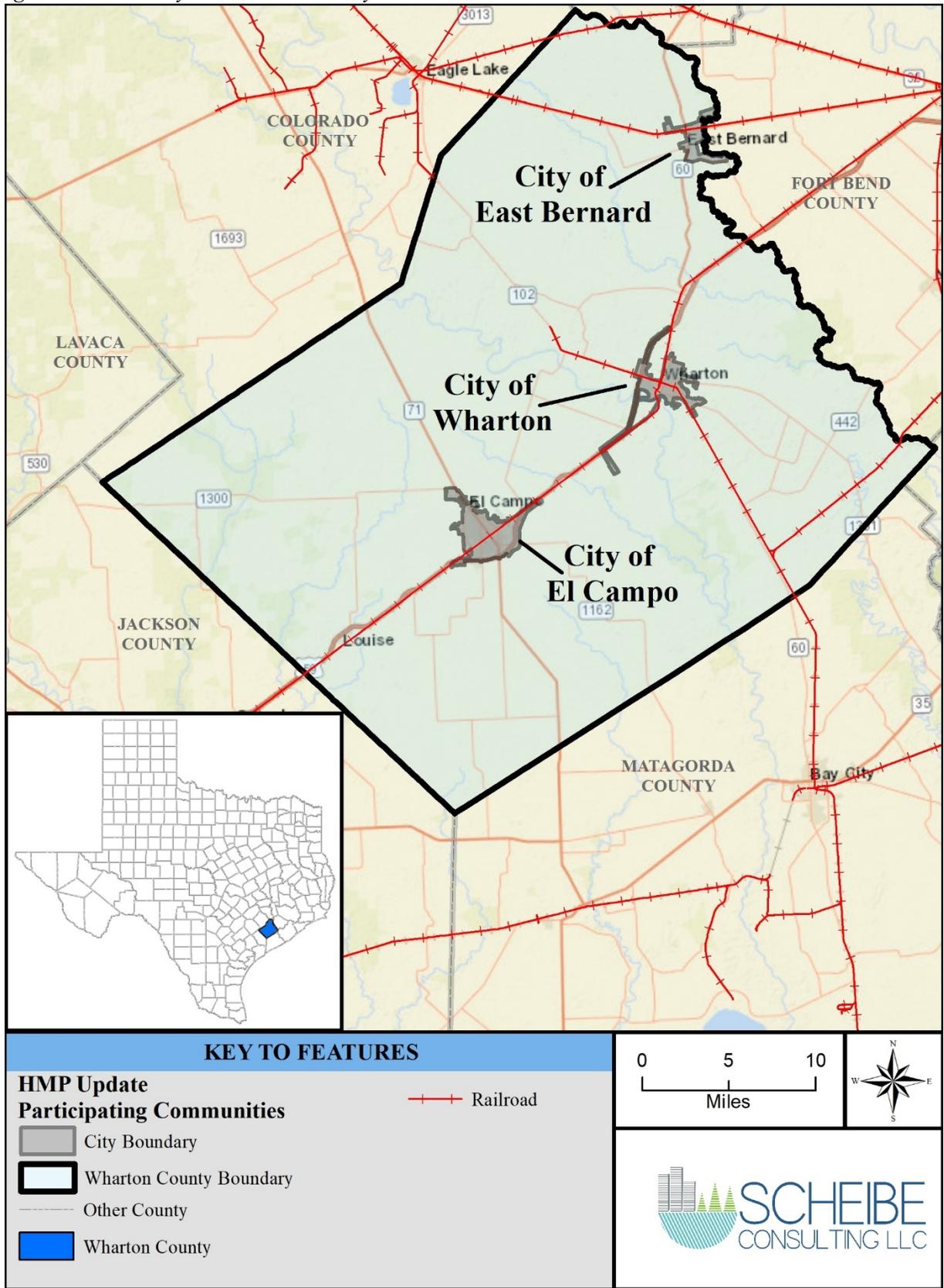


Note: From TxDOT

Railway Hazard

Railways are often used for the transport of HAZMATs due to their high level of safety as a mode of transportation. According to the Federal Railroad Administration (FRA), from 1994 to 2005, 116 fatalities occurred due to hazardous materials released in highway accidents whereas only 14 fatalities occurred due to hazardous material released in railroad accidents (2020). The FRA administers and oversees the movement of hazardous materials. When HAZMATs are transported over railways, a range of safety measures are taken, ranging from “special train formations, improved maintenance of vehicles and track, routing away from heavily populated areas and special handling and security” (IRSC, n.d.). Accidents involving trains carrying HAZMATs can result in toxic spills, most of which are caused by derailed trains. Trains don’t carry passengers when they carry HAZMATs, so spills mostly affect those who live in the community where the spill occurs (Pottroff & Karlin, 2021). Figure 19-3 displays the locations of the railways that run through Wharton County.

Figure 19-3. Railways in Wharton County



19.2.1 Past Events

Wharton County has experienced 24 highway transportation incidents, none of which are classified as serious HAZMAT incidents. According to PHMSA (2000), a serious incident includes:

- a fatality or major injury caused by the release of hazardous material
- the evacuation of 25 or more employees or responders or any number of the general public as a result of the release of a hazardous material or exposure to fire
- a release or exposure to fire which results in the closure of a major transportation artery
- the alteration of an aircraft flight plan or operation
- the release of radioactive materials from Type B packaging
- the suspected release of Risk Group 3 or 4 infectious substance
- the release of over 11.9 gallons or 88.2 pounds of a severe marine pollutant
- the release of a bulk quantity (over 119 gallons or 882 pounds) of hazardous material.

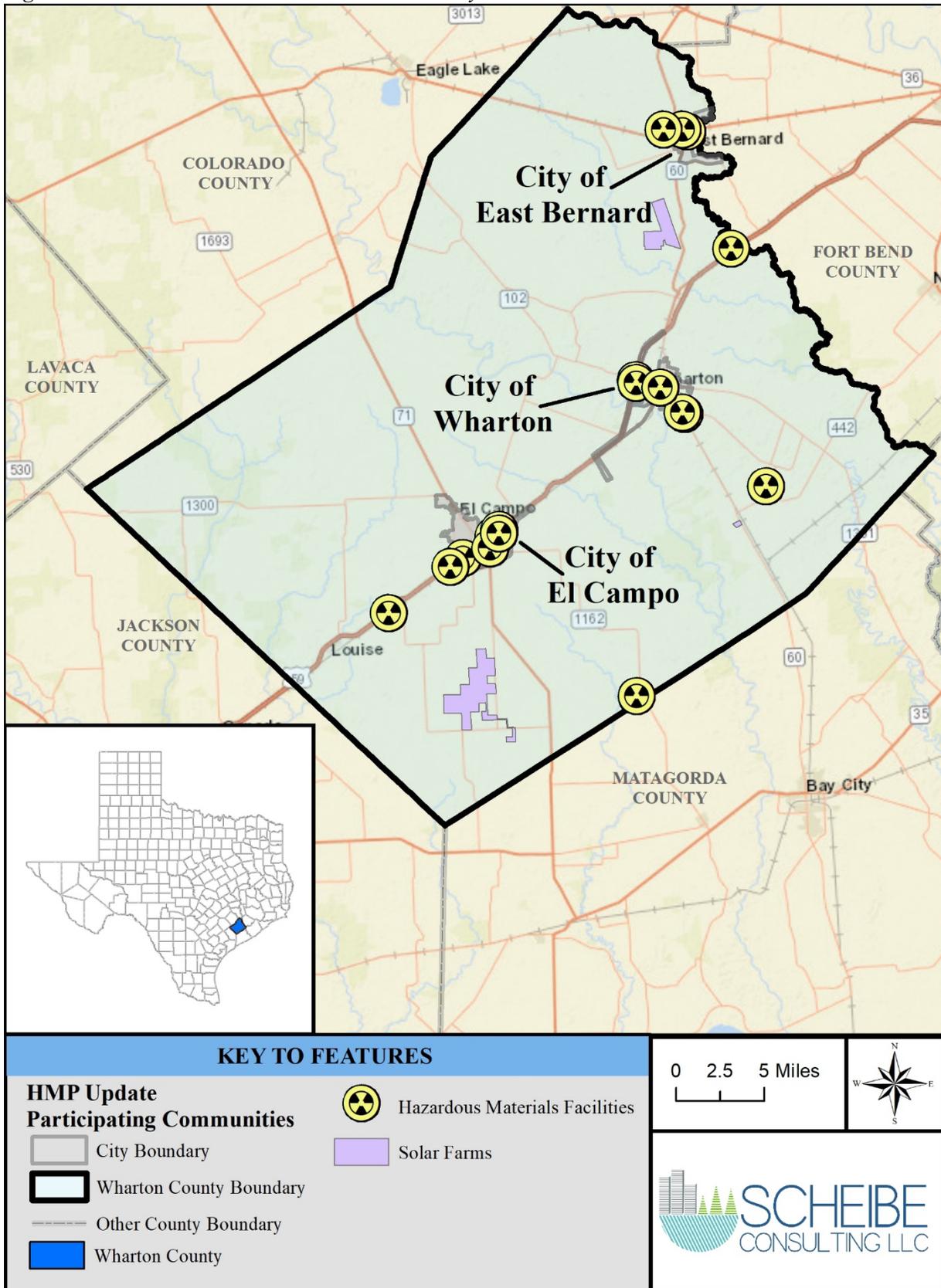
Notable hazardous materials spills in the planning area are as follows:

- In 2014, a natural gas line along F.M. 1164, in Wharton County, ruptured causing an explosion. One person driving near the line experienced non-life-threatening injuries, but the explosion caused damage to the roadway and a nearby house. After the explosion occurred, the line was isolated so gas could no longer feed into the line. The road was closed and the fire was allowed to burn off (Halvety, 2014). Although there were no casualties during this incident, HAZMAT incidents can result in mass casualties and the destruction of numerous properties.
- On May 11, 2001, a fire occurred at a facility in the City of East Bernard resulting in the release of 250 pounds of pesticides. Although the release did not occur directly at the East Bernard River, the chemicals progressed through the storm water sewer and the City of East Bernard sewage treatment facility until finally reaching the river system. The spill released high levels of Guthion 2L and Bidrin-8, both highly toxic chemicals to fish, into the river system resulting in a fish kill approximately 20 miles downstream as well as the death of other area livestock (NOAA, 2015).

19.2.2 Location

Figure 19-4 shows the hazardous materials facilities in Wharton County. This list was compiled with the use of the HAZUS-HM inventory system as well as local knowledge. Undocumented hazardous materials storage may be located in the planning area at locations not identified in Figure 19-4. Hazardous materials may also travel throughout the planning area via railroads, pipelines, or roads.

Figure 19-4. HAZMAT Facilities in Wharton County



19.2.3 Frequency

Based on historical occurrence data provided by PHMSA, Wharton County and participating communities can expect to experience a hazardous material spill every 1 to 2 years, most likely linked to a transportation incident.

19.2.4 Severity

HAZMAT spills or toxic releases can have a substantial impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. Shielding in the form of sheltering-in-place can protect people and property from harmful events. Long-term effects can also result from releases in the form of contamination to land, soil, and groundwater.

The impacts associated with a pipeline failure are highly dependent upon the product being transported. If any of the pipelines in the planning area were to rupture, such an event could endanger lives and cause damage to property in the immediate area (within less than a half-mile radius).

19.2.5 Warning Time

Warning time for hazardous materials incidents is minimal to none. There are, however, more long-term and gradual releases, such as with solar farms that can and should be expected once these farms are operational.

19.3 SECONDARY HAZARDS

Hazardous materials spills and leaks can pollute waterways exposing fish to toxic chemicals causing immediate death or long-term disease. Spills can also negatively impact the growth of other aquatic life, destroying plant habitats and food sources. Common secondary hazards associated with toxic releases and hazardous materials include:

- Water quality
- Fire
- Air quality
- Public Health
- Agricultural Operations

19.4 EXPOSURE

All of Wharton County is exposed to HAZMATs, however, those closest to the storage facilities and solar farms, as well as those along the railways, highways, and pipelines, face a greater risk of exposure. An analysis was conducted to identify population and property within a half-mile radius of all documents hazardous materials locations (See Tables 19-2 through 19-5).

19.4.1 Population

It can be assumed that the entire planning area population may be potentially exposed to hazardous materials. Certain areas are at a higher risk of exposure due to their location near HAZMAT facilities (See Tables 19-2 through 19-5).

19.4.2 Property

According to the HAZUS-MH inventory data (updated with 2010 U.S. Census data and 2018 RS Means Square Foot Costs), there are 16,979 buildings within the census blocks that define the planning area with an asset replaceable value of almost \$3.9 billion (excluding contents). About 91% of these buildings (and 75% of the building value) are associated with residential housing. Other types of buildings in this report include agricultural, education, religious, and governmental structures. See hazard loss tables for community-specific total assessed numbers (e.g., Table 19-7). Table 19-1 list the exposed structures and population for the participating communities.

Although all structures within the planning area are considered at risk to HAZMAT incidents, those located near the HAZMAT facilities and along railways, major roads, and pipelines have a greater risk of exposure. Tables 19-2 through 19-5 list the exposed structures and population within a half-mile radius of storage/commercial facilities, solar farms, pipelines, and railways for each participating community.

TABLE 19-1 EXPOSED STRUCTURES AND POPULATION					
Jurisdiction	Residential	Commercial	Other *	Total Structures	Total Population
City of East Bernard	909	62	43	1,014	2,272
City of El Campo	4,465	352	200	5,017	11,602
City of Wharton	3,299	321	138	3,758	8,832
Unincorporated Area	6,799	210	181	7,190	18,574
Wharton County Total	15,472	945	562	16,979	41,280

Note: *Other includes industrial, agricultural, religious, governmental, and educational classifications.

**TABLE 19-2
EXPOSED STRUCTURES AND POPULATION WITHIN A HALF-MILE RADIUS OF
STORAGE/COMMERCIAL FACILITIES**

Jurisdiction	Residential	Commercial	Other *	Total Structures	Total Population
City of East Bernard	406	36	24	466	1,060
City of El Campo	713	63	36	812	2,175
City of Wharton	675	93	32	800	1,647
Unincorporated Area	74	6	3	83	256
Wharton County Total	1,868	198	95	2,161	5,138

Note: *Other includes industrial, agricultural, religious, governmental, and educational classifications.

**TABLE 19-3
EXPOSED STRUCTURES AND POPULATION WITHIN A HALF-MILE RADIUS OF
SOLAR FARMS**

Jurisdiction	Residential	Commercial	Other *	Total Structures	Total Population
City of East Bernard	0	0	0	0	0
City of El Campo	0	0	0	0	0
City of Wharton	0	0	0	0	0
Unincorporated Area	165	1	3	169	391
Wharton County Total	165	1	3	169	391

Note: *Other includes industrial, agricultural, religious, governmental, and educational classifications.

**TABLE 19-4
EXPOSED STRUCTURES AND POPULATION WITHIN A HALF-MILE RADIUS OF
PIPELINES**

Jurisdiction	Residential	Commercial	Other *	Total Structures	Total Population
City of East Bernard	374	25	16	415	1,063
City of El Campo	977	52	49	1078	2,715
City of Wharton	1,014	70	26	1,110	2,788
Unincorporated Area	5,129	161	123	5,413	12,324
Wharton County Total	7,494	308	214	8,016	18,890

Note: *Other includes industrial, agricultural, religious, governmental, and educational classifications.

**TABLE 19-5
EXPOSED STRUCTURES AND POPULATION WITHIN A HALF-MILE RADIUS OF
RAILWAYS**

Jurisdiction	Residential	Commercial	Other *	Total Structures	Total Population
City of East Bernard	435	37	25	497	1,126
City of El Campo	1,568	190	91	1,849	4,638
City of Wharton	1,947	245	100	2,292	5,473
Unincorporated Area	1,397	76	46	1,519	3,443
Wharton County Total	5,347	548	262	6,157	14,680

Note: *Other includes industrial, agricultural, religious, governmental, and educational classifications.

19.4.3 Critical Facilities and Infrastructure

All critical facilities are likely vulnerable to HAZMATs. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water, and sewer systems may not function. Roads may become impassable due to HAZMAT spills or pipeline explosions.

19.4.4 Environment

The environment is highly exposed to HAZMAT incidents. Natural habitats can experience major damage and destruction during a HAZMAT incident. The effects of a HAZMAT event can have long-lasting impacts on an area. Incidents can lead to the contamination of the water, soil, sediment, and air in an area. High levels of contamination can create an uninhabitable area.

19.5 VULNERABILITY

All populations, buildings, critical facilities, and infrastructure in the planning area are vulnerable to HAZMAT incidents. People and animals are subject to health risks from exposure to HAZMATs. Elderly people and economically disadvantaged populations in the planning area are at greater risk during these events due to a lack of physical and financial ability to prepare for and mitigate a HAZMAT incident.

19.5.1 Population

Vulnerable populations are the elderly, low-income, linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are living near major roads, railways, and the HAZMAT facilities. These populations face higher chances of illness or death when a HAZMAT incident occurs. Commuters who are caught near a HAZMAT incident may be particularly vulnerable. Additionally, individuals engaged in outdoor recreation during a HAZMAT event may be exposed to harsh chemicals. Table 19-6 contains the vulnerable populations by jurisdiction in the planning area.

TABLE 19-6 MOST VULNERABLE POPULATION						
Jurisdiction	Youth Population (< 16)	% of Total Population	Elderly Population (> 65)	% of Total Population	Economically Disadvantage (Income < \$20,000)	% of Total Population
City of East Bernard	638	28.07	342	15.05	129	5.68
City of El Campo	3402	29.33	1648	14.21	992	8.55
City of Wharton	2317	26.23	1288	14.58	1251	14.17
Unincorporated Area	4,715	25.39	2,741	14.76	1,537	8.28
Wharton County Total	11,072	26.82	6,019	14.58	3,910	9.47

19.5.2 Property

All property is vulnerable during HAZMAT events, but properties in poor condition or particularly vulnerable locations may risk the most damage. Those that are located over or near HAZMAT facilities, railways, major roads, or pipelines may be vulnerable to damage in the event of a spill, fire, or explosion.

Loss estimations for HAZMAT incidents are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing historical data from transportation incidents listed in the PHMSA database. Annualized losses of ‘negligible’ are less than \$50 annually but are included due to the possibility of a high-value event. The annualized loss estimated for hazardous materials incidents is shown in Table 19-7. This table does not include estimates for other assessed hazardous materials exposure types and is not an accurate loss estimation for all hazardous material incidents. There is potential for a high-value hazardous materials incident to occur throughout the planning area.

TABLE 19-7 LOSS ESTIMATES FOR HAZARDOUS MATERIAL			
Jurisdiction	Exposed Value	Annualized Loss	Annualized Loss Percentage
City of East Bernard	\$391,249,566	Negligible	Negligible
City of El Campo	\$2,159,712,947	\$1,483	<0.1
City of Wharton	\$1,416,664,643	\$1,132	<0.1
Unincorporated Area	\$2,255,940,086	\$5,167	<0.1
Wharton County Total	\$6,233,567,243	\$7,782	<0.1

Community Perception of Vulnerability

See the front page of the current chapter for a summary of hazard rankings for Wharton County and participating communities in this HMP update. Chapter 21 gives a detailed description of these rankings and Chapter 22 addresses mitigations actions for this hazard vulnerability.

19.5.3 Critical Facilities and Infrastructure

Damage to roadways and structures poses the greatest issue for emergency functions during an event. Of particular concern are roads providing access to vulnerable populations and critical facilities. Severe damage to major routes can disrupt the shipment of goods and other commerce as well as emergency functions. Damage to certain facilities could cause prolonged impacts on the planning area.

19.5.4 Environment

The vulnerability of the environment to HAZMATs is the same as the exposure, discussed in Section 19.4.4.

19.6 FUTURE TRENDS IN DEVELOPMENT

Jurisdictions in the planning area should ensure that known HAZMAT facilities are regulated under their planning and zoning programs. In areas where hazardous materials may be present, permitting processes should require investigations to assess risk and vulnerability to hazard areas. HAZMAT issues generally do impact land use and structure development. Issues pertaining to land use in these areas are likely addressed through jurisdictional building codes, ordinances, and regulations.

19.7 SCENARIO

Although HAZMAT incidents are infrequent, impacts can be significant. A worst-case event would involve a large HAZMAT incident in a populated area. Such an event could lead to the instantaneous loss of life and property. If a major roadway were to be involved in such an event, emergency operations and supply chains could be hindered, causing further risks to public health and safety. Damage to subsurface infrastructure could hinder water, electric, sewer, and gas supply to portions of the planning area. Damage to this infrastructure could also lead to the contamination of the water supply resulting in long-lasting impacts.

19.8 ISSUES

The major issues for a HAZMAT incident are the following:

- Hazardous materials incidents are unpredictable and can spread fast leaving little time to react and mitigate the effects of the incident
- Spills and releases can cause facilities to be shut down for prolonged periods
- The capacity for backup power generation is limited
- The older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to HAZMAT incidents

- Knowledge of the long-term impacts of solar Farms to land, agriculture, soil, and groundwater is limited, and means to mitigate these potential impacts are not well defined

Chapter 20. LAND SUBSIDENCE

LAND SUBSIDENCE RANKING	
Wharton County	Low
City of East Bernard	Low
City of El Campo	Low
City of Wharton	Low

<u>DEFINITIONS</u>	
Land Subsidence	Gradual or sudden sinking of the Earth’s surface due to the removal or displacement of subsurface earth materials
Sinkhole	Depression in the ground that has no natural external surface drainage – type of land subsidence

20.1 GENERAL BACKGROUND

According to the USGS, land subsidence is the gradual or sudden sinking of the Earth’s surface due to the removal or displacement of subsurface earth materials (USGS, n.d.). Land subsidence can be characterized by the gradual sinking of the Earth’s surface over an extended period of time or by the sudden sinking of the Earth’s surface. The two causes of subsidence are natural compression and human activity. USGS (2000) notes the following:

The principal causes (of land subsidence) are aquifer-system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost (National Research Council, 1991). Three distinct processes account for most of the water-related subsidence--compaction of aquifer systems, drainage and subsequent oxidation of organic soils, and dissolution and collapse of susceptible rocks.

The pumping of groundwater remains the largest cause of subsidence in the United States. More than 80 percent of identified land subsidence occurrences in the United States have been caused by human interaction with subsurface water. Although aquifer systems have the ability to recharge, the excessive pumping of groundwater can lead to compaction which is largely unrecoverable (USGS, 2000). The level of depressurization that an aquifer might experience varies greatly depending on the distribution of clays and sands within an aquifer due to their grain structure (Young, et.al., 2020). Clay’s compressibility is far greater than that of sand allowing for greater subsurface compression (Freeze & Cherry 1979; Domenico & Schwartz, 1990). Another attribute leading to greater subsidence levels when comparing clay and sand is the difference in porosity. Due to the higher porosity associated with clay at the time of deposition, clays can experience a greater overall reduction in porosity over time compared to sand deposits. This results in greater land subsidence in areas with large clay deposits (Young, et.al., 2020).

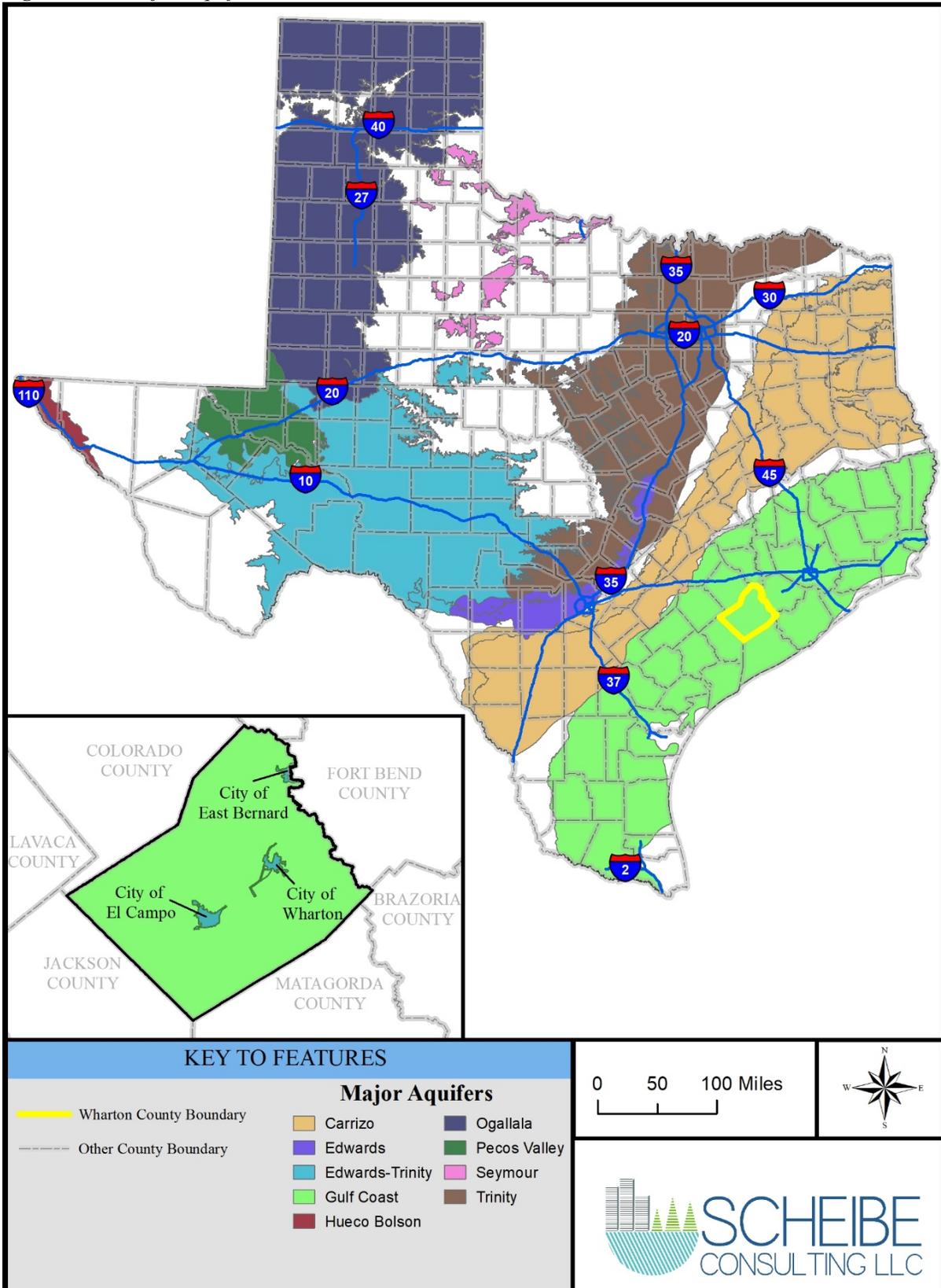
Another major contributor to land subsidence occurrences, specifically sinkholes, is the rock type of an area. As ground-water levels decrease from pumping and percolation increase, rock types susceptible to dissolution in water begin to form cavities. These rock cavities tend to be associated with two specific

rock types: evaporites (salt, gypsum, and anhydrite) and carbonates (limestone and dolomite). Evaporites tend to form cavities in a relatively short time, a few days or years, when compared to carbonates that can take centuries to millennia to form. Approximately 40 percent of the contiguous United States (including Wharton County and participating communities) is underlain with evaporites and approximately 40 percent of the United States east of Tulsa, Oklahoma consists of carbonate karst landscapes (USGS, 2000).

20.1.1 Texas Gulf Coast Aquifer

The Houston-Galveston region is one of the largest areas of land subsidence in the United States. Running parallel to the Gulf of Mexico coastline, the Texas coastal region contains the largest aquifer system in Texas stretching from the border of Louisiana to the border of Mexico. Figure 20-1 shows the Gulf Coast Aquifer expanding 41,970 square miles, encompassing 56 counties, including Wharton County (Texas Water Development Board, n.d.). Although Wharton is not affected to the extent of the Houston-Galveston metropolitan area, the county still experiences land subsidence due to the Texas Gulf Coast Aquifer.

Figure 20-1. Major Aquifers in Texas



Note: From Texas Water Development Board (n.d)

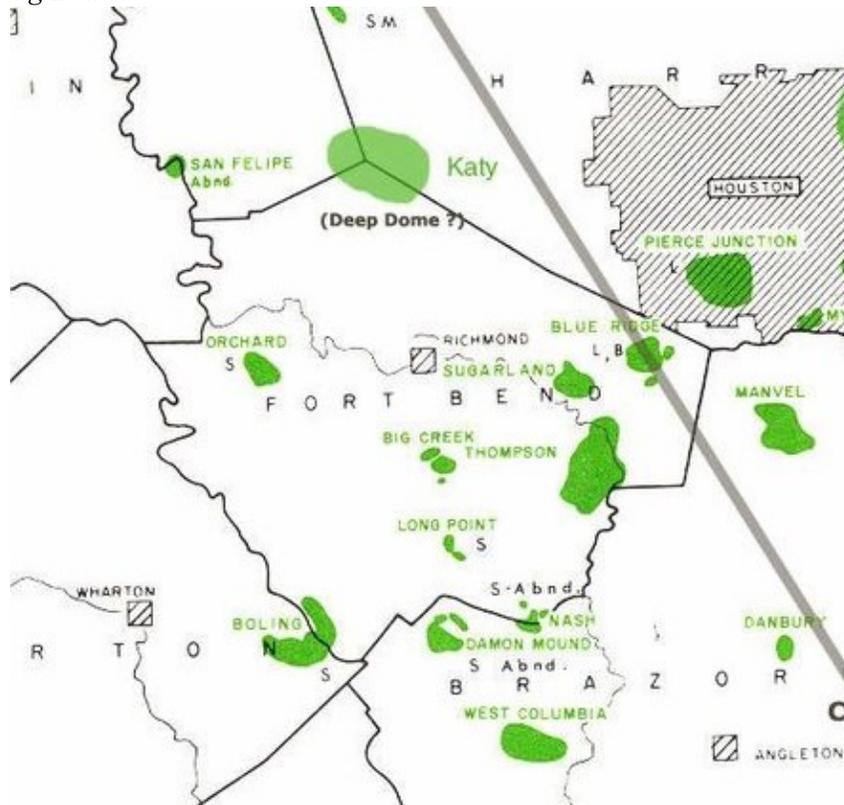
20.2 HAZARD PROFILE

20.2.1 Past Events

The most notable historical event of land subsidence in Wharton County is the sinkhole that opened on August 12, 1983, near the town of Boling. On the western bank of the San Bernard River in Wharton County lies the Boling Dome (see Figure 20-2). Stretching five miles east-west and 3 miles north-south, this oval-like salt dome contains petroleum, sulfur, and salt. Due to its rich mineral deposits, mining from the Boling Dome began in March of 1929. Sulfur mining started in 1929 and lasted until 1993. During the sulfur mining period, over 8,000 wells were drilled, removing 80.8 million tons of sulfur. Oil production from the Boling Dome produced 6,246 million cubic feet of natural gas and 25,635,836 barrels of oil with the use of 12,000 wells between 1925 and 1989. Today, Valero, Incorporated uses the Boling Dome for 7.5 million barrels of gas storage within the salt stock (Hudgins, n.d.)

Likely due to subsurface instability caused by the removal of subsurface mineral deposits, a sinkhole opened three miles northeast of the City of Boling on August 12, 1983. Spanning approximately 250 feet in diameter and twenty-five feet deep, the sinkhole opened up along Farm Road 442 collapsing the roadway. Gulf Production Company records showed a well location drilled in 1927 existed near the center of the sinkhole. Although this is the largest sinkholes to open over the Boling Dome, several other sinkholes have occurred over the area (Hudgins, n.d.).

Figure 20-2. Boling Dome

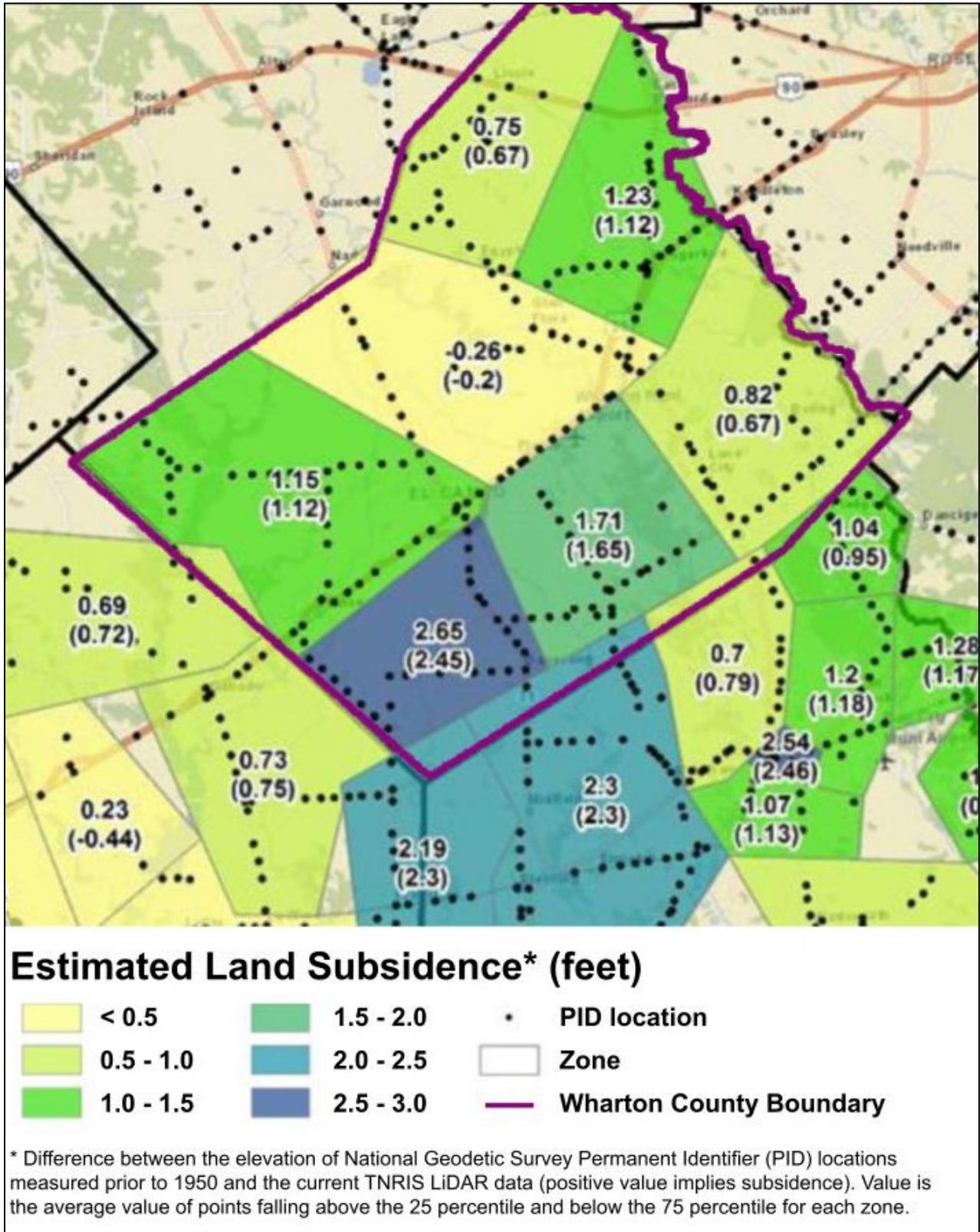


Note: From Growth Faulting and Subsidence in the Houston, Texas Area: Guide to the Origins, Relationships, hazards, Potential Impacts and Methods of Investigation: An Update (Campbell & Wise, 2018)

Land Subsidence Studies

Although land subsidence occurrences are recorded throughout the Texas Gulf Aquifer, very few studies have been conducted beyond the Houston-Galveston area. This is largely, in part, due to the level, difficulty, and expense associated with these studies. One study conducted by Ratzlaff (1982) noted land subsidence throughout Wharton County and neighboring counties as less than 0.5 ft (0.15 m) from 1918 to 1973. Another study conducted by Young (2016) indicated at least 2 ft of land subsidence had occurred over a more than 50-year time period in Wharton County. This was determined when comparing photoionization detector (PID) data collected prior to 1950 and Light Detection and Ranging (LiDAR) surveys collated after 2006. Figure 20-3 displays the “estimated average land subsidence from before 1950 to after 2003 for specific polygons as determined by the difference between ground surface elevation from PIDs surveyed prior to 1950 and from LiDAR surveys after 2006 at the locations of the PIDs. Land subsidence values are expressed as averages and medians (in parenthesis) of the differences calculated at PIDs located inside the polygons. Positive values indicate lower ground surface elevation at a later time. Negative values indicate higher ground surface elevations at a later time” (Young, 2016).

Figure 20-3. Estimates of Land Subsidence Rates in Wharton County Based on the Analysis of Remote Sensing Data



Note: From Young (2016)

The following information comes from a recent study of Wharton County, prepared for the Coastal Bend Groundwater Conservation District, which analyzed land subsidence in the Wharton County conducted by Young, et. al. (2020).

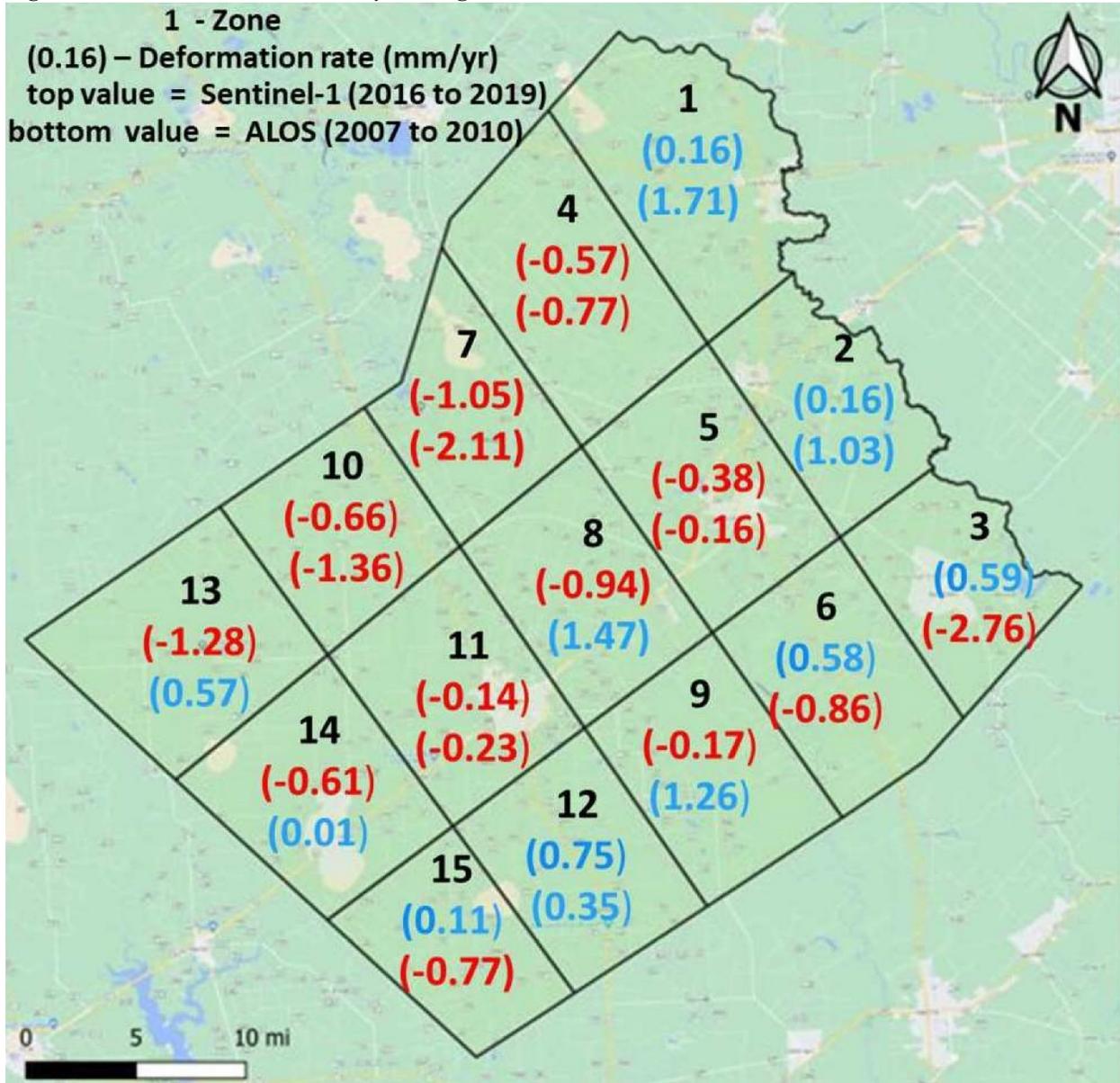
The study assessed land subsidence during two time periods: 2015 to 2019 and 2007 to 2010. Wharton County was divided into 15 zones for analysis. The study concluded for the period of 2015 to 2019, “the average deformation for the 15 zones ranged from -1.28 mm/yr (land subsidence) to 0.75 mm/yr (land uplift). Specifically, “the ground surface in the southern and eastern portion of Wharton County is generally uplifting, whereas in the portion of Wharton County north of Highway 59 and northwest of the City of Wharton is generally subsiding”. For the period between 2007 to 2010 “the average deformation rates for the 15 zones ranged from -2.76 mm/yr (land subsidence) to 1.7 mm/yr (land uplift).” Figure 20-4 compares the average rate of deformation for the 15 zones. Negative values indicate a rate of subsidence. Positive values indicate rates of rebound.

Although Wharton County is experiencing land subsidence, one of the most significant findings of this data set was that the land subsidence rates in Wharton County are not greater than that of the naturally occurring land subsidence along the Texas Gulf Coast; the land subsidence throughout Wharton County was less than 8 mm/year. The low rate of land subsidence documented in this study was partially attributed to the relatively stable annual mean water levels in the Texas Gulf Coast Aquifer System over the last twenty years. The study also notes the importance of the historical pumping rates in Wharton County:

With regard to land subsidence, a very significant aspect of the historical pumping rates is the pumping rate from 2007 to 2018 relative to the previous pumping period. Based on the changes in the historical pumping rates, land subsidence rates in Wharton were likely the greatest from about 1960 to about 1995. From about 1995 to 2007, the slow hydraulic response of the clays to the increased aquifer water levels caused by a reduction of pumping would likely have allowed land subsidence to continue a few years after 1995 but at a much-reduced rate than before 1995. From 2007 to 2018, changes in land surface elevation would remain relatively small because the average annual pumping level of 125,700 AFY is about 15% less than the average annual pumping rate of 160,700 AFY from 1968 to 2007.

When comparing the historical pumping rates to the findings of all three studies, a strong correlation can be seen between the land subsidence rates and the historical pumping rates.

Figure 20-4. Land Subsidence Study Averages 2007 to 2010 and 2015 to 2019



Note: From Mapping of Ground Surface Deformation Rates in Wharton County Based on the Analysis of Remote Sensing Data (Young, et. al., 2020)

20.2.2 Location

Wharton County and the participating communities are susceptible to land subsidence. Although most of the land subsidence occurrence in Wharton County is characterized as a slow process and goes largely unnoticed, occurrences of sudden land subsidence in the area have been recorded. The sinkhole which opened in 1983 in the unincorporated area of Wharton County north-east of the town of Boling where mineral removal has occurred is the most significant recorded sudden land subsidence event. Although this is a significant event, smaller sudden land subsidence events have occurred throughout the Boling Dome area. Sudden land subsidence can cause major damage to both subsurface infrastructure and

surface infrastructure. As in the case of the Boling Sinkhole in 1983, roadways can become damaged and made impassable.

Though largely unnoticed, gradual land subsidence in Wharton County remains an issue. Land subsidence has been recorded throughout the county in multiple studies. One study noted the most recent significant shifts in Wharton County have been in the area north of Highway 59 and northwest of the City of Wharton. Local observations have also noted land subsidence along the new Lane City Dam located at Arbuckle Reservoir 8 miles south-east of the City of Wharton and 6.5 miles south-west of the City of Boling as well as along the Colorado River near the Arbuckle Reservoir at the Lane City River Gauge by LCRA.

20.2.3 Frequency

As discussed in Past Events and Land Subsidence Studies (section 20.2.1 and 20.2.2), only one major occurrence of sudden land subsidence has been recorded in Wharton County, specifically to the northeast of the City of Boling. However, gradual land subsidence remains an issue throughout Wharton County as it is a natural process that can be exacerbated by human activity. With documented land subsidence in Wharton County and participating communities since before 1950, the probability of a future land subsidence event for the planning area is high (probable in the next 10 years).

20.2.4 Severity

The magnitude and severity of land subsidence in Wharton County and the participating communities are largely related to the extent and location of the areas that are impacted. Sudden land subsidence events can cause property damage as well as loss of life; however, events may also occur in remote areas of the planning area where there is little to no impact on people or property. If subsurface conditions remain stable, future events can be assumed to be similar in extent and severity as previous events in the area, averaging 0.70mm/yr.

20.2.5 Warning Time

Generally, land subsidence occurs over an extended period of time, going largely unnoticed; however, sudden land subsidence can occur with little to no warning. Although naturally occurring, these processes may be intensified as a result of human activities, mainly groundwater pumping.

20.3 SECONDARY HAZARDS

Events that cause damage to improved areas can result in secondary hazards, such as explosions from natural gas lines, loss of utilities (such as water and sewer due to shifting infrastructure), and potential failures of reservoir dams. Water and sewer damage can lead to groundwater contamination risking environmental health and safety. Over time land subsidence may also cause changes in elevation and slope of waterways reducing or hindering drainage capacity of an area causing excessive flooding; damage public infrastructures such as roadways, bridges, and railways hindering emergency operations; and damage public and private buildings causing foundation issues or lowering finished floor elevations, resulting in higher flood hazards (Leake, 2016).

20.4 CLIMATE CHANGE IMPACTS

In areas where climate change results in less precipitation and reduced surface-water supplies, communities will pump more groundwater. Changes in precipitation events and the hydrological cycle may result in changes in the rate of subsidence. The reduction of surface water will likely coincide with a population increase and a rise in potable water supply-demand. As groundwater pumping levels rise, land subsidence rates will likely increase due to the high correlation noted between groundwater pumping levels and land subsidence.

20.5 EXPOSURE

While all structures and foundations are exposed to land subsidence in Wharton County, some areas such as that over the Boling Dome are at a higher risk for sudden land subsidence occurrence due to increased human interaction with subsurface minerals. Each participating community's structures and population are potentially exposed and at risk by expansive soils. Table 20-1 lists the exposed population and structure count for each participating jurisdiction.

20.5.1 Population

It can be assumed that the entire planning area is exposed to some extent to land subsidence. Certain areas are more exposed due to geographic location and human activity. Current growth trends could cause more planning area residents to be exposed to land subsidence. Increased population will increase demands on structure development, as well as sub-surface water use which may lead to higher land subsidence rates.

20.5.2 Property

According to the HAZUS-MH inventory data (updated with 2010 U.S. Census data and 2018 RS Means Square Foot Costs), there are 16,979 buildings within the census blocks that define the planning area with an asset replaceable value of almost \$3.9 billion (excluding contents). About 91% of these buildings (and 75% of the building value) are associated with residential housing. Other types of buildings in this report include agricultural, education, religious, and governmental structures. See hazard loss tables for community-specific total assessed numbers (e.g., Table 20-3). Table 20-2 lists the exposed structures and population for the participating communities.

Although all structures within the planning area are considered to be exposed to land subsidence, those located near the Boling Dome are particularly vulnerable to sudden land subsidence.

**TABLE 20-1
EXPOSED STRUCTURES AND POPULATION**

Jurisdiction	Residential	Commercial	Other *	Total Structures	Total Population
City of East Bernard	909	62	43	1,014	2,272
City of El Campo	4,465	352	200	5,017	11,602
City of Wharton	3,299	321	138	3,758	8,832
Unincorporated Area	6,799	210	181	7,190	18,574
Wharton County Total	15,472	945	562	16,979	41,280

Note: *Other includes industrial, agricultural, religious, governmental, and educational classifications.

20.5.3 Critical Facilities and Infrastructure

All critical facilities are considered exposed to land subsidence. There are several major roads that are available to move people and supplies throughout the region. Damage to these roads and other infrastructure could hinder emergency services and affect public health and safety.

20.5.4 Environment

The environment is highly exposed to land subsidence. Natural habitats can experience major damage and destruction during land subsidence events.

20.6 VULNERABILITY

Wharton County and participating communities have a high risk from land subsidence as studies have recorded continual subsidence in the area since the 1950s. For the specific rankings given for each entity see ranking tables in chapter 21. Because land subsidence cannot be directly modeled in HAZUS-MH, annualized losses were estimated using GIS-based analysis, historical data analysis, and statistical risk assessment methodology. Event frequency, severity indicators, expert opinions, and historical local knowledge of the region were used for this assessment.

20.6.1 Population

The risk of injury or fatalities as a result of this hazard is limited but possible. The most vulnerable demographics will be the economically disadvantaged population areas, children under 16 years, and the elderly. Economically disadvantaged families and those living on a fixed income may not have the financial means to adequately deal with the effects of an event and make the necessary structural improvements. The youth and elderly population may require further assistance as dependents if an event were to occur. Table 20-2 shows all vulnerable populations per participating community.

TABLE 20-2 MOST VULNERABLE POPULATION						
Jurisdiction	Youth Population (< 16)	% of Total Population	Elderly Population (> 65)	% of Total Population	Economically Disadvantage (Income < \$20,000)	% of Total Population
City of East Bernard	638	28.07	342	15.05	129	5.68
City of El Campo	3402	29.33	1648	14.21	992	8.55
City of Wharton	2317	26.23	1288	14.58	1251	14.17
Unincorporated Area	4,715	25.39	2,741	14.76	1,537	8.28
Wharton County Total	11,072	26.82	6,019	14.58	3,910	9.47

All properties are at some level of risk from land subsidence, but properties in poor condition or in particularly vulnerable locations may risk the most damage. Generally, damage is minimal and goes unreported.

Loss estimations for land subsidence hazards are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing projected damages (annualized loss) on exposed values. Historical events, statistical analysis, and probability factors were applied to the counties and communities exposed values to create an annualized loss. Table 20-3 lists the property loss estimates for each participating community compared to the exposed value including structure and content. Annualized losses of ‘negligible’ are less than \$50 annually. The Negligible loss hazards are still included despite minimal annualized losses because of the potential for a high-value damaging event.

TABLE 20-3 LOSS ESTIMATES FOR LAND SUBSIDENCE			
Jurisdiction	Exposed Value	Annualized Loss	Annualized Loss Percentage
City of East Bernard	\$391,249,566	Negligible	Negligible
City of El Campo	\$2,159,712,947	Negligible	Negligible
City of Wharton	\$1,416,664,643	Negligible	Negligible
Unincorporated Area	\$2,255,940,086	Negligible	Negligible
Wharton County Total	\$6,233,567,243	Negligible	Negligible

Vulnerability Narrative

All participating communities are at risk to land subsidence. Table 20-1 list the exposed structures and population for each participating community. Table 20-2 lists the vulnerable population per community. Notably, the portions of Wharton County, north of Highway 59 and northwest of the City of Wharton as well as the area located over the Boling Dome, have recorded incidence of significant land subsidence. As the population of the unincorporated areas of Wharton County continues to increase, vulnerability to land subsidence events will increase.

Community Perception of Vulnerability

See the front page of the current chapter for a summary of hazard rankings for Wharton County and participating communities in this HMP update. Chapter 21 gives a detailed description of these rankings and Chapter 22 addresses mitigations actions for this hazard vulnerability.

20.6.2 Critical Facilities and Infrastructure

Damage to roadways and structures poses the greatest issue for the community. Of particular concern are roads providing access to vulnerable populations and critical facilities. Severe damage to major routes can disrupt the shipment of goods and other commerce as well as emergency functions. Damage to certain facilities could cause prolonged impacts on the planning area.

20.6.3 Environment

The vulnerability of the environment to winter weather is the same as the exposure, discussed in Section 20.5.4.

20.7 FUTURE TRENDS IN DEVELOPMENT

All future development will be affected by land subsidence. The vulnerability of community assets to land subsidence is increasing over time as more people enter the planning area. The ability to withstand impacts lies in sound land-use practices. Future coordination with groundwater districts will help to monitor and mitigate the effects of land subsidence on new structures. This will allow the communities to deal with future growth and the associated impacts of land subsidence.

20.8 SCENARIO

Although sudden land subsidence events are infrequent, impacts can be significant. A worst-case event would involve a large, sudden land subsidence event in a populated area. Such an event could lead to the instantaneous loss of life and property. If a major roadway were to be involved in such an event, emergency operations and supply chains could be hindered resulting in further risks to public health and safety. Damage to subsurface infrastructure could hinder water, electric, sewer, and gas supply to portions of the planning area. Damage to this infrastructure could also lead to the contamination of the water supply resulting in long-lasting impacts.

20.9 ISSUES

Important issues associated with land subsidence in the planning area include the following:

- Rising rates of land subsidence are in many cases closely related to changes in groundwater pumping rates. Groundwater interaction (draw-down and recharge) should be closely monitored.
- A more detailed analysis should be conducted for critical facilities and infrastructure within the planning area in regard to land subsidence. The analysis should address how potential structural issues were addressed in facility design and construction.
- Continue monitoring the Lane City gauge subsidence and determine if new more stringent flood standards are needed and to be set to mitigate for added flood risk.

Chapter 21.

PLANNING AREA RISK RANKING

A risk ranking was performed for the hazards of concern described in this plan. This risk ranking assesses the probability of each hazard's occurrence as well as its likely impact on the people, property, and economy of the planning area. The risk ranking was conducted by the Planning Committee based on the hazard risk assessment as well as local knowledge of the planning area. Estimates of risk were generated with data from HAZUS-MH using methodologies promoted by FEMA. The hazard rankings were used in establishing mitigation action priorities.

21.1 PROBABILITY OF OCCURRENCE

The probability of occurrence of a hazard is indicated by a probability factor based on the likelihood of annual occurrence:

- **High** – Hazard event is likely to occur within 10 years (Probability Factor = 3)
- **Medium** – Hazard event is likely to occur within 25 years (Probability Factor = 2)
- **Low** – Hazard event is not likely to occur within 100 years (Probability Factor = 1)
- **No exposure** – There is no probability of occurrence (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the planning area. The probability of occurrence is shown in Table 21-1.

**TABLE 21-1.
HAZARD PROBABILITY OF OCCURRENCE**

	Wharton County		City of East Bernard		City of El Campo		City of Wharton	
Hazard	High/Med/ Low/No	Probability Factor	High/Med/ Low/No	Probability Factor	High/Med/ Low/No	Probability Factor	High/Med/ /Low/No	Probability Factor
Dam/Levee Failure	L	1	L	1	L	1	L	1
Drought	H	3	H	3	H	3	H	3
Earthquake	L	1	L	1	L	1	L	1
Expansive Soils	H	3	H	3	M	2	H	3
Extreme Heat	H	3	H	3	H	3	H	3
Flood	H	3	H	3	H	3	H	3
Hail	H	3	H	3	H	3	H	3
Hazardous Materials	H	3	H	3	H	3	H	3
Hurricane/ Tropical Storm	H	3	H	3	H	3	H	3
Land Subsidence	H	3	H	3	H	3	H	3
Lightning	H	3	H	3	H	3	H	3
Pandemic	H	3	H	3	H	3	H	3
Tornado	H	3	H	3	H	3	H	3
Wildfire	H	3	M	2	H	3	H	3
Wind	H	3	H	3	H	3	H	3
Winter Weather	H	3	H	3	H	3	H	3

21.2 IMPACT

Hazard impacts were assessed in three categories, impacts on: people, property, and the local economy. The planners generally followed the following ranking system for each category. Planners also applied an element of subjectivity when assigning values for impacts based on their local knowledge. Numerical impact factors were assigned as follows:

People – Values were assigned based on the percentage of the total population exposed to the hazard event, but a level of subjectivity was applied to these rankings based on the local knowledge. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people who live in a hazard zone will be equally impacted when a hazard event occurs. Impact factors were assigned as follows:

- High – 50% or more of the population is exposed to a hazard (Impact Factor = 3)
- Medium – 25% to 49% of the population is exposed to a hazard (Impact Factor = 2)
- Low – 24% or less of the population is exposed to the hazard (Impact Factor = 1)
- No impact – None of the population is exposed to a hazard (Impact Factor = 0)

Property – Values were assigned based on the percentage of the total assessed property value exposed to the hazard event, but a level of subjectivity was applied to these rankings based on local knowledge:

- High – 30% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)
- Medium – 15% to 29% of the total assessed property value is exposed to a hazard (Impact Factor = 2)
- Low – 14% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)
- No impact – None of the total assessed property value is exposed to a hazard (Impact Factor = 0)

Economy – Values were assigned based on total impact to the economy from the hazard event and activities conducted after the event to restore the community to previous functions. Values were assigned based on the number of days the hazard impacts the community, including impacts on tourism, businesses, road closures, or government response agencies, but a level of subjectivity is applied to these rankings based on local knowledge.

- High – Community impacted for more than 7 days (Impact Factor = 3)
- Medium – Community impacted for 1 to 7 days (Impact Factor = 2)
- Low – Community impacted for less than 1 day (Impact Factor = 1)
- No impact – No community impacts estimated from the hazard event (Impact Factor = 0)

The impacts of each hazard category were assigned a weighting factor to reflect the significance of the impact. These weighting factors are consistent with those typically used for measuring the benefits of hazard mitigation actions: impact on people was given a weighting factor of 3; impact on property was given a weighting factor of 2; and impact on the economy was given a weighting factor of 1. The impacts for each hazard are summarized in Table 21-2 through Table 21-4. The total impact factor shown on the tables equals the impact factor multiplied by the weighting factor.

**TABLE 21-2.
IMPACT ON PEOPLE FROM HAZARDS**

	Wharton County		City of East Bernard		City of El Campo		City of Wharton	
Hazard	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor
Dam/Levee Failure	L	1	L	1	L	1	H	3
Drought	H	3	L	1	M	2	L	1
Earthquake	L	1	L	1	L	1	L	1
Expansive Soils	M	2	L	1	H	3	M	2
Extreme Heat	H	3	M	2	H	3	M	2
Flood	H	3	H	3	H	3	H	3
Hail	M	2	L	1	M	2	L	1
Hazardous Materials	H	3	H	3	H	3	H	3
Hurricane/ Tropical Storm	H	3	H	3	H	3	H	3
Land Subsidence	L	1	L	1	L	1	L	1
Lightning	L	1	L	1	M	2	L	1
Pandemic	H	3	H	3	H	3	H	3
Tornado	M	2	M	2	L	1	M	2
Wildfire	M	2	L	1	M	2	L	1
Wind	L	1	L	1	H	3	L	1
Winter Weather	L	1	L	1	M	2	M	2

**TABLE 21-3.
IMPACT ON PROPERTY FROM HAZARDS**

	Wharton County		City of East Bernard		City of El Campo		City of Wharton	
Hazard	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor
Dam/Levee Failure	L	1	L	1	L	1	H	3
Drought	H	3	L	1	M	2	L	1
Earthquake	L	1	L	1	L	1	L	1
Expansive Soils	M	2	L	1	H	3	M	2
Extreme Heat	H	3	M	2	H	3	M	2
Flood	H	3	H	3	H	3	H	3
Hail	M	2	L	1	M	2	L	1
Hazardous Materials	H	3	H	3	H	3	H	3
Hurricane/ Tropical Storm	H	3	H	3	H	3	H	3
Land Subsidence	L	1	L	1	L	1	L	1
Lightning	L	1	L	1	M	2	L	1
Pandemic	L	1	H	3	L	1	L	1
Tornado	M	2	M	2	L	1	M	2
Wildfire	M	2	L	1	M	2	L	1
Wind	L	1	L	1	H	3	L	1
Winter Weather	L	1	L	1	M	2	M	2

**TABLE 21-4.
IMPACT ON ECONOMY FROM HAZARDS**

	Wharton County		City of East Bernard		City of El Campo		City of Wharton	
Hazard	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor	High/Med /Low/No	Total Impact Factor
Dam/Levee Failure	L	1	L	1	L	1	H	3
Drought	H	3	L	1	M	2	L	1
Earthquake	L	1	L	1	L	1	L	1
Expansive Soils	M	2	L	1	H	3	M	2
Extreme Heat	H	3	M	2	H	3	M	2
Flood	H	3	H	3	H	3	H	3
Hail	M	2	L	1	M	2	L	1
Hazardous Materials	H	3	H	3	H	3	H	3
Hurricane/ Tropical Storm	H	3	H	3	H	3	H	3
Land Subsidence	L	1	L	1	L	1	L	1
Lightning	L	1	L	1	M	2	L	1
Pandemic	H	3	H	3	H	3	H	3
Tornado	M	2	M	2	L	1	M	2
Wildfire	M	2	L	1	M	2	L	1
Wind	L	1	L	1	H	3	L	1
Winter Weather	L	1	L	1	M	2	M	2

21.3 RISK RATING AND RANKING

The risk rating for each hazard was calculated by multiplying the probability factor by the sum of the weighted impact factors for people, property, and operations, as summarized in Table 21-5. Based on these ratings, a priority of high, medium, or low was assigned to each hazard. The hazards ranked as being of highest concern vary by jurisdiction but generally include drought, extreme heat, flood, hurricane/tropical storm, and pandemic. Table 21-6 summarizes the hazard risk ranking.

**TABLE 21-5.
HAZARD RISK RANKING CALCULATIONS**

	Wharton County			City of East Bernard			City of El Campo			City of Wharton		
Hazard	Probability Factor	Impact Weighted Sum	Total	Probability Factor	Impact Weighted Sum	Total	Probability Factor	Impact Weighted Sum	Total	Probability Factor	Impact Weighted Sum	Total
Dam/Levee Failure	1	6	6	1	6	6	1	6	6	1	18	18
Drought	3	18	54	3	6	18	3	12	36	3	6	18
Earthquake	1	6	6	1	6	6	1	6	6	1	6	6
Expansive Soils	3	12	36	3	6	18	2	18	36	3	12	36
Extreme Heat	3	18	54	3	12	36	3	18	54	3	12	36
Flood	3	18	54	3	18	54	3	18	54	3	18	54
Hail	3	12	36	3	6	18	3	12	36	3	6	18
Hazardous Materials	3	18	54	3	18	54	3	18	54	3	18	54
Hurricane/ Tropical Storm	3	18	54	3	18	54	3	18	54	3	18	54
Land Subsidence	3	6	18	3	6	18	3	6	18	3	6	18
Lightning	3	6	18	3	6	18	3	12	36	3	6	18
Pandemic	3	14	42	3	18	54	3	14	42	3	14	42
Tornado	3	12	36	3	12	36	3	6	18	3	12	36
Wildfire	3	12	36	2	6	12	3	12	36	3	6	18
Wind	3	6	18	3	6	18	3	18	54	3	6	18
Winter Weather	3	6	18	3	6	18	3	12	36	3	12	36

Notes:

Impact Weighted Sum=Total Impact Factor People+ Total Impact Factor Property + Total Impact Factor Economy

Total = Probability x Impact Weighted Sum

**TABLE 21-6.
HAZARD RISK SUMMARY**

Hazard	Wharton County	City of East Bernard	City of El Campo	City of Wharton
Dam/Levee Failure	Low	Low	Low	Low
Drought	High	Medium	Medium	Low
Earthquake	Low	Low	Low	Low
Expansive Soils	Medium	Medium	Medium	Medium
Extreme Heat	High	High	High	Medium
Flood	High	High	High	High
Hail	Medium	Medium	Medium	Low
Hazardous Materials	High	High	High	High
Hurricane/ Tropical Storm	High	High	High	High
Land Subsidence	Low	Low	Low	Low
Lightning	Low	Medium	Medium	Low
Pandemic	High	High	High	High
Tornado	Medium	High	Low	Medium
Wildfire	Medium	Low	Medium	Low
Wind	Low	Medium	High	Low
Winter Weather	Low	Medium	Medium	Medium

PART 3
MITIGATION AND PLAN
MAINTENANCE STRATEGY

Chapter 22.

AREA-WIDE MITIGATION ACTIONS AND IMPLEMENTATION

The Steering Committee reviewed a variety of hazard mitigation alternatives that present a broad range of alternatives to be considered for use in the planning area, in compliance with Title 44 Code of Federal Regulations (44 CFR) (Section 201.6(c)(3)(ii)). The menu provided a baseline of mitigation alternatives that are backed by a planning process, are consistent with the planning partners' goals and objectives, and are within the capabilities of the partners to implement. The Steering Committee reviewed the full range of actions as well as the county and participating cities' ability to implement the variety of mitigation actions. Hazard mitigation actions recommended in this plan were selected from among the alternatives presented in the menu as well as other projects known to be necessary.

22.1 RECOMMENDED MITIGATION ACTIONS

The planning partners and the Steering Committee identified actions that could be implemented to provide hazard mitigation benefits. Table 22-1 lists the recommended mitigation actions and the hazards addressed by the action. All of the hazards profiled in this plan are addressed by more than one mitigation action.

Table 22-2 provides more details on the mitigation actions, including the mitigation action description, action type, estimated cost, potential funding sources, timeline, and benefit to the community (high, medium, or low). Mitigation types used for this categorization are as follows:

- Local Plans and Regulations (LPR) – These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.
- Structure and Infrastructure Projects (SIP) – These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
- Natural Systems Protection (NSP) – These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.
- Education and Awareness Programs (EAP) – These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These initiatives may also include participation in national programs, such as StormReady and Firewise Communities.

22.2 BENEFIT/COST REVIEW AND PRIORITIZATION

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) Grant Program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Each of the mitigation actions was assigned a subjective ranking (high,

medium, and low) based on these discussions related to the costs and benefits of these projects. Table 22-2 shows the benefit of each mitigation action.

The committee analyzed all chosen mitigation actions and used a prioritization method based on the method used in the previous hazard mitigation plan. This prioritization evaluation process reviewed specific characteristics for each mitigation action. The evaluated components are as follows: cost-benefit ranking, benefits to life safety, property protection, cost-effectiveness, multi-hazard reduction, timeline, and feasibility.

The planning partners used the results of the benefit/cost review and prioritization exercise to rank the mitigation actions in order of priority, with 1 being the highest priority. The highest priority mitigation actions are shown in red on Table 22-2, medium priority actions are shown in yellow, and low priority actions are shown in green.

**TABLE 22-1.
MITIGATION ACTIONS DEVELOPED TO ADDRESS HAZARDS**

Action No.	Title	Dam/Levee Failure	Drought	Earthquake	Expansive Soil	Extreme heat	Flood	Hail	Hazardous Material	Land Subsidence	Hurricane/ Tropical Storm	Lightning	Pandemic	Tornado	Wildfire	Wind	Winter Weather
WHARTON COUNTY																	
1	Improve drainage infrastructure throughout the County (Bridge, culvert, channel, levee, and dam projects)	X					X				X						
2	Update and adopt the Wharton County Flood Insurance Study and FIRM						X										
3	Adopt “Higher Standard” Riverine Flood Damage Prevention Ordinances and Standards						X										
4	Join FEMA’s CRS Program						X										
5	Create/Maintain a Wharton Disaster Response Team	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	Implement a Wharton County Flood Warning/Monitoring System						X										
7	Install emergency backup generators at critical facilities	X		X		X	X	X			X	X		X	X	X	X
8	Educate community on hazards	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	Drainage Master Plan Update						X										
10	Update Subdivision Ordinance				X		X				X						
11	Collaborate with Regional Flood Planning Group						X				X						
12	Collaborate with local canal owners to identify funding to improve and expand existing infrastructure	X	X		X												

**TABLE 22-1.
MITIGATION ACTIONS DEVELOPED TO ADDRESS HAZARDS**

Action No.	Title	Dam/Levee Failure	Drought	Earthquake	Expansive Soil	Extreme heat	Flood	Hail	Hazardous Material	Land Subsidence	Hurricane/ Tropical Storm	Lightning	Pandemic	Tornado	Wildfire	Wind	Winter Weather
13	Collaborate with local MUD Districts to establish/implement drought/expansive soils contingency plan		X		X												
14	Develop a plan to improve Pandemic response												X				
15	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic												X				
16	Collaborate with local groundwater district to monitor land subsidence									X							
17	Establish a county-wide hazardous material response team								X								
CITY OF EAST BERNARD																	
1	Purchase Public Hazard Alert System		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	Organize outreach program for vulnerable populations					X	X				X						X
3	Prepared and adopt a stormwater drainage plan and ordinance						X				X						
4	Update emergency response plan		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)						X				X						
6	Install emergency generators at critical facilities			X		X	X	X			X	X		X	X	X	X
7	Implementation of Zoning Ordinance				X		X				X						
8	Update Comprehensive Plan		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

**TABLE 22-1.
MITIGATION ACTIONS DEVELOPED TO ADDRESS HAZARDS**

Action No.	Title	Dam/Levee Failure	Drought	Earthquake	Expansive Soil	Extreme heat	Flood	Hail	Hazardous Material	Land Subsidence	Hurricane/ Tropical Storm	Lightning	Pandemic	Tornado	Wildfire	Wind	Winter Weather
9	Develop plan to improve Pandemic response												X				
10	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic												X				
11	Collaborate with local MUD Districts to establish/implement drought/expansive soils contingency plan		X		X												
12	Collaborate with local groundwater district to monitor land subsidence									X							
13	GIS Mapping				X		X										
14	Establish a hazardous material response team								X								
CITY OF EL CAMPO																	
1	Provide education on water conservation techniques		X														
2	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)						X				X						
3	Adopt freeboard ordinance						X				X						
4	Adopt IBC and IRC		X	X	X	X	X	X	X	X	X	X		X	X	X	X
5	GIS mapping				X		X										
6	Outreach to vulnerable populations regarding extreme and adverse weather/conditions					X											X

**TABLE 22-1.
MITIGATION ACTIONS DEVELOPED TO ADDRESS HAZARDS**

Action No.	Title	Dam/Levee Failure	Drought	Earthquake	Expansive Soil	Extreme heat	Flood	Hail	Hazardous Material	Land Subsidence	Hurricane/Tropical Storm	Lightning	Pandemic	Tornado	Wildfire	Wind	Winter Weather
7	Implement Master Drainage Plan (7 projects)						X				X						
8	Educate the community on all hazards		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	Alternative notification/alert system		X		X	X	X	X	X	X	X	X	X	X	X	X	X
10	Establish Post Disaster Temporary Transfer Center			X			X				X						
11	Establish/implement drought/expansive soils contingency plan		X		X												
12	Update Drainage master plan						X				X						
13	Develop a plan to improve Pandemic response												X				
14	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic												X				
15	Collaborate with local groundwater district to monitor land subsidence									X							
16	Establish a hazardous materials response team								X								
17	Install emergency generators at critical facilities			X		X	X	X			X	X		X	X	X	X
CITY OF WHARTON																	
1	Clean and repair storm drains routinely						X				X						
2	Increase freeboard requirements for permitting structures in the floodplain						X				X						

**TABLE 22-1.
MITIGATION ACTIONS DEVELOPED TO ADDRESS HAZARDS**

Action No.	Title	Dam/Levee Failure	Drought	Earthquake	Expansive Soil	Extreme heat	Flood	Hail	Hazardous Material	Land Subsidence	Hurricane/ Tropical Storm	Lightning	Pandemic	Tornado	Wildfire	Wind	Winter Weather
3	Implement a comprehensive watershed ordinance for new development						X										
4	Acquire, reuse, and preserve open spaces adjacent to flood-prone areas						X										
5	Educate the community on the hazards		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	Minimize the impact of flooding by installing berms and levees where appropriate						X				X						
7	Develop flood-reduction / stream restoration/channelization projects to ensure adequate drainage/diversion of stormwater						X				X						
8	Establish a reserve fund for emergency and public mitigation measures		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	Strengthen and harden at-risk critical facilities		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	Acquisition and relocation, elevation and “demo-rebuild” of flood-prone structures						X										
11	Install emergency backup generators at critical facilities			X		X	X	X			X	X		X	X	X	X
12	Use impact fees to help fund public hazard mitigation projects related to land development				X		X				X			X		X	
13	Implement warning systems		X		X	X	X	X	X	X	X	X	X	X	X	X	X
14	Establish/implement drought/expansive soil contingency plan		X		X												

**TABLE 22-1.
MITIGATION ACTIONS DEVELOPED TO ADDRESS HAZARDS**

Action No.	Title	Dam/Levee Failure	Drought	Earthquake	Expansive Soil	Extreme heat	Flood	Hail	Hazardous Material	Land Subsidence	Hurricane/Tropical Storm	Lightning	Pandemic	Tornado	Wildfire	Wind	Winter Weather
15	Update/implement Drainage Master Plan						X				X						
16	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)						X				X						
17	Develop a plan to improve Pandemic response												X				
18	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic												X				
19	Collaborate with local groundwater district to monitor land subsidence									X							
20	Establish a hazardous material response team								X								

Notes:

COVID-19	Coronavirus Disease 2019	GIS	Geographic Information System
CRS	Community Rating System	IBC	International Building Code
FEMA	Federal Emergency Management Agency	IRC	International Residential Code
FIRM	Flood Insurance Rate Map	MUD	Municipal Utility District

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
WHARTON COUNTY										
1	Improve drainage infrastructure throughout the County (Bridge, culvert, channel, levee, and dam projects)	Install larger drainage improvements throughout the county. During flood and hurricane events the streams overflow. There are areas that do not pass the required flow needed for emergency access during flood events.	1	SIP	G1, G2, G6	Drainage Department	>\$100,000	Road and Bridge Fund, State/Federal Grants	60	High
2	Update and adopt the Wharton County Flood Insurance Study and FIRM	Updated and adopt a new Flood Insurance Study and FIRM. This would prevent new properties from developing on the floodway.	8	LPR, EAP	G2	Commissioner's Court	>\$100,000	Road and Bridge Fund, State/Federal Grants, TWDB	60	Hight
3	Adopt "Higher Standard" Riverine Flood Damage Prevention Ordinances and Standards	This would result in a discount on insurance for new and existing properties and mitigate damages for both new and existing structures.	9	LPR	G2, G3, G6	Drainage Department	<\$10,000	Road and Bridge Fund	24	High
4	Join FEMA's CRS Program	Complete the initial steps to join FEMA's CRS program and reduce the cost of insurance for new and existing buildings. It is better to protect existing properties through the development of CRS activities.	17	LPR, EAP	G4, G6	Development Department	\$10,000 to \$100,000	County funds	60	Low
5	Create/Maintain a Wharton Disaster Response Team	Having a disaster response team in place that can respond quickly to a natural or man-caused event would prevent damage to existing buildings.	10	EAP	G1, G2, G6	Emergency Management	<\$10,000	County funds	60	High

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
6	Implement a Wharton County Flood Warning/Monitoring System	Wharton County experiences flooding at low-water crossing which can lead to injuries and even fatalities.	2	SIP	G1, G2	Commissioner's Court	>\$100,000	HGAC, State/Federal Grants	36	High
7	Install emergency backup generators at critical facilities	Install emergency back-up generators at critical facilities to provide backup power from hazard events.	3	SIP	G1, G3, G6	Commissioner's Court	>\$100,000	County funds, State/Federal grants	36	High
8	Educate the community on hazards	Educate the community on the hazards they are exposed to and how to mitigate their homes from hazards on the county website and public forums.	15	EAP	G1, G2, G3, G4, G5	Emergency Management	<\$10,000	County funds	60	Medium
9	Drainage Master Plan Update	Develop an update the 2010 DMP needed to identify and prioritize drainage improvements County-Wide	7	LPR	G2, G4, G5	Commissioner's Court	\$10,000 to \$100,000	County funds, State/Federal grants	60	Medium
10	Update Subdivision Ordinance	Update development regulations to resolve loop holes in standards and improve clarity	4	LPR	G2, G4, G5	Drainage Department	\$10,000 to \$100,000	County funds	24	High
11	Collaborate with Regional Flood Planning Group	Coordinate with RFPG to ensure projects are identified in their plan for future grant funding	5	LPR, EAP	G4, G5, G6	Drainage Department	<\$10,000	County funds	60	High

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
12	Collaborate with local canal owners to identify funding to improve and expand existing infrastructure	Coordinate with LCRA primarily as it relates to existing canal systems that may have leaks or seepages issues. Develop a plan to resolve these problems to help reduce water loss during droughts.	14	SIP	G1, G2, G4, G6	Commissioner's Court	\$10,000 to \$100,000	County funds, State/Federal grants	60	Low
13	Collaborate with local MUD Districts to establish/implement drought/expansive soils contingency plan	Coordinate with MUD districts on water, wastewater, and soil expansion plan. Identify projects for funding.	6	LPR	G3, G4, G5	Emergency Management	<\$10,000	County funds, State/federal grants	60	Low
14	Develop a plan to improve Pandemic response	Coordinate with regional partners to develop a regional plan to improve future Pandemic response.	12	LRP	G1, G4	Emergency Management	\$10,000 to \$100,000	County funds, State/federal grants	60	Medium
15	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic	Conduct "lessons learned" meetings related to the pandemic and compile a report.	11	LPR, EAP	G1, G4	Emergency Management	<\$10,000	County funds	12	Medium
16	Collaborate with local groundwater district to monitor land subsidence	This effort will include coordination and monitoring related to known subsidence issues. This may also include coordination with LCRA on known subsidence issues near the Lane City Gage.	16	LPR	G4	Emergency Management	<\$10,000	County funds	60	Low

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
17	Establish a county-wide hazardous material response team	Develop a county-wide hazard response team and coordinate a regional response plan.	13	LPR, EAP	G4	Emergency Management	<\$10,000	County funds	60	Medium
CITY OF EAST BERNARD										
1	Purchase Public Hazard Alert System	The city will purchase a public hazard alert system so that the city may provide warning to the citizens during a hazard event.	8	SIP	G1	Emergency Management	<\$10,000	City Funds	24	Medium
2	Organize outreach program for vulnerable populations	We will use several media outlets to promote accessible heating and cooling centers and education of flood and hurricane hazards to vulnerable populations.	10	EAP	G1, G3, G4, G6	Emergency Management	<\$10,000	Information Technology	60	Medium
3	Prepare and adopt a stormwater drainage plan and ordinance	Prepared and adopt a stormwater drainage plan and ordinance needed to prioritize and identify funding needed to implement the plan.	1	LPR	G1, G2, G3, G4, G5	City Secretary	\$10,000 to \$100,000	City Funds	36	High
4	Update emergency response plan	Form a committee to update the emergency response plan for emergency officials and personnel to use.	7	LPR	G1, G4	Emergency Management	<\$10,000	City and County funds	24	Medium
5	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)	Conduct a regional drainage assessment, develop a plan, and begin implementation of identified and prioritized projects.	2	SIP	G1, G2, G6	Public Works	<\$100,000	City and County funds	60	High

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
6	Install emergency generators at critical facilities	Install emergency generators at key critical facilities to provide back-up power during/post hazardous events.	3	SIP	G1, G2	Public Works	<\$100,000	WCID Funds, State/Federal Grants	60	Medium
7	Implementation of Zoning Ordinance	Develop a zoning ordinance to better regulate development throughout the city. Zoning will be used to manage congestion and develop in a sustainable way.	6	LPR	G2, G4, G5	City Secretary	\$10,000 to \$100,000	City Funds	60	Medium
8	Update Comprehensive Plan	Update comprehensive plan to help guide city staff on the direction forward.	4	LPR	G1, G2, G4, G5	City Secretary	\$10,000 to \$100,000	City Funds	36	High
9	Develop a plan to improve Pandemic response	Develop a plan based on "lessons learned" from the pandemic. Coordinate with regional partners.	13	LPR	G1, G4	Emergency Management	<\$10,000	City and County funds	60	Medium
10	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic	Develop an after-action report based on COVID-19 lessons learned.	12	LRP, EAP	G1, G4	Emergency Management	<\$10,000	City and County funds	60	Medium
11	Collaborate with local MUD Districts to establish/implement drought/expansive soils contingency plan	Collaborate with local MUD districts on water, wastewater, and expansive soils plan. This plan is needed to identify and prioritize water, wastewater, and similar improvements.	11	LPR	G3, G4, G5	City Secretary	\$10,000 to \$100,000	WCID Funds, State/Federal Grants	60	Medium

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
12	Collaborate with local groundwater district to monitor land subsidence	This effort will include coordination and monitoring related to known subsidence issues.	14	LPR	G4	Emergency Management	<\$10,000	City and County funds	60	Medium
13	GIS Mapping	Develop a City-Wide GIS web map for use in maintaining City-Wide data.	5	LPR	G1, G2	City Secretary	\$10,000 to \$100,000	City Funds, State/Federal Grants	60	Medium
14	Establish a hazardous material response team	Develop a county-wide hazard response team and coordinate a regional response plan.	9	LRP, EAP	G4	Emergency Management	<\$10,000	City and County funds	60	Medium
CITY OF EL CAMPO										
1	Provide education on water conservation techniques	Provide water conservation measures low-flow plumbing, etc., as mail inserts with utility bills and discuss with local media outlets.	8	EAP	G3, G4, G6	Utility Department	<\$10,000	Utility Revenue	36	High
2	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)	Implement drainage improvements to culverts, bridges, channels, detention facilities, and levees as needed.	4	SIP	G1, G2, G6	Public Works	>\$100,000	City funds, State/Federal Grants	60	High

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
3	Adopt freeboard ordinance	Adopt freeboard ordinance to reduce flood risk of structures.	17	LPR	G2, G3, G4, G5	Building Department	<\$10,000	City Funds	24	High
4	Adopt IBC and IRC	Adopt the latest IBC and IRC that go to mitigated identified hazards, such as a tornado, high wind, and impact-resistant materials (windows, doors, roof bracing); dry-proofing public buildings for flooding; upgrading to higher standard insulation for extreme heat and winter storms; installing lightning rods and grounding systems on public buildings; retrofitting to low-flow plumbing and replacing landscaping with drought and fire resistant plant; stricter codes for hail and fire-resistant roofing and siding; implementing higher standards for foundations, and upgrading requirements for construction beams, breakers and foundation to mitigate impacts of earthquake and expansive soils.	6	LPR	G1, G2, G4, G5	Building Department	<\$10,000	City Funds	24	High
5	GIS mapping	Use GIS mapping to overlay properties with known hazards of expansive soils, flood, and wildland interface areas. Then notify residents of at-risk structures to help residents mitigate the hazards around their property.	7	LPR	G1, G2	Public Works	\$10,000 to \$100,000	Information Technology	36	Medium

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
6	Outreach to vulnerable populations regarding extreme and adverse weather/conditions	We will use several media outlets to promote accessible heating and cooling centers and education of flood and hurricane hazards to vulnerable populations.	9	EAP	G1, G3, G4	Emergency Management	<\$10,000	City Funds	60	Medium
7	Implement Master Drainage Plan (7 projects)	Seven areas of the city are known to be subject to flood damage because of inadequate storm drainage. Install larger storm drainage and reduce flood damage.	11	SIP	G1, G2, G4, G6	Public Works	>\$100,000	City funds, State/Federal Grants	60	High
8	Educate community on all hazards	Educate the community on the hazards they are exposed to and how to mitigation their homes from hazards on the county website and public forums.	12	EAP	G1, G3, G4, G6	Emergency Management	<\$10,000	City Funds	60	Medium
9	Alternative notification / alert system	Develop and implement an alternative system to assist with emergency response despite the loss of power and internet for the community and staff.	5	LPR, EAP	G1	Emergency Management	\$10,000 to \$100,000	Information Technology	36	high
10	Establish Post Disaster Temporary Transfer Center	This activity may include identification of a Transfer Center, construction of a Transfer Center, and/or setup of a Transfer Center	16	LPR	G4	Emergency Management	>\$100,000	City Funds, State/Federal Grants, Cost Sharing	60	Medium

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
11	Establish/implement drought/expansive soils contingency plan	Develop and implement a drought and expansive soils contingency plan that addresses mitigation measures for drought, extreme heat, and expansive soils.	14	LPR, EAP	G1, G3, G4, G5, G6	Utility Department	<\$10,000	City funds, State/Federal Grants	36	High
12	Update Drainage master plan	Update 2004 Drainage Master Plan to help direct the City forward with regard to planning and drainage improvements	13	LPR	G1, G2, G3, G4, G5	Public Works	>\$100,000	City funds, State/Federal Grants	60	High
13	Develop a plan to improve Pandemic response	Develop a plan based on "lessons learned" from the pandemic. Coordinate with regional partners.	3	LPR	G1, G4	Emergency Management	<\$10,000	City Funds	24	Medium
14	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic	Develop an after-action report based on COVID-19 lessons learned.	1	LPR, EAP	G1, G4	Emergency Management	<\$10,000	City Funds	24	Medium
15	Collaborate with local groundwater district to monitor land subsidence	This effort will include coordination and monitoring related to known subsidence issues.	15	LPR	G4	Emergency Management	<\$10,000	City Funds	60	Medium

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
16	Establish a hazardous materials response team	Develop a county-wide hazard response team and coordinate on a regional response plan.	10	LPR, EAP	G4	Emergency Management	<\$10,000	City Funds	60	Medium
17	Install emergency generators at critical facilities	Install emergency generators at key critical facilities to provide back-up power during/post hazardous events.	2	SIP	G1, G2	Public Works	>\$100,000	City Funds, State/Federal Grants, Cost Share	60	High
CITY OF WHARTON										
1	Clean and repair storm drains routinely	Citywide cleaning and repairing of storm drains.	3	SIP	G1, G2	Public Works	>\$100,000	Public Works Fund	60	High
2	Increase freeboard requirements for permitting structures in the floodplain	Adopt ordinance to increase freeboard requirement in the 100-year floodplain. This action will result in safer structures, and thus, fewer flood damages.	13	SIP	G2, G3, G4, G5, G6	Floodplain Management	<\$10,000	City Funds	12	High
3	Implement a comprehensive watershed ordinance for new development	This ordinance will help to reduce flood risk to new development.	4	LPR	G2, G5, G6	Floodplain Management	\$10,000 to \$100,000	Watershed Funds	24	High

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
4	Acquire, reuse, and preserve open spaces adjacent to flood-prone areas	Acquire, reuse, and preserve open spaces adjacent to flood-prone areas	11	LPR	G2, G4, G5, G6	City Public Works	>\$100,000	FMA, PDM, HMGP	36	High
5	Educate the community on the hazards	We will use several media outlets to promote accessible heating and cooling centers and education of flood and hurricane hazards to vulnerable populations.	15	EAP	G1, G3, G5, G6	Planning Dept.	<\$10,000	City Funds	36	Medium
6	Minimize the impact of flooding by installing berms and levees where appropriate	Coordinate with the USACE and other entities to implement levee improvements, etc.	1	SIP	G1, G2, G4, G6	Floodplain Administrator	>\$100,000	City Funds, State/Federal Grants	60	High
7	Develop flood-reduction / stream restoration/channelization projects to ensure adequate drainage/diversion of stormwater	Projects may include channel improvements to Caney Creek, Peach Creek, Baughman Slough, the Colorado River, and/or other minor channels throughout the City limits and ETJ.	5	SIP	G1, G2, G4, G6	Planning Dept.	>\$100,000	City Funds, State/Federal Grants	60	High
8	Establish a reserve fund for emergency and public mitigation measures	Coordinate with City Council to establish this fund.	7	LPR, EAP	G2, G3, G4, G5, G6	Planning Dept.	<\$10,000	City Funds	60	high

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
9	Strengthen and harden at-risk critical facilities	This effort will focus on Water Treatment, Wastewater Treatment, electric, water supply, and other similar facilities	2	LPR	G1, G6	Emergency Management	>\$100,000	City Funds	48	High
10	Acquisition and relocation, elevation, and “demo-rebuild” of flood-prone structures	This will focus on flood-prone structures specifically identified during Hurricane Harvey Flood	12	SIP, NSP	G2, G5, G6	Emergency Management	>\$100,000	FMA, PDM, HMGP	60	High
11	Install emergency backup generators at critical facilities	Install emergency backup generators at critical facilities	8	SIP, NSP	G1, G2, G6	Emergency Management	>\$100,000	HMGP, City Funds	60	High
12	Use impact fees to help fund public hazard mitigation projects related to land development	Use impact fees to help fund public hazard mitigation projects related to land development	17	LPR	G1, G2, G3, G4, G5	Floodplain Administrator	<\$10,000	City Funds	24	Medium
13	Implement warning systems	Coordinate with County and LCRA to implement a County-Wide Flood Warning System of gauges.	9	LPR, EAP	G1	Planning Dept.	>\$100,000	Grant Funds, HGAC, and Coordination with County	60	High
14	Establish/implement drought/expansive soil contingency plan	Develop and implement a drought and expansive soils contingency plan that addresses mitigation measures for drought, extreme heat, and expansive soils.	20	LPR	G3, G4, G5	Planning Dept.	<\$10,000	City Funds	60	Low

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
15	Update/implement Drainage Master Plan	Update DMP to identify flood reduction projects, funding sources, and prioritization	14	LPR	G1, G2, G3, G4, G5	Planning Dept.	\$10,000 to \$100,000	City Funds	60	Medium
16	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)	Implement drainage improvements throughout the City, including culvert improvements, levees, dams, channel widening, storm sewer, and detention facilities.	6	SIP	G1, G2, G6	Planning Dept.	>\$100,000	City Funds	60	High
17	Develop plan to improve Pandemic response	Develop a plan based on "lessons learned" from the pandemic. Coordinate with regional partners.	16	LPR	G1, G4	Emergency Management	<\$10,000	City Funds	60	Medium
18	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic	Develop an after-action report based on COVID-19 lessons learned.	18	LPR, EAP	G1, G4	Emergency Management	<\$10,000	City Funds	60	Medium
19	Collaborate with local groundwater district to monitor land subsidence	This effort will include coordination and monitoring related to known subsidence issues.	19	LPR	G4	Emergency Management	<\$10,000	City Funds	60	Medium
20	Establish a hazardous material response team	Develop a county-wide hazard response team and coordinate a regional response plan.	10	LPR, EAP	G4	Emergency Management	<\$10,000	City Funds	24	High

Notes:

**TABLE 22-2.
RECOMMENDED MITIGATION ACTIONS**

Action No.	Title	Description	Mitigation Action Ranking	Action Type	Applicable Goals	Responsible Department	Estimated Cost	Potential Funding Sources	Timeline in Months	Benefit
COVID-19	Coronavirus Disease 2019		IBC		International Building Code					
CRS	Community Rating System		IRC		International Residential Code					
DMP	Drainage Master Plan		LCRA		Lower Colorado River Authority					
EAP	Education and Awareness Program		LRP		Local Plans and Regulations					
ETJ	Extraterritorial Jurisdiction		MUD		Municipal Utility District					
FEMA	Federal Emergency Management Agency		NSP		Natural Systems Protection					
FIRM	Flood Insurance Rate Map		SIP		Structure and Infrastructure Project					
GIS	Geographic Information System									

Chapter 23. **PLAN ADOPTION AND MAINTENANCE**

23.1 PLAN ADOPTION

A hazard mitigation plan must document that it has been formally adopted by the governing body of the jurisdiction requesting federal approval of the plan (44 CFR Section 201.6(c)(5)). For multi-jurisdictional plans, each jurisdiction requesting approval must document that it has been formally adopted. All planning partners fully met the participation requirements specified by the Steering Committee and will seek Disaster Mitigation Act of 2000 (DMA) compliance under this plan. The plan will be submitted for review to the Texas Division of Emergency Management (TDEM) and then to the Federal Emergency Management Agency (FEMA) Region VI for review and pre-adoption approval. Once pre-adoption approval has been provided, all planning partners will formally adopt the plan. All partners understand that DMA compliance and its benefits cannot be achieved until the plan is adopted. Copies of the resolutions adopting this plan for all planning partners can be found in Appendix D.

23.2 PLAN MAINTENANCE STRATEGY

A hazard mitigation plan must present a plan maintenance process that includes the following (44 CFR Section 201.6(c)(4)):

- A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan over a 5-year cycle
- A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate
- A discussion on how the community will continue public participation in the plan maintenance process.

This chapter details the formal process that will ensure that the Wharton County Hazard Mitigation Plan remains an active and relevant document and that the planning partners maintain their eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an updated plan every 5 years. This chapter also describes how public participation will be integrated throughout the plan maintenance and implementation process. It also explains how the mitigation strategies outlined in this plan will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, and building code enforcement and implementation. The plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

23.2.1 Plan Implementation

The effectiveness of the hazard mitigation plan depends on its implementation and incorporation of its action items into partner jurisdictions' existing plans, policies, and programs. Together, the action items in the plan provide a framework for activities that the partnership can implement over the next 5 years. The planning team and the Steering Committee have established goals and objectives and have prioritized mitigation actions that will be implemented through existing plans, policies, and programs.

The Wharton County Office of Emergency Management will have the lead responsibility for overseeing the plan implementation and maintenance strategy. Plan implementation and evaluation will be a shared responsibility among Wharton County and the cities of East Bernard, El Campo, and Warton. The public will be invited to attend meetings regarding the implementation of the plan and feedback will be solicited at the end of the meeting.

23.2.2 Steering Committee

The Steering Committee is a total volunteer body that oversaw the development of the plan and made recommendations on key elements of the plan, including the maintenance strategy. It was the Steering Committee's position that an implementation committee with representation similar to the initial Steering Committee should have an active role in the plan maintenance strategy. The Steering Committee and the Implementation Committee are the same. Therefore, it is recommended that a Steering Committee remain a viable body involved in key elements of the plan maintenance strategy. The new Steering Committee should strive to include representation from the planning partners, as well as other stakeholders in the planning area. The public will be invited to attend Steering Committee meetings regarding maintenance of the plan and will be asked for feedback or comments on the maintenance strategy.

The principal role of the new implementation committee in this plan maintenance strategy will be to review the annual progress report and provide input to the Wharton County Emergency Management Coordinator on possible enhancements to be considered at the next update. Future plan updates will be overseen by a Steering Committee similar to the one that participated in this plan development process, so keeping an interim Steering Committee intact will provide a head start on future updates. Completion of the progress report is the responsibility of each planning partner, not the responsibility of the Steering Committee. It will simply be the Steering Committee's role to review the progress report in an effort to identify issues needing to be addressed by future plan updates.

With the adoption of this plan, the implementation committee will be tasked with plan monitoring, evaluation, and maintenance. The participating jurisdictions and agencies, led by the Wharton County Emergency Management Coordinator, agree to:

- Meet annually, and after a disaster event, to monitor and evaluate the implementation of the plan;
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low- or no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Report on plan progress and recommended changes to the Wharton County Commissioners Court and governing bodies of participating jurisdictions; and
- Inform and solicit input from the public.

The implementation committee is an advisory body and can only make recommendations to county, city, or district elected officials. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information in areas accessible to the public.

23.2.3 Plan Maintenance Schedule

The implementation committee will meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. The Wharton County Emergency Management Coordinator will be responsible for initiating the plan reviews with the implementation committee.

23.2.4 Annual Progress Report

The minimum task of each planning partner will be the evaluation of the progress of its individual action plan during a 12-month performance period. This review will include the following:

- Summary of any hazard events that occurred during the performance period and the impact these events had on the planning area
- Review of mitigation success stories
- Review of continuing public involvement and feedback received from the community
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to evaluate whether the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or initiatives that involve hazard mitigation
- Monitor the incorporation of the Mitigation Plan into planning mechanisms

The planning team has created a template to guide the planning partners in preparing a progress report (see Appendix E). The plan maintenance Steering Committee and the public will provide feedback to the planning team on items included in the template. The planning team will then prepare a formal annual report on the progress of the plan. This report should be used to:

- Post on the Wharton County Office of Emergency Management website
- Provide information for a press release that will be issued to the local media
- Inform planning partner governing bodies of the progress of actions implemented during the reporting period

Uses of the progress report will be at the discretion of each planning partner. Annual progress reporting is not a requirement specified under 44 CFR. However, it may enhance the planning partnership's opportunities for funding. While failure to implement this component of the plan maintenance strategy

will not jeopardize a planning partner's compliance under the DMA, it may jeopardize its opportunity to partner and leverage funding opportunities with the other partners.

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

23.2.5 Plan Update

Local hazard mitigation plans must be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits under the DMA (44 CFR, Section 201.6(d)(3)). The Wharton County partnership intends to update the hazard mitigation plan on a 5-year cycle from the date of initial plan adoption. This cycle may be accelerated to less than 5 years based on the following triggers:

- A Presidential Disaster Declaration that impacts the planning area
- A hazard event that causes loss of life
- A comprehensive update of the county or participating city's comprehensive plan

It will not be the intent of future updates to develop a completely new hazard mitigation plan for the planning area. The update will, at a minimum, include the following elements:

- The update process will be convened through a Steering Committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plans will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new partnership policies identified under other planning mechanisms (such as the comprehensive plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to participate in the update process and comment on the update prior to adoption.
- The partnership governing bodies will adopt their respective portions of the updated plan.

23.2.6 Continuing Public Involvement

The public will continue to be apprised of the plan's progress through the Wharton County Office of Emergency Management's websites and other methods as appropriate. This site will not only house the final plan, it will become the one-stop shop for information regarding the plan, the partnership, and plan implementation. Copies of the plan will be distributed to the public library system in Wharton County Library. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new Steering Committee. This strategy will be based on the needs and capabilities of the planning partnership at the time of the update. This strategy will include the use of local media outlets within the planning area to notify the public of the implementation, monitoring, and evaluation of the plan. The public will be invited to participate in each stage by attending meetings and

provide feedback to the planning team and new Steering Committee. The Steering Committee may include community stakeholders, such as prominent businesses, local action groups, etc.

23.2.7 Incorporation into Other Planning Mechanisms

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best science and technology available at the time this plan was prepared. The existing Wharton County regulations, ordinances, and plans (including the Wharton County Emergency Operations Plan), and the comprehensive plans of the partner cities are considered to be integral parts of this plan. The county and partner cities, through the adoption of comprehensive plans and zoning ordinances, have planned for the impact of natural hazards.

It will be the responsibility of the county and the cities to determine additional implementation procedures when appropriate. This includes integrating the requirements of the hazard mitigation plan into other local planning documents, processes, or mechanisms.

All municipal planning partners are committed to creating a linkage between the hazard mitigation plan and their individual comprehensive plans. Other planning processes and programs to be coordinated with the recommendations of the hazard mitigation plan include the following:

- Comprehensive plans
- Strategic plans
- Partners' emergency response plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments
- Community wildfire protection plans
- Growth management plans
- Ordinances, resolutions, and regulations
- Continuity of operations plans

The previous *Wharton County Hazard Mitigation Plan Update 2016* identified mitigation actions for each participating community. These mitigation actions and their current status are listed in Table 2-2.

Ongoing or delayed mitigation actions identified in the previous plan were carried forward into new mitigation actions for Wharton County or the City of East Bernard, the City of El Campo, or the City of Wharton. The annual progress report discussed in Chapter 23.2.4 and Appendix E will provide a framework for tracking future mitigation actions and the incorporation of this plan into other planning mechanisms.

Opportunities to integrate the requirements of this plan into other local planning mechanisms will continue to be identified through future meetings of the Steering Committee, by the individual communities and the county, and through the annual and five-year review processes as required by FEMA. The primary means for integrating mitigation strategies into other local planning mechanisms will be through the revision, update, and implementation of each jurisdiction's individual plans that require specific planning and administrative tasks (for example, plan amendments, ordinance revisions, capital improvement projects, etc.).

The previous Steering Committee representatives will remain charged with ensuring that the goals and strategies of new and updated local planning documents for their jurisdictions or agencies are consistent with the goals and actions of the Wharton County Hazard Mitigation Plan Update and will not contribute to increased hazard vulnerability in Wharton County, the City of East Bernard, the City of El Campo, or the City of Wharton. During the planning process for new and updated local planning documents, such as a comprehensive plan, capital improvements plan, or emergency management plan, the applicable jurisdiction will provide a copy of the Wharton County Hazard Mitigation Plan Update to the appropriate parties and recommend that all goals and strategies of new and updated local planning documents are consistent with and support the goals of the Wharton County plan and will not contribute to increased hazards in the affected jurisdiction(s).

Although it is recognized that there are many possible benefits to integrating components of this plan into other local planning mechanisms, the development and maintenance of this stand-alone hazard mitigation plan is deemed by the Steering Committee to be the most effective and appropriate method to ensure the implementation of local hazard mitigation actions at this time. All organizations will incorporate the Wharton County Hazard Mitigation Plan Update into existing plans in an effort to mitigate the impact of future disasters. A list of the existing plans and procedures in which mitigation activities will be integrated is listed in Table 23-1.

**TABLE 23-1.
INCORPORATION OF MITIGATION ACTIVITIES**

Type of Plan	Department	Review Timeline	New or Existing	Actions to be Integrated
WHARTON COUNTY				
Wharton County Master Subdivision Policy, 2005 (as amended)	Permit and Inspection Department	5 years	Existing	Maintain current data on high-risk areas via the mitigation plan and regularly incorporate information on high-risk hazard areas into the subdivision requirements, thereby eliminating or reducing potential impacts on current and future development. Update to the development regulations will help resolve loopholes in standards and improve clarity.
Flood Damage Prevention Order signed October 22, 2001	Permit and Inspection Department	5 years	Existing	Overlay high-risk/flood-prone areas with current and future floodplain regulations, thereby minimizing or reducing the impacts of flooding on current and future development. Adopt "Higher Standard" Riverine Flood Damage Prevention Ordinances and Standards to reduce insurance rates and mitigate flood damages for both new/existing buildings. The new county floodplain maps went into effect on December 21, 2017.
Wharton County Basic Emergency Operations Plan	Emergency Manager, Commissioners' Court	2 years	Existing	Integrate and implement hazard mitigation plan data on high hazards and applicable mitigation actions that are affected by or will affect the emergency operations plan on an annual basis.
Drainage Master Plan	Drainage Department, Commissioners' Court	5 Years	New	The county will incorporate current data on high hazard areas presented in the hazard mitigation plan as they prepare/commission and adopt a stormwater drainage master plan. This will help identify and prioritize drainage improvements countywide helping to reduce the impact of flooding on new and existing structures.
Drought/Expansive Soils Contingency Plan	Emergency Management	5 Years	New	The county will collaborate with local MUD districts regarding water, wastewater, and soil expansion throughout the county. Areas of concern as well as projects to mitigate the effects of drought and expansive soils will be identified. The identified projects will be prioritized into a drought/expansive soils contingency plan to be adopted by the county.
Pandemic Response Plan	Emergency Management	5 Years	New	The county will participate in "lessons learned" meetings related to the COVID-19 pandemic and compile a report. This report will be used to help collaborate with local and regional entities to develop a regional plan to improve future pandemic response.
CITY OF EAST BERNARD				
2005 East Bernard Comprehensive Plan (To be Updated)	City Secretary	3 Years	Existing/New	The city will conduct a review/update of the current 2005 East Bernard Comprehensive Plan to identify projects, plans, and policies which will help guide the development of East Bernard in the future. The update process will review mitigation actions from the hazard mitigation plan for incorporation into the Comprehensive Plan Goals and Objectives elements.
Standard for Floodplain Management (2004)	City Secretary	Annual	Existing	During the regular review process, the City Council will review the identified actions and will either approve or deny the actions.
Wharton County Basic Emergency Operations Plan	City Secretary	2 years	Existing	Under the leadership of the County OEM, all appropriate planning documents will be updated to include and implement the appropriate mitigation actions as prioritized in the current hazard mitigation plan.

**TABLE 23-1.
INCORPORATION OF MITIGATION ACTIVITIES**

Type of Plan	Department	Review Timeline	New or Existing	Actions to be Integrated
Stormwater Drainage Plan and Ordinance	City Council	Annual	New	City Council will incorporate current data on high hazard areas presented in the hazard mitigation plan as they prepare/commission and adopt a stormwater drainage plan and ordinance.
Zoning Ordinance	City Secretary	Annual	New	City Council will incorporate current data on high hazard areas presented in the hazard mitigation plan as they prepare/commission and adopt a zoning ordinance. This will aid in the reduction or elimination of potential negative impacts of high hazards on existing and future development.
Drought/Expansive Soils Contingency Plan	City Secretary	5 Years	New	The city will collaborate with local MUD districts regarding water, wastewater, and soil expansion throughout the county. Areas of concern as well as projects to mitigate the effects of drought and expansive soils will be identified. The identified projects will be prioritized into a drought/expansive soils contingency plan to be adopted by the city.
Pandemic Response Plan	Emergency Management	5 Years	New	The city will participate in “lessons learned” meetings related to the COVID-19 pandemic and compile a report. This report will be used to help collaborate with local and regional entities to develop a regional plan to improve future pandemic response.
CITY OF EL CAMPO				
El Campo 2020 Plan	City Council	20 years	Existing	During the regular review process, the Planning and Zoning Commission will consider mitigation actions from the hazard mitigation plan for incorporation into the Comprehensive Plan Goals and Objectives elements, and present those actions to the City Council for approval.
Drought/Expansive Soils Contingency Plan	Utility Department	3 Years	New	The city will collaborate with local MUD districts regarding water, wastewater, and soil expansion throughout the county. Areas of concern as well as projects to mitigate the effects of drought and expansive soils will be identified. The identified projects will be prioritized into a drought/expansive soils contingency plan to be adopted by the city.
Chapter 10, Subdivision (2014, as amended)	Inspection Department, Planning and Zoning Commission	5 years	Existing	During the City’s regular review and update of the subdivision regulations, they will incorporate current data on high hazard areas thereby reducing or eliminating the potential negative impacts of high hazards on existing and future development.
Floodplain Ordinance, Part of Chapter 10, Buildings (2006, as amended)	Inspection Department, Planning and Zoning Commission	5 years	Existing	During the regular review process of the Floodplain Ordinance (within the Subdivision Ordinance), bring the identified actions to the Planning and Zoning Commission and the City Council for approval. The Council will approve or deny the actions.
Chapter 14, Zoning (2000, as amended)	Board of Adjustment, Planning and Zoning Commission	10 years	Existing	During the City’s regular review and update of the zoning ordinance, they will incorporate current data on high hazard areas, thereby reducing or eliminating the potential negative impacts of high hazards on existing and future development.

**TABLE 23-1.
INCORPORATION OF MITIGATION ACTIVITIES**

Type of Plan	Department	Review Timeline	New or Existing	Actions to be Integrated
Site Plan Review Process	Building Official and Public Works Department	Regularly	Existing	The Building Official and Public Works Department will consider the high hazard areas within the community and make development decisions in the best interest of the community integrating the mitigation plan data and proposed actions as applicable into their decision-making processes.
Capital Improvements Plan	City Development Corporation	Annual	Existing	During the annual budget review cycle, the City Development Corporation will bring the identified mitigation actions to the City Council for approval as part of the capital improvements funding stream. The Council will approve or deny the actions.
Wharton County Basic Emergency Operations Plan	Assistant Police Chief	2 years	Existing	Under the leadership of the City Police Department and the County Office of Emergency Management, all appropriate planning documents will be updated to include and implement the appropriate mitigation actions as prioritized in the current hazard mitigation plan.
Drainage Master Plan (Update)	Public Works	5 Years	Existing/New	The City of El Campo will incorporate engineering studies as well as current data on high hazard areas presented in the hazard mitigation plan as they prepare/commission and adopt a stormwater drainage master plan. This will help identify and prioritize drainage improvements in El Campo helping reduce the impact of flooding on new and existing structures.
Pandemic Response Plan	Emergency Management	5 Years	New	The city will participate in “lessons learned” meetings related to the COVID-19 pandemic and compile a report. This report will be used to help collaborate with local and regional entities to develop a regional plan to improve future pandemic response.
CITY OF WHARTON				
2018-2028 Wharton Comprehensive Plan	City Council	10 Years	Existing	During the regular review process, City Council will consider mitigation actions from the hazard mitigation plan for incorporation into the Comprehensive Plan Goals and Objectives elements.
Subdivision Ordinance (within the City of Wharton Code of Ordinances, as amended)	Code Enforcement Department	10 years	Existing	During the City’s regular review and update of the subdivision regulations, they will incorporate current data on high hazard areas thereby reducing or eliminating the potential negative impacts of high hazards on existing and future development.
Watershed Ordinance	Floodplain Management	2 years	New	The city will adopt/implement a watershed ordinance to aid in the reduction of flood risk to new development and its impact on other properties in the city.
Standard for Floodplain Management (1996)	Code Enforcement Department	5 years	Existing	During the regular review process of the Floodplain Ordinance, update the ordinance to be more restrictive. Incorporate identified hazard mitigation plan actions to increase freeboard requirements for permitting structures in the floodplain. Bring proposed amendments to the City Council, which will approve or deny the actions.
Wharton Code of Ordinance – Zoning (1997, as amended)	Code Enforcement Department	10 years	Existing	During the City’s regular review and update of the City’s zoning ordinance, they will incorporate current data on high hazard areas thereby reducing or eliminating the potential negative impacts of high hazards on existing and future development.
Adopted Annual Budget	City Manager	Annual	Existing	During the annual budget review cycle, bring the identified mitigation actions to the City Council for approval. The Council will approve or deny the actions.

**TABLE 23-1.
INCORPORATION OF MITIGATION ACTIVITIES**

Type of Plan	Department	Review Timeline	New or Existing	Actions to be Integrated
Drainage Master Plan (Update)	Planning Department	5 Years	Existing/New	The City of El Campo will incorporate engineering studies as well as current data on high hazard areas presented in the hazard mitigation plan as they prepare/commission and adopt a stormwater drainage master plan. This will help identify and prioritize drainage improvements in El Campo helping reduce the impact of flooding on new and existing structures.
Drought/Expansive Soils Contingency Plan	Planning Department	5 Years	New	The city will collaborate with local MUD districts regarding water, wastewater, and soil expansion throughout the county. Areas of concern as well as projects to mitigate the effects of drought and expansive soils will be identified. The identified projects will be prioritized into a drought/expansive soils contingency plan to be adopted by the city.
Pandemic Response Plan	Emergency Management	5 Years	New	The city will participate in “lessons learned” meetings related to the COVID-19 pandemic and compile a report. This report will be used to help collaborate with local and regional entities to develop a regional plan to improve future pandemic response.

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Wharton County
Hazard Mitigation Plan Update

APPENDIX A.
ACRONYMS AND DEFINITIONS

APPENDIX A. ACRONYMS AND DEFINITIONS

ACRONYMS

Note: Acronyms are defined the first time they are used in each part of this plan

%g	Percent Gravity Acceleration
°C	Degrees Celsius
°F	Degrees Fahrenheit
44 CFR	Title 44 Code of Federal Regulations
AIDS	Acquired Immunodeficiency Syndrome
ASTM	American Society for Testing and Materials
BFE	Base Flood Elevation
CDC	Center for disease Control
CEM	Certified Emergency Manager
COVID-19	Coronavirus Disease 2019
CPZ	Community Protection Zone
CRS	Community Rating System
CWA	Clean Water Act
CWPP	Community Wildfire Protection Plan
CWSRF	Clean Water State Revolving Fund
DCM	Drainage Criteria Manual
DMA	Disaster Mitigation Act of 2000
DMP	Drainage Master Plan
DPS	Department of Public Safety
EAP	Education and Awareness Program
EDA	Endangered Species Act
EF	Enhanced Fujita
EMS	Emergency Medical Services
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESD	Emergency Service District
ETJ	Extraterritorial Jurisdiction
FEMA	Federal Emergency Management Agency

FERC	Federal Energy Regulatory Commission
FHBM	Flood Hazard Boundary Map
FIRM	Flood Insurance Rate Map
FRA	Federal Railroad Administration
GIS	Geographic Information System
GLF	Geophysical Log Facility
HAZMAT	Hazardous Materials
HAZUS-MH	Hazards United States Multi-Hazard
H-GAC	Houston-Galveston Area Council
HIV	Human Immunodeficiency Virus
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
IBC	international building code
IRC	international residential code
ISD	Independent School District
kts	knots
LCRA	Lower Colorado River Authority
LPR	Local Plans and Regulations
ML	Local Magnitude Scale
MLI	Midterm Levee Inventory
mph	Miles per Hour
MUD	municipal utility district
MW	Moment Magnitude
NASA	National Aeronautic Space Administration
NCDC	National Climatic Data Center
NEHRP	National Earthquake Hazard Reduction Program
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NIDIS	national Integrated Drought Information System
NLD	National Levee Database
NOAA	National Oceanic and Atmospheric Administration
NREL	National Renewable Energy Laboratory
NSP	Natural Systems Protection
NSSL	National Sever Storm Laboratory

NWS	National Weather Service
OTA	Congressional Office of Technology Assessment
PDI	Palmer Drought Index
PDM	Pre-Disaster Mitigation Grant Program
PGA	Peak Ground Acceleration
PHDI	Palmer Hydrological Drought Index
PHMSA	Pipeline and Hazardous Materials Safety Administration
PID	Photoionization Detector
PMF	Probable Maximum Flood
PSI	Pandemic Severity Index
SARS	Severe Acute Respiratory Syndrome
SFHA	Special Flood Hazard Area
SIP	Structure and Infrastructure Project
SPI	Standardized Precipitation Index
SWCD	Soil and Water Conservation District
TCEQ	Texas Commission on Environmental Quality
TCRFC	Texas Colorado River Floodplain Coalition
TDEM	Texas Division of Emergency Management
TFS	Texas Forest Service
TNRIS	Texas Natural Resources Information System
TSSWCB	Texas State Soil and Water Conservation Board
TSSWCD	Texas State Soil and Water Conservation District
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
TxWRAP	Texas A&M Forest Service Wildfire Risk Assessment Portal
UBC	Unified Building Code
UDC	Unified Development Code
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USFS	U.S. Forest Service
USGS	United States Geological Survey
VFD	Volunteer Fire Department
VRI	Value Response Index
WCEDC	Wharton County Economic Development Corporation

WCID	Water Control and Improvement District
WDEC	Wharton Economic Development Corporation
WHO	World Health Organization
WHP	Wildfire Hazard Potential
WUI	Wildland Urban Interface

DEFINITIONS

100-Year Flood: The term “100-year flood” can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1% chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1% annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Accredited Levee: A levee that is shown on a FIRM as providing protection from the 1% annual chance or greater flood. A **non-accredited** or **de-accredited levee** is a levee that is not shown on a FIRM as providing protection from the 1% annual chance or greater flood. A **provisionally accredited levee** is a previously accredited levee that has been de-accredited for which data and/or documentation is pending that will show the levee is compliant with NFIP regulations.

Acre-Foot: An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre-foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Asset: An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Base Flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the “100-year” or “1% chance” flood. The base flood is a statistical concept used to ensure that all properties subject to the NFIP are protected to the same degree against flooding.

Basin: A basin is an area within which all surface water, whether from rainfall, snowmelt, springs, or other sources, flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as “watersheds” and “drainage basins.”

Benefit: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable risk reduction factors, including a reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benefit/Cost Analysis: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost-effectiveness.

Breach: An opening through which floodwaters may pass after part of a levee has given way.

Building: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment: A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

Collapsible soils: Collapsible soils consist of loose, dry, low-density materials that collapse and compact under the addition of water or excessive loading. Soil collapse occurs when the land surface is saturated at depths greater than those reached by typical rain events. This saturation eliminates the clay bonds holding the soil grains together. Similar to expansive soils, collapsible soils result in structural damage such as cracking of the foundation, floors, and walls in response to settlement.

Common Vehicle: Disease transmitted by a common inanimate vehicle resulting in multiple infections; most commonly food or water

Community Protection Zones (CPZ): CPZs are based on an analysis of the "Where People Live" housing density data and surrounding fire behavior potential and represent those areas considered the highest priority for wildfire mitigation planning activities. "Rate of Spread" data is used to determine the areas of concern around populated areas that are within a 2-hour fire spread distance.

Conflagration: A fire that grows beyond its original source area to engulf adjoining regions. Wind, extremely dry or hazardous weather conditions, excessive fuel buildup, and explosions are usually the elements behind a wildfire conflagration.

Critical Area: An area defined by state or local regulations as deserving special protection because of unique natural features or its value as a habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations.

Critical Facility: Facilities and infrastructure that are critical to the health and welfare of the population. These become especially important after any hazard event occurs. For the purposes of this plan, critical facilities include:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, or water-reactive materials.
- Hospitals, nursing homes, and housing are likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event.
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers are needed for disaster response before, during, and after hazard events.
- Public and private utilities, facilities, and infrastructure are vital to maintaining or restoring normal services to areas damaged by hazard events.

- Government facilities.

Dam: A barrier, including one for flood detention, designed to impound liquid volumes and which has a height of dam greater than six feet (Texas Administrative Code, Ch. 299, 1986).

Dam Failure: Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

Debris Flow: Dense mixtures of water-saturated debris that move down-valley; looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

Deposition: Deposition is the placing of eroded material in a new location.

Disaster Mitigation Act of 2000 (DMA): The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program (HMGP) were established.

Drainage Basin: A basin is an area within which all surface water, whether from rainfall, snowmelt, springs, or other sources, flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Drainage basins are also referred to as **watersheds** or **basins**.

Drought: Drought is a period of time without substantial rainfall or snowfall from one year to the next. Drought can also be defined as the cumulative impacts of several dry years or a deficiency of precipitation over an extended period of time, which in turn results in water shortages for some activity, group, or environmental function. Hydrological drought is caused by deficiencies in surface and subsurface water supplies. A socioeconomic drought impacts the health, well-being, and quality of life or starts to have an adverse impact on a region. Drought is a normal, recurrent feature of climate and occurs almost everywhere.

Earthquake: An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

Emergency Action Plan: A document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life. The plan specifies actions the dam owner should take to alleviate problems at a dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency situation. It also contains inundation maps to show emergency management authorities the critical areas for action in case of an emergency. (FEMA 64)

Enhanced Fujita Scale (EF-scale): The EF-scale is a set of wind estimates (not measurements) based on damage. It uses 3-second gusts estimated at the point of damage based on a judgment of 8 levels of

damage to the 28 indicators. These estimates vary with height and exposure. Standard measurements are taken by weather stations in openly exposed area.

Epicenter: The point on the earth's surface directly above the hypocenter of an earthquake. The location of an earthquake is commonly described by the geographic position of its epicenter and by its focal depth.

Expansive Soil: Expansive soils are soils that expand when water is added and shrink when they dry out. They usually undergo significant volume change with the addition or depletion of pore water. Generally, the result of the chemical structure of certain types of clay soils.

Exposure: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent: The extent is the size of an area affected by a hazard.

Extreme Heat: Summertime weather that is substantially hotter or more humid than average for a location at that time of year.

Fault: A fracture in the earth's crust along which two blocks of the crust have slipped with respect to each other.

Fire Behavior: Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

Fire Frequency: Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of the areas most likely to burn is based on past fire history or fire rotation in the area, fuel conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

Flash Flood: A flash flood occurs with little or no warning when water levels rise at an extremely fast rate.

Flood: The inundation of normally dry land resulting from the rising and overflowing of a body of water.

Flood Insurance Rate Map (FIRM): FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's FIRM. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by floodwaters from any source. A FIRM identifies most, but not necessarily all, of a community's floodplain as the SFHA.

Floodway: Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation by more than one foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Focal Depth: The depth from the earth's surface to the hypocenter.

Freeboard: Freeboard is the margin of safety added to the base flood elevation.

Freezing Rain: The result of rain occurring when the temperature is below the freezing point. The rain freezes on impact, resulting in a layer of glaze ice up to an inch thick. In a severe ice storm, an evergreen tree 60 feet high and 30 feet wide can be burdened with up to 6 tons of ice, creating a threat to power and telephone lines and transportation routes.

Frequency: For the purposes of this plan, frequency refers to how often a hazard of a specific magnitude, duration, or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1% chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

Fujita Scale of Tornado Intensity: Tornado wind speeds are sometimes estimated on the basis of wind speed and damage sustained using the Fujita Scale. The scale rates the intensity or severity of tornado events using numeric values from F0 to F5 based on tornado wind speed and damage. An F0 tornado (wind speed less than 73 miles per hour [mph]) indicates minimal damage (such as broken tree limbs), and an F5 tornado (wind speeds of 261 to 318 mph) indicates severe damage.

Goal: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Geographic Information System (GIS): GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Ground Subsidence: Ground subsidence is the sinking of land over human-caused or natural underground voids and the settlement of native low-density soils.

Groundwater Depletion: Groundwater depletion occurs when groundwater is pumped from pore spaces between grains of sand and gravel. If an aquifer has beds of clay or silt within or next to it, the lowered water pressure in the sand and gravel causes slow drainage of water from the clay and silt beds. The reduced water pressure is a loss of support for the clay and silt beds. Because these beds are compressible, they compact (become thinner), and the effects are seen as a lowering of the land surface.

Hazard: A hazard is a source of potential danger or adverse condition that could harm people or cause property damage.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

Hazardous Materials (HAZMAT): Matter (solid, liquid, or gas) or energy that when released is capable of creating harm to people, the environment, and property, including weapons of mass destruction

Hazards U.S. Multi-Hazard (HAZUS-MH) Loss Estimation Program: HAZUS-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The HAZUS-MH software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. HAZUS-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. HAZUS-MH has also been used to assess vulnerability (exposure) for other hazards.

High Hazard Dam: Dams where failure or operational error will probably cause loss of human life. (FEMA 333)

Hurricane: A tropical cyclone with maximum sustained surface winds (using the U.S. 1-minute average) of 64 knot (kt) (74 miles per hour [mph]) or more.

Hydraulics: Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology: Hydrology is the analysis of the waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Hypocenter: The region underground where an earthquake's energy originates.

Intensity: For the purposes of this plan, intensity refers to the measure of the effects of a hazard.

Interface Area: An area susceptible to wildfires and where wildland vegetation and urban or suburban development occur together. An example would be smaller urban areas and dispersed rural housing in forested areas.

Inventory: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Land Subsidence: Land subsidence is the loss of surface elevation due to the removal of subsurface support. In Texas, there are three types of subsidence that warrant the most concern: groundwater depletion, sinkholes in karst areas, and erosion.

Landslide: Landslides can be described as the sliding movement of masses of loosened rock and soil down a hillside or slope. Fundamentally, slope failures occur when the strength of the soils forming the slope exceeds the pressure, such as weight or saturation, acting upon them.

Levee: A man-made structure, usually an earthen embankment or concrete floodwall, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide reasonable assurance of excluding temporary flooding from the leveed area.

Lightning: Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt," usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000°F. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100 people are struck and killed by lightning each year (see <http://www.fema.gov/hazard/thunderstorms/thunder.shtm>).

Liquefaction: Liquefaction is the complete failure of soils, occurring when soils lose shear strength and flow horizontally. It is most likely to occur in fine-grain sands and silts, which behave like viscous fluids when liquefaction occurs. This situation is extremely hazardous to development on the soils that liquefy and generally results in extreme property damage and threats to life and safety.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under state law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal

organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Magnitude: Magnitude is the measure of the strength of an earthquake, and is typically measured by the Richter scale. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

Mitigation Actions: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects of a disaster and reduce the loss of life and property.

National Flood Insurance Program (NFIP): The NFIP provides federally backed flood insurance in exchange for communities enacting floodplain regulations.

Objective: For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal.

Outbreak: The sudden rise in the incidence of a disease.

Pandemic: An outbreak of a disease that occurs over a wide geographic area, such as multiple countries or continents, and typically affects a significant proportion of the population; a pandemic outbreak of a disease.

Peak Ground Acceleration: Peak Ground Acceleration is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

Preparedness: Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate the probability of occurrence.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of \$1,000; or
- Two paid flood losses in excess of \$1,000 within any 10-year period since 1978; or
- Three or more paid losses that equal or exceed the current value of the insured property.

Riparian Zone: The area along the banks of a natural watercourse.

Riverine: Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Risk: Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to the occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Risk Ranking: This ranking serves two purposes, first to describe the probability that a hazard will occur, and second to describe the impact a hazard will have on people, property, and the economy. Risk estimates for the jurisdiction are based on the methodology that the jurisdiction used to prepare the risk assessment for this plan. The following equation shows the risk ranking calculation:

$$\text{Risk Ranking} = \text{Probability} + \text{Impact (people + property + economy)}$$

Robert T. Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Severe Local Storm: Small-scale atmospheric systems, including tornadoes, thunderstorms, windstorms, ice storms, and snowstorms. These storms may cause a great deal of destruction and even death, but their impact is generally confined to a small area. Typical impacts are on transportation infrastructure and utilities.

Significant Hazard Dam: Dams where failure or operational error will result in no probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities, or can impact other concerns. Significant hazard dams are often located in rural or agricultural areas but could be located in areas with population and significant infrastructure. (FEMA 333)

Sinkhole: A collapse depression in the ground with no visible outlet. Its drainage is subterranean. It is commonly vertical-sided or funnel-shaped.

Soil Erosion: Soil erosion is the removal and simultaneous transportation of earth materials from one location to another by water, wind, waves, or moving ice.

Special Flood Hazard Area: The base floodplain is delineated on a FIRM. The SFHA is mapped as a Zone A in riverine situations. The SFHA may or may not encompass all of a community's flood problems.

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

Stream Bank Erosion: Streambank erosion is common along rivers, streams, and drains where banks have been eroded, sloughed, or undercut. However, it is important to remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are "bad" and in need of repair. Generally, stream bank erosion becomes a problem where development has

limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

Steep Slope: Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

Sustainable Hazard Mitigation: This concept includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards and mitigation must be understood in the largest possible social and economic context.

Thunderstorm: A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

Tornado: A tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

Tropical Storm: A tropical cyclone with maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 34 kt (39 mph) to 63 kt (73 mph).

Tropical Depression: A tropical cyclone with maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 4 kt (39 mph) to 63 kt (73 mph).

Values Response Index (VRI): The wildfire VRI reflects a rating of the potential impact of a wildfire on values or assets. The VRI is an overall rating that combines the impact ratings for WUI (housing density) and Pine Plantations (pine age) into a single measure. VRI combines the likelihood of a fire occurring

Vector: Living organisms that can transmit infectious pathogens between humans, or from animals to humans (threat) with those areas of most concern that are adversely impacted by fire to derive a single overall measure of wildfire risk.

Vulnerability: Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Watershed: A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Wildfire: Wildfire refers to any uncontrolled fire occurring on undeveloped land that requires fire suppression. The potential for wildfire is influenced by three factors: the presence of fuel, topography, and air mass. Fuel can include living and dead vegetation on the ground, along the surface as brush and small trees, and in the air such as tree canopies. The topography includes both slope and elevation. Air

mass includes temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount, duration, and the stability of the atmosphere at the time of the fire. Wildfires can be ignited by lightning and, most frequently, by human activity including smoking, campfires, equipment use, and arson.

Wildfire Hazard Potential (WHP): The wildfire threat or WHP is the likelihood of a wildfire occurring or burning into an area. The threat is calculated by combining multiple landscape characteristics including surface and canopy fuels, fire behavior, historical fire occurrences, weather observations, terrain conditions, and other factors.

Windstorm: Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

Winter Storm: A storm having significant snowfall, ice, or freezing rain; the quantity of precipitation varies by elevation.

Zoning Ordinance: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

Wharton County
Hazard Mitigation Plan Update

APPENDIX B.
LOCAL MITIGATION PLAN REVIEW TOOL

APPENDIX B. LOCAL MITIGATION PLAN REVIEW TOOL

This appendix presents the local mitigation action review tool for the Wharton County Hazard Mitigation Plan. The review tool demonstrates how the plan meets federal regulations and offers state and FEMA planners an opportunity to provide feedback on the plan to the community.

LOCAL MITIGATION PLAN REVIEW TOOL

The Local Mitigation Plan Review Tool demonstrates how the local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA’s evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan’s strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this Local Mitigation Plan Review Guide when completing the Local Mitigation Plan Review Tool.

Jurisdiction: Wharton County, Texas	Title of Plan: Wharton County Hazard Mitigation Plan Update 2021	Date of Plan: September 24, 2021
Local Point of Contact: Andy Kirkland	Address: 315 E. Elm Street Wharton, TX 77488	
Title: Emergency Management Coordinator		
Agency: Wharton County Office of Emergency Management		
Phone Number: (979) 532 - 1123	E-mail: Andy.kirkland@co.wharton.tx.us	

State Reviewer:	Title:	Date:
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FEMA Reviewer:	Title:	Date:
Date Received in REMA region VI:		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

**SECTION 1:
REGULATION CHECKLIST**

REGULATION CHECKLIST		Location in Plan	
Regulation (44 CFR 201.6 Local Mitigation Plans)		(section and/or page number)	
		Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Pages ES-1 to ES-4 (Executive Summary); Pages 3-1 to 3-2 (Section 3.2), 3-4 (Section 3.4); Pages 3-4 to 3-6 (Section 3.5)		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Pages 3-4 to 3-6 (Sections 3.4 through 3.6); Page 3-8 (Section 3.8.1)		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Pages 3-8 through 3-10 (Section 3.8)		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Page 3-7 to 3-8 (Section 3.7); Pages 6-33 to 6-48 (Section 6.9); Pages 7-1 to 7-11 (Chapter 7)		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Pages 23-1 through 23-5 (Sections 23.2.1 through 23.2.6); Page 23-5 to 23-10 (Section 23.2.7)		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Pages 23-1 through 23-10 (Section 23.2); Pages E-1 through E-9 (Appendix E)		
<u>ELEMENT A REQUIRED REVISIONS:</u>			

REGULATION CHECKLIST		Location in Plan	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)		(section and/or page number)		
ELEMENT B. HAZARD IDENTIFICATION AND RIASK ASSESSMENT				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Chapters 8 through 20, including: <ul style="list-style-type: none"> Section 1 of each chapter (General Background) describes the type of hazard Section 2.2 of each chapter (Location) Section 2.3 (Frequency); and 2.4 (Severity) of each chapter, which describe the extent of the hazard 			
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	<ul style="list-style-type: none"> Previous occurrences: Pages 6-3 and 6-4 (Section 6.2); Chapters 8 through 20, Section 2.1 (Past Events) of each chapter Probability of future events: Chapters 8 through 20, Section 2.3 (Frequency) of each chapter 			
B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Chapters 8 through 20; specifically, Section 2.4 (Severity), Section 4, 5, and/or 6 (Exposure, Vulnerability, and/or Exposure and Vulnerability) of each chapter			
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Page 12-32 through 12-35 (Section 12.6.2, Property); including Figure 12-13			
<u>ELEMENT B REQUIRED REVISIONS:</u>				

REGULATION CHECKLIST		Location in Plan	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)		(section and/or page number)		
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Pages 6-33 to 6-48 (Section 6.9); Pages 7-1 through 7-11 (Chapter 7); Pages 23-5 through 23-10 (Section 23.2.7)			
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Page 6-35; Pages 6-38 through 6-48 (description of laws, ordinances, and programs for each jurisdiction); Pages 7-1 through 7-11 (floodplain ordinances and availability of DFIRMs); Pages 12-32 through 12-35			
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Pages 4-1 through 4-2 (Chapter 4)			
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Pages 22-1 through 22-23(Chapter 22); specifically, Tables 22-1 and 22-2			
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Pages 22-2 and 22-3 (Section 22.2)			
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Pages 23-5 through 23-10 (Section 23.2.7); Specifically, Table 23-1			
<u>ELEMENT C REQUIRED REVISIONS:</u>				

REGULATION CHECKLIST		Location in Plan	
Regulation (44 CFR 201.6 Local Mitigation Plans)		(section and/or page number)	
		Met	Not Met
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Chapter 6.8 (pages 6-29 through 6-33) and Chapters 8 through 20, Section 6 or Section 7 of each chapter (Future Trends in Development)		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Pages 2-1 through 2-9 (Chapter 2)		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Pages 1-1 through 1-3 (Chapter 1); Pages 2-1 through 2-9 (Chapter 2)		
<u>ELEMENT D REQUIRED REVISIONS:</u>			

**SECTION 2:
PLAN ASSESSMENT**

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas that could be improved beyond minimum requirements.

Element A: Planning Process

Element B: Hazard Identification and Risk Assessment

Element C: Mitigation Strategy

Element D: Plan Review, Evaluation, and Implementation (Plan Updates Only)

B. Resources for Implementing Your Approved Plan

**SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET**

MULTI-JURISDICTION SUMMARY SHEET									
#	Jurisdiction Name	Jurisdiction Type	Jurisdiction Contact	E-mail	Requirements Met (Y/N)				
					A. Planning Process	B. HIRA	C. Mitigation Strategy	D. Update Rqmts.	E. Adoption Resolution
1	Wharton County	County	Andy Kirkland	Andy.kirkland@co.wharton.tx.us					
2	City of East Bernard	Incorporated City	Audrey Searce	ebcityhall@gmail.com					
3	City of El Campo	Incorporated City	Lori Hollingsworth	lhollingsworth@cityofelcampo.org					
4	City of Wharton	Incorporated City	Gwyneth Teves	gteves@cityofwharton.com					

Wharton County
Hazard Mitigation Plan Update

APPENDIX C.
PUBLIC OUTREACH

APPENDIX C. PUBLIC OUTREACH

This appendix includes the agenda, sign-in sheets, and meeting notes from each of the Steering Committee Meetings. This appendix also includes the community brochure and results of the Wharton County Hazard Mitigation Plan questionnaire, as described in Section 3.7.2.

Hazard Mitigation Plan Update - Wharton County

Steering Committee Meeting #1

Tuesday, June 22, 2021 @ 10:00 A.M.

Location: Wharton County Civic Center and Zoom

DISCUSSION TOPICS:

1. Introductions
2. Project Overview
3. Plan Components
4. Risk Assessment
 - a. Hazard Identification
 - b. Hazard Analysis
5. Community Survey Results
6. Introduction of Mitigation Strategies
7. Next Steps
8. Questions and Comments Session

ATTENDEES SUMMARY:

Eric Scheibe – Scheibe Consulting, LLC
Abigail Ayers – Scheibe Consulting, LLC
Steve Johnson – City of Wharton – Emergency Management Coordinator
Richard Zahn – Wharton County - Commissioner Precinct 1
Krystal Hasselmeier – City of Wharton – Assistant to the Community Development Director
Gwyn Teves – City of Wharton – Community Development Director
Audrey Scarce – City of East Bernard – Emergency Management Coordinator
Fred Ivy – Hungerford MUD – President
Jessica Moreno – Wharton County - Administrative Assistant Precinct 1
W.D. Bud Graves – Wharton County – Commissioner Precinct 2
Casey Lewis – Wharton County - Administrative Assistant Precinct 4
Rodney Grimmer – Fort Bend County Homeland Security and Emergency Management– Hazard Mitigation Planner
Brandi Jimenez – City of Wharton – Assistant to the City Manager
Mario Chapa – LCRA – Business Continuity Program Manager
Shelly Schulz – Wharton County Electric Cooperative – Communications Specialist
Philip Gaudette – East Bernard ISD - Elementary Principal
David Janecek – East Bernard ISD - Junior High Principal
Frank Garza - Fort Bend County Homeland Security and Emergency Management – Regional Planner
Ryan Simper – TxDOT – Area Engineer
Stephan Gage – HGAC – Principal Planner, Transportation
Joseph Pace – City of Wharton – City Manager
Kenna Lucas – El Campo Lost Lagoon – Owner

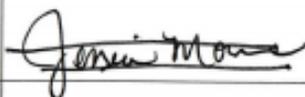
ATTENDANCE SIGN-IN SHEET:

Steering Committee Meeting #1 – June 22, 2021

Entity	Name	Title	Sign-In
Wharton County	Andy Kirkland	Emergency Management Coordinator	
Wharton County	Debbie Cenko	Deputy Emergency Management Coordinator	
City of Wharton	Krystal Hasselmeier	Assistant to the Community Development Director	<i>Krystal Hasselmeier</i>
City of Wharton	Gwyneth Teves	Community Development Director	<i>Gwyneth Teves</i>
City of East Bernard	Audrey Searce	City Secretary	<i>Audrey Searce</i>
City of El Campo	Lori Hollingsworth	Emergency Management Coordinator	
City of El Campo	Kevin Thompson	Director of Public Works	
Colorado County	Charles Rogers	Emergency Management Coordinator	
Jackson County	Kelly Janica	Emergency Management Coordinator	
Matagorda County	Amanda Campos	Emergency Management Coordinator	
Fort Bend County	Mark Flathouse	Emergency Management Coordinator	
Fort Bend County	Alan Spears		
Brazoria County	Steve Rosa	Emergency Management Coordinator	
City of Kendleton	Christina Flores	City Secretary	

City of Beasley	Misty Tiemann	City Secretary	
HGAC	Stephan Gage		
TxDOT	Ryan Simper	Area Engineer	online
LCRA	Stacy Moore-Guajardo	Emergency Management Coordinator	online
Wharton County Electric Cooperative	Wesley Lange		
Wharton County Electric Cooperative	Shelly Schulz	Communications Specialist	online
Wharton County Junior College	Danny Terronez	Directory of Security/Public Safety	
Lost Lagoon	Kenna & Stephen Lucas	Owner	online
Boling Municipal Water District	Mr. Ezell		
Hungerford MUD	Fred Ivy	President	<i>Fred D. Ivy</i>
Hungerford MUD	Taylor Ivy		
WCID #1	BJ Popp	Office Manager	
WCID #2	Ed Vacek	Superintendent	
Isaacson MUD	Colette Popp		

Coastal Bend Ground Water Conservation District	Neal Hudgin	General Manager	
West Wharton County Hospital District			
Wharton County ESD #1	William "Bubba" Wilcox		
Wharton County ESD #2	Britt Whitley		
Wharton County ESD #3	Dr. Herman Wolff		
Wharton County ESD #4			
Boling ISD	Lindsay Mahalitic	Secretary to Superintendent	
East Bernard ISD	Courtney Hudgins	Superintendent	
El Campo ISD	Bob Callagen	Superintendent	
Hallettsville ISD	Jo Ann Bludau	Superintendent	
Louise ISD	Dr. Garth Oliver	Superintendent	
Wharton ISD	Michael O'Guin	Superintendent	
Precinct #1	Jessica Moreno	Admin. Assistant	<i>Jessi Moreno</i>
Precinct #2	Bud Graves	Commissioner	<i>Bud Graves</i>

Precinct #3	Sheryl Thonsgaard	Admin. Assistant	
Precinct #4	Casey Lewis	Admin Assistant	online
Wharton ISD	Michael O'Guin	Emergency Management Coordinator	
Precinct #1	Jessica Moreno	Deputy Emergency Management Coordinator	
Precinct #1	Richard Zehn	Comm	in-person
Eric Scheibe	Scheibe Consulting	Project Manager	in-person
Abigail Ayers	Scheibe Consulting	Graduate Engineer	in-person
City of Wharton	Steve Johnson	Emergency Management Coord.	in-person
Fort Bend County EM&HS	Rodney Grimmer	Hazard Mitigation Planner	online
City of Wharton	Brandi Jimenez	Assistant to the City Manager	online
LCRA	Mario Chapca	Business Continuity Program Manager	online
East Bernard ISD	Philip Gaudette	Elementary Principle	online
East Bernard ISD	David Janeczek	Junior High Principle	online
Fort Bend County HS&EM	Frank Garza	Regional Planner	online
City of Wharton	Joseph Pace	City Manager	online

NOTES:

Introductions – Eric Scheibe

- Hazard Mitigation Plan Update includes Wharton County and the cities of East Bernard, Wharton, and El Campo.
 - This also involves other entities in the planning area
- The end goal is to develop a master plan and devise solutions
 - Allows for access to federal funds to help implement solutions
- Thus far have met with the cities and counties to gather data to analyze hazards and identify any changes in hazard profiles
- Based on data collection, the Scheibe team presented the hazards during the meeting
- It was noted the Scheibe team is looking for feedback and comments to better the hazard analysis

Project Overview – Abigail Ayers

- Provided link to a survey file containing important documents: 2016 Wharton County Hazard Mitigation Plan, Spanish Brochure, English Brochure, Goals and Objectives, Previous Mitigation Actions, Community Survey Results (as of 06/21/21), and the full Hazard Analysis document
- Explained what Hazard Mitigation
- Explained what a Hazard Mitigation Plan is
- Outlined the primary objectives of the project

Plan Components – Abigail Ayers

- Explained the six sections which the plan document is broken into
 - Planning Process
 - Community Profile
 - Demographics, critical facilities, along with other county-specific information
 - Capability Assessment
 - Risk Assessment
 - To be discussed later in the presentation
 - Mitigation Strategies
 - To be discussed in future steering committee meetings
 - Plan Adoption and Maintenance
- Hazard Mitigation Planning Process
 - Five phases
 - Organize and Review
 - Update the Risk Assessment
 - Conducted by Scheibe Consulting
 - Engage the Public
 - Form steering committee
 - Hold public meetings
 - Assemble the Updated Plan
 - Adopt/Implement the Plan

Risk Assessment – Abigail Ayers

Hazard Identification

- 14 hazards were assessed
- The shared folder contains full draft hazard analysis

Hazard Analysis

- Expansive Soils
 - Issues in Wharton County are mostly due to type D soil with high clay content

- Clay shrinking and swelling causes cracks in structures
- Can take 5 years for the moisture dome to settle under a foundation
- Damage is slow and mostly goes undocumented
- Eric noted that new developments have noticed extensive cracking on roadways shortly after completion
 - Suggested policies may be put into place for roadway construction
 - Does not only involve effects on structures
- Dam/Levee Failure
 - Dam count is based on national dam inventory and does not account for dams on private property
 - Two major dams upriver, Ceder Creek dam and Tom Miller dam, could release large quantities of water and affect Wharton County
 - The exposure level does not account for private dams which may not be analyzed for risk of failure as they are nonregulated
- Drought/Extreme Heat
 - Explained the heat level is 90 degrees Fahrenheit. This temperature combined with a relative humidity of 70% or above creates a heat index of 105.
 - This is the level at which many people experience stress.
 - Most impacts are felt in the agricultural industry
- Earthquake
 - Wharton County is not considered a high probability of occurrence
- Flood
 - Many community survey comments were in regard to flooding
- Hurricane and Tropical Storm
 - Secondary events are the main issue – hail, wind, lightning, and flooding
 - Noted the before and after-effects of flooding in the City of Wharton during hurricane Harvey
- Lightning, Wind, and Hail
 - Texas is ranked in the top 10 for lightning occurrences
- Tornado
- Wildfire
 - The figure displayed showed Wharton County areas that are non-burnable in pink and very low risk in green
 - Eric noted the data used for wildfire analysis is volunteer-driven. A greater amount of information was provided for El Campo. This is compared to no fires reported in the City of East Bernard or the City of Wharton. Based on these discrepancies the Scheibe team believes the data is skewed due to the voluntary reporting data collection method. The team believes there is a comparable risk in all cities.
- Winter Weather
- Pandemic
 - Most pandemics do not have a direct effect on the planning area
- Steve Johnson noted hazardous materials were not listed as a hazard and should be considered. Explained that there might be a risk to the county as a major railroad passes through the area. Steve further explained that there have been occurrences of spills on roadways in the planning area in the past.

Community Survey Results – Abigail Ayers

- 66 responses to English survey
- 1 response to Spanish survey
- The survey collects general information about the participant
- The survey assesses community preparedness level
- Steve Johnson noted that there are systems in place, such as RAVE, for distributing information to the community
- The survey results showed flood hazard as the highest concern rate
- Steve Johnson noted that ravine flooding differs from flash flooding
 - This results in different exposure areas and levels
- The survey collects the community's level of understanding regarding hazards
- Steve Johnson noted that homes in the area which are for sale have been advertised as located in areas that did not flood during 2017
- Audrey Scarce and Steve Johnson noted that the community has buy out programs in place, but it is difficult as once bought out the communities must maintain the space – could lead to scattered empty lots in city areas
- Steve Johnson noted that bought out properties may only be turned into green space
- Eric Scheibe noted that from the data collected for analysis and the survey results that flooding and hurricanes are of the highest priority in the planning area

Introduction of Mitigation Strategies – Abigail Ayers and Eric Scheibe

- Plan goals and objectives have been brought forward from the two previous plan iterations
 - All goals and objectives must be met with mitigation actions
 - FEMA Mitigation Ideas document provided in the shared folder is from 2013 and covers many hazards and possible mitigation actions
- Presented the mitigation actions included in the 2016 update specific for Wharton County:
 - Comments for each existing Wharton County mitigation actions from 2016:
 1. The Mitigation action is consistent with data and survey results.
 2. New data and modeling exist for the majority of the county. This could be submitted to FEMA to update mapping.
 3. Could push for the addition of ordinances. Example: raise finished floor elevation requirements.
 4. Recommended keeping in the plan for future funding opportunities.
 5. Helps to set finished floors – with new GPS survey equipment might be less of a priority.
 6. Suggested support be provided for all flood reduction projects.
 7. Goes beyond minimum FEMA requirements. Higher standards are developed. The CRS program allows for the lowering of insurance programs. Good for the general public.
 8. Roughly in place, but might be useful to create a formal structure.
 9. Currently occurring in Wharton. Opportunity to install more river gages for real-time data. Allows for access to inundation map given a certain flood stage during an event.
 10. Might be future opportunities available.
 11. Ongoing action item.
 12. Partially already done by NRCS but might have opportunities to expand.
 13. Moving towards different systems.
 14. This item is more likely handled with internal budgeting.
 15. Providing easier access to information would be helpful. Suggested to have an external website for high-risk hazards such as a flood.

- Asterisk denoted mitigation actions which encompassed actions carried forward from the 2011 hazard mitigation plan
- The shared folder contains the mitigation action status for each action in the 2016 hazard mitigation plan
- Projects which have not been completed can be brought forward as action items in the updated plan
- A meeting in the next couple of weeks will be held to discuss mitigation actions

Next Steps – Abigail Ayers

- Encouraged to push for more community survey responses so that more data may be collated
 - Noted that data can be skewed if a hazard event occurs such as flooding

Questions and Comments Session

- Stephan Gage noted that the community survey results might not accurately represent the county. It reflects those who have participated in the survey. Ideal to make sure the community receives consistent information to the greatest extent possible. If information is not easily accessible, community members will obtain information from a variety of locations that might be inaccurate or inconsistent. Might result in residents taking actions that are not ideal. The county should publish, at a minimum, the basic information the public should know and guidance for residents. The first location residents look to during a hazard event is governmental websites. In the end, the county needs to publish basic, easy-to-access information to help ensure consistency.
- City of Wharton Emergency Management Intern noted that almost all survey takers noted reliable access to the internet along with a majority falling into higher household income classes. Based on this information, many groups in the county might not be able to complete the survey due to their circumstances.
- Abigail Ayers noted that the survey was distributed via the county and cities' websites and social media pages as well as the local newspapers.

Moving Forward

- Mitigation Actions
- Steering Committee members are encouraged to look at the materials provided in the folder

Hazard Mitigation Plan Update - Wharton County

Steering Committee Meeting #2

Monday, July 26, 2021 @ 1:30 P.M.

Location: Wharton County Civic Center and Zoom

DISCUSSION TOPICS:

1. Introductions
2. Land Subsidence
3. Survey Results
4. Mitigation Actions - Creating Actions
 - a. Wharton County
 - b. City of East Bernard
 - c. City of El Campo
 - d. City of Wharton
5. Comment Session
6. Next Steps

ATTENDEES SUMMARY:

Eric Scheibe – Scheibe Consulting, LLC

Abigail Ayers – Scheibe Consulting, LLC

Debbie Cenko – Wharton County – Deputy Emergency Management Coordinator

Audrey Searce – City of East Bernard – Emergency Management Coordinator

Lori Hollingsworth – City of El Campo – Emergency Management Coordinator

Stephan Gage – HGAC – Principal Planner, Transportation

Shelly Schulz – Wharton County Electric Cooperative – Communications Specialist

W.D. Bud Graves – Wharton County – Commissioner Precinct 2

Steve Johnson – City of Wharton – Emergency Management Coordinator

Andy Kirkland – Wharton County – Emergency Management Coordinator

ATTENDANCE SIGN-IN SHEET:

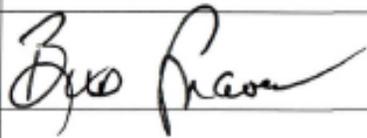
Stakeholder Committee Meeting #2 – July 22, 2021

Entity	Name	Title	Sign-In
Wharton County	Debbie Cenko	Deputy Emergency Management Coordinator	<i>Debbie Cenko</i>
City of Wharton	Krystal Hasselmeier	Assistant to the Community Development Director	
City of Wharton	Gwyneth Teves	Community Development Director	
City of East Bernard	Audrey Searce	City Secretary	<i>Audrey Searce</i>
City of El Campo	Lori Hollingsworth	Emergency Management Coordinator	<i>online attendance</i>
City of El Campo	Kevin Thompson	Director of Public Works	
Colorado County	Charles Rogers	Emergency Management Coordinator	
Jackson County	Kelly Janica	Emergency Management Coordinator	
Matagorda County	Amanda Campos	Emergency Management Coordinator	
Fort Bend County	Mark Flathouse	Emergency Management Coordinator	
Fort Bend County	Alan Spears	Deputy Emergency Management Coordinator	
Brazoria County	Steve Rosa	Emergency Management Coordinator	
City of Kendleton	Christina Flores	City Secretary	

Stakeholder Committee Meeting #2 – July 22, 2021

Entity	Name	Title	Sign-In
City of Beasley	Misty Tiemann	City Secretary	
HGAC	Stephan Gage		<i>online attendance</i>
TxDOT	Ryan Simper	Area Engineer	
LCRA	Stacy Moore-Guajardo	Emergency Management Coordinator	
Wharton County Electric Cooperative	Wesley Lange		
Wharton County Electric Cooperative	Shelly Schulz	Communications Specialist	<i>online attendance</i>
Wharton County Junior College	Danny Terronez	Directory of Security/Public Safety	
Lost Lagoon	Kenna & Stephen Lucas	Owner	
Boling Municipal Water District	Mr. Ezell		
Hungerford MUD	Fred Ivy	President	
WCID #1	BJ Popp	Office Manager	
WCID #2	Ed Vacek	Superintendent	
Isaacson MUD	Colette Popp		

Stakeholder Committee Meeting #2 – July 22, 2021

Entity	Name	Title	Sign-In
Coastal Bend Ground Water Conservation District	Neal Hudgin	General Manager	
Wharton County ESD #1	William "Bubba" Wilcox		
Wharton County ESD #2	Britt Whitley		
Wharton County ESD #3	Dr Herman Wolff		
Boling ISD	Lindsay Mahalitic	Secretary to Superintendent	
East Bernard ISD	Courtney Hudgins	Superintendent	
El Campo ISD	Bob Callagen	Superintendent	
Hallettsville ISD	Jo Ann Bludau	Superintendent	
Louise ISD	Dr Garth Oliver	Superintendent	
Wharton ISD	Michael O'Guin	Superintendent	
Precinct #1	Jessica Moreno	Admin. Assistant	
Precinct #2	Bud Graves	Commissioner	
Precinct #3	Sheryl Thonsgaard	Admin. Assistant	

Stakeholder Committee Meeting #2 – July 22, 2021

Entity	Name	Title	Sign-In
Precinct #4	Casey Lewis	Admin Assistant	
City of Wharton	Steve Johnson	Emergency management Coordinator	
East Bernard ISD	Philip Gaudette	East Bernard Elementary Principal	
Precinct 1	Richard Zahn	Commissioner	
Fort Bend County HS&EM	Rodney Grimmer	Hazard Mitigation Planner	
City of Wharton	Brandi Jimenez	Assistant to the City Manager	
LCRA	Mario Chapa	Business Continuity Program Manager	
East Bernard ISD	David Janecek	Junior High Principle	
Fort Bend County HS&EM	Frank Garza	Regional Planner	
City of Wharton	Joseph Pace	City Manager	
Wharton County	Andy Kirkland	Emc	

NOTES:

Introductions – Eric Scheibe

- Introductions of all attendees

Land Subsidence – Abigail Ayers

- Most recent addition
- A majority of information was obtained from a 2020 study conducted for the Coastal Bend Ground Water Conservation District
 - Summarized two studies of land subsidence
 - Figure contained in PowerPoint was pulled for the study
 - The majority of the measurements confirmed land subsidence
- The only major occurrence of sudden land subsidence on record is the Boling Sinkhole of 1983
- Noted north of highway 59 and north-west of the City of Wharton are locations experiencing the greatest land subsidence
- Eric stated that discussions with Chris Riley at LCRA noted a gauge at Lane City Dam has subsided a substantial amount over the past 10–15-year period.
 - The cause of the subsidence has not been identified
 - Suggested monitoring needs to occur as land subsidence can affect flood risk in the area
 - Findings will be noted in the Hazard Mitigation Plan

Survey Results – Abigail Ayers

- Survey results from June 1, 2021, to July 21, 2021
 - No responses were received over the previous two-week period
- Review of Survey results
- Survey Results presented did not contain the one response received from the Spanish survey, but will be included in the final Hazard Mitigation Plan

Goals and Objectives – Abigail Ayers

- Included in the handout given to attendees
- Changes have not been made between plan updates
- Goals link to the mitigation actions
- Objectives provide further details for each goal
- Noted that FEMA requires an emphasis on new and existing structures

Mitigation Actions - Creating Actions – Abigail Ayers

- Included in the handout given to attendees
- Review of each mitigation action item
 - Alternatives, changes, and approval/removal
- Noted that each jurisdiction must have jurisdiction-specific action items
- Asterisk denotes action items from the previous hazard mitigation plan which were identified as ongoing or delayed and will be brought forward in the hazard mitigation plan update
- Wharton County Mitigation Actions
 - “Update and adopt the Wharton County Flood Insurance Study and FIRM”
 - Item will be a continual action item as updates will be made regularly
 - “Join FEMA’s CRS Program”
 - Approved as it will be a goal to reach over the next 5 years
 - “Create/Maintain a Wharton Disaster Response Team”
 - approved
 - A team of individuals exists which can be contacted to aid during a hazard event, but no formal response team exists

- “Educate homeowners on hazards”
 - wording changed from homeowners to the community to broaden the target audience
- “Collaborate with local canal owners to identify funding to improve and expand existing infrastructure”
 - Changed to also include expansive soils hazard
- “Conduct lessons learned meeting regarding COVID-19 Pandemic”
 - noted the value of holding a larger meeting with adjacent counties and local entities
- All action items were approved by the committee
- All hazards are covered by two or more action items
- No other action items were proposed
- East Bernard Mitigation Actions
 - No changes were made to the mitigation action items
 - All actions items were approved by the committee
 - “GIS mapping” was proposed as an additional mitigation action
 - This item covers expansive soils, flood, wildfire, and land subsidence hazards
 - All hazards are covered by two or more action items
- City of El Campo Mitigation Actions
 - “Outreach to vulnerable populations”
 - changed to “Outreach to vulnerable population regarding extreme heat and cold”
 - this covers extreme heat and winter weather hazards
 - “Educate homeowners on hazards”
 - wording changed from homeowners to the community to broaden the target audience
 - All action items were approved by the committee
 - No additional action items were proposed
 - All hazards are covered by two or more action items
- City of Wharton Mitigation Actions
 - “Educate homeowners on hazards”
 - wording changed from homeowners to the community to broaden the target audience
 - “Implement Reverse 911 and Warning sign”
 - Changed to “Implement Warning System”
 - Implement Reverse 911 has been completed
 - “Conduct lesson learned meeting in regard to COVID-19 Pandemic”
 - Changed to “Conduct after-action report and improvement plan in regard to COVID-19 Pandemic”
 - This action item wording will be updated for each jurisdiction
 - All hazards are covered by two or more action items
 - All action items were approved by the committee
 - No additional action items were proposed

Comments Session

- Requested the addition of a hazardous materials section to the hazard mitigation plan
 - Addition requested due to location of railroads, highways, pipelines, fertilizer plants/storage facilities, battery storage facilities (lithium-ion battery storage containers), wind farms, solar farms, and commercial facilities in the planning area.

- Potential action items
 - “Establish a county-wide hazardous material response team”
 - This will be added to each jurisdiction’s mitigation action item list
 - “Implementation of hazardous material warnings”
 - “Establish traffic plan to divert hazardous material transportation around risk areas”

Next Steps

- Update Mitigation Action Items in Draft
- Review/approval of Land Subsidence chapter by the committee
- Creating Hazardous Material Chapter
- Final review stage
- Public Comment period
 - Draft posted at all City halls and Wharton County courthouse
- Final Hazard Mitigation Plan submittal to FEMA for review/approval

Wharton County Hazard Mitigation Plan Public Involvement and Participation

Wharton County and the participating communities created a brochure as a means to engage the public in the hazard mitigation planning process. The brochure contained information informing the public of what a hazard mitigation plan is as well as the benefits of participating as a community member. Also included was a list of hazards reviewed in the update with further information provided for three high-risk/impact hazards. The brochure provided the community with links and contact information for any questions or concerns regarding the update of the plan. Lastly, a link and QR code for the survey was provided for the community members to complete as a means of active participation in the update process. The brochure was distributed through the planning partners' websites, social media pages, offices, and local newspapers.

A copy of the brochure provided to community members can be found below as well as the results of the community survey.

Wharton County Brochure (English):

WHARTON COUNTY HAZARD MITIGATION PLAN







What is a Hazard Mitigation Plan?

A HMP is “the representation of the jurisdiction’s commitment to reduce risks from natural hazards, serving as a guide for decision-makers as they commit resources to reducing the effects of natural hazards” (44 CFR 201.6).

What are the benefits of participating in the Hazard Mitigation Plan?

- Awareness of risk and vulnerabilities
- Identification of implementable strategies and funding sources
- Reduction of hazard impact (save lives, property, and the local economy)
- Creation of partnerships and develop comprehensive approaches that enhance project grant funding opportunities
- Pooling of resources while avoiding duplication of effort
- Creation of more resilient communities; bounce-back from disasters faster!

Hazards Evaluated

- Dam/Levee Failure
- Drought
- Expansive Soils
- Extreme Heat
- Earthquake
- Flood
- Hail

- Hurricane and Topical Storms
- Lightning
- Pandemic
- Tornado
- Wildfire
- Wind
- Winter Weather

Schedule

Phase 1:
Organize
and Review

➔

Phase 2:
Update the Risk
Assessment

➔

Phase 3:
Engage the
Public

➔

Phase 4:
Assemble the
Updated Plan

➔

Phase 5:
Adopt/Implement
the plan

HAZARDS OF HIGHEST CONCERN

Flood:

- There is a 45% chance of a flash flood occurring within any given year in Wharton County.
- The base flood event, or 100-Year Flood (1% annual chance), has the capability of displacing approximately 12,928 residents in the county.
- The FEMA Flood Zone Map shows Wharton County during a 100-Year and 500-Year event (0.2% annual chance).

FEMA Flood Zone

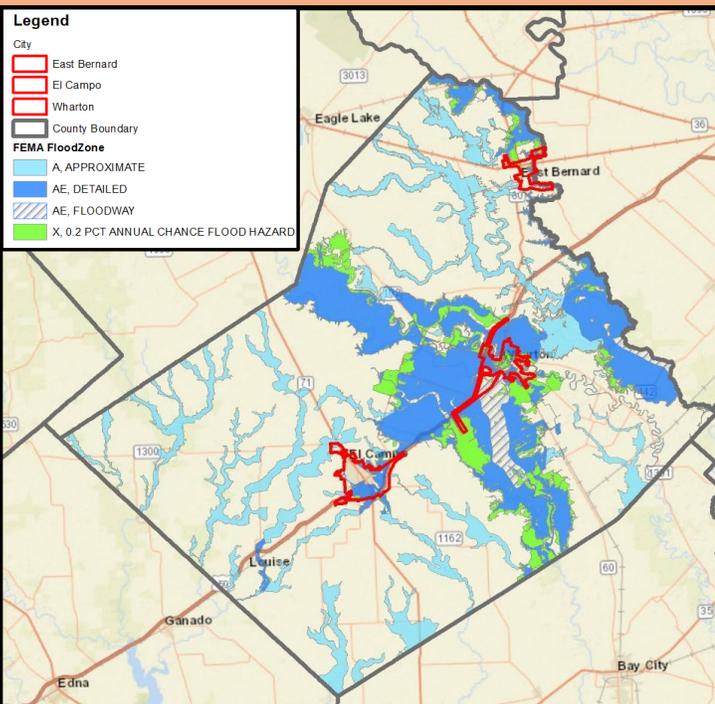
Legend

City

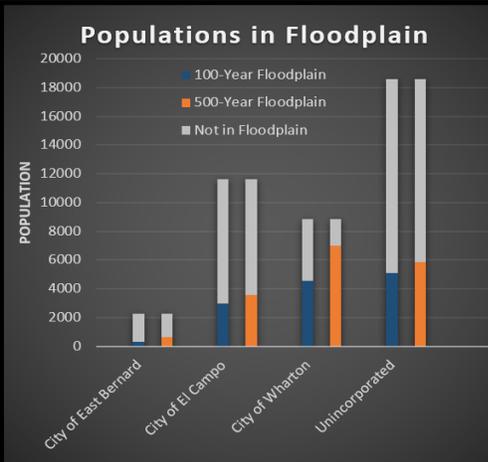
- East Bernard
- El Campo
- Wharton
- County Boundary

FEMA FloodZone

- A, APPROXIMATE
- AE, DETAILED
- AE, FLOODWAY
- X, 0.2 PCT ANNUAL CHANCE FLOOD HAZARD



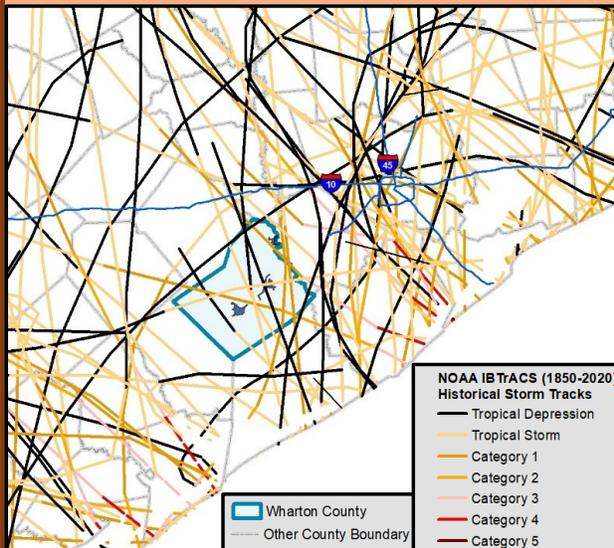
Populations in Floodplain



Jurisdiction	100-Year Floodplain	500-Year Floodplain	Not in Floodplain
City of East Bernard	~1,000	~1,000	~1,000
City of El Campo	~3,000	~4,000	~8,000
City of Wharton	~4,000	~3,000	~5,000
Unincorporated	~5,000	~6,000	~12,000

Hurricanes/Tropical Storms:

Past Hurricanes and Tropical Storms Affecting Wharton County



- Wharton County is predicted to be in the direct line of a hurricane/tropical storm once every 19 years.
- Wharton County will experience the effects of a hurricane/tropical storm once every 3 years.
- During 100-year probabilistic event approximately 10% of buildings (mostly residential) are expected to sustain moderate damage.
- The annualized losses estimate (both structures and content) due to past hurricanes/tropical storm events in Wharton County is \$8,849,000.

HOW YOU CAN HELP?

Public input on the mitigation planning process is very important and residents are encouraged to educate themselves about the existing plan and offer comments on the update. A link to the public survey for the 2021 update to the Wharton County Hazard Mitigation Plan is below. This survey will gather input and evaluate citizens' preparedness for natural disasters. **For more information about hazard mitigation visit the City of Wharton Emergency Management Department website:** http://www.cityofwharton.com/page/em_home

Wharton County Resident? Take our survey!

<https://www.surveymonkey.com/r/WhartonCountyHMP>

– Or –

Scan the QR code to complete the survey



Pandemic:

What is considered a Pandemic?

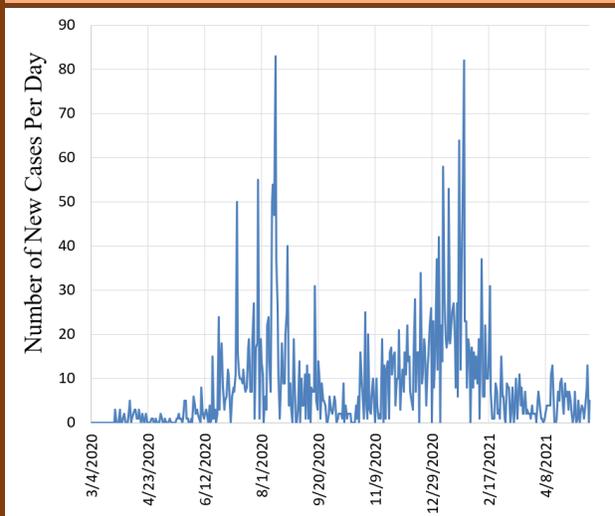
An outbreak of a disease that occurs over a wide geographic area, such as multiple countries or continents, and typically affects a significant proportion of the population.

- Wharton County is predicted to experience a pandemic of some severity within the next 10 years. (See Pandemic Severity Index Table)
- According to the Cleveland Clinic, intervals between pandemics are shortening and frequency is increasing.
- Pandemics can have far-reaching effects on a community's health, economy, and social well-being.
 - The effects of a pandemic were most recently felt due to the outbreak of COVID-19 in 2020.

Pandemic Severity Index (PSI)

Category	Case Fatality Ratio	Example
1	Less than 0.1%	Seasonal Flu
2	0.1 - <0.5%	Asian Flu and Hong Kong Flu
3	0.5 - <1%	Pandemic H1N1 (2009)
4	1.0 - <2.0%	Lassa Fever
5	2.0% or higher	1918 Flu Pandemic

Confirmed COVID-19 Cases in Wharton County



For any questions about hazard mitigation or the process, please contact:

Eric Scheibe, PE, CFM

Phone: (512) 263-0418

Email: escheibe@scheibeconsulting.com



Wharton County Brochure (Spanish):

PLAN DE MITIGACIÓN DE RIESGOS DEL CONDADO DE WHARTON



SCHEIBE
CONSULTING LLC

¿Qué es un Plan de Mitigación de Riesgos?

El Plan de Mitigación de Riesgos forma parte del esfuerzo del Condado de Wharton de minimizar o eliminar el riesgo a largo plazo para la vida humana y la propiedad debido a peligros conocidos como sequías, inundaciones, tornados, incendios forestales y otros desastres importantes.

Riesgos Evaluados

- Falla en la represa/dique
- Sequía
- Suelos Expansivos
- Calor Extremo
- Terremoto
- Inundación
- Granizo
- Huracanes y Tormentas Tropicales
- Relámpagos
- Pandemia
- Tornado
- Incendio forestal
- Vientos Fuertes
- Clima de Invierno Severo

¿Cuáles son los beneficios de participar en un Plan de Mitigación de Riesgos?

- Nuevo conocimiento de riesgos y vulnerabilidades.
- Identificación de estrategias implementables y de recursos de fondos.
- Reducción de impactos adversos de los riesgos evaluados (para salvar vidas, proteger propiedades y la economía local)
- Habilidad de formar relaciones y desarrollar enfoques exhaustivos que aumentan oportunidades de subvenciones para proyectos locales.
- Combinación de recursos para eliminar el doble esfuerzo
- ¡Creación de una comunidad más fuerte y resistente!

CALENDARIO

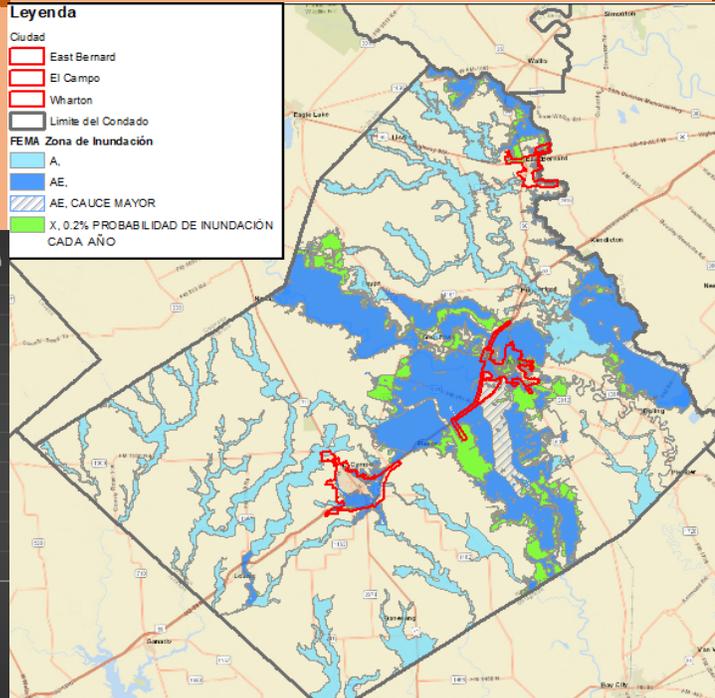


RIESGOS PRINCIPALES

Inundación:

- Cada año hay una probabilidad de 45% que ocurra una inundación repentina en el Condado de Wharton.
- La inundación de 100 años (inundación de un 1% probabilidad de ocurrencia cada año) tiene la capacidad de desplazar a 12,928 residentes.
- El mapa de inundaciones de FEMA muestra el impacto de inundaciones de 100-años y de 500-años (0.2% probabilidad de ocurrir cada año.)

MAPA DE INUNDACION DE FEMA

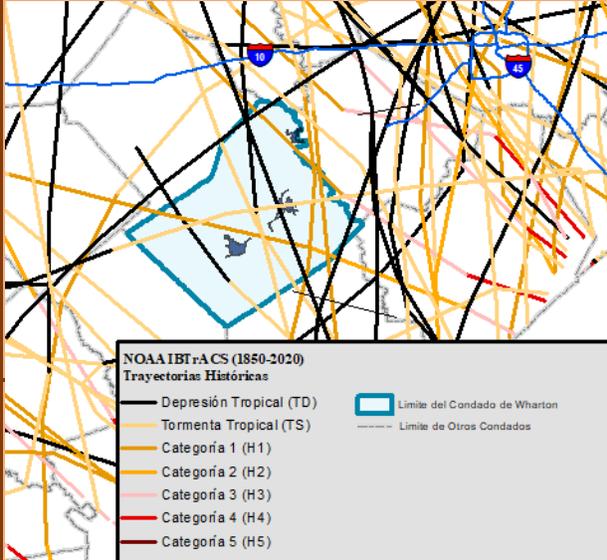


Población Dentro de la Zona de Inundación



Huracanes y Tormentas Tropicales:

Huracanes y Tormentas Tropicales Históricas en el Condado Wharton



- Cada 19 años el Condado de Wharton está en línea directa de un huracán o una tormenta tropical.
- Cada 3 años el condado de Wharton siente los efectos de un Huracán o una tormenta tropical.
- En el caso de un evento con un periodo de retorno de 100 años 10% de los edificios (principalmente edificios residenciales) sufrirían daños moderados.
- La pérdida anualizada debido a Huracanes y Tormentas Tropicales en el Condado de Wharton es \$8,849,000.

¿COMO PUEDO AYUDAR?

Es muy importante que la comunidad nos ayude a identificar y analizar los riesgos que los pueden afectar. Alentamos a todos los miembros de la comunidad que nos ofrezcan comentarios sobre el plan actual y su actualización. Un **enlace** con la encuesta publica sobre la actualización del Plan de Mitigación de Riesgos del Condado de Wharton se encuentre abajo.

Para más información sobre la mitigación de riesgos visite el sitio de web del Departamento de Emergencias de la Ciudad de Wharton:

http://www.cityofwharton.com/page/em_home

¿Residente del Condado de Wharton? ¡Contesta nuestra encuesta!

<https://www.surveymonkey.com/r/encuestawharton>

– O –

Escanea el Código QR para completar la encuesta



Pandemia:

¿Qué es una Pandemia?

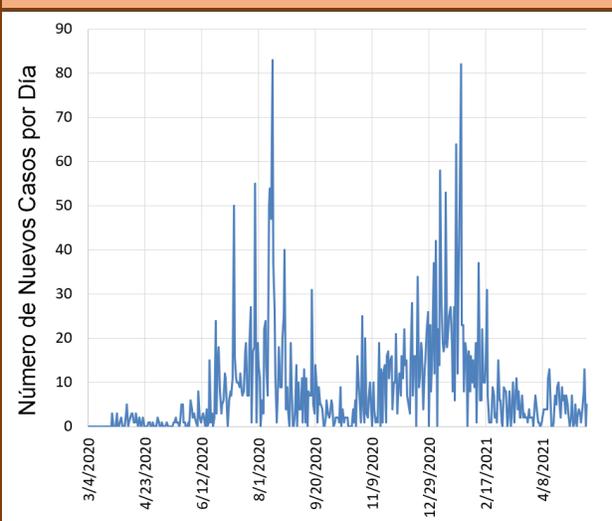
Una pandemia es una epidemia de una enfermedad infecciosa que se ha propagado en un área geográficamente extensa, afectando a un número considerable de personas.

- En los próximos 10 años va a ocurrir otra pandemia de un cierto nivel de gravedad en el Condado Wharton (véase el cuadro de Gravedad de las Pandemias a continuación.)
- Según la Clínica de Cleveland las pandemias son cada vez más frecuentes con menos tiempo entre cada evento.
- Pandemias pueden tener efectos devastadores en la salud, economía, y bienestar social de una comunidad.
 - En el 2020 COVID-19 demostró los efectos que puede tener una pandemia.

Índice de Gravedad de las Pandemias (PSI)

Categoría	Tasa de Letalidad	Ejemplo
1	Menos de 0.1%	Gripe Estacional
2	0.1 - <0.5%	Gripe de Hong Kong
3	0.5 - <1%	Gripe pandémica H1N1 (2009)
4	1.0 - <2.0%	Fiebre de Lassa
5	2.0% o Más	Gripe Española (1918)

Casos oficiales de COVID-19 en el Condado de Wharton



Para preguntas adicionales sobre la mitigación de riesgos o este proceso por favor contacte al:

Sr. Eric Scheibe, PE, CFM

Tel: (512) 263-0418

Email: escheibe@scheibeconsulting.com

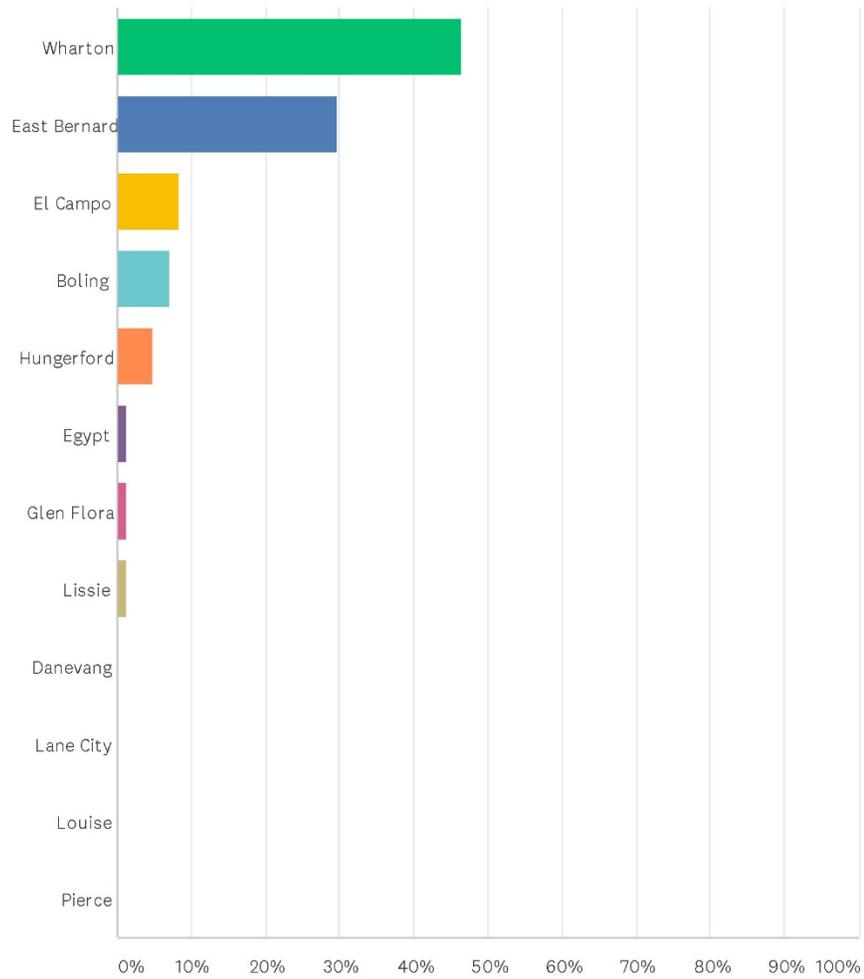


Wharton County Survey (English) Responses:

Wharton County TX HMP Update Survey 2021

Q1 Where in Wharton County do you live?

Answered: 84 Skipped: 3

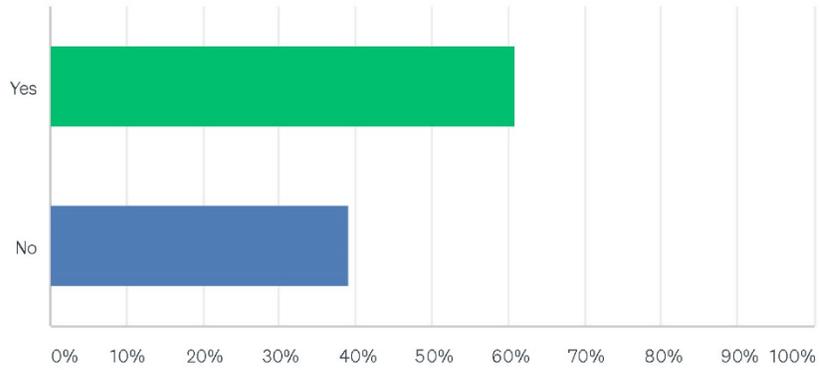


Wharton County TX HMP Update Survey 2021

ANSWER CHOICES	RESPONSES	
Wharton	46.43%	39
East Bernard	29.76%	25
El Campo	8.33%	7
Boling	7.14%	6
Hungerford	4.76%	4
Egypt	1.19%	1
Glen Flora	1.19%	1
Lissie	1.19%	1
Danevang	0.00%	0
Lane City	0.00%	0
Louise	0.00%	0
Pierce	0.00%	0
TOTAL		84

Q2 Do you work in Wharton County?

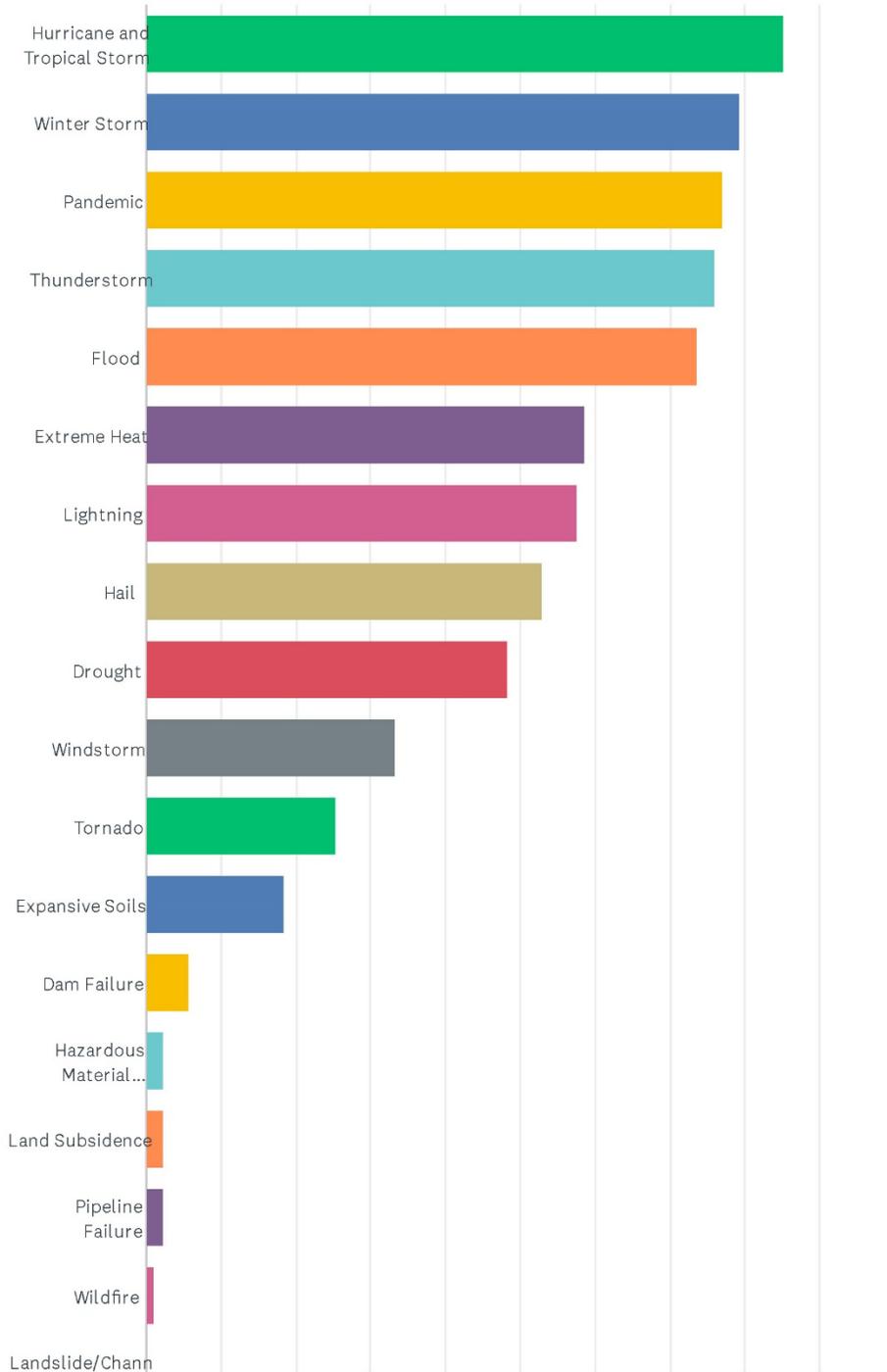
Answered: 87 Skipped: 0



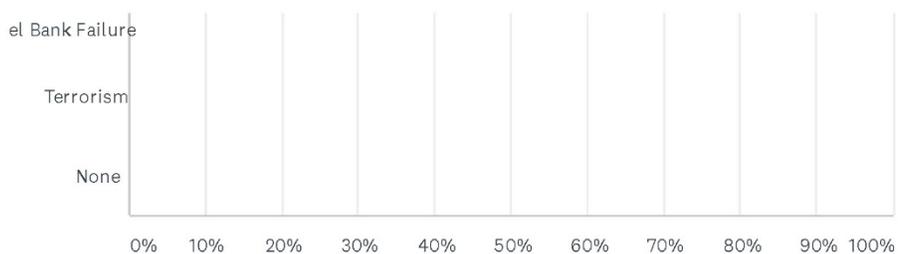
ANSWER CHOICES	RESPONSES	
Yes	60.92%	53
No	39.08%	34
TOTAL		87

Q3 Which of the following hazard events have you or anyone in your household experienced in the past 20 years within Wharton County?
(Check all that apply)

Answered: 87 Skipped: 0



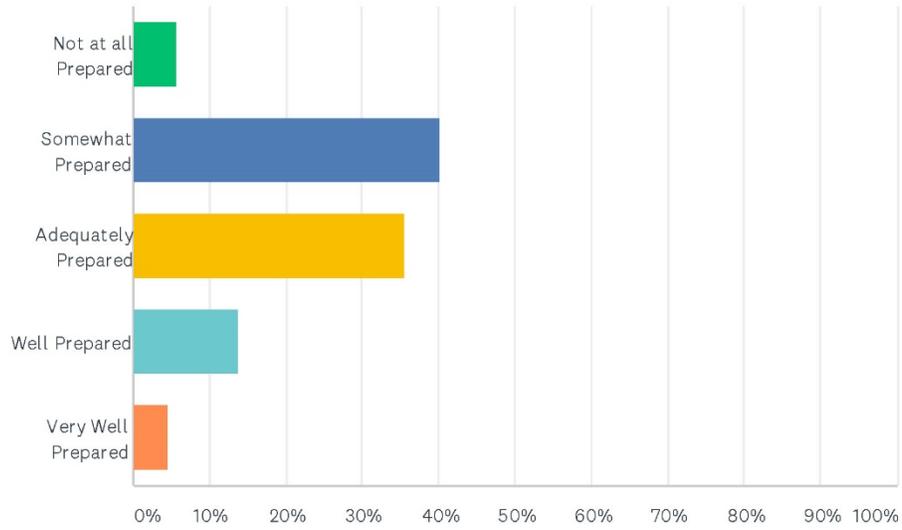
Wharton County TX HMP Update Survey 2021



ANSWER CHOICES	RESPONSES	
Hurricane and Tropical Storm	85.06%	74
Winter Storm	79.31%	69
Pandemic	77.01%	67
Thunderstorm	75.86%	66
Flood	73.56%	64
Extreme Heat	58.62%	51
Lightning	57.47%	50
Hail	52.87%	46
Drought	48.28%	42
Windstorm	33.33%	29
Tornado	25.29%	22
Expansive Soils	18.39%	16
Dam Failure	5.75%	5
Hazardous Material Release	2.30%	2
Land Subsidence	2.30%	2
Pipeline Failure	2.30%	2
Wildfire	1.15%	1
Landslide/Channel Bank Failure	0.00%	0
Terrorism	0.00%	0
None	0.00%	0
Total Respondents: 87		

Q4 How prepared is your household to deal with a natural hazard event?

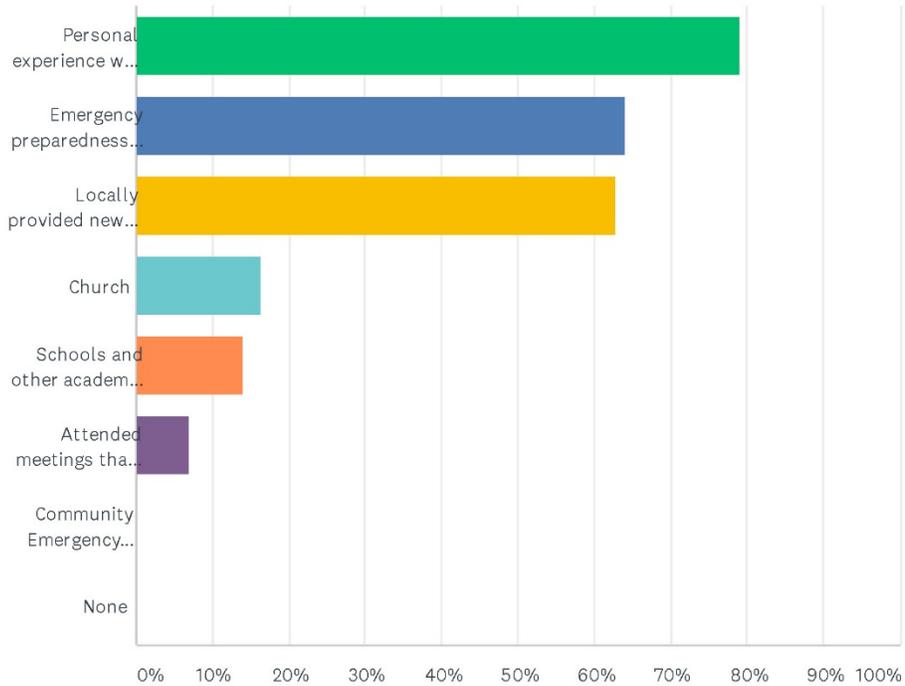
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Not at all Prepared	5.75%	5
Somewhat Prepared	40.23%	35
Adequately Prepared	35.63%	31
Well Prepared	13.79%	12
Very Well Prepared	4.60%	4
TOTAL		87

Q5 Which of the following have provided you with useful information to help you be prepared for a natural hazard event? (Check all that apply)

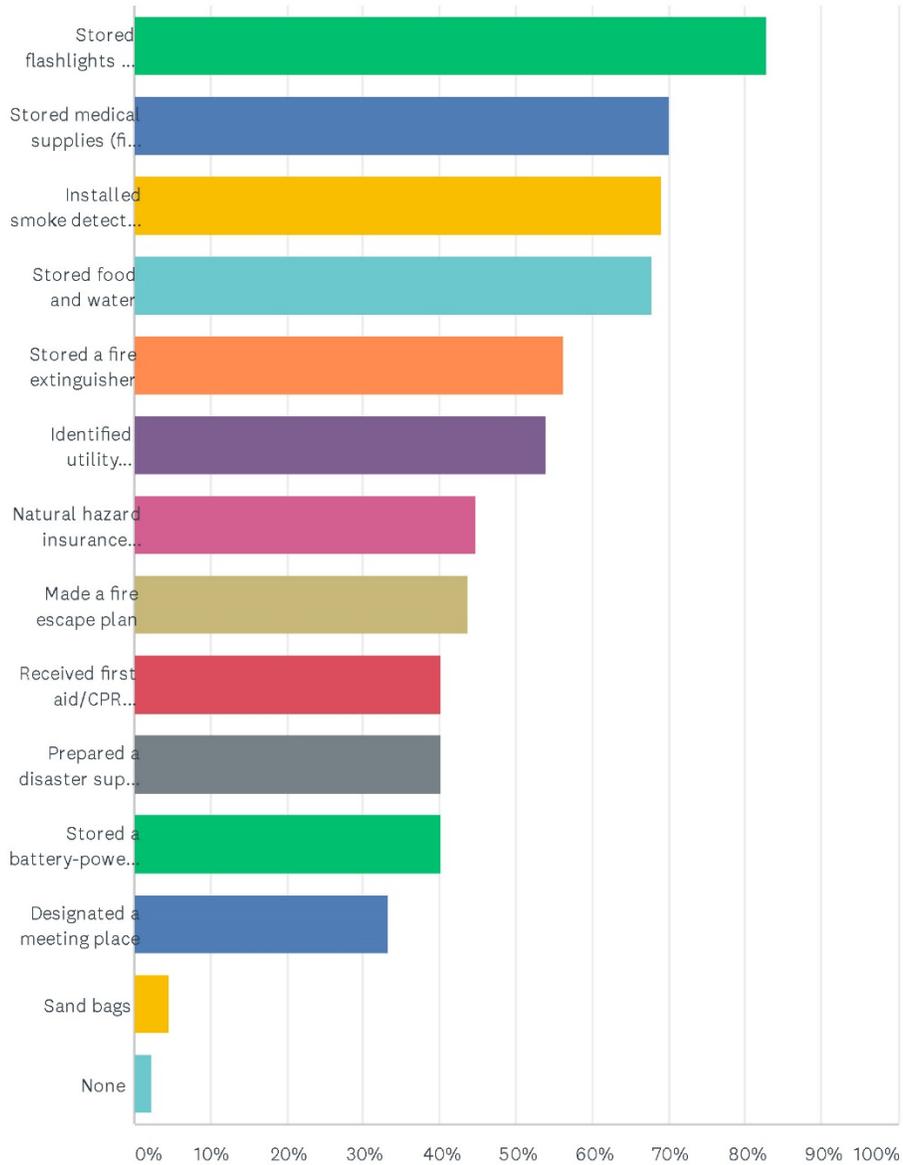
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
Personal experience with one or more natural hazards/disasters	79.07%	68
Emergency preparedness information from a government source (e.g., federal, state, or local emergency management)	63.95%	55
Locally provided news or other media information	62.79%	54
Church	16.28%	14
Schools and other academic institutions	13.95%	12
Attended meetings that have dealt with disaster preparedness	6.98%	6
Community Emergency Response Training (CERT)	0.00%	0
None	0.00%	0
Total Respondents: 86		

Q6 Which of the following steps has your household taken to prepare for a natural hazard event? (Check all that apply)

Answered: 87 Skipped: 0

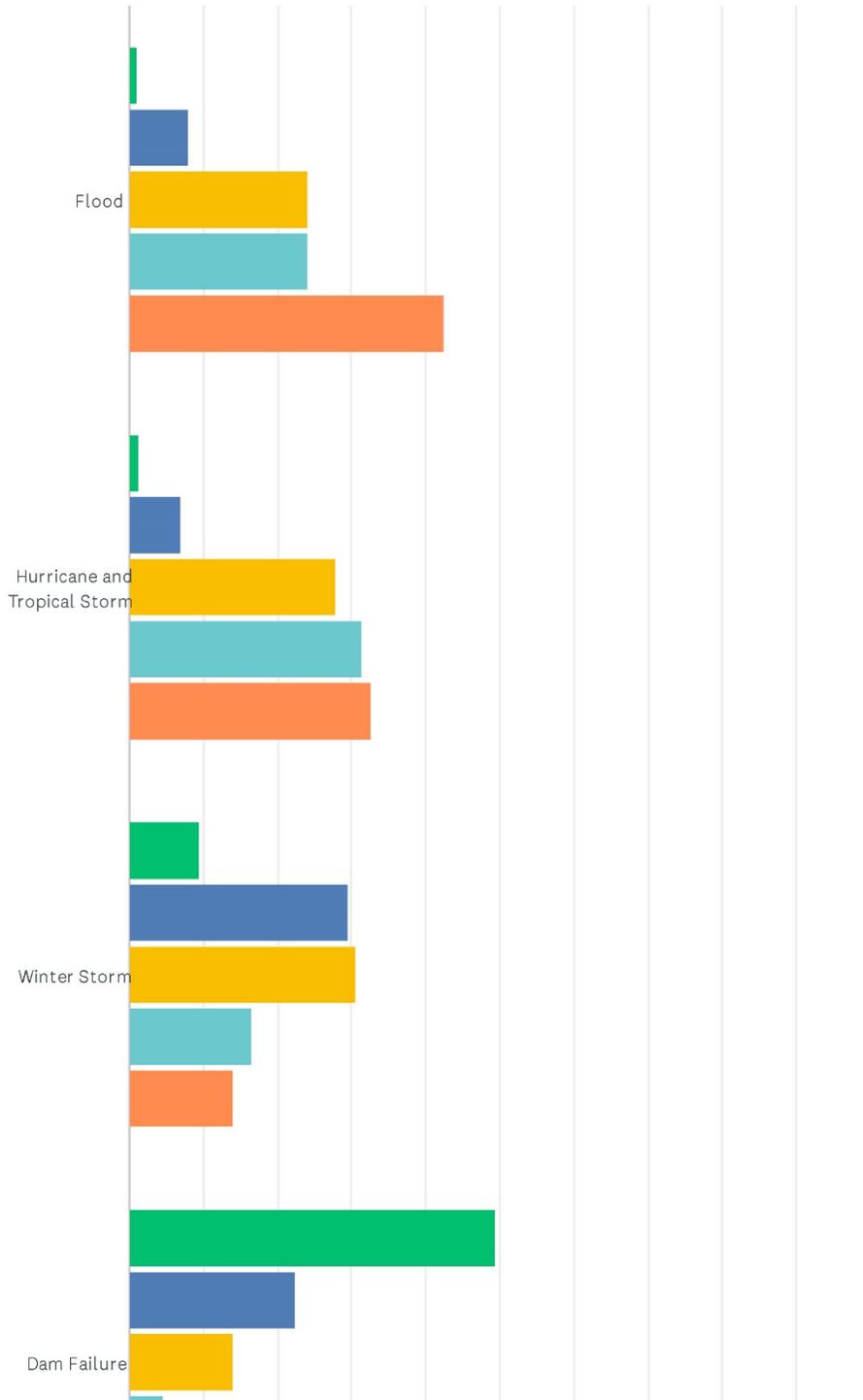


Wharton County TX HMP Update Survey 2021

ANSWER CHOICES	RESPONSES	
Stored flashlights and batteries	82.76%	72
Stored medical supplies (first aid kit, medications, personal protective equipment (PPE))	70.11%	61
Installed smoke detectors on each level of the house	68.97%	60
Stored food and water	67.82%	59
Stored a fire extinguisher	56.32%	49
Identified utility shutoffs	54.02%	47
Natural hazard insurance (Flood, Earthquake, Wildfire)	44.83%	39
Made a fire escape plan	43.68%	38
Received first aid/CPR training	40.23%	35
Prepared a disaster supply kit	40.23%	35
Stored a battery-powered radio	40.23%	35
Designated a meeting place	33.33%	29
Sand bags	4.60%	4
None	2.30%	2
Total Respondents: 87		

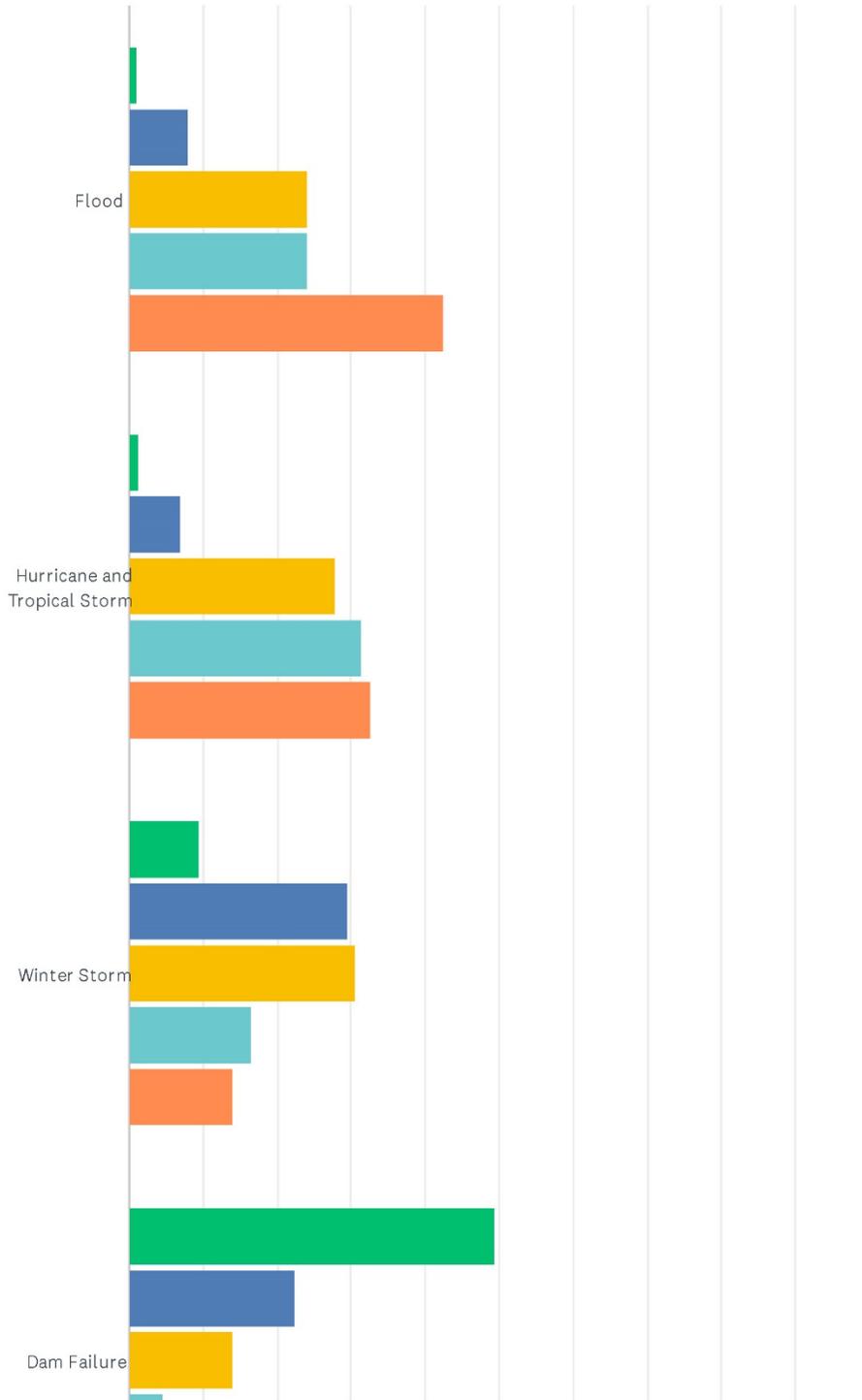
Q7 How concerned are you about the following natural hazards in Wharton County? (Check one response for each hazard)

Answered: 87 Skipped: 0

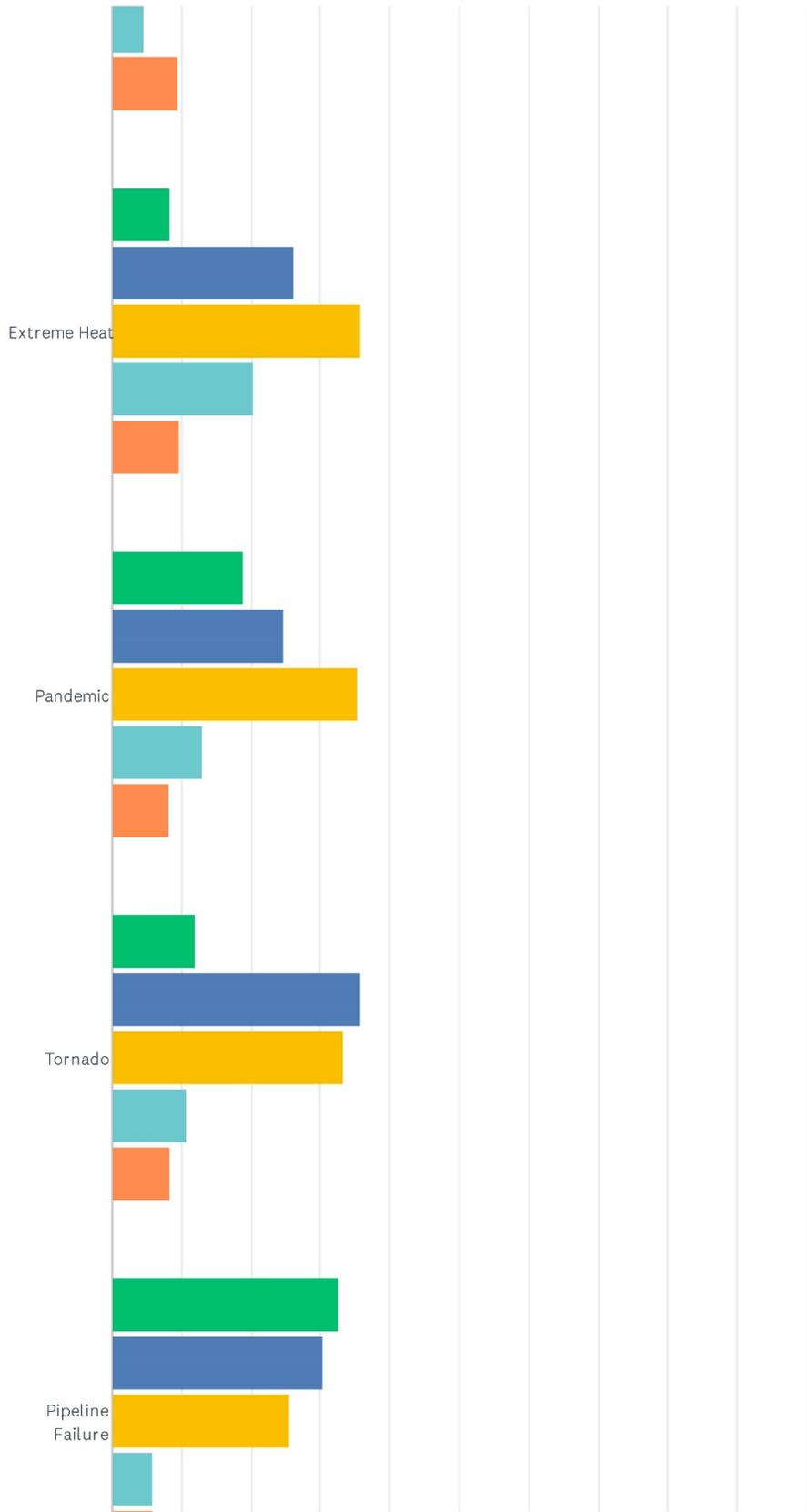


Q7 How concerned are you about the following natural hazards in Wharton County? (Check one response for each hazard)

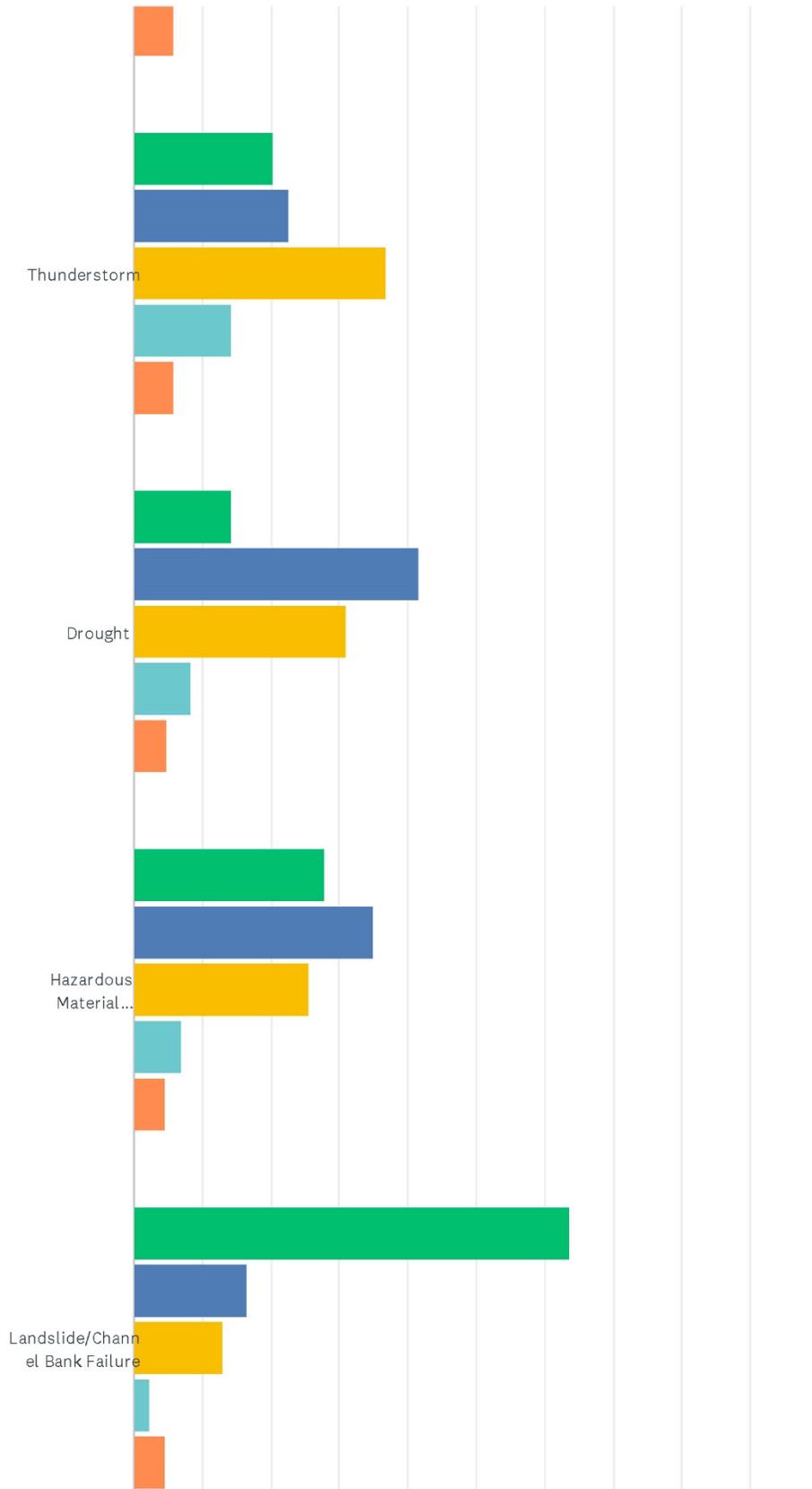
Answered: 87 Skipped: 0



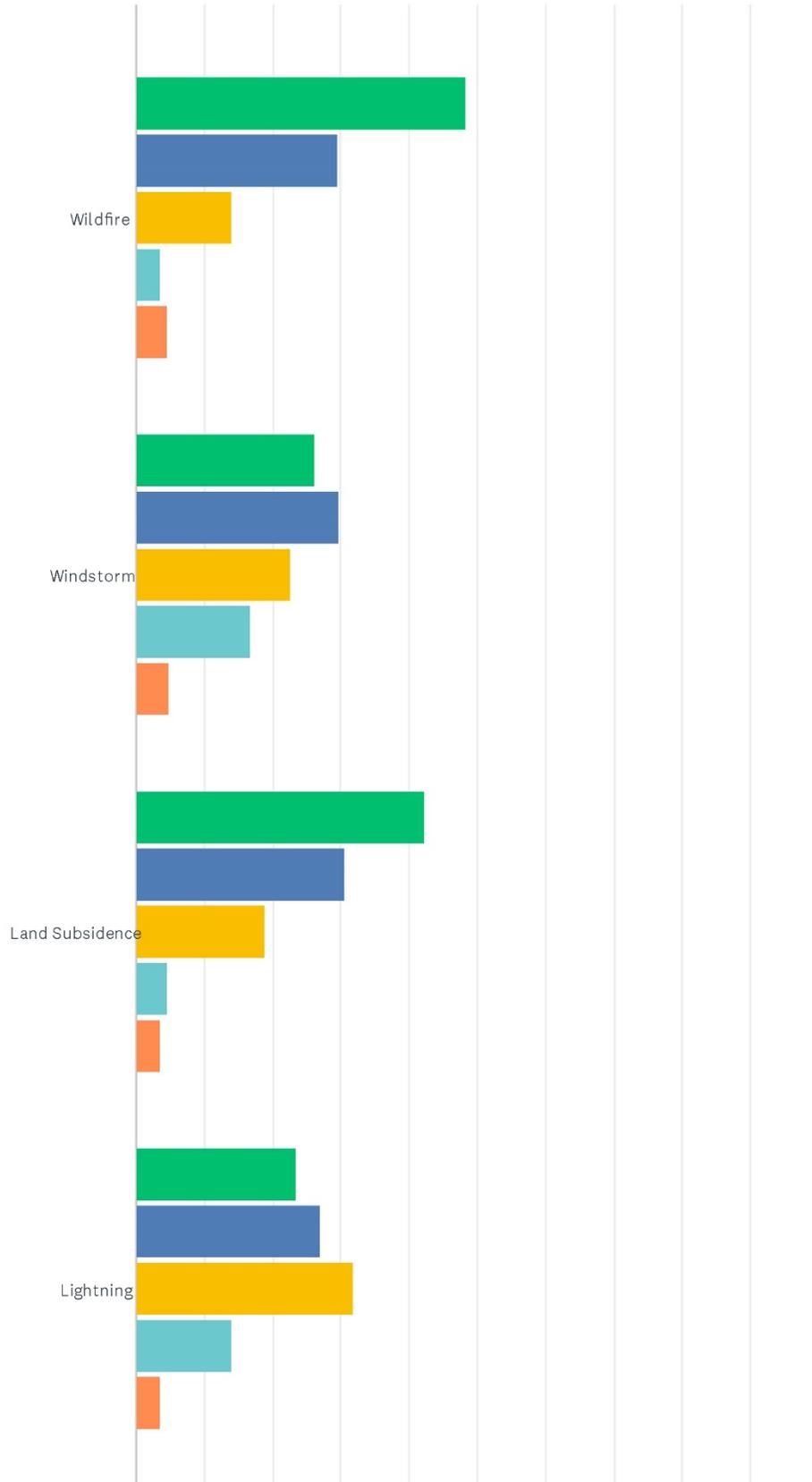
Wharton County TX HMP Update Survey 2021



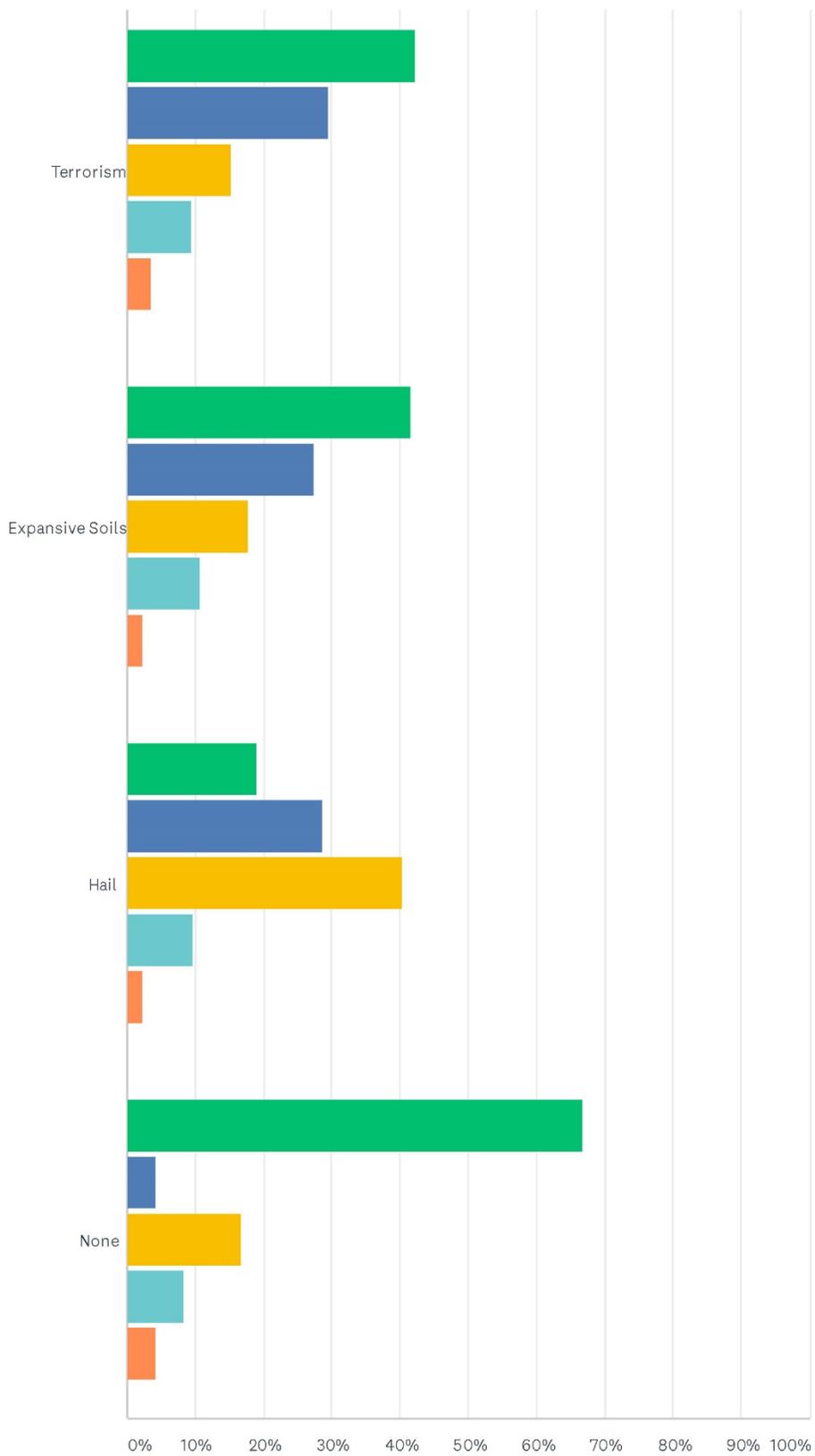
Wharton County TX HMP Update Survey 2021



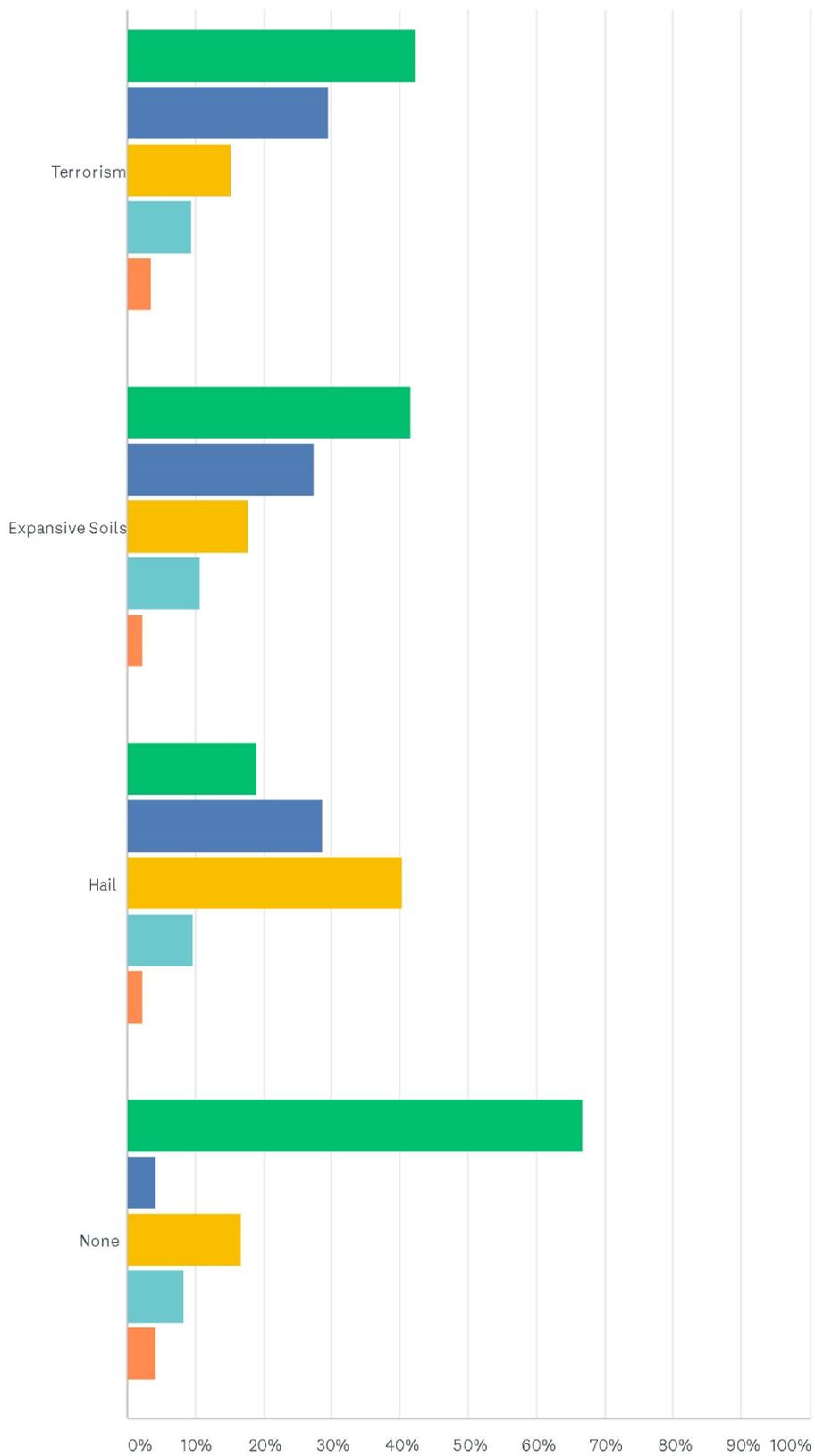
Wharton County TX HMP Update Survey 2021



Wharton County TX HMP Update Survey 2021



Wharton County TX HMP Update Survey 2021



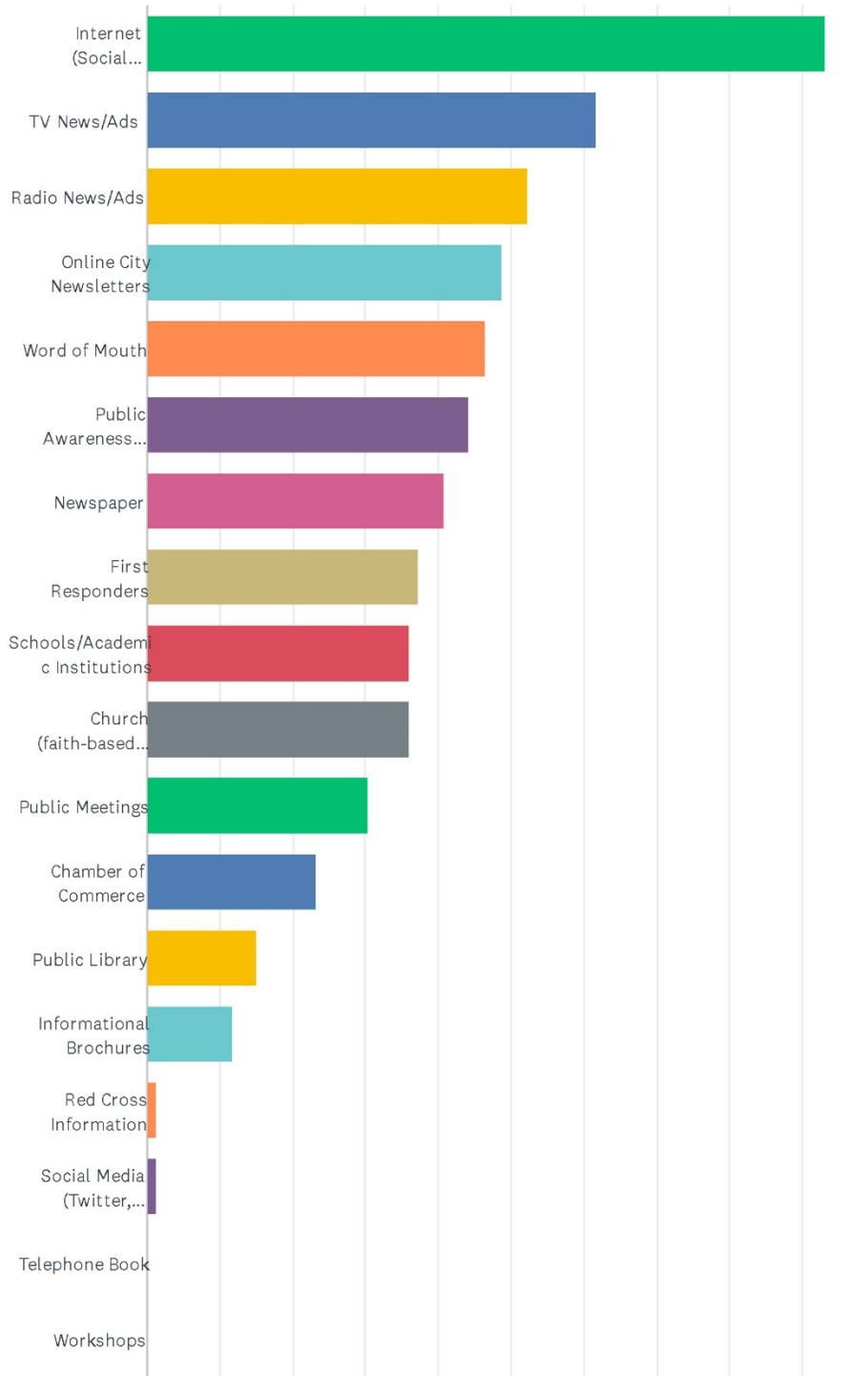
Wharton County TX HMP Update Survey 2021

■ Not Concerned
 ■ Somewhat Concerned
 ■ Concerned
 ■ Very Concerned
■ Extremely Concerned

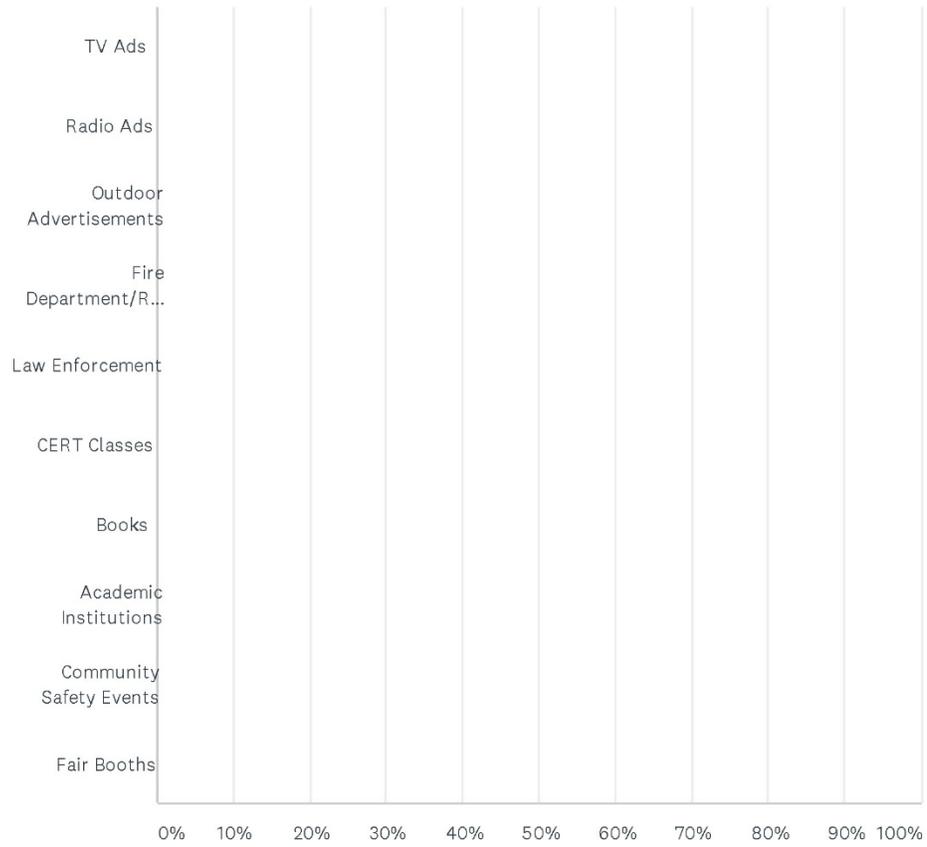
	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL
Flood	1.15% 1	8.05% 7	24.14% 21	24.14% 21	42.53% 37	87
Hurricane and Tropical Storm	1.16% 1	6.98% 6	27.91% 24	31.40% 27	32.56% 28	86
Winter Storm	9.41% 8	29.41% 25	30.59% 26	16.47% 14	14.12% 12	85
Dam Failure	49.41% 42	22.35% 19	14.12% 12	4.71% 4	9.41% 8	85
Extreme Heat	8.33% 7	26.19% 22	35.71% 30	20.24% 17	9.52% 8	84
Pandemic	18.82% 16	24.71% 21	35.29% 30	12.94% 11	8.24% 7	85
Tornado	11.90% 10	35.71% 30	33.33% 28	10.71% 9	8.33% 7	84
Pipeline Failure	32.56% 28	30.23% 26	25.58% 22	5.81% 5	5.81% 5	86
Thunderstorm	20.24% 17	22.62% 19	36.90% 31	14.29% 12	5.95% 5	84
Drought	14.29% 12	41.67% 35	30.95% 26	8.33% 7	4.76% 4	84
Hazardous Material Release	27.91% 24	34.88% 30	25.58% 22	6.98% 6	4.65% 4	86
Landslide/Channel Bank Failure	63.53% 54	16.47% 14	12.94% 11	2.35% 2	4.71% 4	85
Wildfire	48.24% 41	29.41% 25	14.12% 12	3.53% 3	4.71% 4	85
Windstorm	26.19% 22	29.76% 25	22.62% 19	16.67% 14	4.76% 4	84
Land Subsidence	42.35% 36	30.59% 26	18.82% 16	4.71% 4	3.53% 3	85
Lightning	23.53% 20	27.06% 23	31.76% 27	14.12% 12	3.53% 3	85
Terrorism	42.35% 36	29.41% 25	15.29% 13	9.41% 8	3.53% 3	85
Expansive Soils	41.67% 35	27.38% 23	17.86% 15	10.71% 9	2.38% 2	84
Hail	19.05% 16	28.57% 24	40.48% 34	9.52% 8	2.38% 2	84
None	66.67% 16	4.17% 1	16.67% 4	8.33% 2	4.17% 1	24

Q8 Which of the following methods do you think are most effective for providing hazard and disaster information? (Check all that apply)

Answered: 86 Skipped: 1



Wharton County TX HMP Update Survey 2021

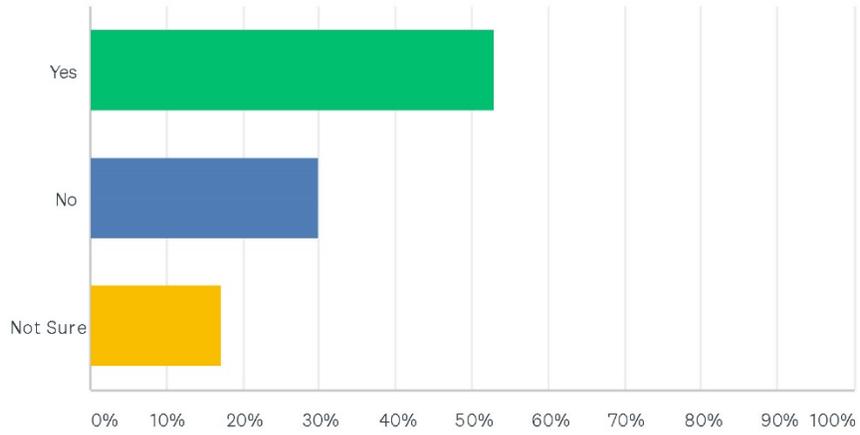


Wharton County TX HMP Update Survey 2021

ANSWER CHOICES	RESPONSES	
Internet (Social Media/Search Engine)	93.02%	80
TV News/Ads	61.63%	53
Radio News/Ads	52.33%	45
Online City Newsletters	48.84%	42
Word of Mouth	46.51%	40
Public Awareness Campaign (e.g., Flood Awareness Week, Winter Storm Preparedness Month)	44.19%	38
Newspaper	40.70%	35
First Responders	37.21%	32
Schools/Academic Institutions	36.05%	31
Church (faith-based institutions)	36.05%	31
Public Meetings	30.23%	26
Chamber of Commerce	23.26%	20
Public Library	15.12%	13
Informational Brochures	11.63%	10
Red Cross Information	1.16%	1
Social Media (Twitter, Facebook, LinkedIn)	1.16%	1
Telephone Book	0.00%	0
Workshops	0.00%	0
TV Ads	0.00%	0
Radio Ads	0.00%	0
Outdoor Advertisements	0.00%	0
Fire Department/Rescue	0.00%	0
Law Enforcement	0.00%	0
CERT Classes	0.00%	0
Books	0.00%	0
Academic Institutions	0.00%	0
Community Safety Events	0.00%	0
Fair Booths	0.00%	0
Total Respondents: 86		

Q9 Is your property located in or near a FEMA-designated floodplain?

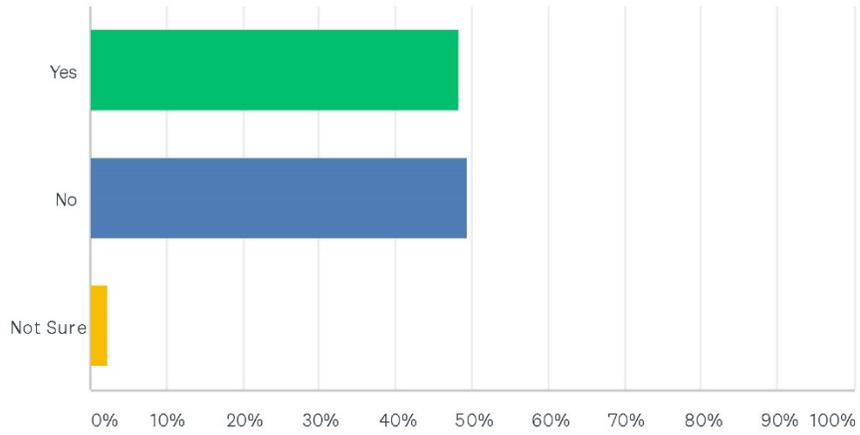
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	52.87%	46
No	29.89%	26
Not Sure	17.24%	15
TOTAL		87

Q10 Do you have flood insurance?

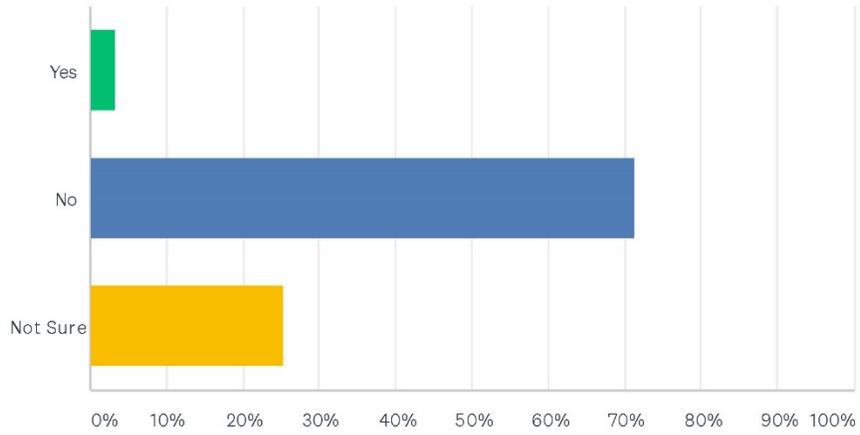
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	48.28%	42
No	49.43%	43
Not Sure	2.30%	2
TOTAL		87

Q11 Is your property located in an area at risk for wildfires?

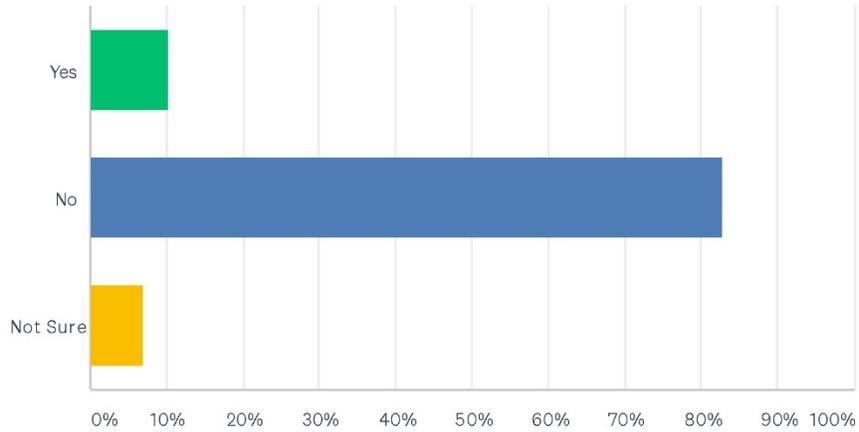
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	3.45% 3
No	71.26% 62
Not Sure	25.29% 22
TOTAL	87

Q12 Have you ever had problems getting homeowners or renters insurance due to risks from natural hazards?

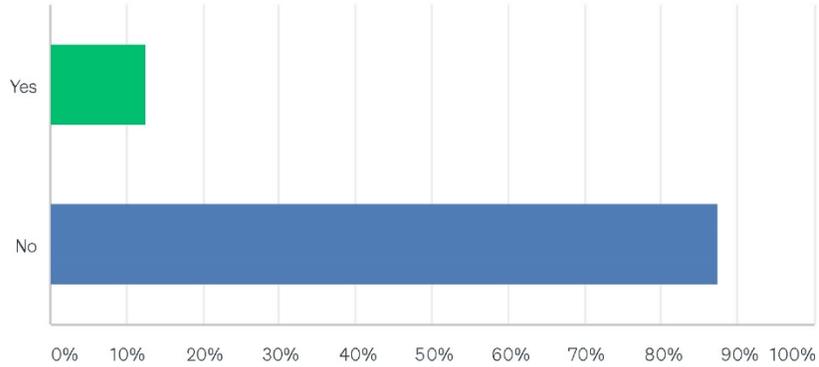
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	10.34%	9
No	82.76%	72
Not Sure	6.90%	6
TOTAL		87

Q13 Do you have any special access or functional needs within your household that would require early warning or specialized response during disasters?

Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	12.64%	11
No	87.36%	76
TOTAL		87

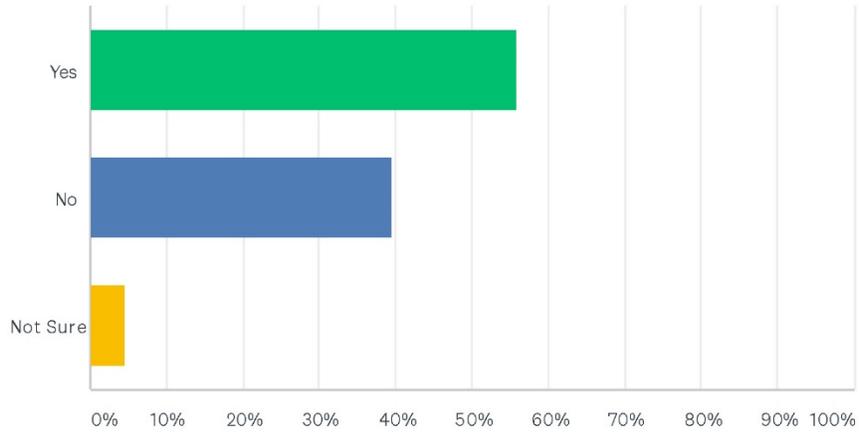
Q14 If the answer to question # 13 was “Yes”, would you like County Emergency Management personnel to contact you regarding your access and functional needs? If yes, please enter your contact information in the following text box.

Answered: 5 Skipped: 82

ANSWER CHOICES	RESPONSES	
Name	100.00%	5
Company	0.00%	0
Address	100.00%	5
Address 2	0.00%	0
City/Town	100.00%	5
State/Province	100.00%	5
ZIP/Postal Code	100.00%	5
Country	100.00%	5
Email Address	80.00%	4
Phone Number	80.00%	4

Q15 When you moved into your home, did you consider the impact a natural disaster could have on your home?

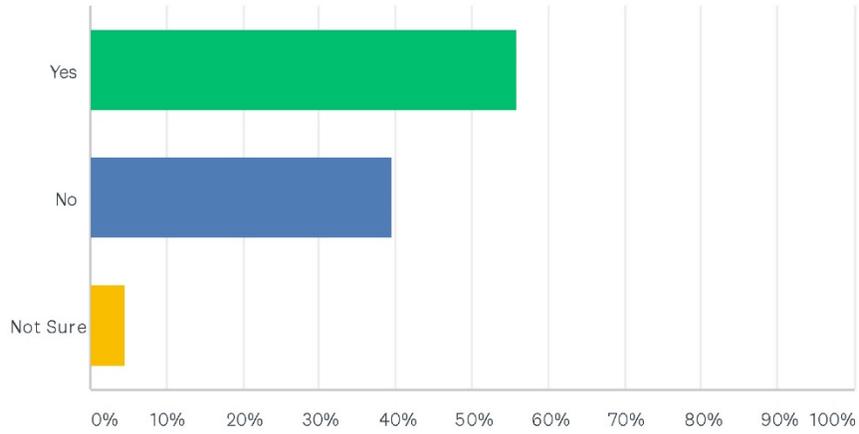
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	55.81%	48
No	39.53%	34
Not Sure	4.65%	4
TOTAL		86

Q15 When you moved into your home, did you consider the impact a natural disaster could have on your home?

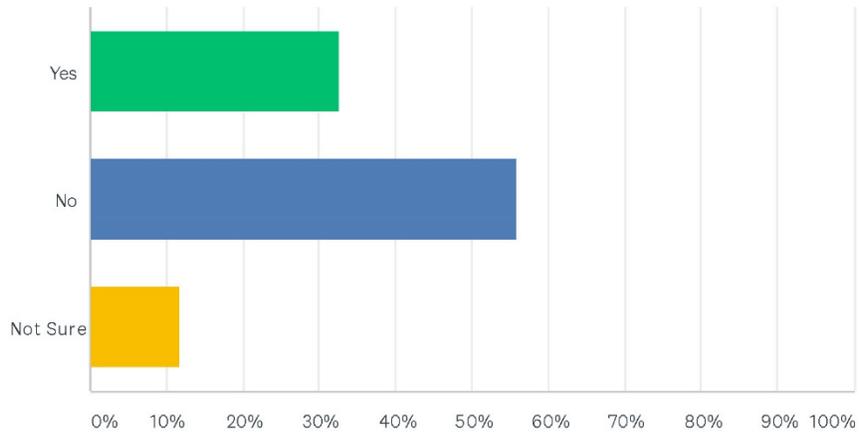
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	55.81%	48
No	39.53%	34
Not Sure	4.65%	4
TOTAL		86

Q16 Was the presence of a natural hazard risk zone (e.g., dam failure zone, flood zone, landslide hazard area, high fire risk area) disclosed to you by a real estate agent, seller, or landlord before you purchased or moved into your home?

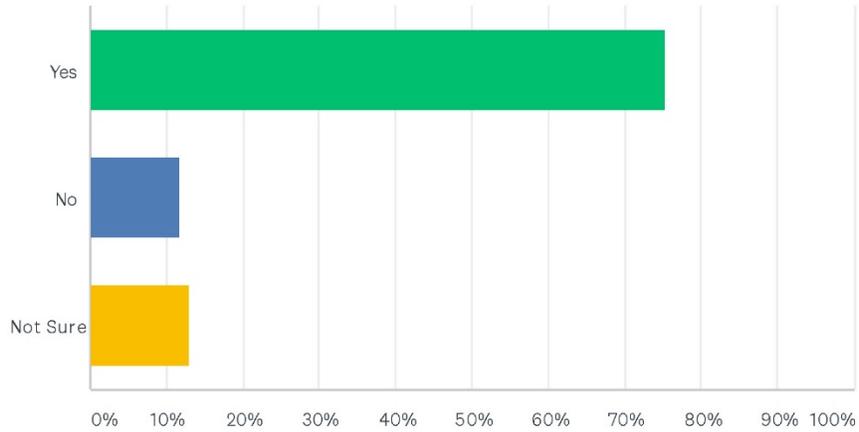
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	32.56%	28
No	55.81%	48
Not Sure	11.63%	10
TOTAL		86

Q17 Would the disclosure of this type of natural hazard risk information influence your decision to buy or rent a home?

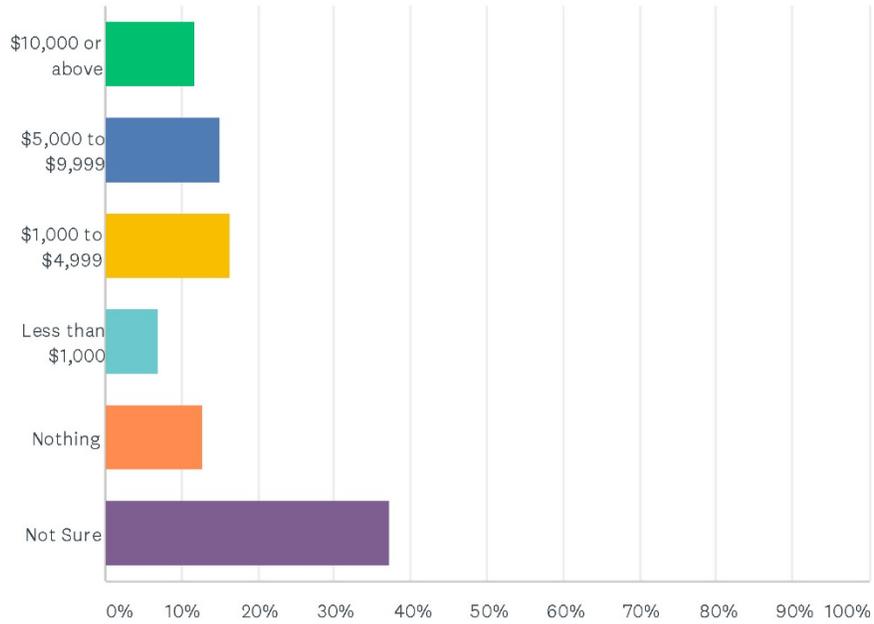
Answered: 85 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	75.29%	64
No	11.76%	10
Not Sure	12.94%	11
TOTAL		85

Q18 How much money would you be willing to spend to retrofit your home to reduce risks associated with natural disasters? (for example, by clearing brush and plant materials from around your home to create a "defensible space" for wildfire, performing seismic upgrades, or replacing a combustible roof with non-combustible roofing)

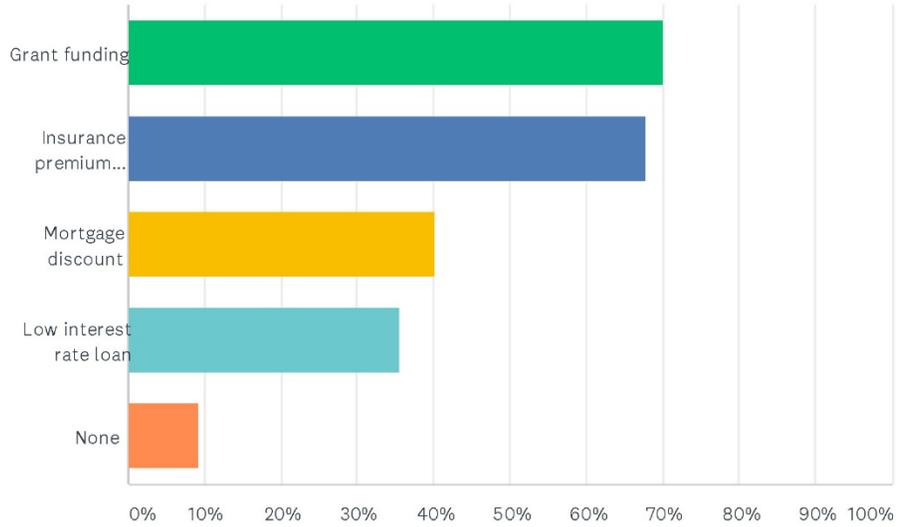
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
\$10,000 or above	11.63%	10
\$5,000 to \$9,999	15.12%	13
\$1,000 to \$4,999	16.28%	14
Less than \$1,000	6.98%	6
Nothing	12.79%	11
Not Sure	37.21%	32
TOTAL		86

Q19 Which of the following incentives would encourage you to spend money to retrofit your home to protect against natural disasters? (Check all that apply)

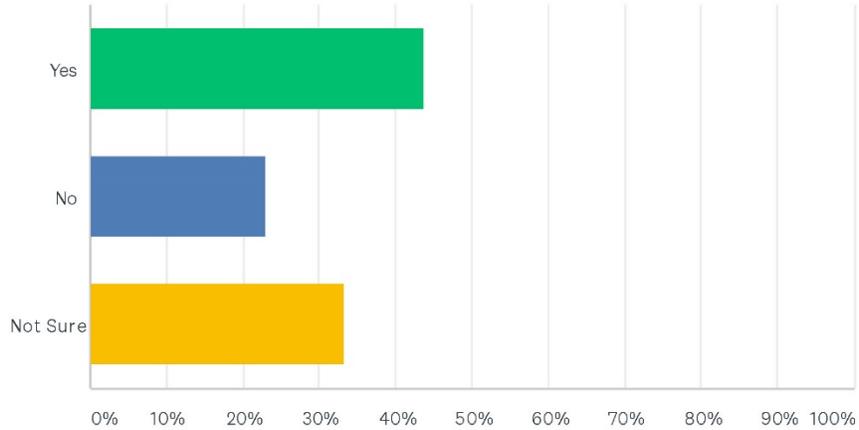
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Grant funding	70.11%	61
Insurance premium discount	67.82%	59
Mortgage discount	40.23%	35
Low interest rate loan	35.63%	31
None	9.20%	8
Total Respondents: 87		

Q20 If your property were located in a designated "high hazard" area or had received repetitive damages from a natural hazard event, would you consider a "buyout" offered by a public agency?

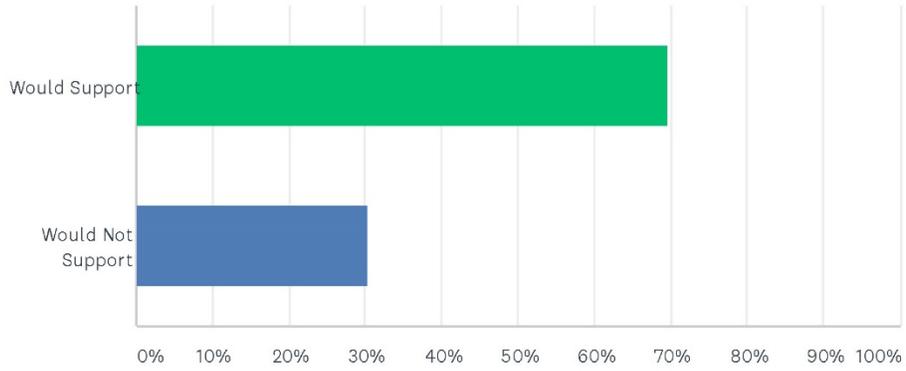
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	43.68%	38
No	22.99%	20
Not Sure	33.33%	29
TOTAL		87

Q21 Would you support the regulation (restriction) of land uses within known high hazard areas?

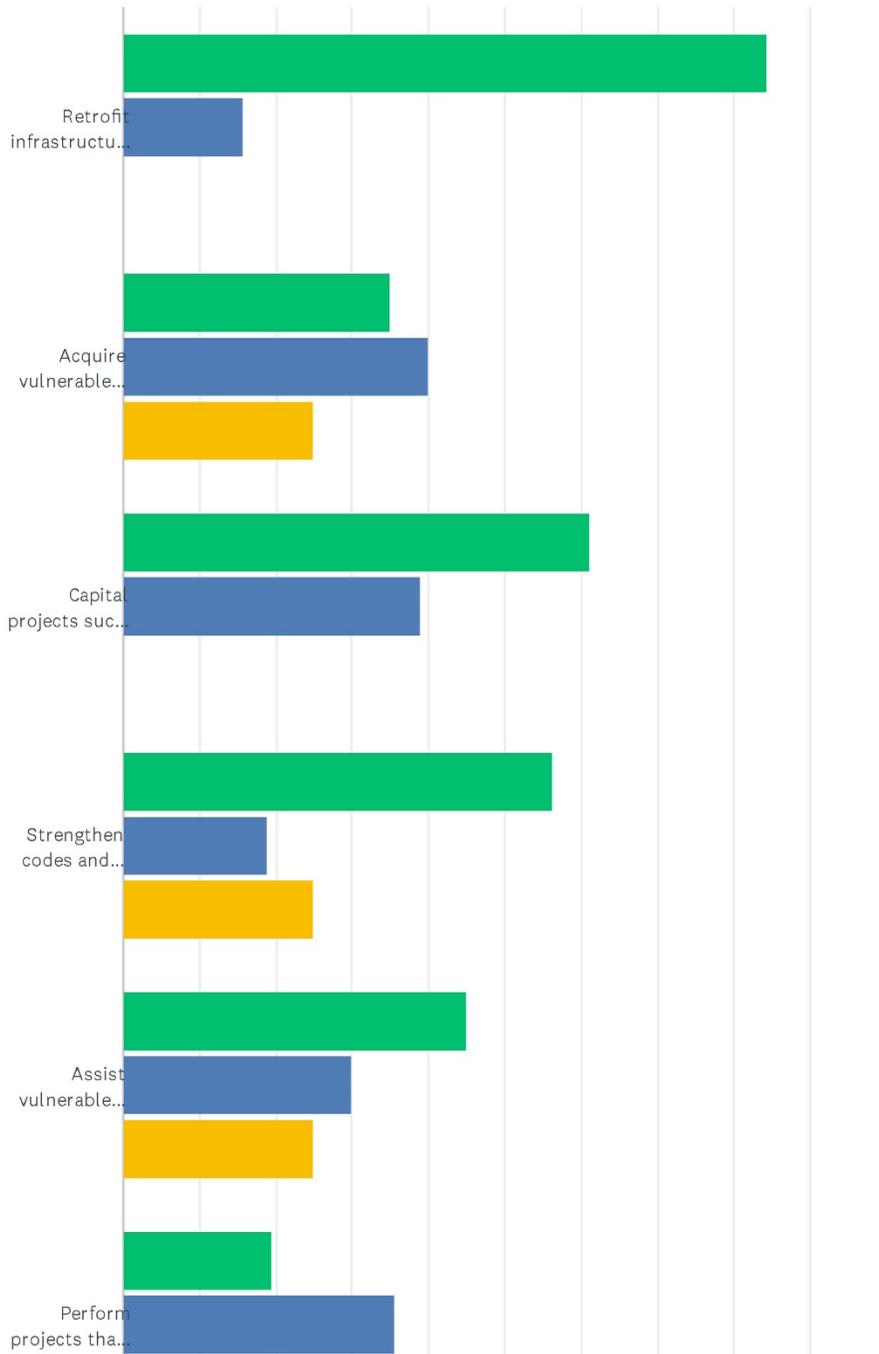
Answered: 86 Skipped: 1



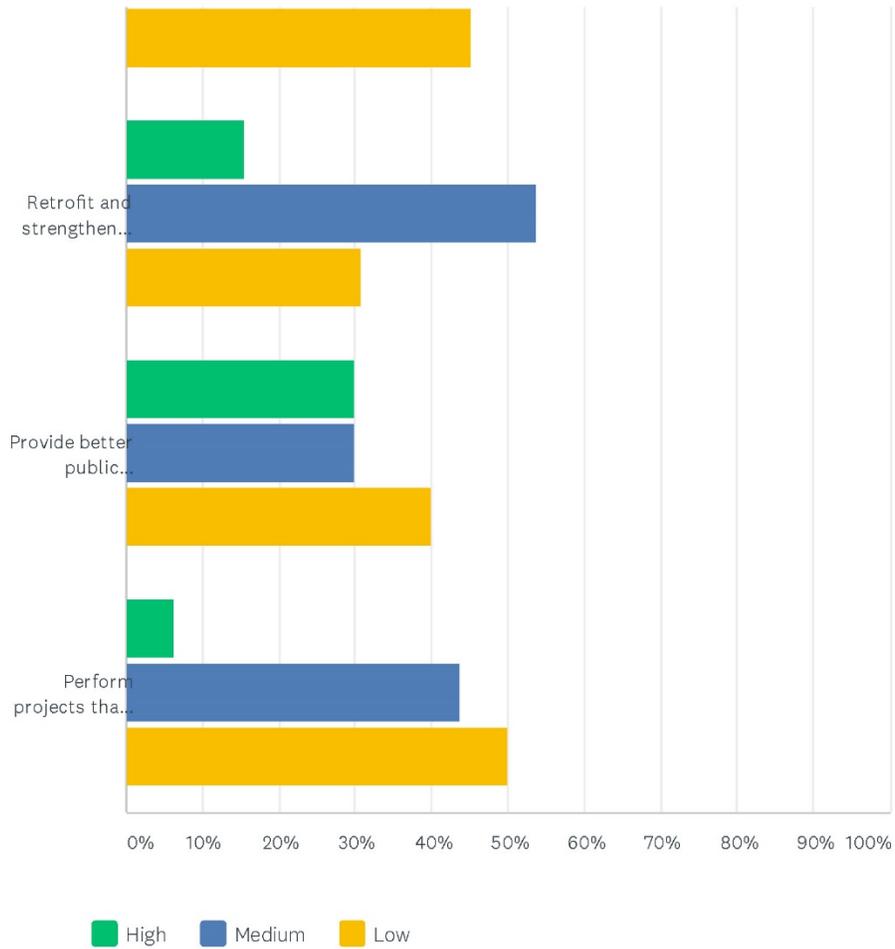
ANSWER CHOICES	RESPONSES
Would Support	69.77% 60
Would Not Support	30.23% 26
TOTAL	86

Q22 What types of projects do you believe the County, State, or Federal government agencies should be doing in order to reduce damage and disruption from hazard events within Wharton County? Please rank each option as a high, medium, or low priority.

Answered: 85 Skipped: 2



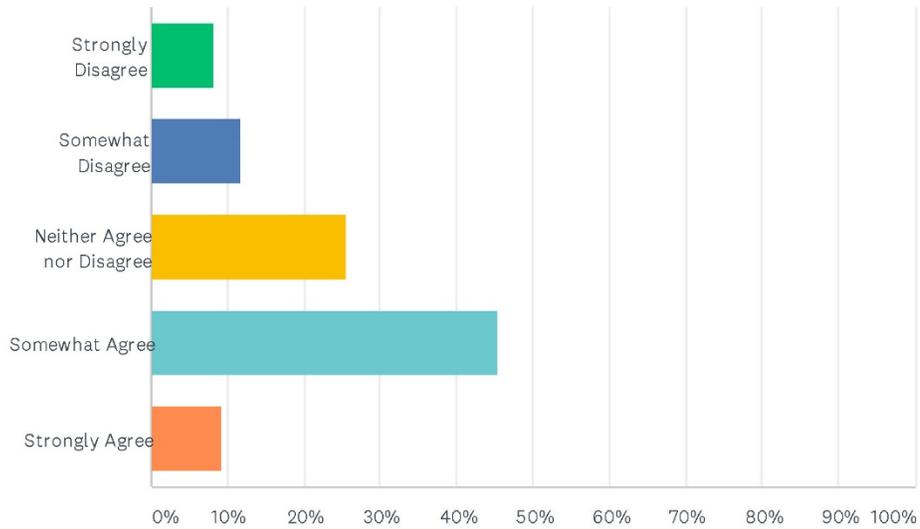
Wharton County TX HMP Update Survey 2021



	HIGH	MEDIUM	LOW	TOTAL
Retrofit infrastructures such as roads, bridges, drainage facilities, levees, water supply, waste water and power supply facilities.	84.38% 27	15.63% 5	0.00% 0	32
Acquire vulnerable properties and maintain as open space.	35.00% 14	40.00% 16	25.00% 10	40
Capital projects such as dams, levees, flood walls, drainage improvements and bank stabilization projects.	61.11% 11	38.89% 7	0.00% 0	18
Strengthen codes and regulations to include higher regulatory standards in hazard areas.	56.25% 9	18.75% 3	25.00% 4	16
Assist vulnerable property owners with securing funding for mitigation.	45.00% 9	30.00% 6	25.00% 5	20
Perform projects that mitigate the potential impacts from climate change.	19.35% 6	35.48% 11	45.16% 14	31
Retrofit and strengthen essential facilities such as police, fire, schools and hospitals.	15.38% 4	53.85% 14	30.77% 8	26
Provide better public information about risk, and the exposure to hazards within the operational area.	30.00% 3	30.00% 3	40.00% 4	10
Perform projects that restore the natural environments capacity to absorb the impacts from natural hazards.	6.25% 1	43.75% 7	50.00% 8	16

Q23 Please indicate how you feel about the following statement: It is the responsibility of government (local, state and federal) to provide education and programs that promote citizen actions that will reduce exposure to the risks associated with natural hazards. (Choose one)

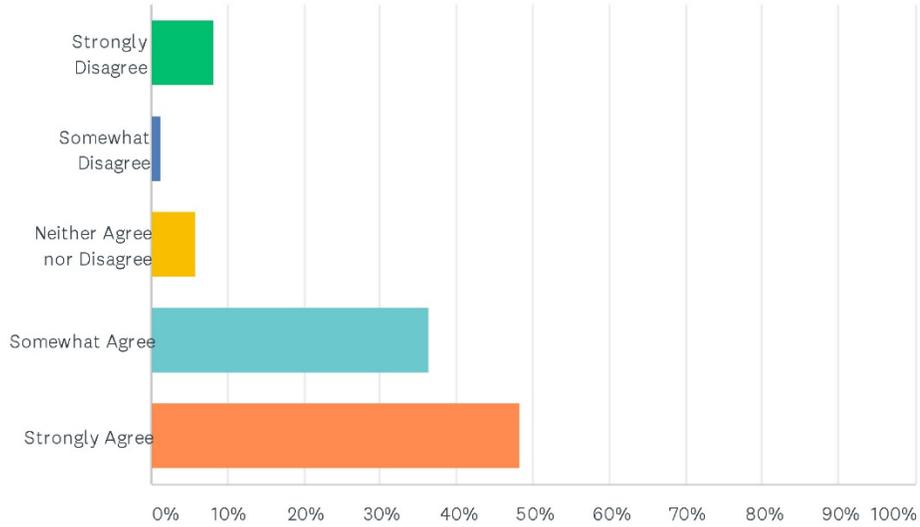
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
Strongly Disagree	8.14%	7
Somewhat Disagree	11.63%	10
Neither Agree nor Disagree	25.58%	22
Somewhat Agree	45.35%	39
Strongly Agree	9.30%	8
TOTAL		86

Q24 Please indicate how you feel about the following statement: It is my responsibility to educate myself and take actions that will reduce my exposure to the risks associated with natural hazards. (Choose one)

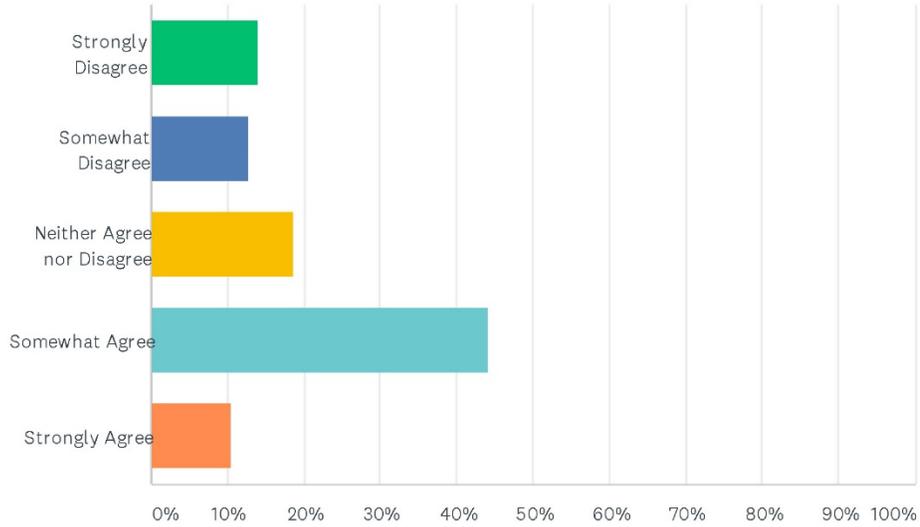
Answered: 85 Skipped: 2



ANSWER CHOICES	RESPONSES	
Strongly Disagree	8.24%	7
Somewhat Disagree	1.18%	1
Neither Agree nor Disagree	5.88%	5
Somewhat Agree	36.47%	31
Strongly Agree	48.24%	41
TOTAL		85

Q25 Please indicate how you feel about the following statement:
 Information about the risks associated with natural hazards is readily
 available and easy to locate. (Choose one)

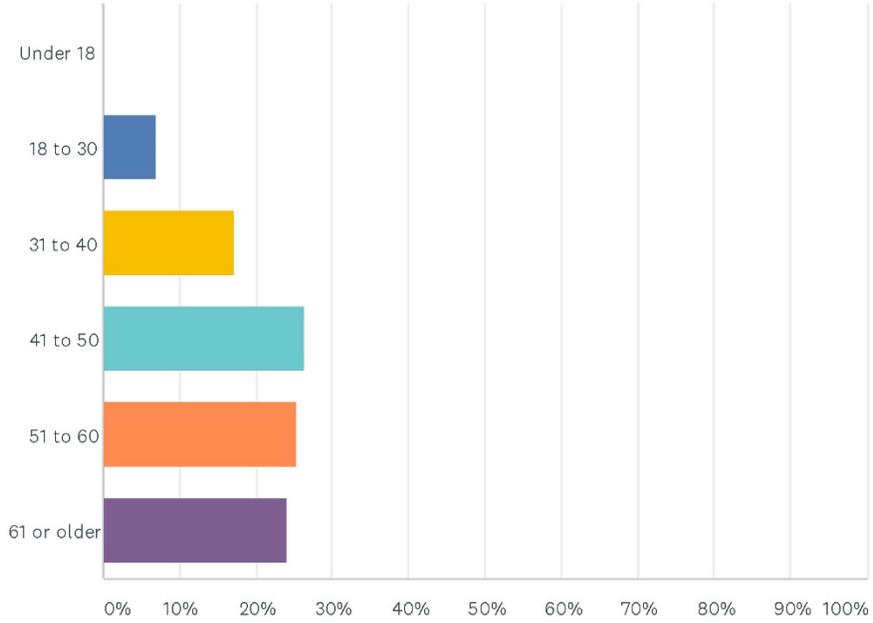
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
Strongly Disagree	13.95%	12
Somewhat Disagree	12.79%	11
Neither Agree nor Disagree	18.60%	16
Somewhat Agree	44.19%	38
Strongly Agree	10.47%	9
TOTAL		86

Q26 Please indicate your age range:

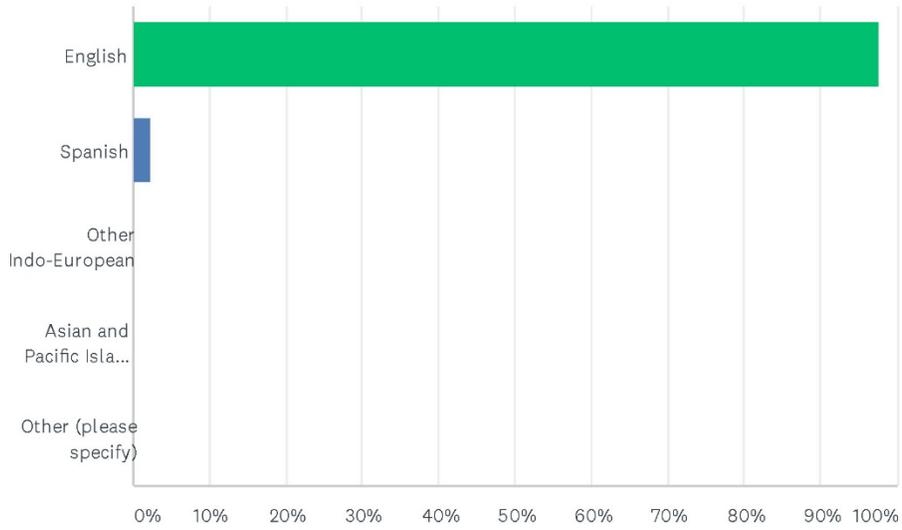
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Under 18	0.00%	0
18 to 30	6.90%	6
31 to 40	17.24%	15
41 to 50	26.44%	23
51 to 60	25.29%	22
61 or older	24.14%	21
TOTAL		87

Q27 Please indicate the primary language spoken in your household:

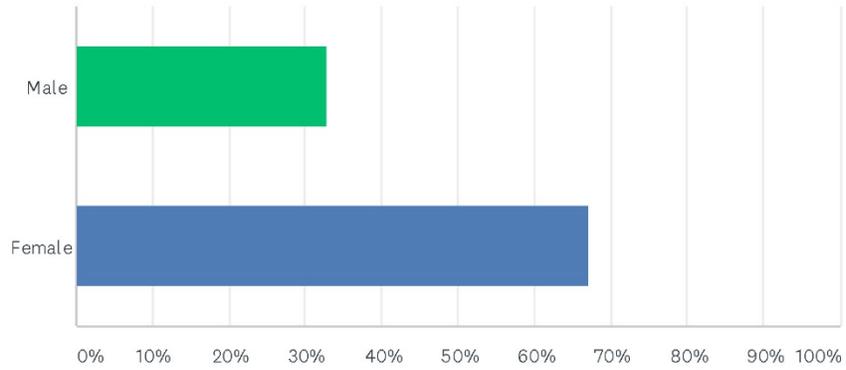
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
English	97.67%	84
Spanish	2.33%	2
Other Indo-European	0.00%	0
Asian and Pacific Island Languages	0.00%	0
Other (please specify)	0.00%	0
TOTAL		86

Q28 Please indicate your gender:

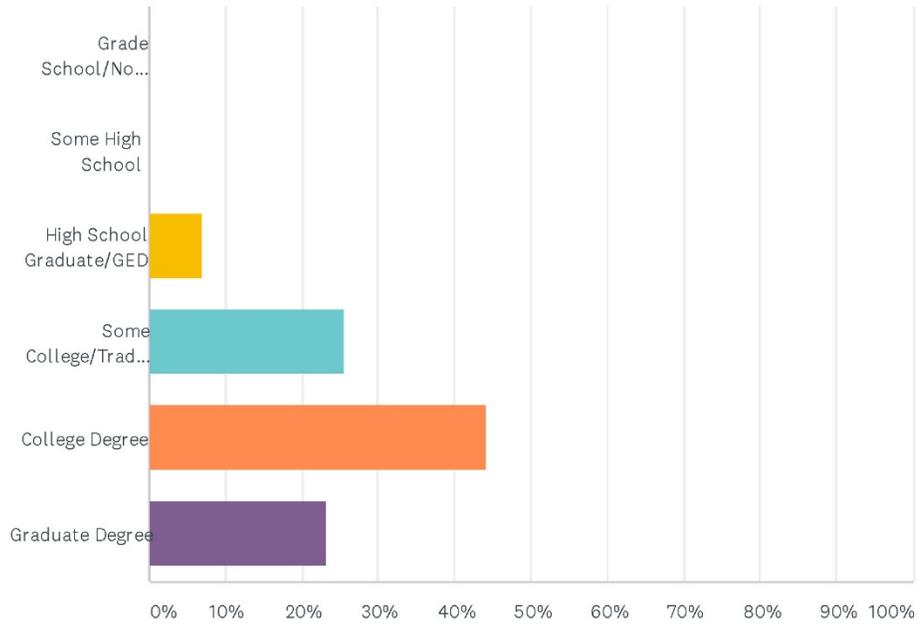
Answered: 85 Skipped: 2



ANSWER CHOICES	RESPONSES	
Male	32.94%	28
Female	67.06%	57
TOTAL		85

Q29 Please indicate your highest level of education:

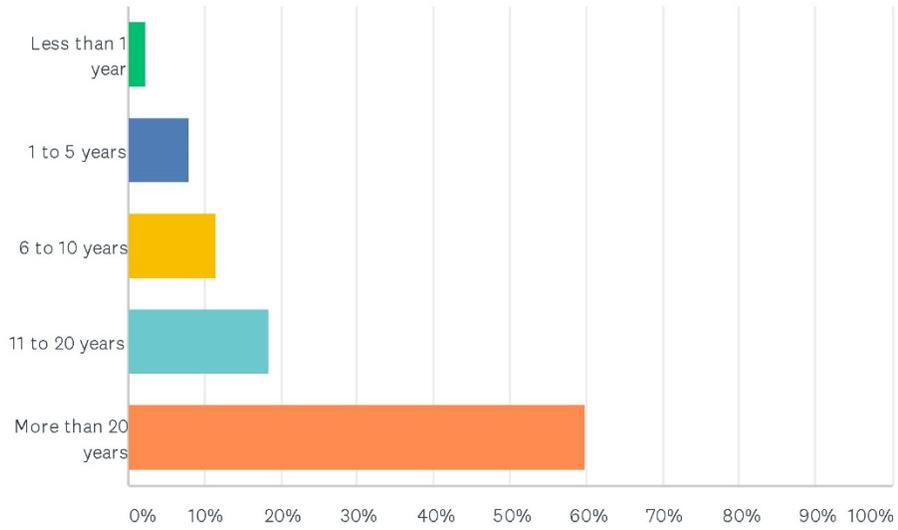
Answered: 86 Skipped: 1



ANSWER CHOICES	RESPONSES	
Grade School/No Schooling	0.00%	0
Some High School	0.00%	0
High School Graduate/GED	6.98%	6
Some College/Trade School	25.58%	22
College Degree	44.19%	38
Graduate Degree	23.26%	20
TOTAL		86

Q30 How long have you lived in Wharton County?

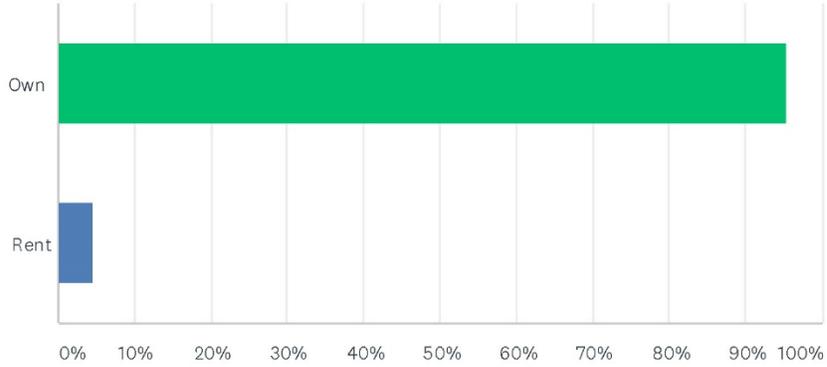
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Less than 1 year	2.30%	2
1 to 5 years	8.05%	7
6 to 10 years	11.49%	10
11 to 20 years	18.39%	16
More than 20 years	59.77%	52
TOTAL		87

Q31 Do you own or rent your place of residence?

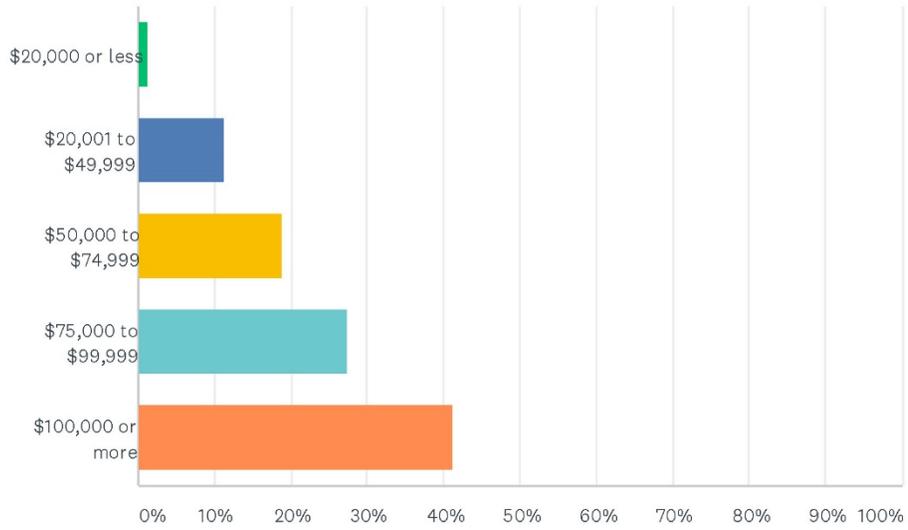
Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Own	95.40%	83
Rent	4.60%	4
TOTAL		87

Q32 How much is your gross household income?

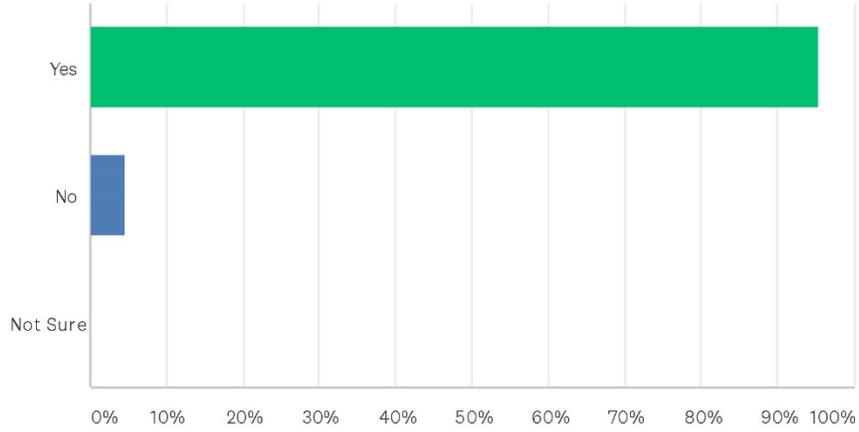
Answered: 80 Skipped: 7



ANSWER CHOICES	RESPONSES
\$20,000 or less	1.25% 1
\$20,001 to \$49,999	11.25% 9
\$50,000 to \$74,999	18.75% 15
\$75,000 to \$99,999	27.50% 22
\$100,000 or more	41.25% 33
TOTAL	80

Q33 Do you have regular access to the Internet?

Answered: 87 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	95.40%	83
No	4.60%	4
Not Sure	0.00%	0
TOTAL		87

Q34 Comments

12 answered – 75 skipped

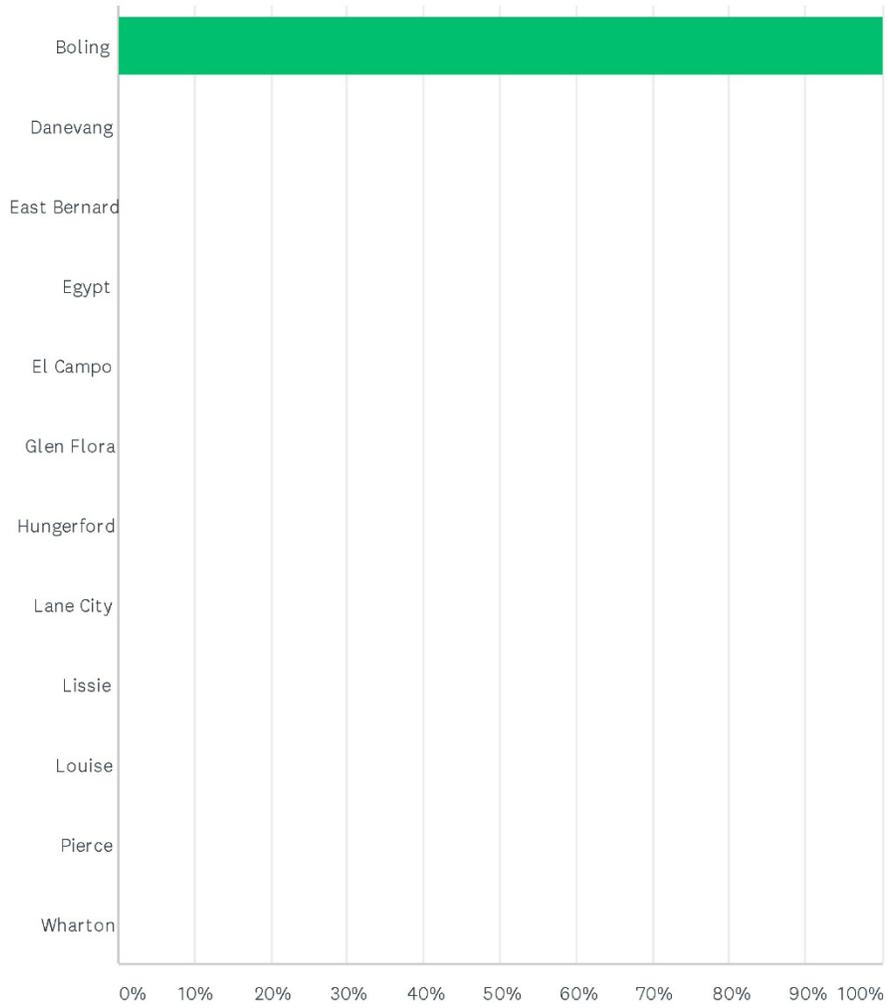
- Drainage is my main concern outside the city limits of Wharton. I've asked for almost 10 years for a drainage ditch to be cleaned out. It's never happened. Things are getting worse and worse with each rain fall.
- My income is not your business.
- The river needs to be cleaned out ain't no telling what's in there. Why it keeps flooding
- Please please do something so that the Colorado river does not flood Hobbin oaks ever again
- "Precinct 2 needs to get out and clean the county ditches that filled up with dirt after the Harvey Flood. Every time we get a big rain, all the county ditch water backs into my yard and close to my house. If My house floods due to county negligence in maintaining ditch drainage, I will be Seeing legal representation. "
- Question #22 would only allow me to select one dot per the whole question instead of marking a dot for each statement. I highly agree that mitigation funds granted to the County needs to be allocated to areas where homeowners that have experienced flooding and loss of property/homes previously. West Wharton County along Chacos Slough needs to be addressed for cleaning out for drainage purposes. The County and TX Dot need to work together more instead of putting the land/property owner in the middle. Precint 3 has more roads, ditches etc than any other Precint in the county; more man power & funding needs to be allocated in Precint 3. Mitigation needs to be addressed in this area as well. Love our farmers! But fields are being turned over differently now and the stock/stubble of fields are washing into our drainage ditches and blocking the flow of water which in turns causes water to stop draining properly and adequately needs to be addressed.
- None at the time
- Water in ditches down 1164 was never an issue for any natural disaster before the new development Bernard Meadows was built. Now during any rain over 5" we have to worry about water coming into our homes. And natural disaster (hurricane) season is not even here yet. A proper impact study was not done before the development of this subdivision. We are upstream and water backs up and floods our properties. Properties that have never flooded before. Even during hurricane Harvey.
- Dredge the ditches in East Bernard so water can flow and sit there for weeks/months
- The lack of attention to drainage ditches in East Bernard is downright criminal! If you're a relative of a county official, you get your ditch dredged. If not, you're out of luck!
- Anything the city/county does to help educate us above and beyond. It is the responsibilities of ADULTS to look into their own welfare, and not blame others for them not taking assertive action.
- Let's cut the bull and do something!!

Wharton County Survey (Spanish) Responses:

Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton

Q1 ¿En cual ciudad del Condado de Wharton Vives?

Answered: 1 Skipped: 0

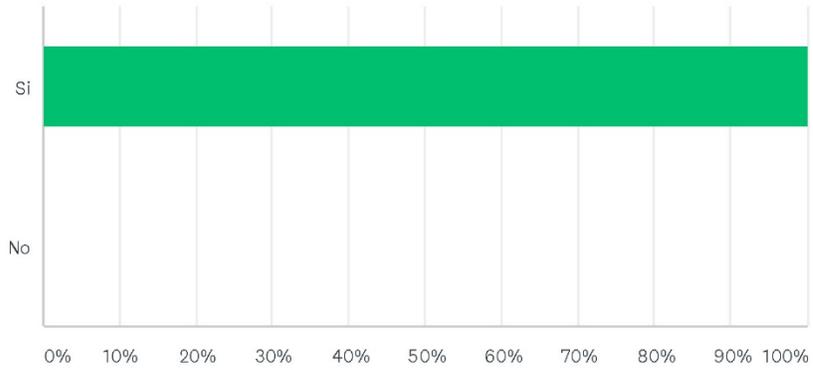


Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton

ANSWER CHOICES	RESPONSES	
Boling	100.00%	1
Danevang	0.00%	0
East Bernard	0.00%	0
Egypt	0.00%	0
El Campo	0.00%	0
Glen Flora	0.00%	0
Hungerford	0.00%	0
Lane City	0.00%	0
Lissie	0.00%	0
Louise	0.00%	0
Pierce	0.00%	0
Wharton	0.00%	0
TOTAL		1

Q2 ¿Trabajas en el Condado de Wharton?

Answered: 1 Skipped: 0



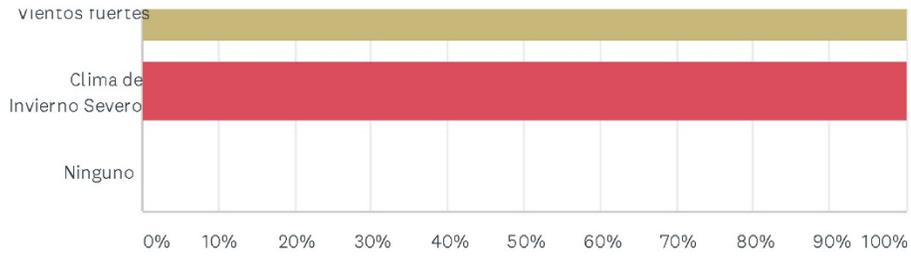
ANSWER CHOICES	RESPONSES	
Si	100.00%	1
No	0.00%	0
TOTAL		1

Q3 ¿Durante los últimos 20 años usted o alguna otra persona en su casa ha sido directamente afectado por uno de los riesgos a continuación (Por favor, marque todos los que apliquen.)

Answered: 1 Skipped: 0



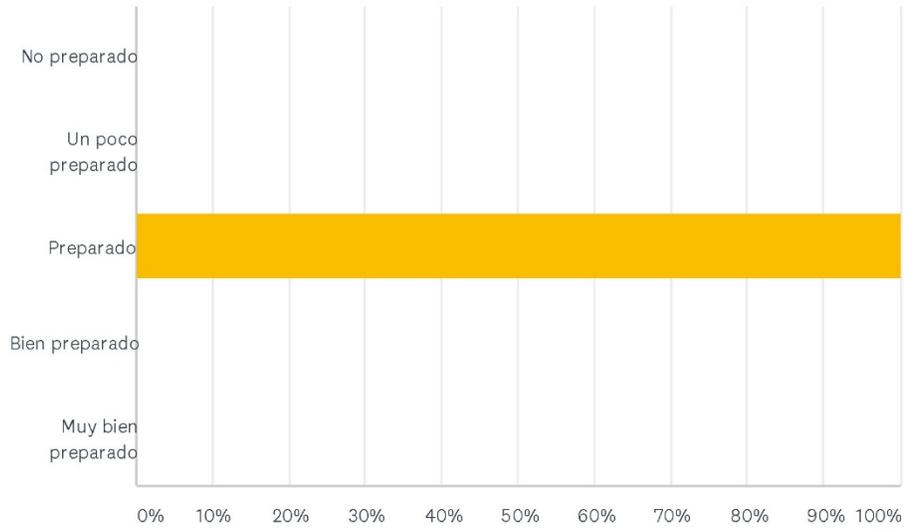
Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton



ANSWER CHOICES	RESPONSES	
Falla en la represa/dique	0.00%	0
Sequía	100.00%	1
Suelos Expansivos	0.00%	0
Calor Extremo	100.00%	1
Inundación	100.00%	1
Granizo	0.00%	0
Fuga de materiales peligrosos/tóxicos	0.00%	0
Huracán/Tormenta Tropical	100.00%	1
Hundimiento de Tierra	0.00%	0
Deslizamientos de tierra y aludes de barro	0.00%	0
Relámpagos	100.00%	1
Pandemia	100.00%	1
Falla de una tubería	0.00%	0
Terrorismo	0.00%	0
Tormenta Severa/Tormenta Eléctrica	100.00%	1
Tornado	0.00%	0
Incendio forestal	0.00%	0
Vientos fuertes	100.00%	1
Clima de Invierno Severo	100.00%	1
Ninguno	0.00%	0
Total Respondents: 1		

Q4 ¿Qué tan preparado está usted para un desastre?

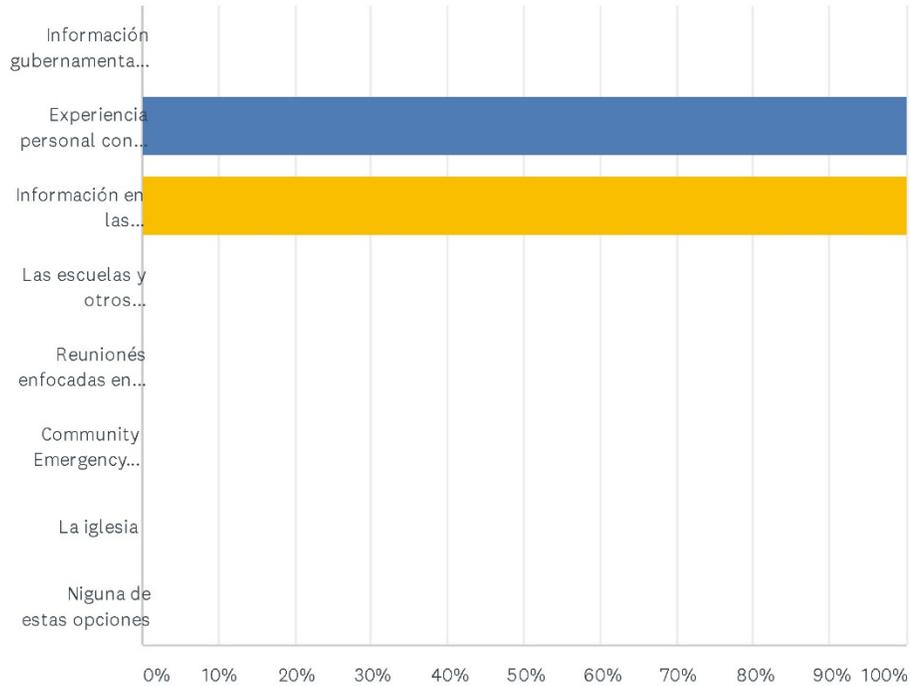
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
No preparado	0.00%	0
Un poco preparado	0.00%	0
Preparado	100.00%	1
Bien preparado	0.00%	0
Muy bien preparado	0.00%	0
TOTAL		1

Q5 ¿Cual de los recursos abajo lo ayudado para prepararse para desastres naturales? (Por favor marque todos lo que apliquen.)

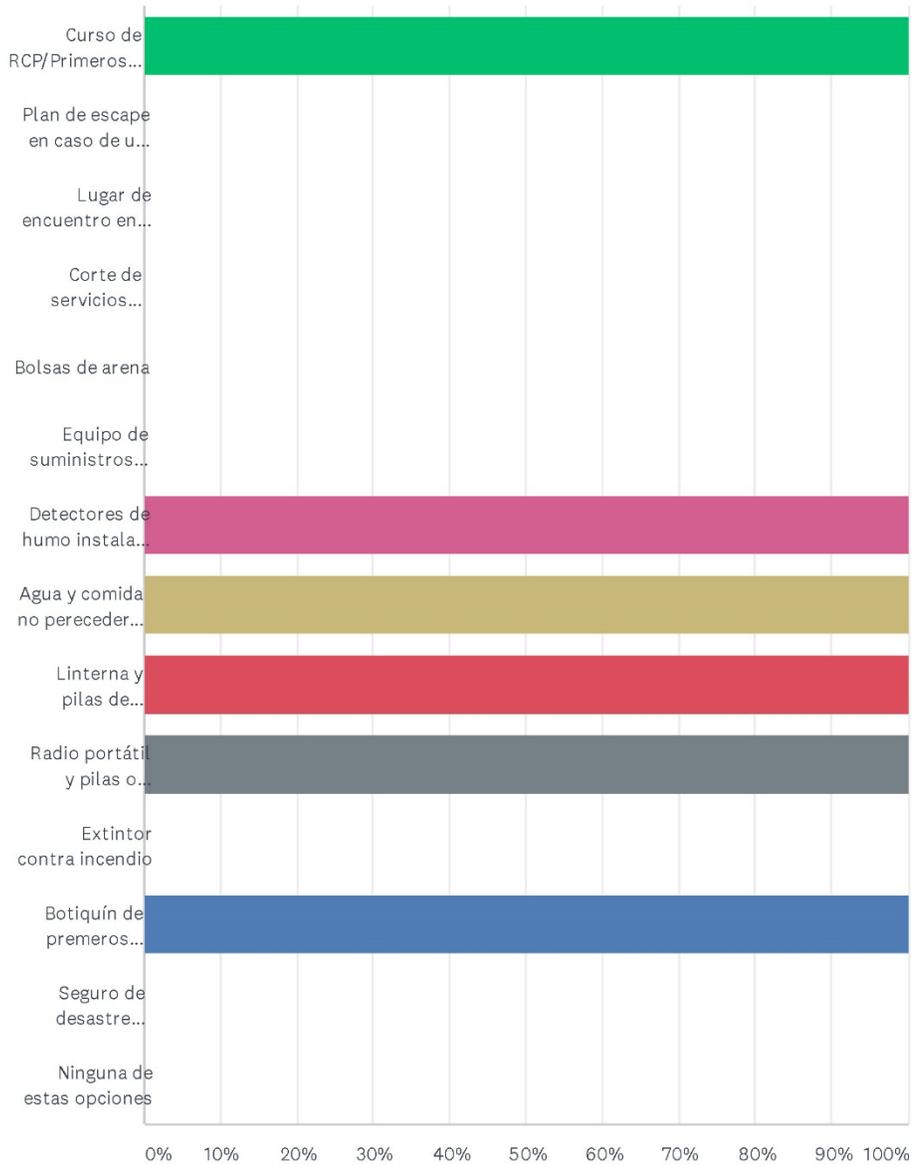
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES
Información gubernamental sobre preparación para casos de desastre (local, federal, o estatal)	0.00% 0
Experiencia personal con un desastre natural	100.00% 1
Información en las noticias/otro tipo de medias locales	100.00% 1
Las escuelas y otros institutos académicos	0.00% 0
Reuniones enfocadas en preparación para desastres	0.00% 0
Community Emergency Response Training (CERT)	0.00% 0
La iglesia	0.00% 0
Ninguna de estas opciones	0.00% 0
Total Respondents: 1	

Q6 ¿Que preparaciones tiene usted o otro miembro de su hogar en caso de un desastre? (Por favor marque todos los que apliquen.)

Answered: 1 Skipped: 0

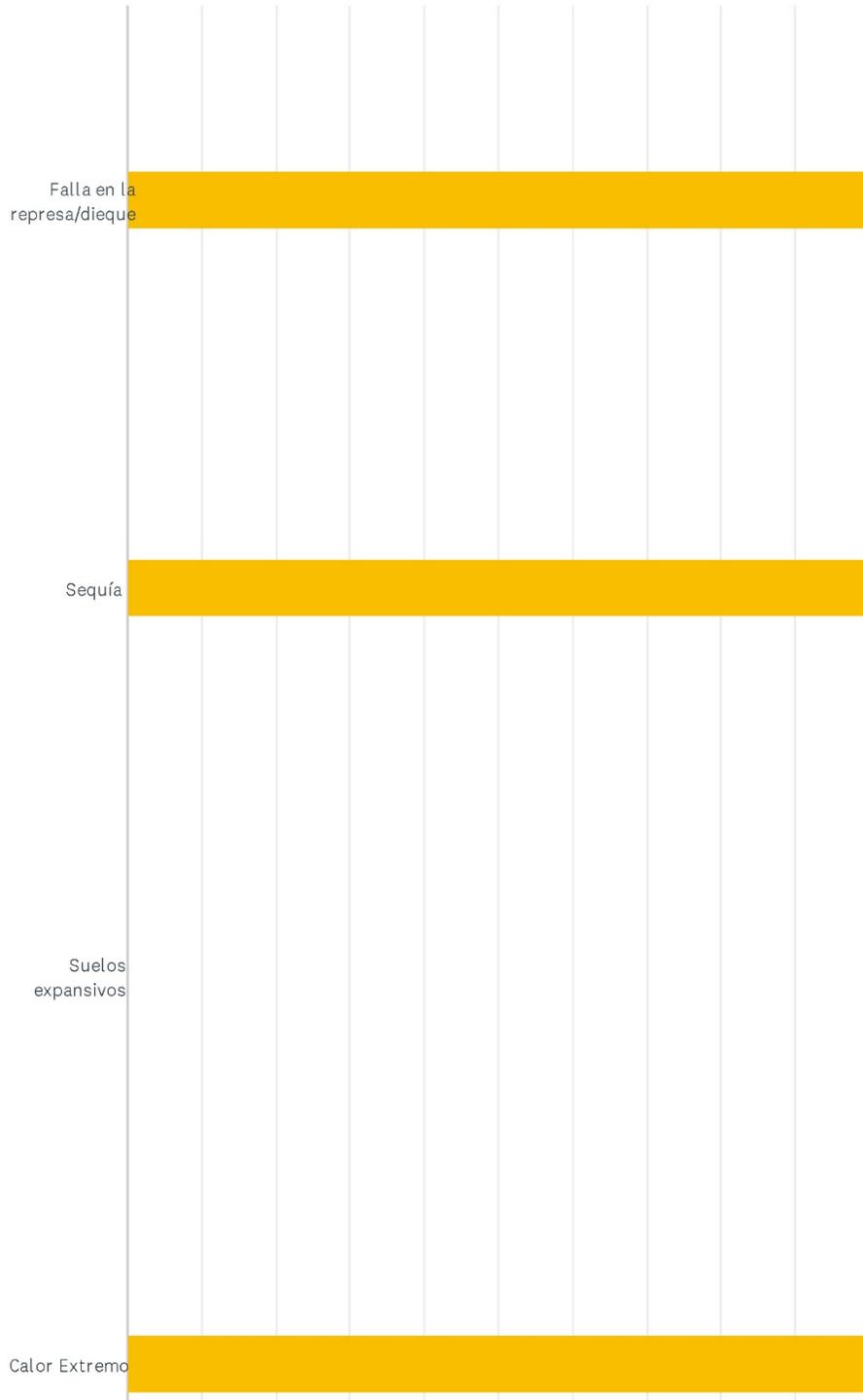


Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton

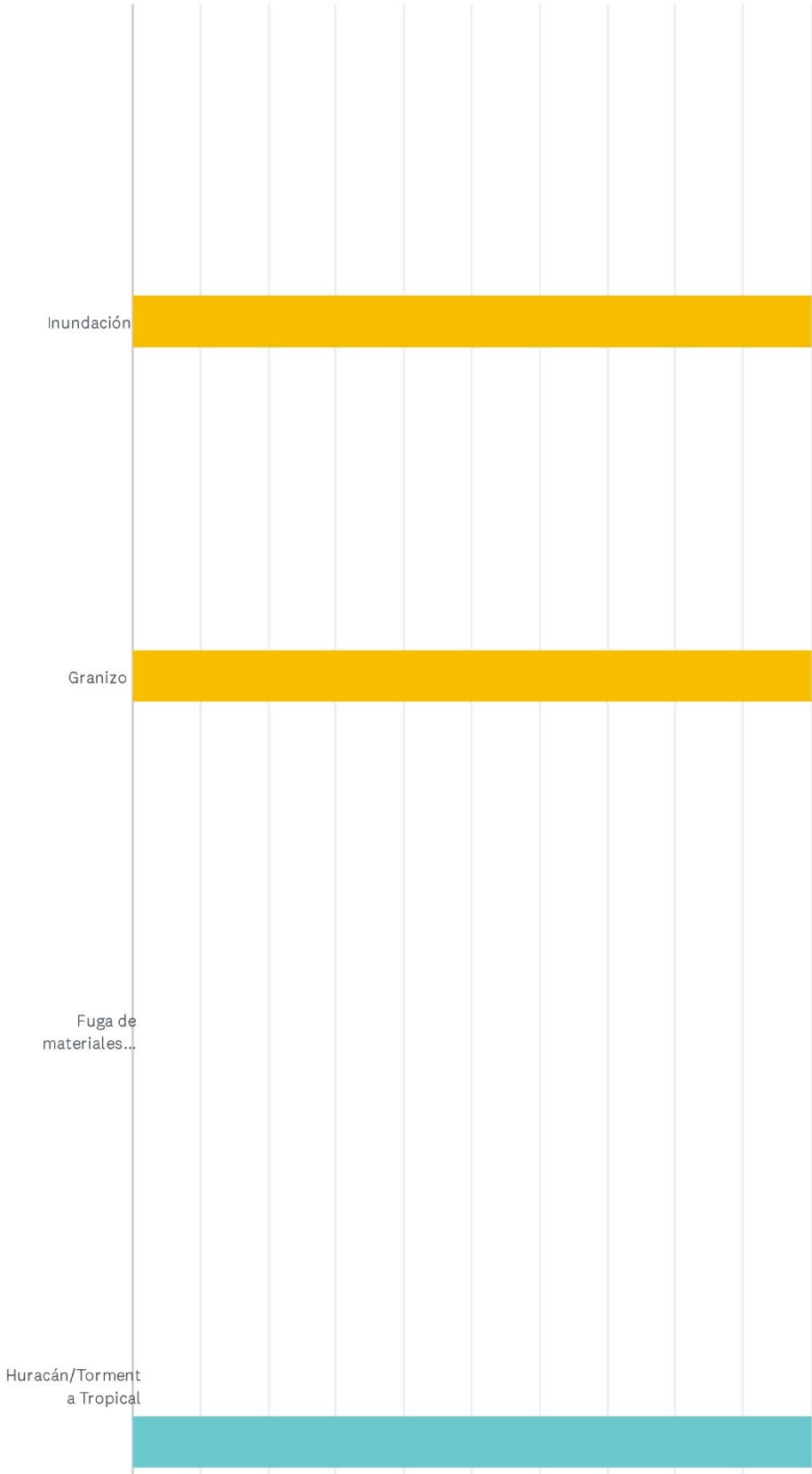
ANSWER CHOICES	RESPONSES	
Curso de RCP/Primeros auxilios	100.00%	1
Plan de escape en caso de un incendio	0.00%	0
Lugar de encuentro en caso de emergencia	0.00%	0
Corte de servicios públicos indentificado	0.00%	0
Bolsas de arena	0.00%	0
Equipo de suministros para caso de desastre	0.00%	0
Detectores de humo instalados en todos los niveles de su hogar	100.00%	1
Agua y comida no perecederos almanecada	100.00%	1
Linterna y pilas de repuesto	100.00%	1
Radio portátil y pilas o baterías de repuesto	100.00%	1
Extintor contra incendio	0.00%	0
Botiquín de premeros auxilios	100.00%	1
Seguro de desastre (contra inundación, incendio, o terremoto)	0.00%	0
Ninguna de estas opciones	0.00%	0
Total Respondents: 1		

Q7 Por favor, indique su nivel de preocupación sobre los siguientes riesgos naturales que pueden afectar su comunidad:

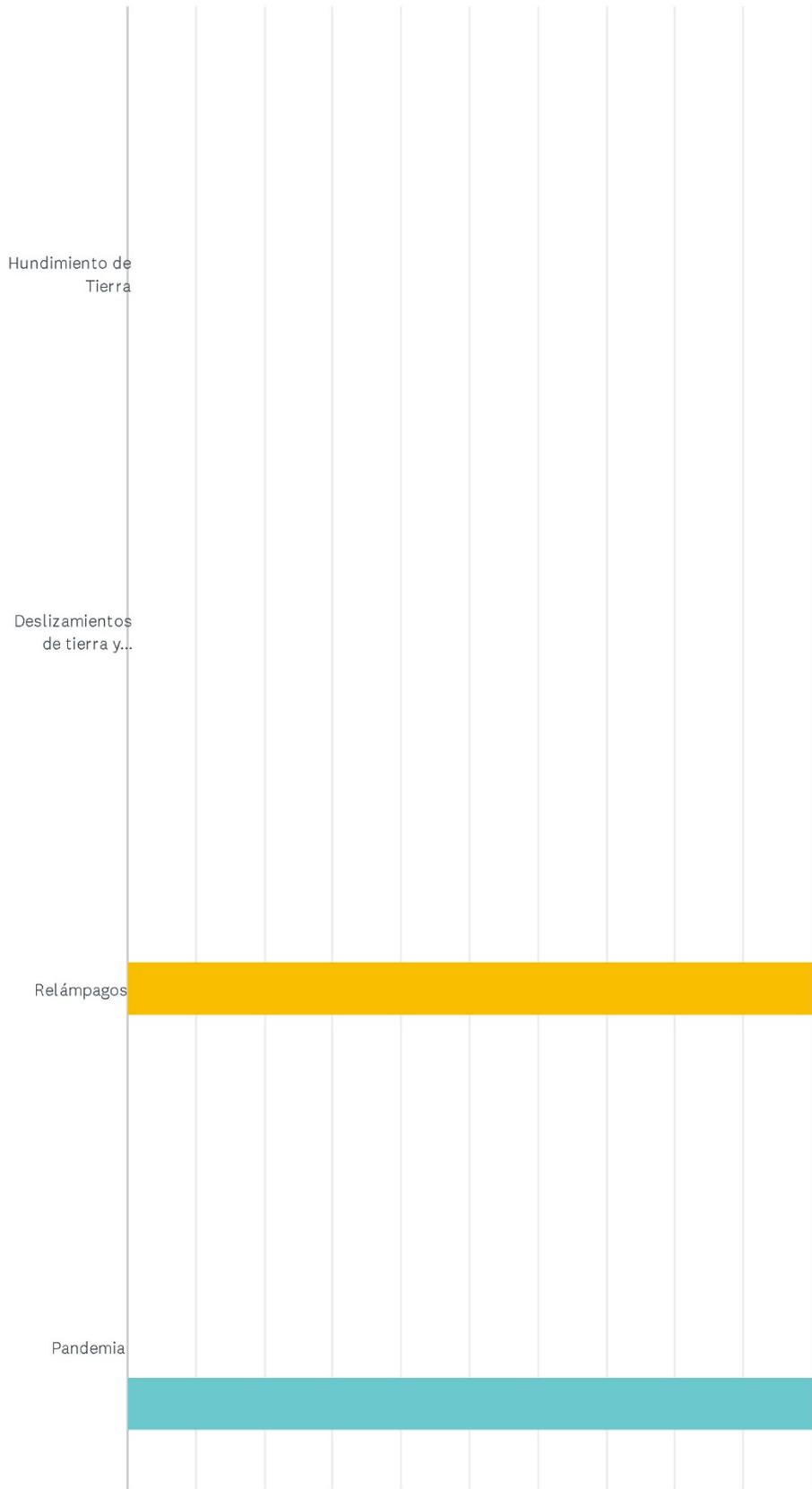
Answered: 1 Skipped: 0



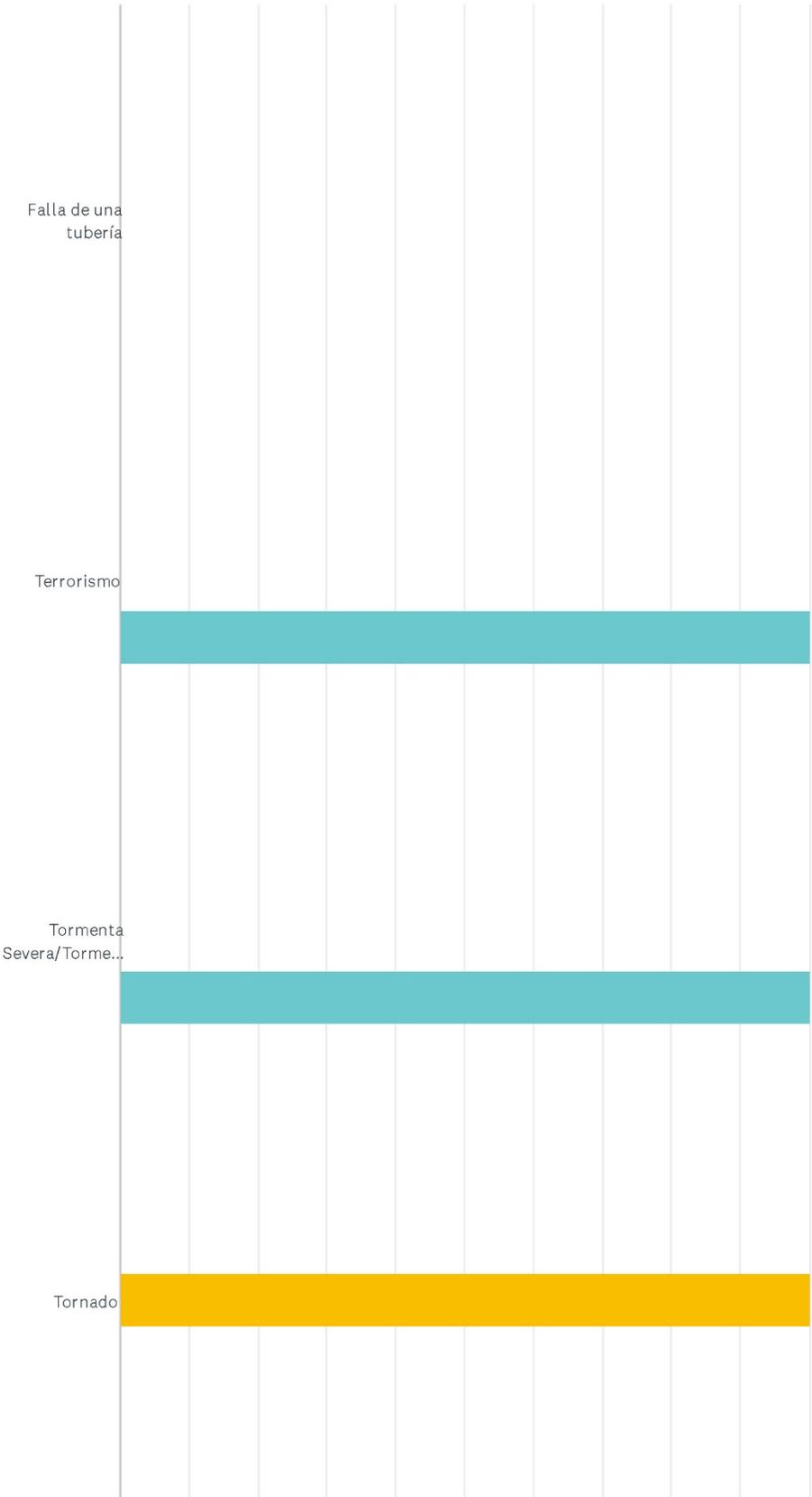
Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton



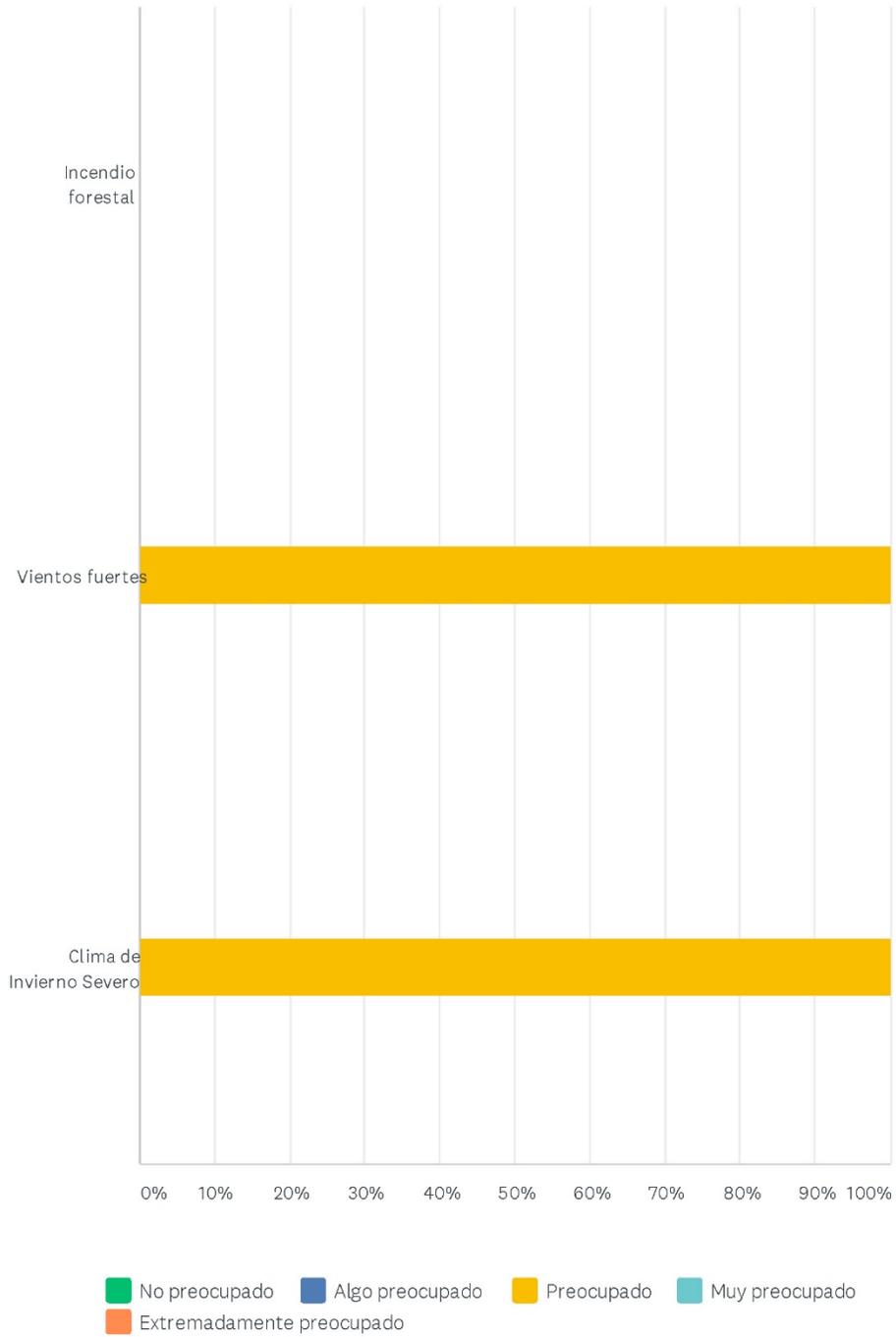
Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton



Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton



Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton

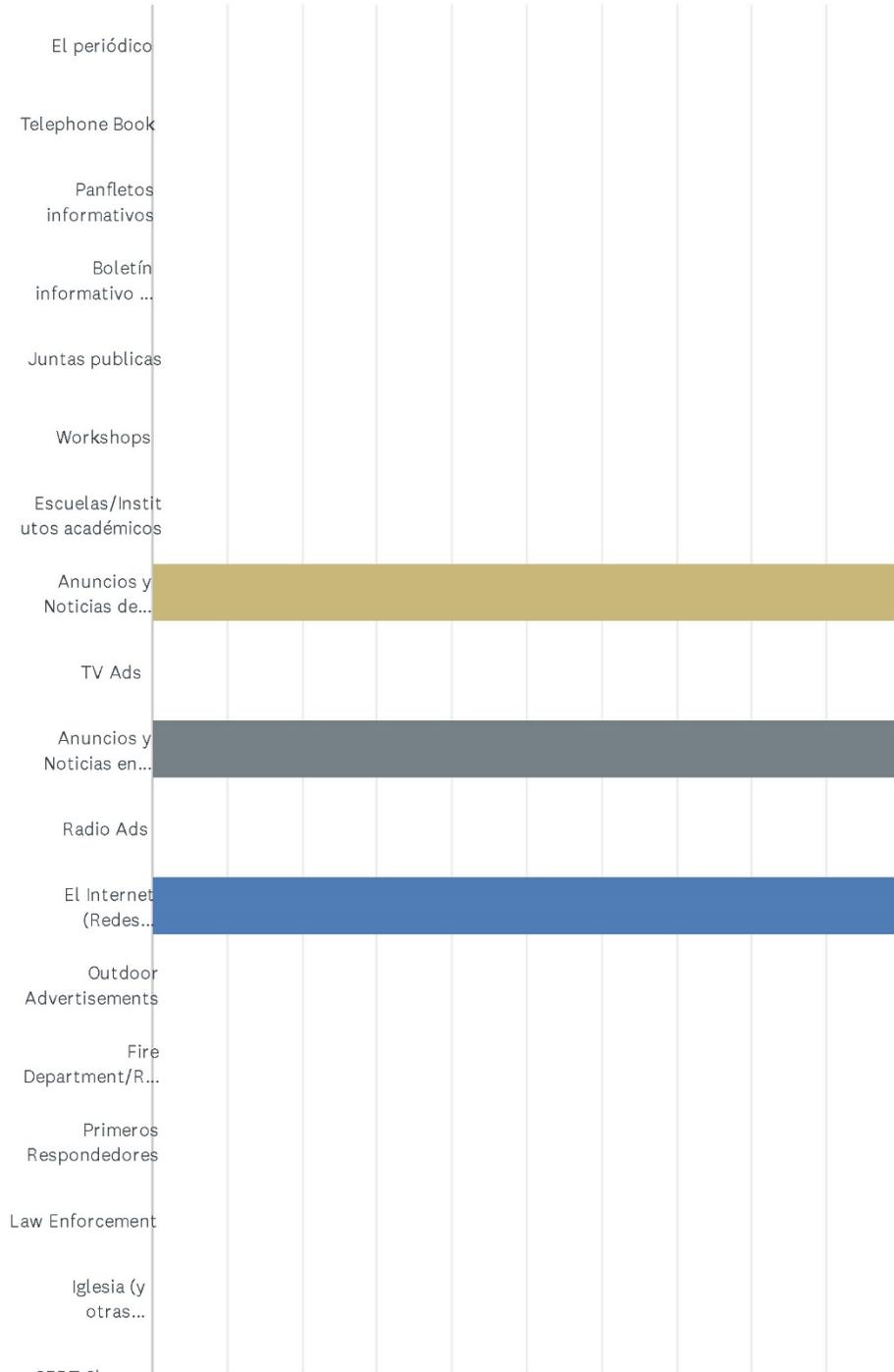


Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton

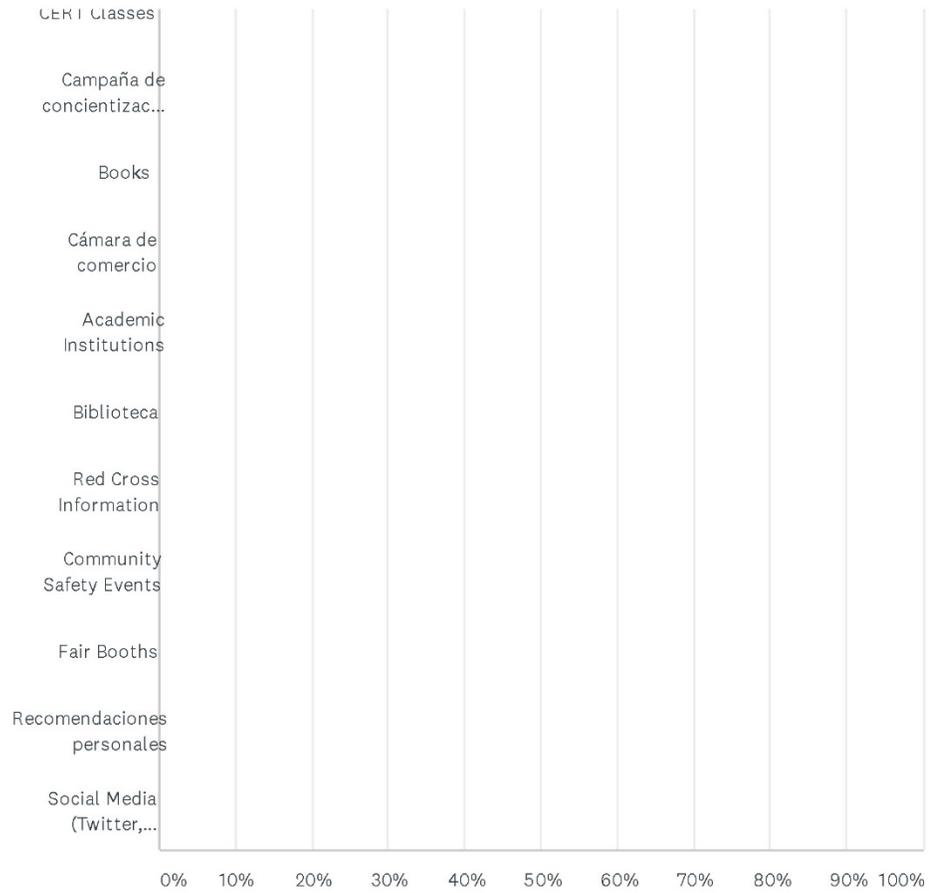
	NO PREOCUPADO	ALGO PREOCUPADO	PREOCUPADO	MUY PREOCUPADO	EXTREMADAMENTE PREOCUPADO	TOTAL
Falla en la represa/dique	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Sequía	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Suelos expansivos	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0
Calor Extremo	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Inundación	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Granizo	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Fuga de materiales peligrosos/tóxicos	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0
Huracán/Tormenta Tropical	0.00% 0	0.00% 0	0.00% 0	100.00% 1	0.00% 0	1
Hundimiento de Tierra	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0
Deslizamientos de tierra y aludes de barro	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0
Relámpagos	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Pandemia	0.00% 0	0.00% 0	0.00% 0	100.00% 1	0.00% 0	1
Falla de una tubería	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0
Terrorismo	0.00% 0	0.00% 0	0.00% 0	100.00% 1	0.00% 0	1
Tormenta Severa/Tormenta Eléctrica	0.00% 0	0.00% 0	0.00% 0	100.00% 1	0.00% 0	1
Tornado	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Incendio forestal	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0
Vientos fuertes	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Clima de Invierno Severo	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1

Q8 ¿Cuales de los métodos a continuación son los más efectivos para proveer información sobre los riesgos y desastres? (Por favor marque todos los que apliquen.)

Answered: 1 Skipped: 0



Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton

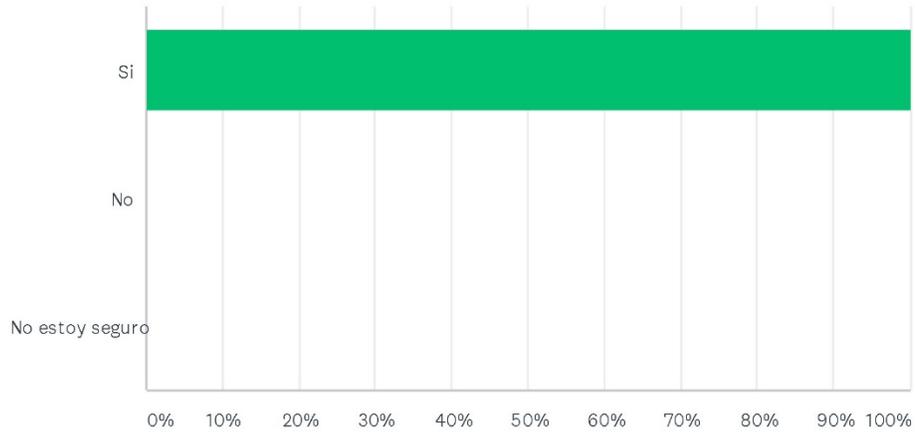


Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton

ANSWER CHOICES	RESPONSES	
El periódico	0.00%	0
Telephone Book	0.00%	0
Panfletos informativos	0.00%	0
Boletín informativo de la ciudad en línea	0.00%	0
Juntas publicas	0.00%	0
Workshops	0.00%	0
Escuelas/Institutos académicos	0.00%	0
Anuncios y Noticias de televisión	100.00%	1
TV Ads	0.00%	0
Anuncios y Noticias en emisoras de radio	100.00%	1
Radio Ads	0.00%	0
El Internet (Redes sociales/Buscadores)	100.00%	1
Outdoor Advertisements	0.00%	0
Fire Department/Rescue	0.00%	0
Primeros Respondedores	0.00%	0
Law Enforcement	0.00%	0
Iglesia (y otras instituciones basadas en fe)	0.00%	0
CERT Classes	0.00%	0
Campaña de concientización publica (Semana de la concienciación sobre inundaciones, etc.)	0.00%	0
Books	0.00%	0
Cámara de comercio	0.00%	0
Academic Institutions	0.00%	0
Biblioteca	0.00%	0
Red Cross Information	0.00%	0
Community Safety Events	0.00%	0
Fair Booths	0.00%	0
Recomendaciones personales	0.00%	0
Social Media (Twitter, Facebook, LinkedIn)	0.00%	0
Total Respondents: 1		

Q9 ¿Su propiedad se encuentra en una zona de inundación de FEMA?

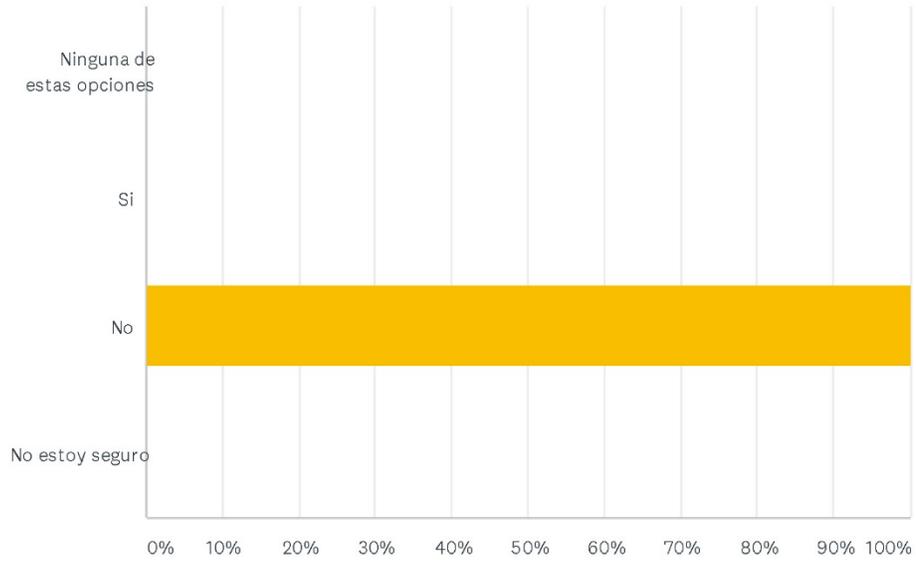
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	100.00%	1
No	0.00%	0
No estoy seguro	0.00%	0
TOTAL		1

Q10 ¿Tiene seguro contra inundaciones?

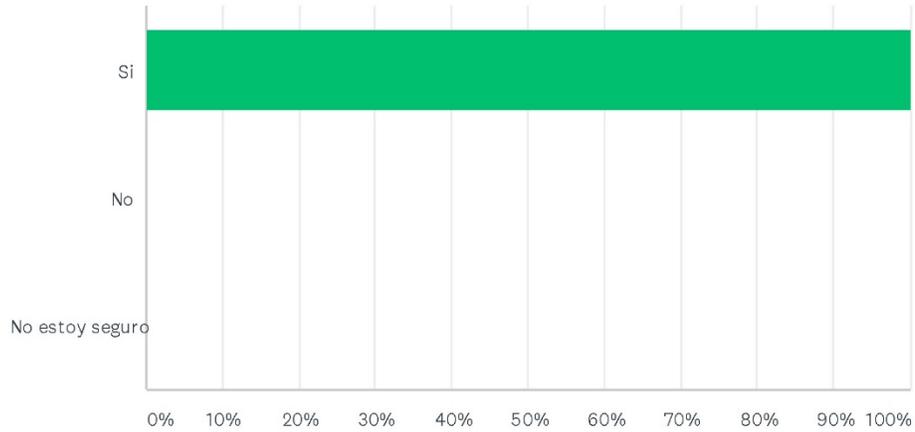
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Ninguna de estas opciones	0.00%	0
Si	0.00%	0
No	100.00%	1
No estoy seguro	0.00%	0
TOTAL		1

Q11 ¿Su propiedad se encuentra en una zona de alto riesgo para los incendios forestales?

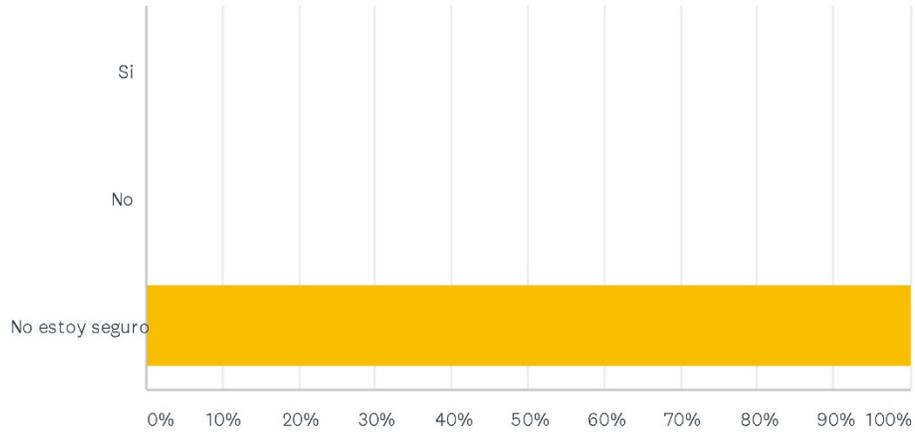
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	100.00%	1
No	0.00%	0
No estoy seguro	0.00%	0
TOTAL		1

Q12 ¿Has tenido problemas obteniendo seguro para su hogar debido a riesgos naturales?

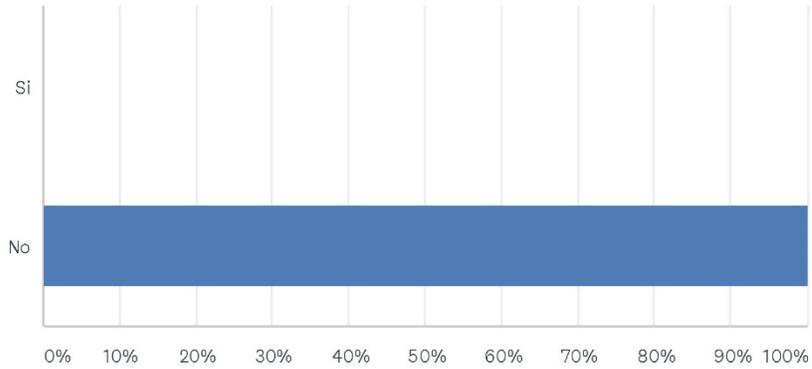
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	0.00%	0
No	0.00%	0
No estoy seguro	100.00%	1
TOTAL		1

Q13 ¿Tiene alguna necesidad especial en su hogar que requiere una advertencia rápida o un responso especializado durante un desastre?

Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	0.00%	0
No	100.00%	1
TOTAL		1

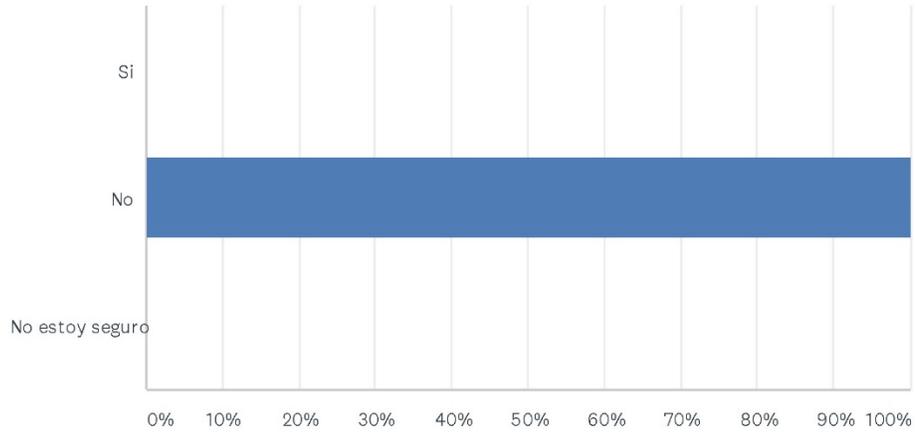
Q14 Si su respuesta fue “Si” para la pregunta #13, quisiera que el Departamento de Emergencias lo contacte sobre su acceso especial y necesidades? Si ese es el caso por favor llene las información abajo.

Answered: 0 Skipped: 1

ANSWER CHOICES	RESPONSES	
Nombre	0.00%	0
Company	0.00%	0
Dirección	0.00%	0
Dirección 2	0.00%	0
Ciudad/Pueblo	0.00%	0
Estado/Provincia	0.00%	0
ZIP/Código Postal	0.00%	0
País	0.00%	0
Dirección de Correo electrónico	0.00%	0
Número de teléfono	0.00%	0

Q15 ¿Cuándo se mudó a su hogar pensó en el impacto que pudieran tener los desastres naturales?

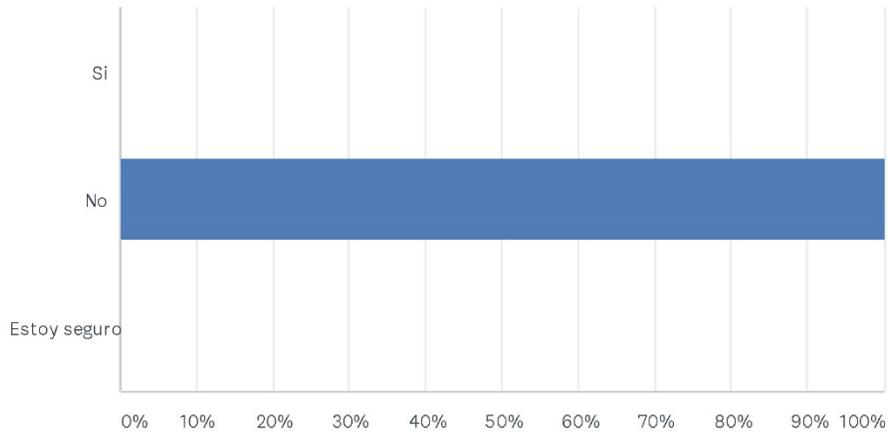
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	0.00%	0
No	100.00%	1
No estoy seguro	0.00%	0
TOTAL		1

Q16 ¿Cuando se mudo a su hogar le informó un agente de bienes raíces, vendedor o propietario sobre la presencia de una zona de riesgo de peligro natural (por ejemplo, zona de falla de presa, zona de inundación, área de riesgo de deslizamiento de tierra, área de alto riesgo de incendio)?

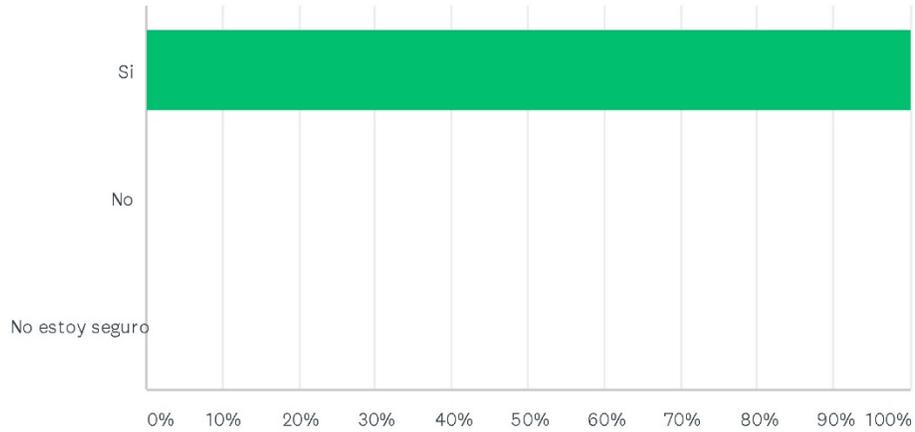
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	0.00%	0
No	100.00%	1
Estoy seguro	0.00%	0
TOTAL		1

Q17 ¿La divulgación de este tipo de información sobre riesgos de peligros naturales influiría en su decisión de comprar o alquilar una casa?

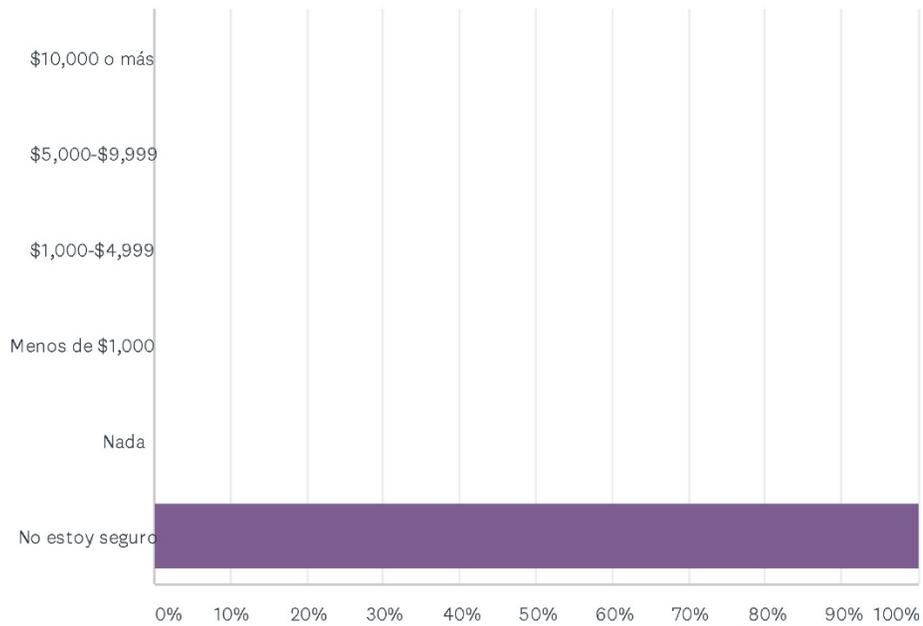
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	100.00%	1
No	0.00%	0
No estoy seguro	0.00%	0
TOTAL		1

Q18 ¿Cuánto dinero estaría dispuesto a gastar para modernizar su casa para reducir los riesgos asociados con los desastres naturales? (por ejemplo, quitando la maleza y los materiales vegetales alrededor de su casa para crear un "espacio defendible" para incendios forestales, realizando mejoras sísmicas o reemplazando un techo combustible con un techo no combustible)

Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
\$10,000 o más	0.00%	0
\$5,000-\$9,999	0.00%	0
\$1,000-\$4,999	0.00%	0
Menos de \$1,000	0.00%	0
Nada	0.00%	0
No estoy seguro	100.00%	1
TOTAL		1

Q19 ¿Cuál de los siguientes incentivos lo alentaría a gastar dinero para modernizar su hogar para protegerlo contra desastres naturales? (Marque todos lo que apliquen)

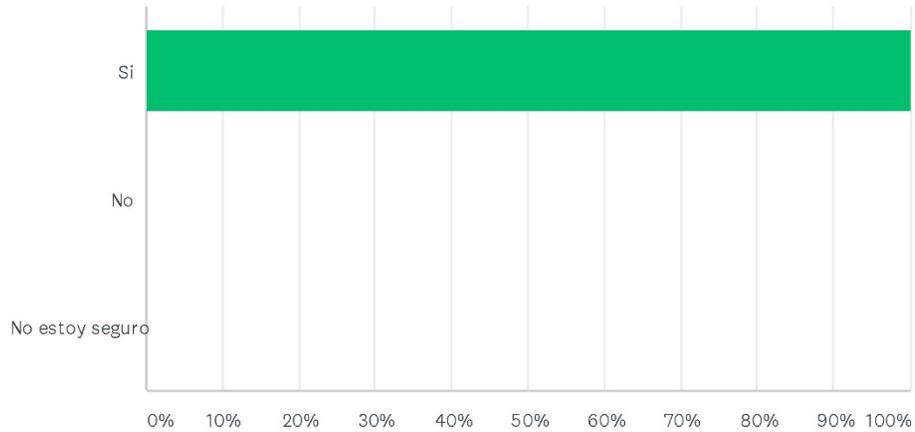
Answered: 0 Skipped: 1

 No matching responses.

ANSWER CHOICES	RESPONSES
Descuento en la prima de seguro	0.00% 0
Descuento hipotecario	0.00% 0
Préstamo con tasa de interés baja	0.00% 0
Financiamiento de subvenciones	0.00% 0
Ninguna de estas opciones	0.00% 0
Total Respondents: 0	

Q20 Si su propiedad estuviera ubicada en un área designada de "alto riesgo" o hubiera recibido daños repetidos por un evento de riesgo natural, ¿consideraría una "compra" ofrecida por una agencia pública?

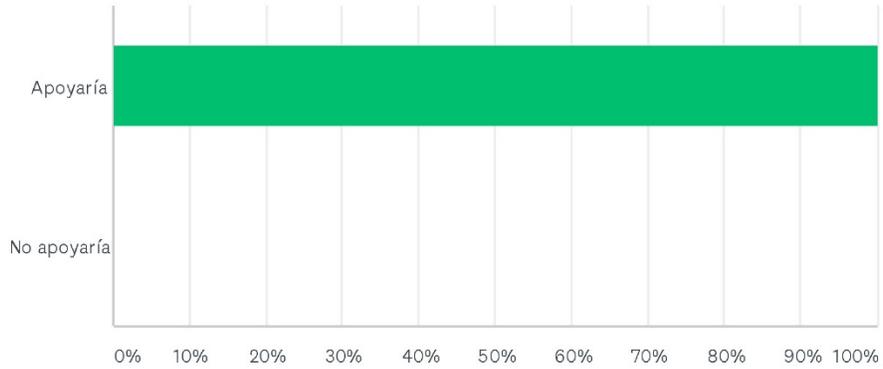
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	100.00%	1
No	0.00%	0
No estoy seguro	0.00%	0
TOTAL		1

Q21 ¿Apoyaría la regulación (restricción) de los usos de la tierra dentro de áreas conocidas de alto riesgo?

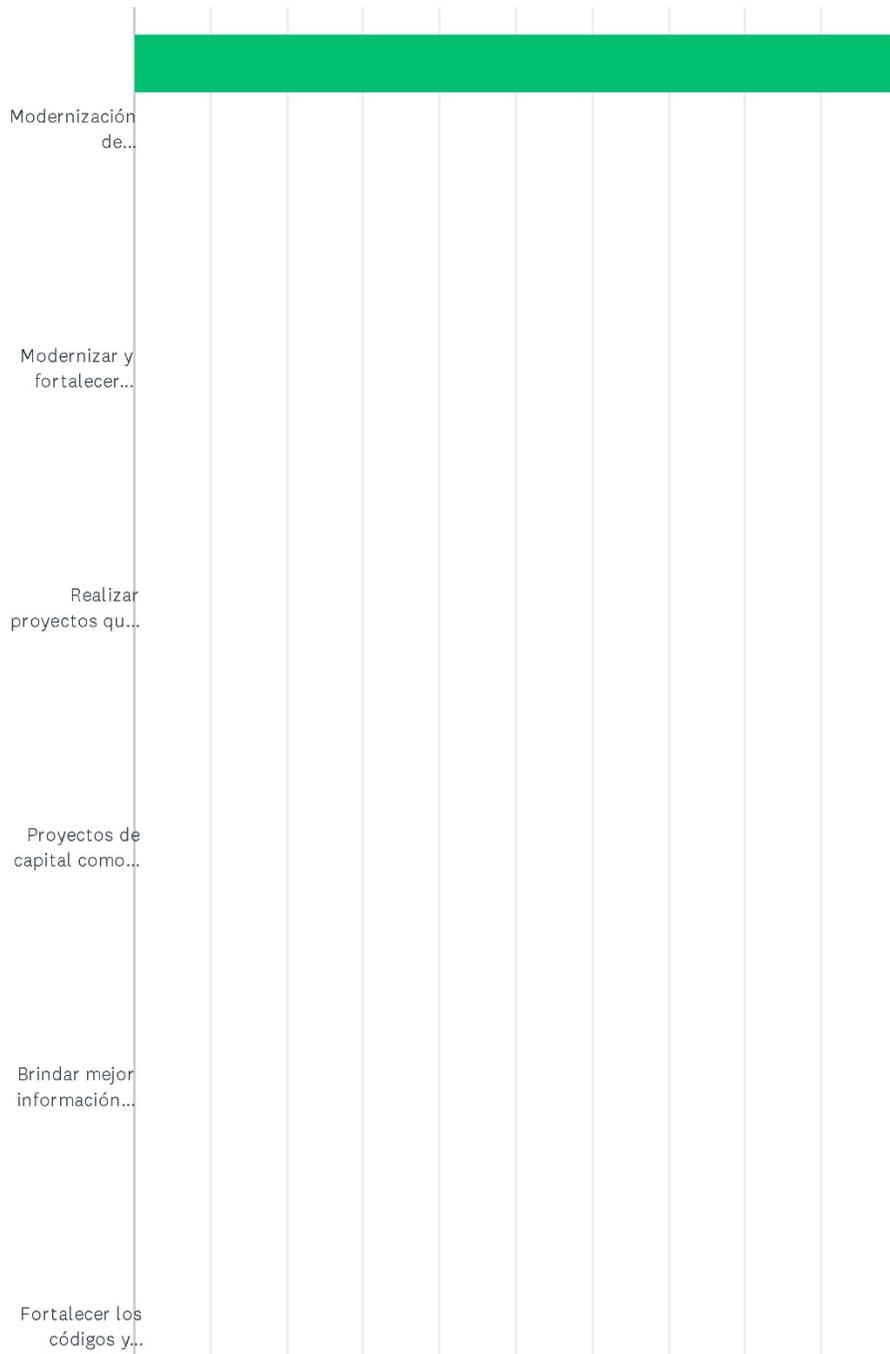
Answered: 1 Skipped: 0



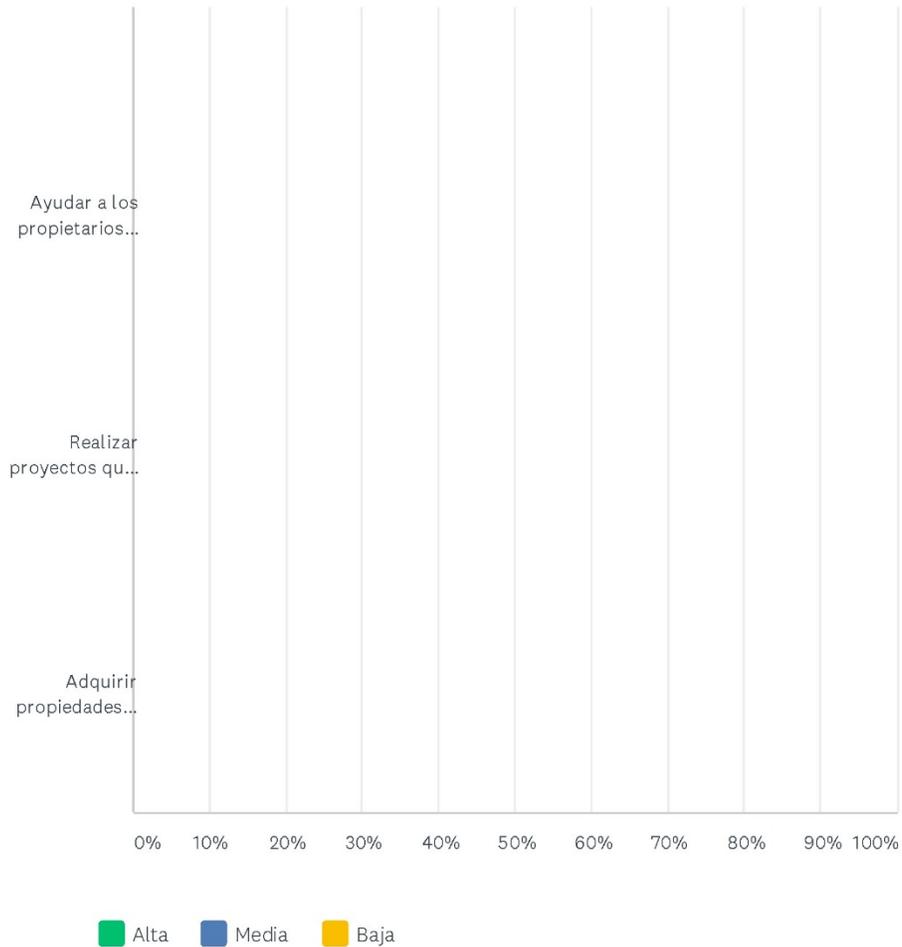
ANSWER CHOICES	RESPONSES	
Apoyaría	100.00%	1
No apoyaría	0.00%	0
TOTAL		1

Q22 ¿Qué tipo de proyectos cree que deberían llevar a cabo las agencias del gobierno federal, estatal o del condado para reducir los daños y las interrupciones causadas por eventos de peligro en el condado de Wharton? Clasifique cada opción como de prioridad alta, media o baja.

Answered: 1 Skipped: 0



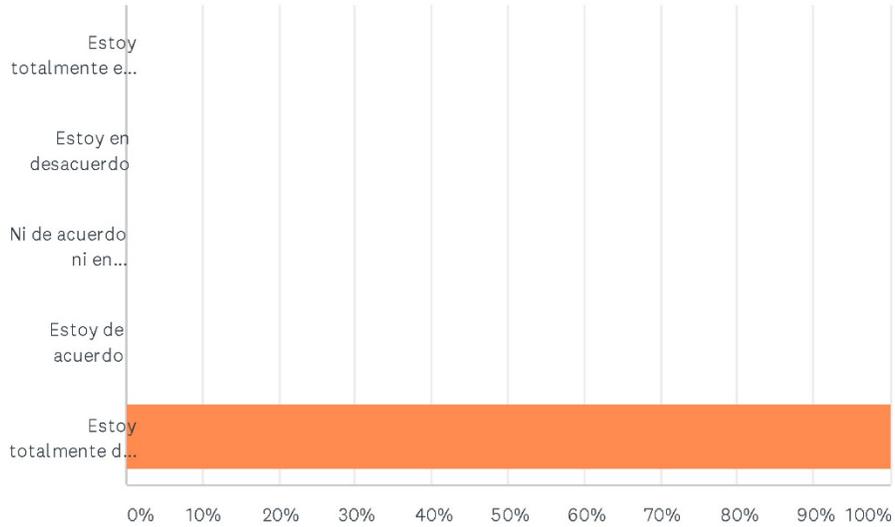
Encuesta para el Plan de Mitigación de Riesgos 2021 del Condado de Wharton



	ALTA	MEDIA	BAJA	TOTAL
Modernización de infraestructuras como carreteras, puentes, instalaciones de drenaje, diques, suministro de agua, aguas residuales e instalaciones de suministro de energía.	100.00% 1	0.00% 0	0.00% 0	1
Modernizar y fortalecer instalaciones esenciales como estaciones de policias, estaciones de bomberos, escuelas y hospitales.	0.00% 0	0.00% 0	0.00% 0	0
Realizar proyectos que restauren la capacidad de los ambientes naturales para absorber los impactos de los riesgos naturales.	0.00% 0	0.00% 0	0.00% 0	0
Proyectos de capital como presas, diques, muros de inundación, mejoras de drenaje y proyectos de estabilización de bancos.	0.00% 0	0.00% 0	0.00% 0	0
Brindar mejor información pública sobre el riesgo y la exposición a peligros dentro del área operativa.	0.00% 0	0.00% 0	0.00% 0	0
Fortalecer los códigos y regulaciones para incluir estándares regulatorios más altos en áreas de alto riesgo.	0.00% 0	0.00% 0	0.00% 0	0
Ayudar a los propietarios vulnerables a obtener fondos para la mitigación.	0.00% 0	0.00% 0	0.00% 0	0
Realizar proyectos que mitiguen los impactos del cambio climático.	0.00% 0	0.00% 0	0.00% 0	0
Adquirir propiedades vulnerables y mantenerlas como espacio abierto.	0.00% 0	0.00% 0	0.00% 0	0

Q23 Por favor indica su nivel de acuerdo o desacuerdo con la siguiente observación: Es la responsabilidad del gobierno (estadal, local, y federal) proveer educación para los residentes para ayudar a minimizar/eliminar la exposición a los riesgos naturales. (Escoge una.)

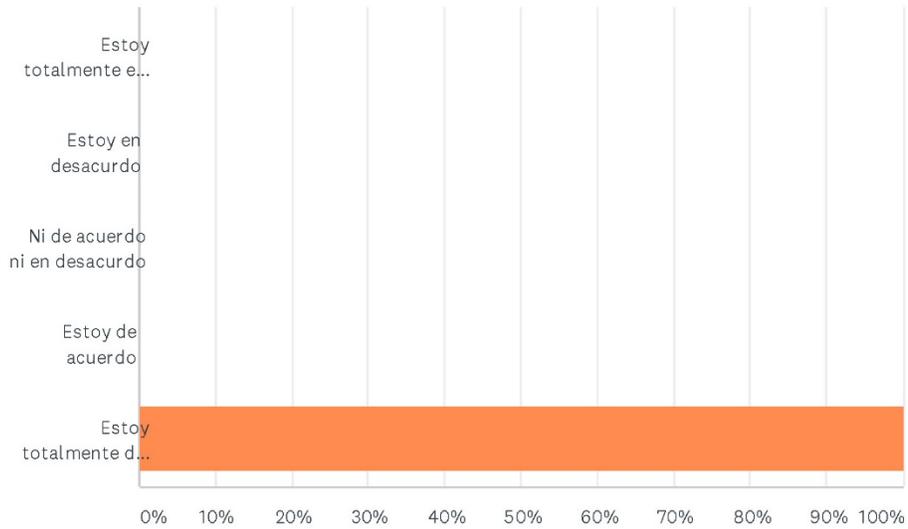
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Estoy totalmente en desacuerdo	0.00%	0
Estoy en desacuerdo	0.00%	0
Ni de acuerdo ni en desacuerdo	0.00%	0
Estoy de acuerdo	0.00%	0
Estoy totalmente de acuerdo	100.00%	1
TOTAL		1

Q24 Por favor indica su nivel de acuerdo o desacuerdo con la siguiente observación: Es mi responsabilidad educarme y tomar los pasos necesarios para minimizar/eliminar mi exposición a los riesgos naturales (Escoge una.)

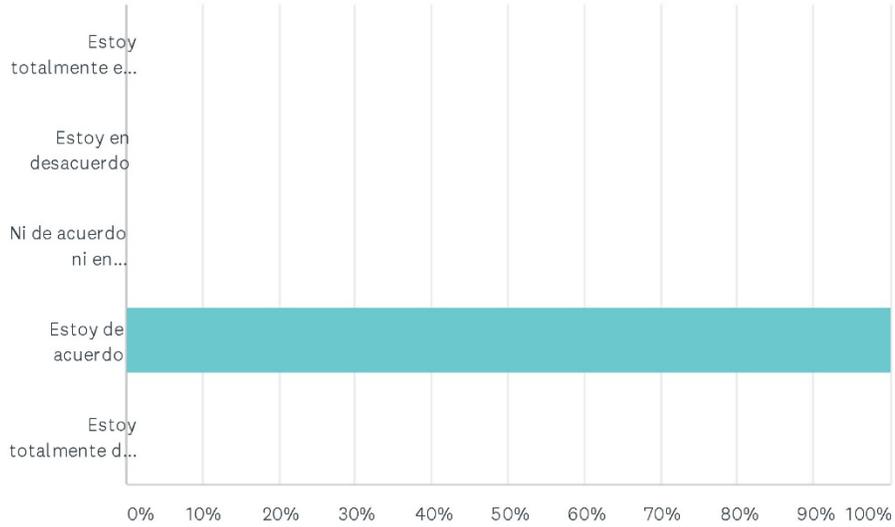
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Estoy totalmente en desacuerdo	0.00%	0
Estoy en desacuerdo	0.00%	0
Ni de acuerdo ni en desacuerdo	0.00%	0
Estoy de acuerdo	0.00%	0
Estoy totalmente de acuerdo	100.00%	1
TOTAL		1

Q25 Por favor indica su nivel de acuerdo o desacuerdo con la siguiente observación: Información sobre los riesgos asociados con peligros naturales es disponible y fácil de encontrar. (Escoge una.)

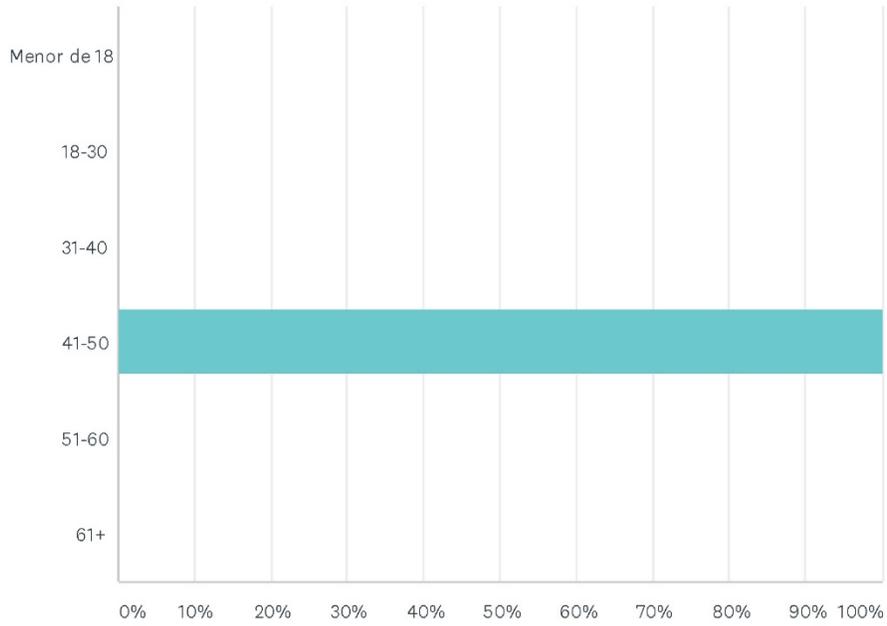
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Estoy totalmente en desacuerdo	0.00%	0
Estoy en desacuerdo	0.00%	0
Ni de acuerdo ni en desacuerdo	0.00%	0
Estoy de acuerdo	100.00%	1
Estoy totalmente de acuerdo	0.00%	0
TOTAL		1

Q26 ¿A qué grupo etario pertenece?

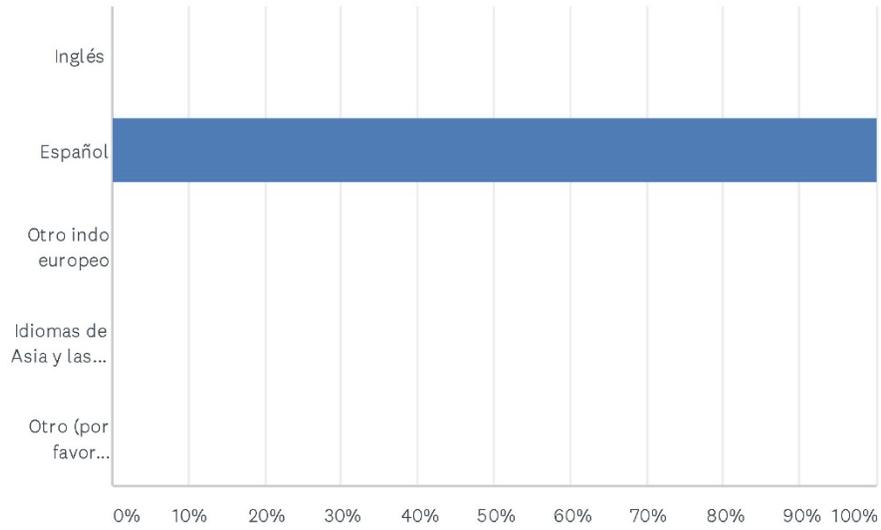
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Menor de 18	0.00%	0
18-30	0.00%	0
31-40	0.00%	0
41-50	100.00%	1
51-60	0.00%	0
61+	0.00%	0
TOTAL		1

Q27 Idioma principal en su hogar:

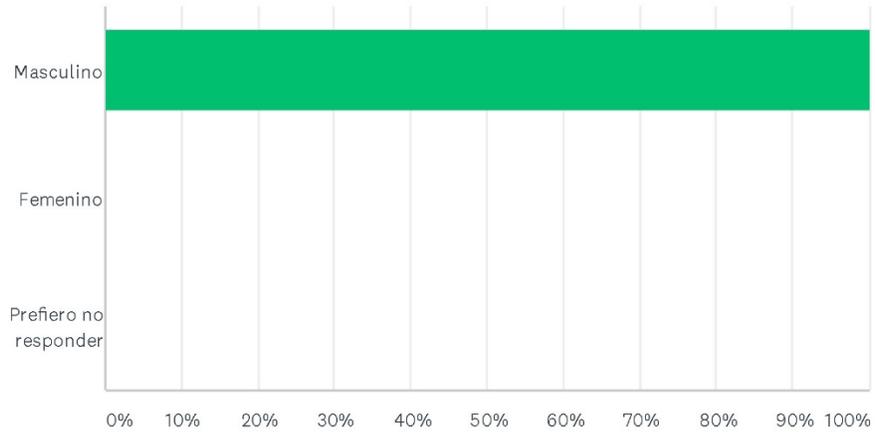
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES
Inglés	0.00% 0
Español	100.00% 1
Otro indo europeo	0.00% 0
Idiomas de Asia y las islas del Pacífico	0.00% 0
Otro (por favor especifique)	0.00% 0
TOTAL	1

Q28 ¿Cuál es su género?

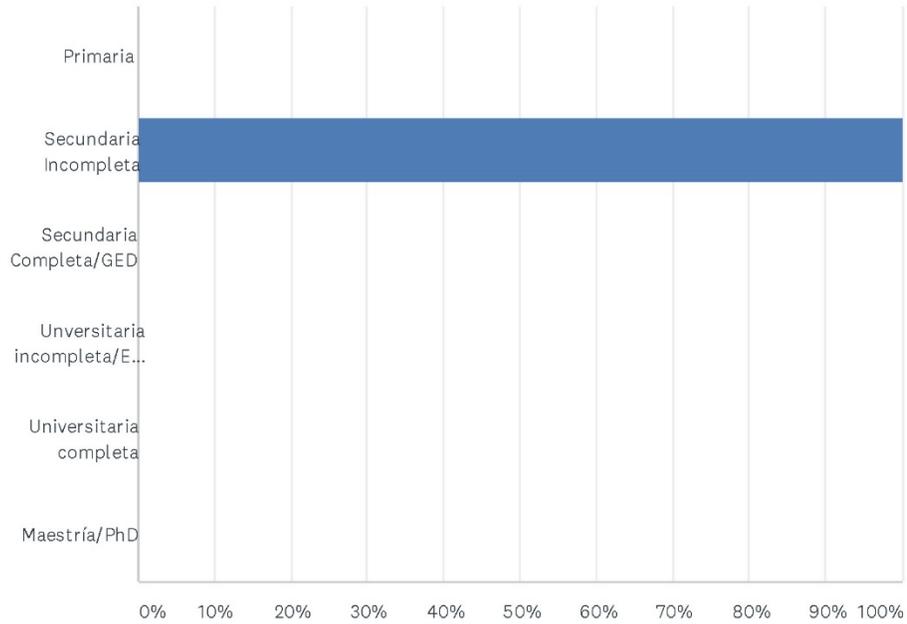
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Masculino	100.00%	1
Femenino	0.00%	0
Prefiero no responder	0.00%	0
TOTAL		1

Q29 Nivel de educación:

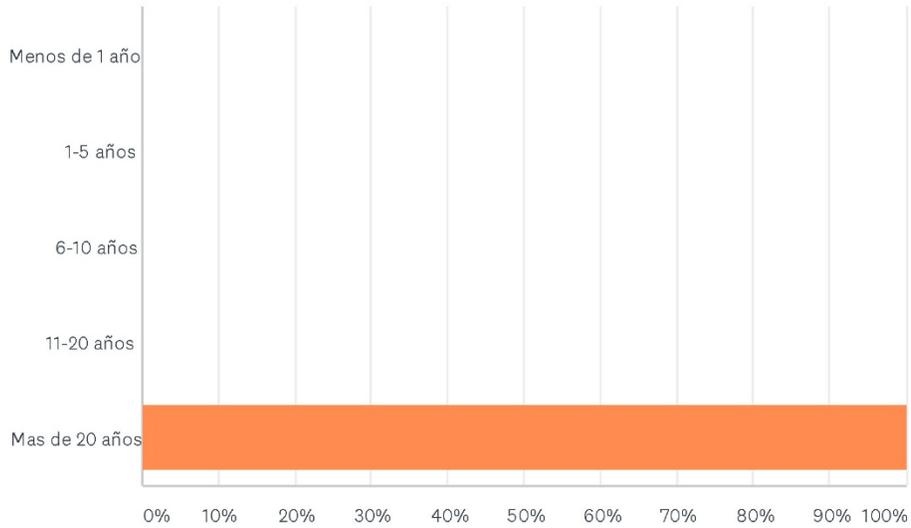
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Primaria	0.00%	0
Secundaria Incompleta	100.00%	1
Secundaria Completa/GED	0.00%	0
Unversitaria incompleta/Escuela de oficio	0.00%	0
Unversitaria completa	0.00%	0
Maestría/PhD	0.00%	0
TOTAL		1

Q30 ¿Cuántos años has vivido en el Condado?

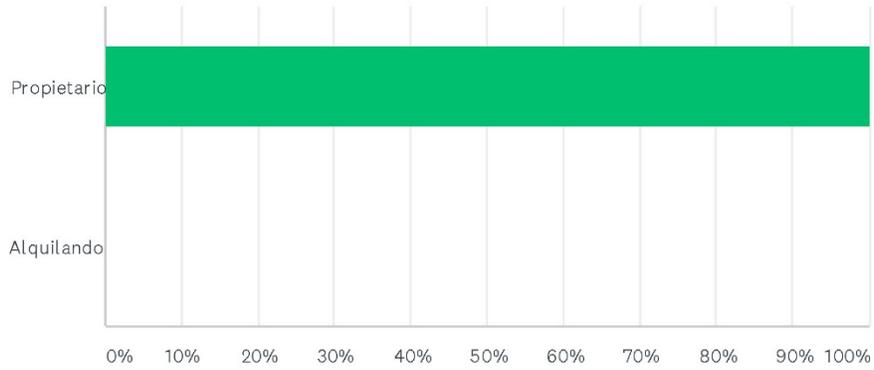
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Menos de 1 año	0.00%	0
1-5 años	0.00%	0
6-10 años	0.00%	0
11-20 años	0.00%	0
Mas de 20 años	100.00%	1
TOTAL		1

Q31 ¿Usted es propietario o está alquilando su hogar?

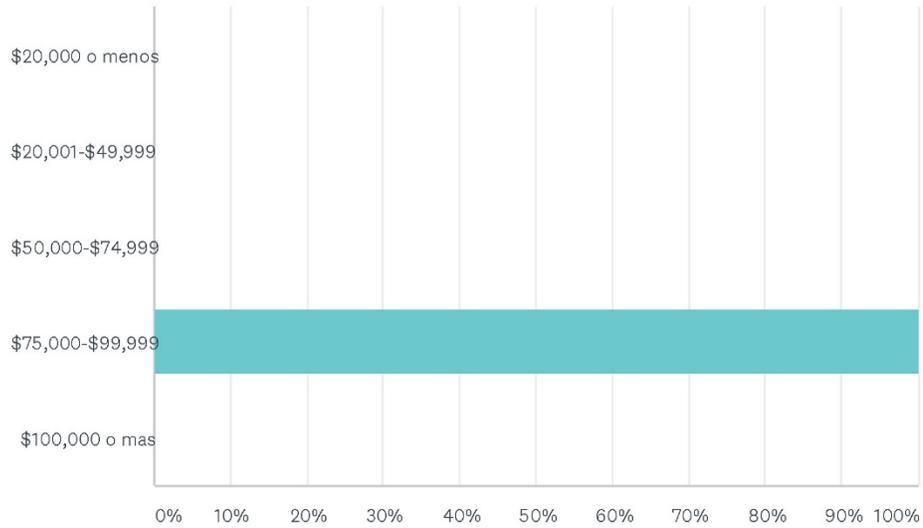
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Propietario	100.00%	1
Alquilando	0.00%	0
TOTAL		1

Q32 ¿Cual es su ingreso familiar anual?

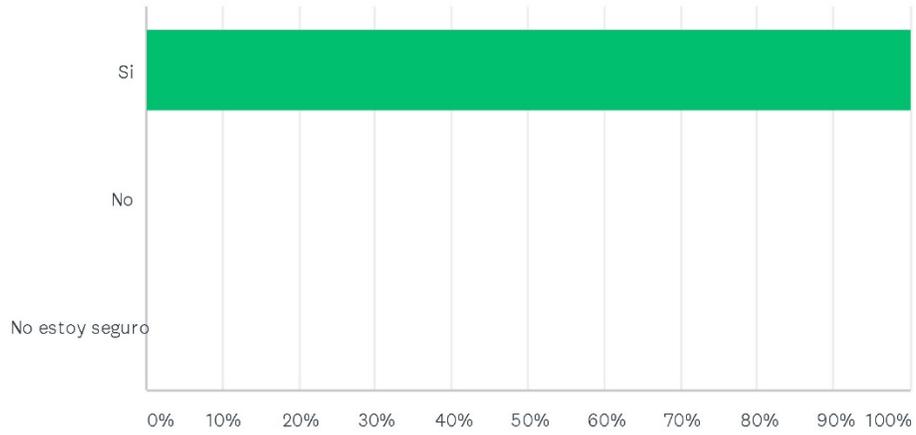
Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES
\$20,000 o menos	0.00% 0
\$20,001-\$49,999	0.00% 0
\$50,000-\$74,999	0.00% 0
\$75,000-\$99,999	100.00% 1
\$100,000 o mas	0.00% 0
TOTAL	1

Q33 ¿Tiene acceso regular al internet?

Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Si	100.00%	1
No	0.00%	0
No estoy seguro	0.00%	0
TOTAL		1

Q34 Comentarios Adicionales

Answered: 0 Skipped: 1

Wharton County
Hazard Mitigation Plan Update

APPENDIX D.
PLAN ADOPTION RESOLUTIONS FROM
PLANNING PARTNERS

**APPENDIX D.
PLAN ADOPTION RESOLUTIONS FROM PLANNING
PARTNERS**

RESOLUTION #22-02
Wharton County, Texas

WHEREAS, Section 322 of the Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5165) requires local governments to develop a hazardous mitigation plan as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects; and,

WHEREAS, the Code of Federal Regulations (CFR) at Title 44, Chapter 1 part 201, requires the County to prepare and adopt a local mitigation plan every five (5) years; and,

WHEREAS, a steering committee comprised of members of the County, and participating incorporated areas within, selected and deemed appropriate by the Commissioners Court in its authority to do so as granted by the people, as well as the local participating governments' leadership was convened in order to assess the risks of hazards facing the County and the Communities, and to make recommendations on actions to be taken to mitigate these hazards; and,

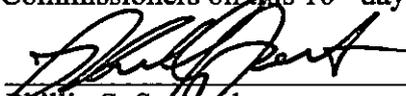
WHEREAS, a Proposal for Professional Services was approved for Scheibe Consulting LLC to update the comprehensive hazard mitigation plan for the County and the participating jurisdictions; and,

WHEREAS, the plan incorporates the comments, ideas and concerns of the community and of the public in general, which this plan is designed to protect, ascertained through a series of public meetings, publication of the draft plan, press releases, and other outreach activities; and

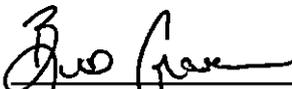
NOW THEREFORE, BE IT RESOLVED by the **Wharton County Commissioners Court** that the 2021 Wharton County, Texas Hazard Mitigation Plan, dated September 2021 is hereby approved and adopted by the Commissioners Court of Wharton County and resolves to execute the actions in the plan.

This Resolution shall take effect immediately without reconsideration.

ADOPTED by the Wharton County Commissioners on this 10th day of January, 2022.


Phillip S. Spenath
Wharton County Judge

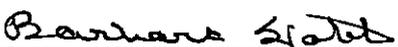

Richard Zahn, Comm. PCT 1


Bud Graves, Comm. PCT 2


Steven Goetsch, Comm. PCT 3


Doug Mathew, Comm. PCT 4

ATTEST:


Barbara Svatek, Wharton County Clerk



**CITY OF WHARTON
RESOLUTION NO. 2022-07**

A RESOLUTION OF THE WHARTON CITY COUNCIL APPROVING THE HAZARD MITIGATION PLAN PREPARED BY SCHEIBE CONSULTING IN COORDINATION WITH WHARTON COUNTY, THE CITY OF EL CAMPO AND THE CITY OF EAST BERNARD.

WHEREAS, Section 322 of the Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5165) requires local governments to develop a hazard mitigation plan as a condition of receiving certain types of non-emergency disaster assistance, including funding for mitigation projects; and,

WHEREAS, The Code of Federal Regulations (CFR) at Title 44, Chapter 1, part 201, requires the City to prepare and adopt a local mitigation plan every five years; and,

WHEREAS, A steering committee comprised of members of the County, the City of El Campo, the City of East Bernard and the City of Wharton, selected and deemed appropriate by the highest elected official in his authority to do so as granted by the people, as well as the City's leadership was convened in order to assess the risks of hazards facing the County and the Cities, and to make recommendations on actions to be taken to mitigate these hazards; and,

WHEREAS, A request for proposals was issued through Wharton County to hire an experienced consulting firm to work with the County and Cities to update a comprehensive hazard mitigation plan for the County, the City of El Campo, the City of East Bernard and the City of Wharton; and,

WHEREAS, The plan incorporates the comments, ideas and concerns of the community and of the public in general, which this plan is designed to protect, ascertained through a series of public meetings, publication of the draft plan, press releases, and other outreach activities.

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF WHARTON, TEXAS:

SECTION I. The Wharton City Council hereby approves the Wharton County Hazard Mitigation Plan.

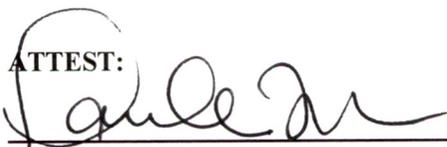
SECTION II. The Wharton City Council hereby authorizes the Mayor of the City of Wharton to execute all documents related to said plan.

SECTION III. That this resolution shall become effective immediately upon its passage.

PASSED, APPROVED, and ADOPTED this 10th day of January 2022.

CITY OF WHARTON, TEXAS

By: 
TIM BARKER
Mayor

ATTEST:

PAULA FAVORS
City Secretary



RESOLUTION NO. R2022-01

WHEREAS, Section 322 of the Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5165) requires local governments to develop a hazardous mitigation plan as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects; and,

WHEREAS, the Code of Federal Regulations (CFR) at Title 44, Chapter 1, part 201, requires the City to prepare and adopt a local mitigation plan every five years; and,

WHEREAS, a steering committee comprised of members of the County, and the City of El Campo, selected and deemed appropriate by the Commissioners Court in his authority to do so as granted by the people, as well as the City's leadership was convened to assess the risks of hazards facing the County and the City, and to make recommendations on actions to be taken to mitigate these hazards; and,

WHEREAS, a request for proposals was issued through the Texas Colorado Regional Floodplain Coalition to hire an experienced consulting firm to work with the County to update a comprehensive hazard mitigation plan for the County and the City of El Campo; and,

WHEREAS, the plan incorporates the comments, ideas and concerns of the community and of the public in general, which this plan is designed to protect, ascertained through a series of public meetings, publication of the draft plan, press releases, and other outreach activities; and

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF EL CAMPO, TEXAS THAT:

Section 1. The 2021 Wharton County, Texas Hazard Mitigation Plan, dated September 2021 is hereby approved and adopted by the City Council of the City of El Campo and resolves to execute the actions in the plan.

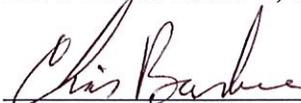
Section 2. This Resolution shall take effect immediately without reconsideration.

Section 3. A copy of the plan is attached to this resolution.

PASSED AND APPROVED this the 10th day of January, 2022.



CITY OF EL CAMPO, TEXAS


Chris Barbee, Mayor

ATTEST:


Kaytee Koudela, City Secretary



RESOLUTION NO 2022-001
ADOPTION OF WHARTON COUNTY HAZARD MITIGATION PLAN

WHEREAS, Section 322 of the Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5165) requires local governments to develop a hazardous mitigation plan as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects; and,

WHEREAS, the Code of Federal Regulations (CFR) at Title 44, Chapter 1, part 201, requires the City to prepare and adopt a local mitigation plan every five (5) years; and,

WHEREAS, a steering committee comprised of members of the County, and participating incorporated areas within, including the City of East Bernard, selected and deemed appropriate by the Commissioners Court in its authority to do so as granted by the people, as well as the City's leadership was convened in order to assess the risks of hazards facing the County and the City, and to make recommendations on actions to be taken to mitigate these hazards; and,

WHEREAS, a Proposal for Professional Services was approved for Scheibe Consulting LLC to update the comprehensive hazard mitigation plan for the County and the participating jurisdictions, including the City of East Bernard; and,

WHEREAS, the plan incorporates the comments, ideas and concerns of the community and of the public in general, which this plan is designed to protect, ascertained through a series of public meetings, publication of the draft plan, press releases, and other outreach activities; and

NOW THEREFORE, BE IT RESOLVED by the Board of Alderman of the City of East Bernard that the 2021 Wharton County, Texas Hazard Mitigation Plan, dated September 2021 is hereby approved and adopted by the Board of Alderman of the City of East Bernard and resolves to execute the actions in the plan.

This Resolution shall take effect immediately without reconsideration.

ADOPTED by the Board of Alderman of the City of East Bernard on this 18th day of JANUARY 2022.

APPROVED:


Marvin R. Holub, Mayor

ATTEST:


Audrey Scarce, City Secretary



Wharton County
Hazard Mitigation Plan Update

APPENDIX E.
EXAMPLE PROGRESS REPORT

APPENDIX E. EXAMPLE PROGRESS REPORT

Wharton County Hazard Mitigation Plan Update Annual Progress Report

Reporting Period: 2021-2025

Background: Wharton County and the Cities of East Bernard, El Campo, and Wharton developed a hazard mitigation plan to reduce risk from all hazards by identifying resources, information, and strategies for risk reduction. The federal Disaster Mitigation Act of 2000 requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. To prepare the plan, the participating partners organized resources, assessed risks from natural hazards within the planning area, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from natural hazards. By completing this process, the jurisdictions maintained compliance with the Disaster Mitigation Act, achieving eligibility for mitigation grant funding opportunities afforded under FEMA’s Hazard Mitigation Assistance grants. The plan can be viewed online at:

<http://www.co.wharton.tx.us/>

Summary Overview of the Plan’s Progress: The performance period for the Hazard Mitigation Plan became effective on [REDACTED], 2021, with the final approval of the plan by FEMA. The initial performance period for this plan will be 5 years, with an anticipated update to the plan to occur before [REDACTED], 2025. As of this reporting period, the performance period for this plan is considered to be [REDACTED] % complete. The Hazard Mitigation Plan has targeted 68 hazard mitigation actions to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

- [REDACTED] out of [REDACTED] actions ([REDACTED] %) reported ongoing action toward completion
- [REDACTED] out of [REDACTED] actions ([REDACTED] %) were reported as being complete
- [REDACTED] out of [REDACTED] actions ([REDACTED] %) reported no action taken

Purpose: The purpose of this report is to provide an annual update on the implementation of the action plan identified in the Wharton County Hazard Mitigation Plan Update. The objective is to ensure that there is a continuing and responsive planning process that will keep the Hazard Mitigation Plan dynamic and responsive to the needs and capabilities of the partner jurisdictions. This report discusses the following:

- Natural hazard events that have occurred within the last year
- Changes in risk exposure within the planning area (all of Wharton County)
- Mitigation success stories
- Review of the action plan
- Changes in capabilities that could impact plan implementation
- Recommendations for changes/enhancement

Review of the Action Plan: Table 2 reviews the action plan, reporting the status of each action. Reviewers of this report should refer to the Hazard Mitigation Plan for more detailed descriptions of each action and the prioritization process.

Address the following in the “status” column of the following table:

- Was any element of the action carried out during the reporting period?
- If no action was completed, why?
- Is the timeline for implementation for the action still appropriate?

If the action was completed, does it need to be changed or removed from the action plan?

**TABLE 2.
ACTION PLAN MATRIX**

Action No.	Title	Action Taken? (Yes or No)	Timeline	Priority	Status Comments	Status (√, O, X)
WHARTON COUNTY						
1	Improve drainage infrastructure throughout the County (Bridge, culvert, channel, levee, and dam projects)					
2	Update and adopt the Wharton County Flood Insurance Study and FIRM					
3	Adopt “Higher Standard” Riverine Flood Damage Prevention Ordinances and Standards					
4	Join FEMA’s CRS Program					
5	Create/Maintain a Wharton Disaster Response Team					
6	Implement a Wharton County Flood Warning/Monitoring System					
7	Install emergency backup generators at critical facilities					
8	Educate the community on hazards					
9	Drainage Master Plan Update					
10	Update Subdivision Ordinance					
11	Collaborate with Regional Flood Planning Group					
12	Collaborate with local canal owners to identify funding to improve and expand existing infrastructure					
13	Collaborate with local MUD Districts to establish/implement drought/expansive soils contingency plan					
14	Develop a plan to improve Pandemic response					
15	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic					

**TABLE 2.
ACTION PLAN MATRIX**

Action No.	Title	Action Taken? (Yes or No)	Timeline	Priority	Status Comments	Status (√, O, X)
16	Collaborate with local groundwater district to monitor land subsidence					
17	Establish a county-wide hazardous material response team					
CITY OF EAST BERNARD						
1	Purchase Public Hazard Alert System					
2	Organize outreach program for vulnerable populations					
3	Prepare and adopt a stormwater drainage plan and ordinance					
4	Update emergency response plan					
5	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)					
6	Install emergency generators at critical facilities					
7	Implementation of Zoning Ordinance					
8	Update Comprehensive Plan					
9	Develop a plan to improve Pandemic response					
10	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic					
11	Collaborate with local MUD Districts to establish/implement drought/expansive soils contingency plan					
12	Collaborate with local groundwater district to monitor land subsidence					
13	GIS Mapping					

**TABLE 2.
ACTION PLAN MATRIX**

Action No.	Title	Action Taken? (Yes or No)	Timeline	Priority	Status Comments	Status (√, O, X)
14	Establish a hazardous material response team					
CITY OF EL CAMPO						
1	Provide education on water conservation techniques					
2	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)					
3	Adopt freeboard ordinance					
4	Adopt IBC and IRC					
5	GIS mapping					
6	Outreach to vulnerable populations regarding extreme and adverse weather/conditions					
7	Implement Master Drainage Plan (7 projects)					
8	Educate the community on all hazards					
9	Alternative notification/alert system					
10	Establish Post Disaster Temporary Transfer Center					
11	Establish/implement drought/expansive soils contingency plan					
12	Update Drainage master plan					
13	Develop a plan to improve Pandemic response					
14	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic					
15	Collaborate with local groundwater district to monitor land subsidence					
16	Establish an all hazards response team					
17	Install emergency generators at critical facilities					

**TABLE 2.
ACTION PLAN MATRIX**

Action No.	Title	Action Taken? (Yes or No)	Timeline	Priority	Status Comments	Status (√, O, X)
CITY OF WHARTON						
1	Clean and repair storm drains routinely					
2	Increase freeboard requirements for permitting structures in the floodplain					
3	Implement a comprehensive watershed ordinance for new development					
4	Acquire, reuse, and preserve open spaces adjacent to flood-prone areas					
5	Educate the community on the hazards					
6	Minimize the impact of flooding by installing berms and levees where appropriate					
7	Develop flood-reduction / stream restoration/channelization projects to ensure adequate drainage/diversion of stormwater					
8	Establish a reserve fund for emergency and public mitigation measures					
9	Strengthen and harden at-risk critical facilities					
10	Acquisition and relocation, elevation and “demo-rebuild” of flood-prone structures					
11	Install emergency backup generators at critical facilities					
12	Use impact fees to help fund public hazard mitigation projects related to land development					

**TABLE 2.
ACTION PLAN MATRIX**

Action No.	Title	Action Taken? (Yes or No)	Timeline	Priority	Status Comments	Status (√, O, X)
13	Implement warning systems					
14	Establish/implement drought/expansive soil contingency plan					
15	Update/implement Drainage Master Plan					
16	Improve drainage infrastructure throughout the city (Bridge, culvert, channel, levee, and dam projects)					
17	Develop a plan to improve Pandemic response					
18	Conduct after-action report and improvement plan meeting in regard to COVID-19 Pandemic					
19	Collaborate with local groundwater district to monitor land subsidence					
20	Establish a hazardous material response team					

Completion statuses legend:

√ = Project Completed

O = Action ongoing toward completion

X = No progress at this time

Changes That May Impact Implementation of the Plan: (Insert a brief overview of any significant changes in the planning area that would have a profound impact on the implementation of the plan. Specify any changes in technical, regulatory, and financial capabilities identified during the plan’s development)

Recommendations for Changes or Enhancements: Based on the review of this report by the Hazard Mitigation Plan Steering Committee, the following recommendations will be noted for future updates or revisions to the plan:

- _____
- _____
- _____
- _____
- _____

Public review notice: *The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the governing boards of all planning partners and local media outlets and the report is posted on the Wharton County Hazard Mitigation Plan website. Any questions or comments regarding the contents of this report should be directed to:*

Insert Contact Info Here

