Cass County Multi-Hazard Mitigation Plan

2021

"Under the Federal Disaster Mitigation Act of 2000 (DMA 2000 or "the Act"), Cass County (County) is required to have a Federal Emergency Management Agency ("FEMA") - approved Local Hazard Mitigation Plan ("the Plan") in order to be eligible for certain pre- and post-disaster mitigation funds. Adoption of this Plan by the County and approval by FEMA will serve the dual objectives of providing direction and guidance on implementing hazard mitigation in the County, and qualify the County to obtain federal assistance for hazard mitigation. Solely to help achieve these objectives, the Plan attempts to systematically identify and address hazards that can affect the County. Nothing in this Plan is intended to be an admission, either expressed or implied, by or on behalf of the County, of any County obligation, responsibility, duty, fault or liability for any particular hazard or hazardous condition, and no such County obligation, responsibility, duty, fault or liability should be inferred or implied from the Plan, except where expressly stated."

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1. Introduction and Background

1) Participating Jurisdictions

The Cass County Multi-Hazard Mitigation plan includes five participating jurisdictions: Cass County, the City of Atlanta, the City of Avinger, the City of Bloomburg, the City of Domino, the City of Douglassville, the City of Hughes Springs, the City of Linden, the City of Marietta, and the City of Queen City.

This plan is an update of the County's current plan that expired in May 2021. That plan, the Cass County Mitigation Action Plan, also included the cities of Atlanta, Avinger, Bloomburg, Domino, Douglassville, Hughes Springs, Linden, Marietta, and Queen City.

2) Hazards to be Addressed

The current expired plan addresses the following natural hazards: floods, tornados, winter storms, severe winds, hailstorms, drought, extreme heat, and wildfire.

For the update each participating jurisdiction will address the following natural hazards identified as threats throughout Texas in the State's 2018 hazard mitigation plan:

Hazard	Jurisdiction									
	Cass County	Atlanta	Avinger	Bloomburg	Domino	Douglassville	Hughes Springs	Linden	Marietta	Queen City
Hurricanes, Tropical Storms and Depressions										
Drought	x	x	x	x	x	x	x	x	x	x
Hailstorm	x	x	x	x	x	x	x	x	x	x
Riverine Flooding	x	x	x	x	x	x	x	x	x	x

Tornados	x	x	x	x	x	x	x	x	x	x
Severe Winds	x	x	x	x	x	x	x	x	x	x
Wildfire	x	x	x	x	x	x	x	x	x	x
Winter Weather	x	x	x	x	x	x	x	x	x	x
Lightning	x	x	x	x	x	x	x	x	x	x
Extreme Cold	x	x	x	x	x	x	x	x	x	x
Extreme Heat	x	x	x	x	x	x	x	x	x	x
Additional Optional Hazards										
Coastal Erosion										
Inland Erosion										
Land Subsidence / Sinkhole										
Earthquakes										
Expansive Soils										
Dam / Levee Failure	x									

Omission Statements

Cass County determined that the history of impacts associated with Hurricanes / Tropical Storms, Severe Coastal Flooding, Coastal Erosion, Land Subsidence / Sinkholes, Earthquakes, and Expansive Soils have been negligible (or non-existent), therefore it is expected that future impacts will be negligible as well.

The Cities of Atlanta, Avinger, Bloomburg, Domino, Douglassville, Hughes Springs, Linden, Marietta, and Queen City determined that the history of impacts associated with Hurricanes / Tropical Storms, Severe Coastal Flooding, Coastal Erosion, Land Subsidence / Sinkholes, Earthquakes, Expansive Soils, and Dam / Levee Failure have been negligible (or non-existent), therefore it is expected that future impacts will be negligible as well.

2. Planning Process

The Cass County Multi-Hazard Mitigation Plan is a multi-jurisdiction plan. Representatives to the local planning team were selected by each jurisdiction. Planning team members represented the following offices and departments:

Table 1: Local Planning Team Representatives

Title	Jurisdiction
Grants Coordinator	Cass County
County Judge	Cass County
City Manager	Linden
Mayor	Marietta
City Manager	Atlanta
Mayor	Avinger
Mayor	Bloomberg
Emergency Coordinator	Cass County
City Manager	Hughes Springs
Mayor	Douglassville
Mayor	Domino

Once the planning team was established, members developed a schedule with specific goals and proposed meeting dates over the planning period.

Hazard mitigation planning team (HMPT) members contributed to the following activities throughout the planning process:

1. Providing technical assistance and necessary data to the HMPT.
2. Scheduling, coordinating, and facilitating community meetings.
3. Providing necessary materials for public planning meetings.
4. Collecting and analyzing data.
5. Developing mitigation goals and implementation strategies.

6. Preparing the first draft of the plan and providing technical writing assistance for review, editing, and formatting.

Each member of the HMPT participated in the following activities associated with development of the plan:

1. Identifying, contacting, coordinating, and implementing input from stakeholders.
2. Attending, conferencing in, or providing meeting support and information for regular HMPT meetings.
3. Identifying hazards and estimating potential losses from future hazard events.
4. Developing and prioritizing mitigation actions to address identified risks.
5. Coordinating public meetings to develop the plan.
6. Identifying community resources available to support planning effort.
7. Submitting proposed plan to all appropriate departments for review and comment, and working with the city to incorporate the resulting comments into the proposed plan.

Table 2: Plan Schedule

Timeline								
Planning Tasks	2021							Completed
	June	July	August	Sept	Oct	Nov	Dec	
Organize Resources and Identify Planning Team								
Create Outreach Strategy								
Review Community Capabilities								
Conduct Risk Assessment								
Identify Mitigation Goals and Actions								
Develop Action Plan for Implementation								
Identify Plan Maintenance Procedures								
Review Plan Draft								
Submit Plan to State and FEMA								
Adopt Plan								TBD
Meetings								
Planning Team	6/1/21		8/10/21					
Public Outreach – Online Surveys								
Stakeholder Outreach								

1) Existing Plans, Reports, Ordinances, and Technical Information Sources

Each planning team member worked to collect and provide the input and information necessary to develop the hazard mitigation strategy. Research was coordinated and conducted by local planning team members. The local planning team reviewed the following documents during the planning process:

Table 3: Planning Team Data Sources

Data Source	Data Incorporation	Purpose
Federal Emergency Management Agency (FEMA) Flood Zones	Flood zone maps	GIS mapping of flood zones
National Centers for Environmental Information (NCEI)	Hazard occurrences	Previous event occurrences, damage dollars, and mapping for all hazards
National Inventory of Dams	Dam information	High-hazard dam list
National Oceanic and Atmospheric Administration (NOAA)	Historic Weather Data	Previous event occurrences, damage dollars, and mapping for all hazards
National Severe Storms Laboratory (NSSL)	Historic Weather Data	Previous event occurrences, damage dollars, and mapping for all severe storms
National Weather Service (NWS), Shreveport, LA Office	Historic Weather Data	Previous event occurrences, damage dollars, and mapping for all hazards
Cass County 2018 CHAMPS Report	Natural hazard data	Review previously compiled natural hazard histories.
Cass County Appraisal District Data	Property values and parcel counts	Population counts, parcel data, and land use data
Cass County Hazard Mitigation Plan, 2016 - 2021	Previous planning approach, hazards addressed, and mitigation actions	Previous planning team representatives, plan maintenance, hazard histories, and mitigation actions
State of Texas Hazard Mitigation Plan 2018 Update	Hazard Descriptions	Official descriptions of hazards and their potential impacts

Additional information sources included: USDA Census of Agriculture, United States Geological Survey, Vaisala, and specific details about previous natural hazard events from planning team participants. Sources are noted throughout the document. Report titles and links to the most recently accessed websites hosting the related information are also noted, where appropriate.

Area stakeholders contacted to participate in the planning process included the following offices and departments:

Table 4: Local Stakeholders Contacted

Stakeholder	Title	Participated
Bowie County	Emergency Management Coordinator	N
Morris County	Emergency Management Coordinator	N
Delta County	Emergency Management Coordinator	N
Hopkins County	Emergency Management Coordinator	N
City of Atlanta	Mayor	N
City of Atlanta	City Manager	N
City of Atlanta	Public Safety Director	N
City of Atlanta	Asst. Chief (Fire Department)	N
City of Atlanta	Captain (Police Department)	N
Eagle Landing HOA	HOA Representative	Y

In an effort to increase participation, each stakeholder was contacted at least twice by email. Area stakeholders who chose to participate provided important supplemental input and information that helped shape mitigation strategies for each hazard, in particular by making the planning team aware of hazard areas that had not been previously identified.

2) Project Meetings

The planning team met on two separate occasions. Additional communication was regularly carried out via email and over the phone.

The first planning team meeting was held on June 1st, 2021. During this meeting, the planning team decided which hazards needed to be addressed in the mitigation plan and which were not relevant. To make these decisions, a hazard handout was produced to show previous occurrences of each hazard, associated deaths and injuries, and total dollar damages.

The team agreed to use the collected hazard data, as the foundation for its hazard risk assessment and ongoing research into hazard extent, impact, and vulnerability.

At the end of the meeting, planning team members were tasked with compiling relevant data, including city ordinances; identifying critical facilities; and providing a status update on previous mitigation actions.

The second planning team meeting was held on August 10th, 2021. To stay on schedule, the planning team needed to meet the following objectives: review the plan draft, identify changes and corrections, and begin reviewing mitigation actions.

The planning team met its objectives.

Through phone calls and emails after the second meeting, due to the COVID-19 pandemic, the planning team decided on mitigation actions, reviewed the plan draft, discussed final changes and reviewed the plan submission process in preparation of submitting the plan for official review on December 30th, 2021.

3) Public Input

Cass County and the participating jurisdictions held their first public comment period following the first planning team meeting on May 1st, 2021 from June 23rd-July 7th, 2021. For the public comment period, a survey was posted on the County website. Members of the public from each jurisdiction were notified of the public comment period via an announcement in the local paper that serves all ten jurisdictions, as well as posts on jurisdictions' social media. The survey received six responses.

The survey asked nine questions:

1. Where do you live?
2. Do you own or rent?
3. Cass County is looking at addressing the following hazards. Which hazards do you believe impact the County and/or participating cities the most? Please select all that apply (multiple choice answer).
4. Which of the above hazards have affected you directly within the past five years? Please select all that apply (multiple choice answer).
5. How have you been affected by the hazards selected above? (Open-ended question)
6. Have you taken any actions to reduce your risk to these hazards? If so, what actions have you taken? (Open-ended question)
7. What is the best means of communication for you? Please select all that apply (multiple choice answer).
8. Which of the following mitigation project types do you believe local government agencies should focus on to reduce disruptions of services and to strengthen the community? Please check all that apply (multiple choice answer).
9. Do you have any other thoughts or concerns relating to the Hazard Mitigation Plan? (Open-ended question).

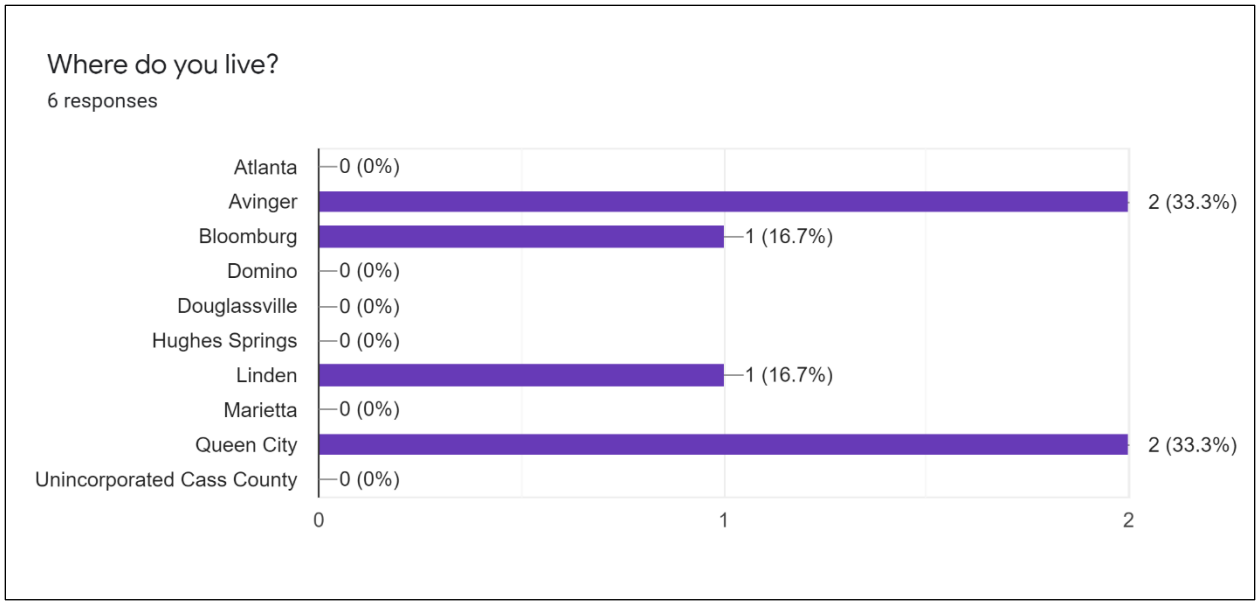


Figure 1: Survey Responses for Question 1

As Figure 1 above shows, the respondents came from the Cities of Avinger, Bloomburg, Linden, and Queen City.

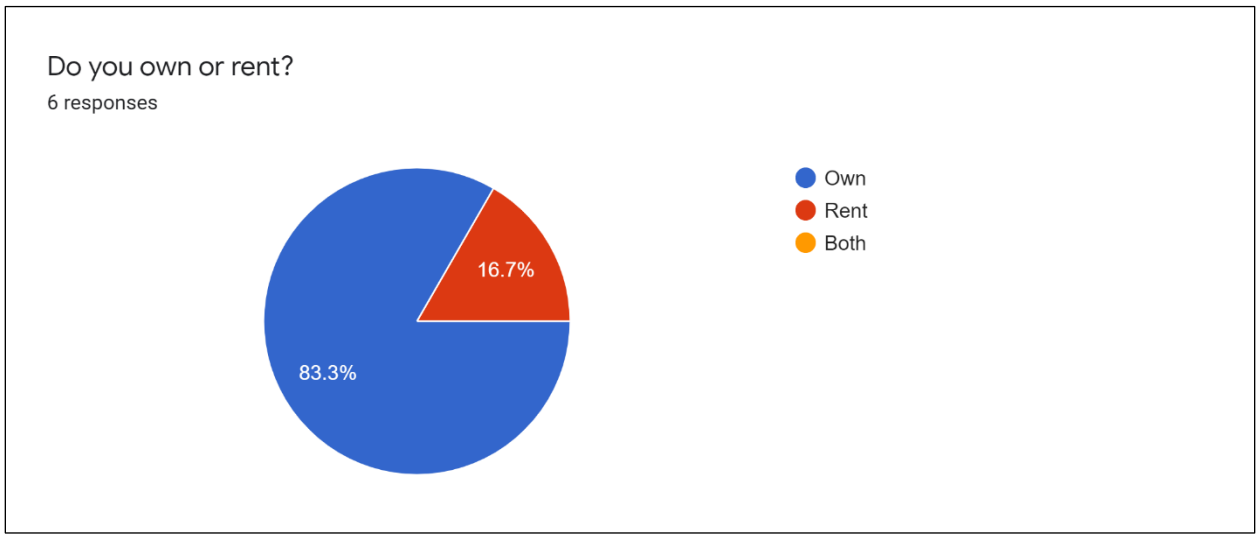


Figure 2: Survey Responses for Question 2

As shown in Figure 2 above, the majority of respondents (83.3%) own their home.

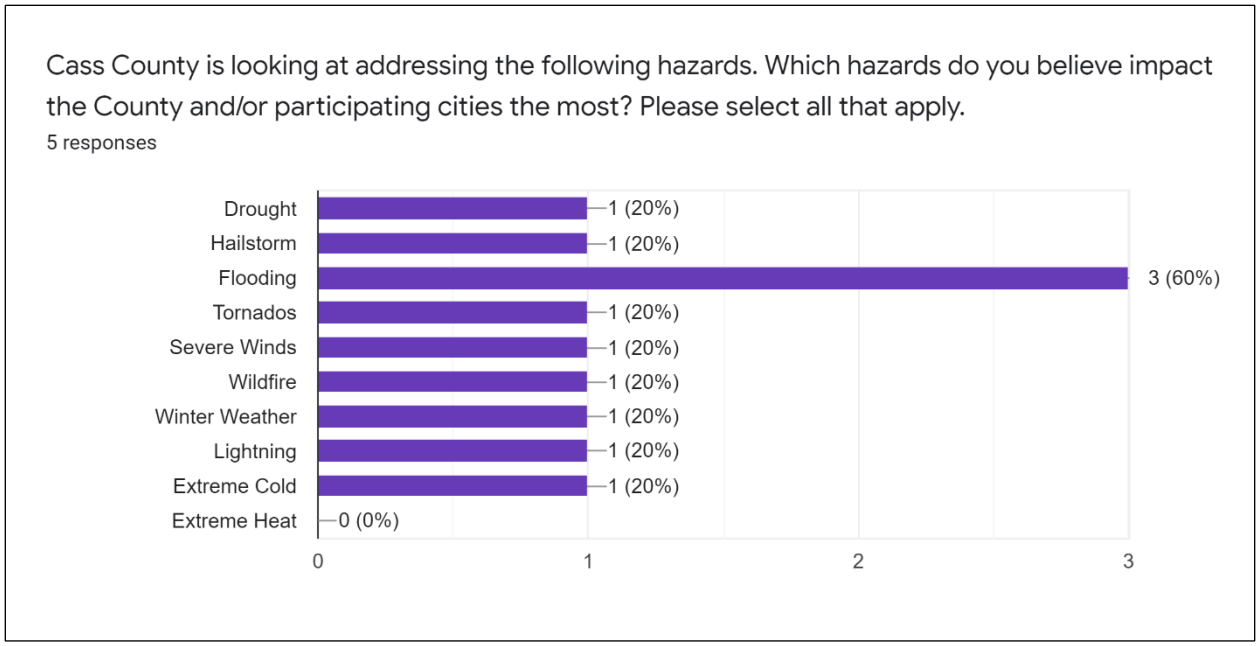


Figure 3: Survey responses for Question 3

The chart in Figure 3 above shows the breakdown of responses for survey question three. The answer choices were Drought, Hailstorm, Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat. Flooding was the hazard respondents were most concerned with, with 60% of the respondents voting for it.

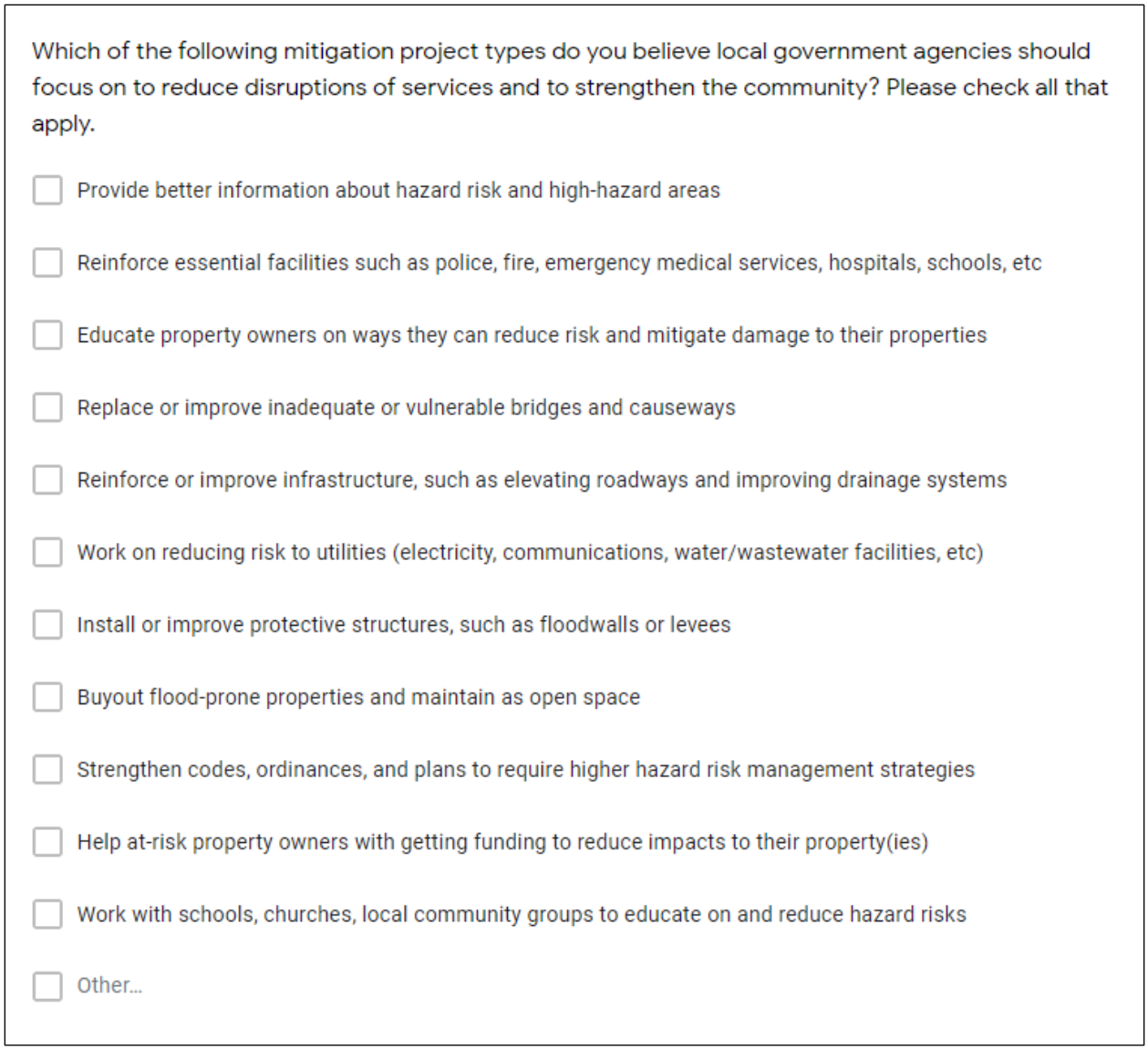


Figure 4: Survey Choices for Question 8

Figure 4 shows the choices for Question 8: Which of the following mitigation project types do you believe local government agencies should focus on to reduce disruptions of services and to strengthen the community? Please check all that apply. Respondents could choose from 11 answers such as "Provide better information about hazard risk and high-hazard areas," "Reinforce or improve infrastructure, such as elevating roadways and improving drainage systems," "Install or improve protective structures, such as floodwalls or levees," or input their own answer.

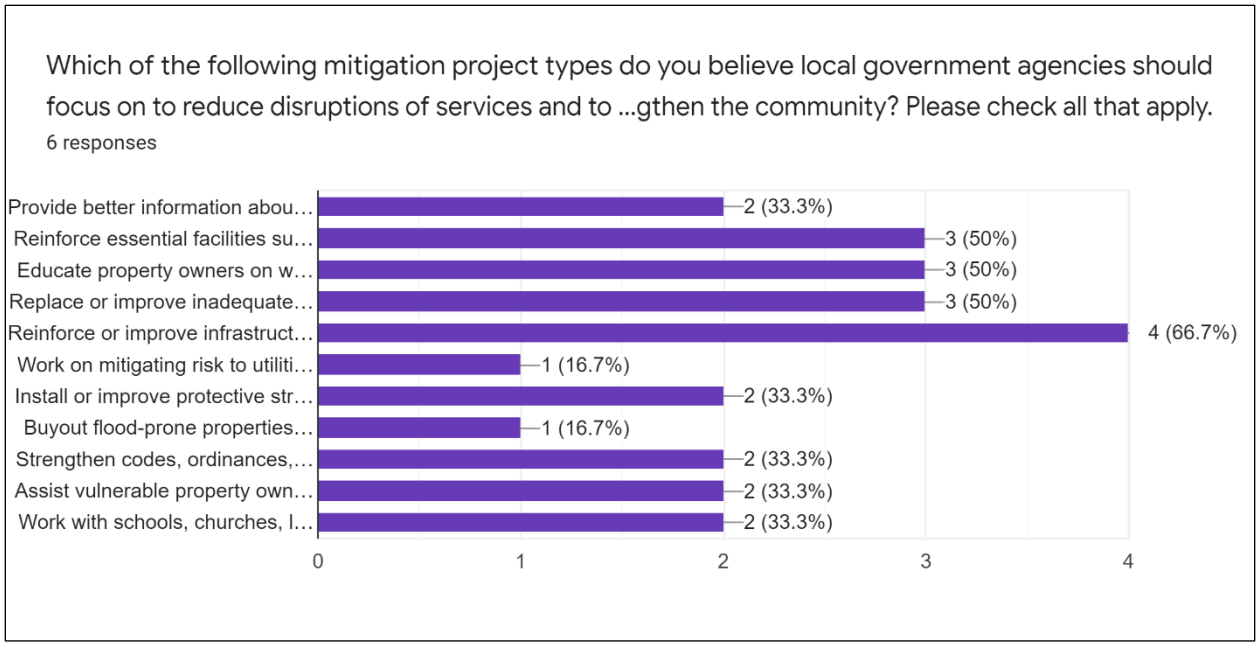


Figure 5: Response Breakdown for Question 8

Figure 5 shows the breakdown of responses to Question 8. The most popular answer was "Reinforce or improve infrastructure, such as elevating roadways and improving drainage systems," with 66.7% of respondents voting for it.

The planning team appreciated receiving responses to the survey and the answers helped inform them in their selection of new mitigation actions for this plan update.

Cass County and the participating jurisdictions held their second and final public comment period during December 2021. Members of the public from each jurisdiction were notified of the meeting via an announcement in the local paper that serves all 10 jurisdictions. During the meeting, the public was given the opportunity to review the completed plan draft on the County Website and make comments and suggestions.

4) Plan Maintenance

The hazard mitigation plan is not a static document. As conditions change and mitigation actions are implemented, the plan will need to be updated to reflect new and changing conditions in each jurisdiction.

The planning team has identified specific departments to oversee action implementation in each jurisdiction. The planning team has also identified potential funding sources and an implementation timeframe for each mitigation action. The expected timeframes will be an

important component in determining whether or not actions are implemented efficiently. The departments or persons identified for each jurisdiction include but are not limited to:

Table 5: Maintenance Responsibility

Title	Jurisdiction
Grants Coordinator	Cass County
County Judge	Cass County
City Manager	Linden
Mayor	Marietta
City Manager	Atlanta
Mayor	Avinger
Mayor	Bloomberg
Emergency Coordinator	Cass County
City Manager	Hughes Springs
Mayor	Douglassville
Mayor	Domino

Within one year of adoption of this plan, each department or agency will review and, as appropriate, integrate implementation of their respective mitigation actions with their existing internal plans and policies relating to capital improvements, land use, design and construction, and emergency management.

On a biannual basis, representatives from each jurisdiction serving as the planning team will evaluate progress on implementing the plan's mitigation actions. The planning team will review departmental / agency findings, public input, and future development plans to evaluate the effectiveness and appropriateness of the plan. Cass County and the participating jurisdictions will solicit public input through announcements in the local paper, fliers, and /or jurisdictional websites and social media accounts.

In light of changing funding sources, hazard vulnerability, and local mitigation priorities, the planning team will identify changes to plan goals and priorities for their respective jurisdictions, and they will report their findings to the rest of the planning team. It will be the planning team's

responsibility to identify relevant reasons for delay or obstacles to completing the plan's mitigation actions, along with recommended strategies to overcome any deficiencies.

Any significant change to the plan, including but not limited to changing mitigation actions, abandoning mitigation actions, or pursuing new mitigation actions, will require the County and participating jurisdictions to provide an opportunity for the public to make its views and concerns known. The jurisdiction will provide notice to the public through announcements in the local paper, fliers posted at city hall, and on the jurisdictions' websites.

5) Plan Monitoring

The Cass County Grants Coordinator will be responsible for the overall continued coordination and monitoring of the mitigation plan in its entirety, including but not limited to the planning process, risk assessment, strategy, and the actions assigned for each hazard. Assistance from the Cass County Emergency Coordinator is also available when required. The agency or department identified above in Table 5 shall serve as the responsible party for each respective jurisdiction. The plan monitoring worksheet outlined below will serve as the basis for revision of the plan.

At a minimum, the mitigation plan will be reviewed by the Grants Coordinator and planning team representatives from each jurisdiction quarterly, during budget workshops, and as other plans are being developed or revised including: comprehensive plans, capital improvement project plans, and emergency plans.

To execute the monitoring requirement, the Grants Coordinator will produce a plan monitoring worksheet to be completed by each jurisdiction's representative. The worksheet will identify and track the following for each mitigation action: the expected implementation schedule, setbacks or delays, changes to the local risk assessment, changes in jurisdictional capabilities, and current and future opportunities for integration with other local plans.

Regularly monitoring the plan implementation process in each participating jurisdiction will ensure that every component of the plan gets reviewed for potential amendments.

After adoption of this plan, it will be posted to each participating jurisdiction's website or Facebook page, and a printed copy will be available for review in the Office of Emergency Management. The goal is to create the opportunity for constant and continued feedback from local officials, stakeholders, and the general public.

6) Plan Evaluation

Proper evaluation will measure the progress and effectiveness of the mitigation actions identified in the plan. On a bi-annual basis the Grants Coordinator along with the planning team representatives from each jurisdiction will use the following criteria, along with additional

metrics as necessary, to assess the effectiveness of the plan in its entirety, including but not limited to the planning process, risk assessment, strategy, and the actions:

- Do the specified goals and objectives still address current and expected conditions?
- Has the nature, magnitude, and/or risk of any hazard changed?
- Have there been changes in land development that the plan needs to address?
- Are available resources suitable for implementing the plan?
- Is funding budgeted or available to successfully implement prioritized mitigation actions?
- Are there opportunities in the local budgeting process or local, state, and national grant funding cycles to increase funding to implement mitigation actions?

Other steps will include site visits to completed mitigation projects in each jurisdiction to measure and ensure their success. In the event that a mitigation project fails to meet its goal, the planning team will evaluate the causes of the shortcoming. The planning team will use their assessment to amend the project and related projects in other jurisdictions, allocate additional resources to achieve the desired outcome for the project and related projects in other jurisdictions, or replace the project and similar projects in other jurisdictions with better projects.

The Grants Coordinator and planning team members will also work to implement any additional revisions required to ensure that the plan and their respective jurisdiction is in full compliance with federal regulations and state statutes.

7) Plan Update

The plan is designed to address a five-year period. In accordance with 44CFR Section 201.6, it will be updated every five years to maintain compliance with State and Federal regulations. However, at least every two years from the date of approval, and quarterly on the fifth and final year of the plan, the EMC and planning team representatives from each participating jurisdiction will thoroughly review any significant changes in their respective jurisdictions that might impact the plan update.

During the update process, planning team representatives will do the following for their respective jurisdictions: collect data on recent occurrences of each natural hazard identified in the plan, record how each natural hazard impacted their jurisdiction during the preceding years, determine whether or not implemented mitigation actions produced the desired outcomes in their jurisdiction, and determine whether or not to modify their jurisdiction's list of hazards to be addressed in the update.

Additional considerations to address on a jurisdictional level include but are not limited to: changes in local development, changes in exposure to natural hazards, the development of new mitigation capabilities or techniques, and revisions to state or federal legislation.

The update process will provide continued opportunity for the public and elected officials to determine which actions succeeded, failed, or are no longer relevant. It is also an opportunity for each jurisdiction to identify recent losses due to natural hazards and to consider whether or not any of those losses could have been avoided.

3. Determining Risk

1) Risk Assessment

Throughout the plan, each hazard addressed will be considered in terms of its history, likelihood of future occurrence, extent, jurisdictional vulnerability, location, and impact.

Likelihood of Future Occurrence is measured based on a hazard's expected frequency of occurrence compared to its previous frequency. Each hazard's likelihood of occurrence will be considered using the following standardized parameters:

- **Highly likely** – event probable in the next year
- **Likely** – event probable in the next three years
- **Occasional** – event possible in the next five years
- **Unlikely** – event possible in the next 10 years

Given this plan's five-year duration, hazards likely to occur during that period will be given priority when selecting and prioritizing mitigation actions.

2) Distribution of Property by Housing Units, Density, and Median Value

Table 6: Estimated Values by Location[1]

Category	Cass County[2]	City of Atlanta	City of Avinger	City of Bloomburg	City of Domino	City of Douglassville	City of Hughes Springs	City of Linden	City of Marietta	City of Queen City
Total Housing Units	14,623	2,705	186	217	44	159	755	984	64	834
Housing Unit Density (per sq. mile)	15	214	95	215	97	25	303	294	110	234
Median Housing Value[3]	$87,100	$87,700	$77,500	$74,500	$52,900	$154,200	$82,900	$79,600	$86,400	$82,400
Estimated Value of Housing Units[4]	$1.27 billion	$237.2 million	$14.4 million	$16.1 million	$2.3 million	$24.5 million	$62.5 million	$78.3 million	$5.5 million	$68.7 million

[1] Source: U.S. Census 2016-2019 American Community Survey 5-Year Estimates.
[2] Table B25001 2016-2019 ACS Housing unit information for Cass County includes totals for cities and unincorporated areas.
[3] Table B25077 2016-2019 ACS
[4] Total value of housing units derived from median value multiplied by number of units

3) Distribution of Vulnerable Populations

The planning team identified a set of indicators it could use to identify each jurisdiction's vulnerable population. The indicators include demographic data like age and income, as well as geographic data including the location of low income or subsidized housing units, concentrations of manufactured and mobile homes, and concentrations of homes in substandard condition.

Age, Disability, and Income

The populations of each jurisdiction were broken down into four categories: young residents, elderly residents, disabled residents, and low-income residents. Residents falling into these categories were deemed most likely to suffer disproportionate losses due to natural hazards because of their potentially limited means to prepare for and recover from a hazard event.

Table 7: Age, Disability, and Poverty Level Percentages by Jurisdiction[5]

Demographic Category	Cass County	City of Atlanta	City of Avinger	City of Bloomburg	City of Domino	City of Douglassville	City of Hughes Springs	City of Linden	City of Marietta	Queen City	Texas	U.S.
Population Under Age 5[6]	5.7%	6.6%	14.7%	3.2%	0%	3.9%	8%	8.3%	2.8%	6.3%	7.1%	6.1%
Population Over Age 65	21.9%	24%	19.5%	18.4%	23.9%	18.6%	23.9%	20.8%	30.3%	15.6%	12.3%	15.6%
Disability Status[7]	18.4%	20.7%	12.2%	10.2%	32.4%	27.8%	20.5%	17.5%	30.3%	21.6%	11.5%	12.6%
Individuals Below Poverty Level[8]	18.5%	23.6%	16.1%	48.3%	4.2%	25.8%	29.2%	30.3%	3.7%	11.6%	14.7%	13.4%

[5] Source: U.S. Census 2016-2019 American Community Survey 5-Year Estimates.
[6] Table S0101, Age and Sex, 2016-2019 ACS 5-Year Estimates
[7] Table S1810, Disability Characteristics. The U.S. Census defines a person as having a work disability if one or more of the following conditions are met:
1. Persons with a health problem or disability which prevents them from working or which limits the kind or amount of work they can do
2. Persons who have retired or left a job for health reasons
3. Persons currently not in the labor force because of a disability.
4. Persons who did not work at all in the previous year because of illness or disability
5. Under 65 years old and covered by Medicare in previous year.
6. Under 65 years old and received Supplemental Security Income (SSI) in previous year.
7. Received VA disability income in previous year.
[8] Table DP03, Selected Economic Characteristics, 2016-2019 5-Year Estimates

Distribution of Vulnerable Populations

The vulnerable populations map is based on a social vulnerability index created specifically for the planning area. The index considers six relevant Census Block Group-level factors: poverty rate, population of residents 65 years old and older, population of residents younger than 18, the population of residents without a high school diploma or GED, the population of residents with a low English proficiency, and the number of homes constructed before 1980.

To create the index, each factor is re-scaled by assigning the largest population in each category a score of 1. The remaining population counts for each category are then given a score based the ratio of the relevant population to the largest population. Once each factor has a re-scaled score, the scores for each factor are totaled to create an overall index number for each Census Block Group. The vulnerable populations map is representative of each Census Block Group's overall vulnerability, based on the six factors outlined above, relative to the other Census Block Groups in the planning area.

Figure 6: Cass County Social Vulnerability Index

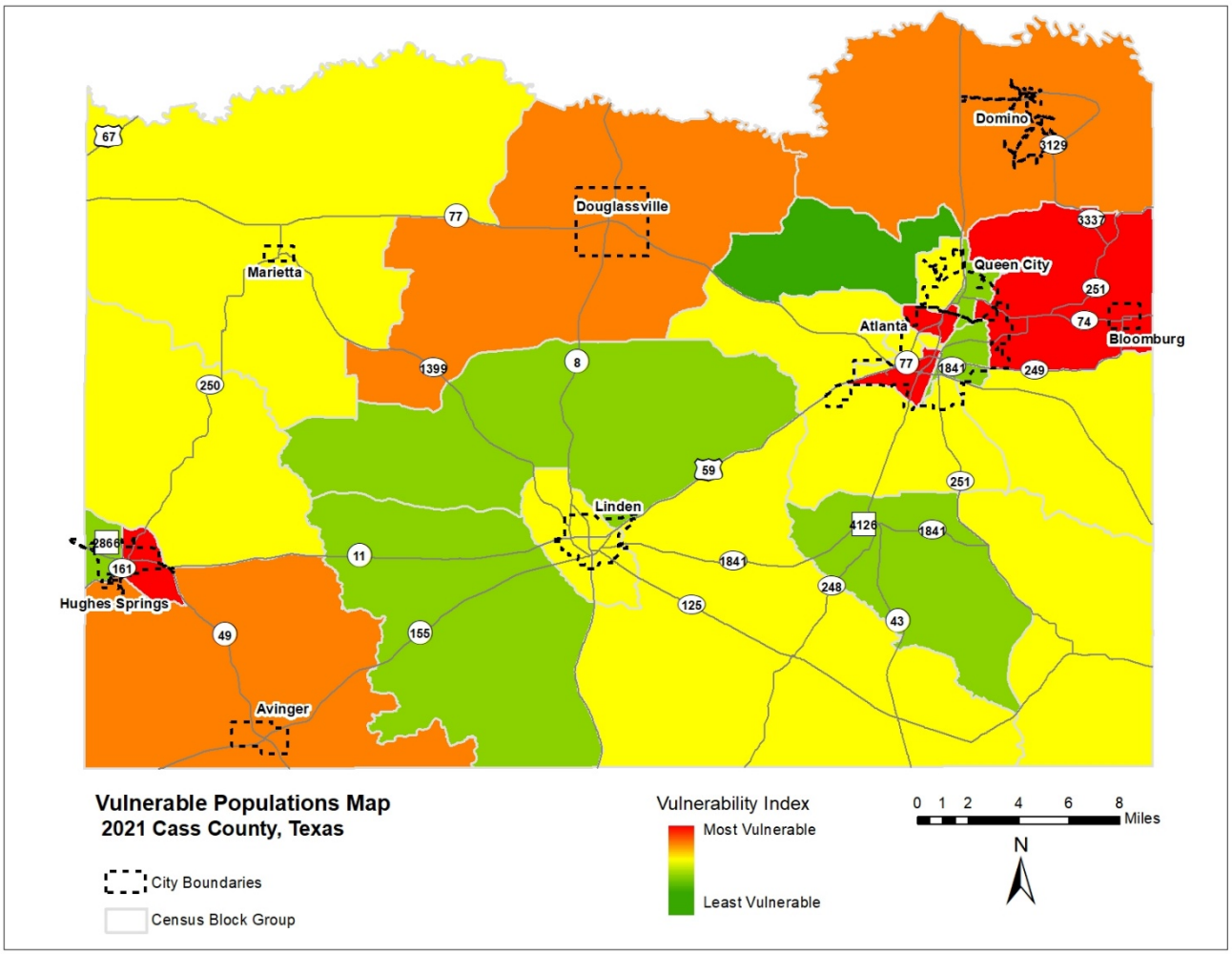


Figure 7: Atlanta & Surrounding Cities Social Vulnerability Index

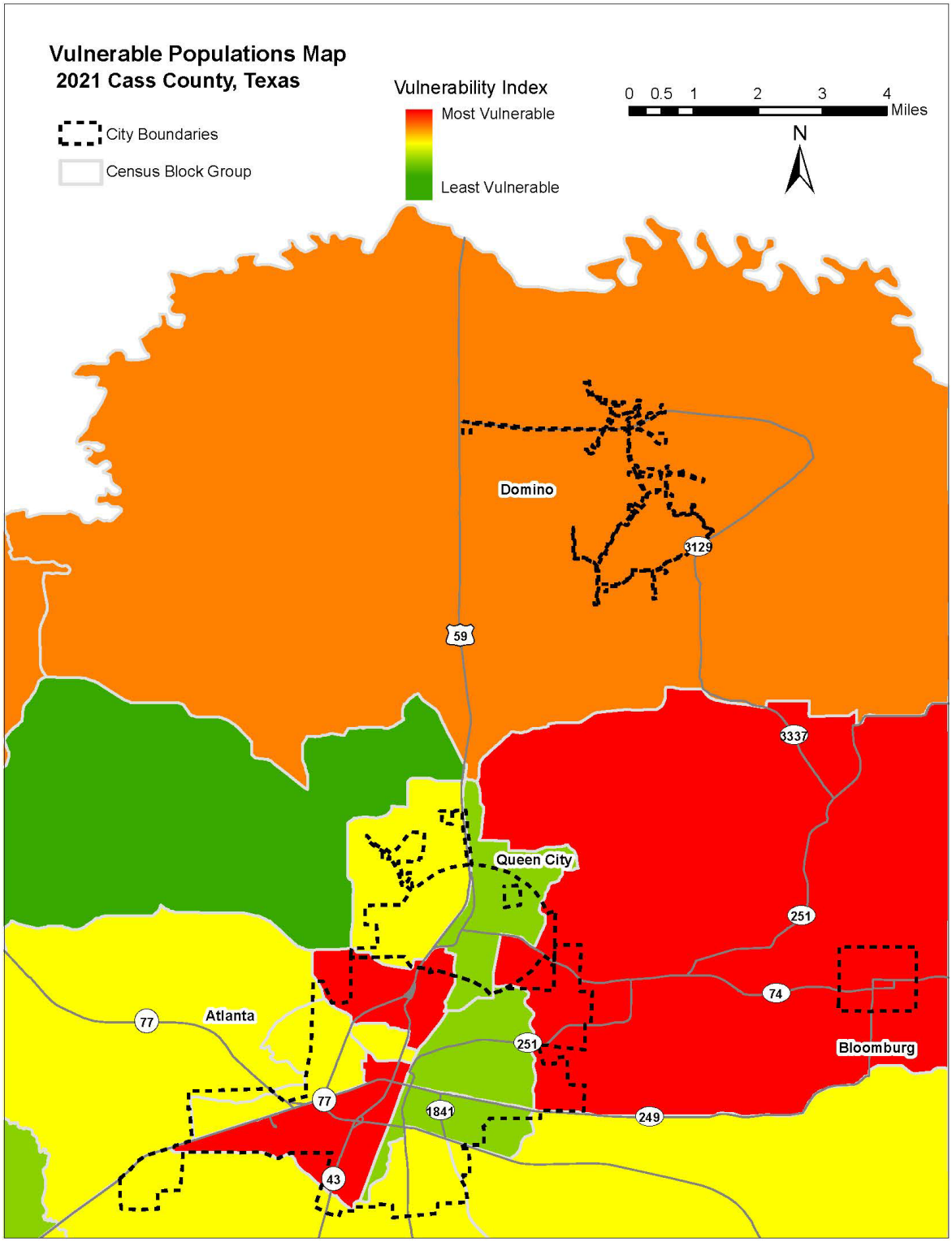


Figure 8: Avinger & Surrounding Cities Social Vulnerability Index

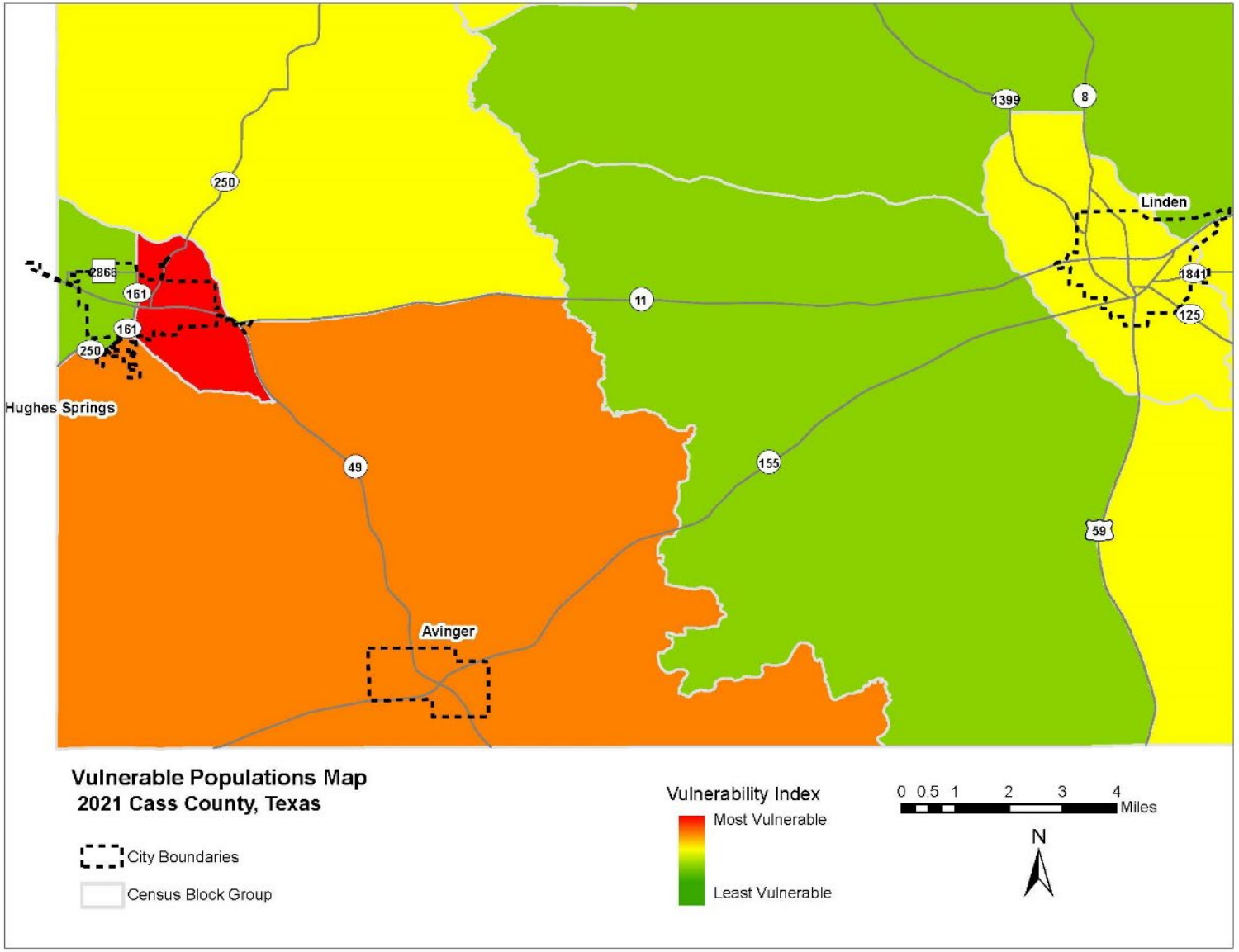
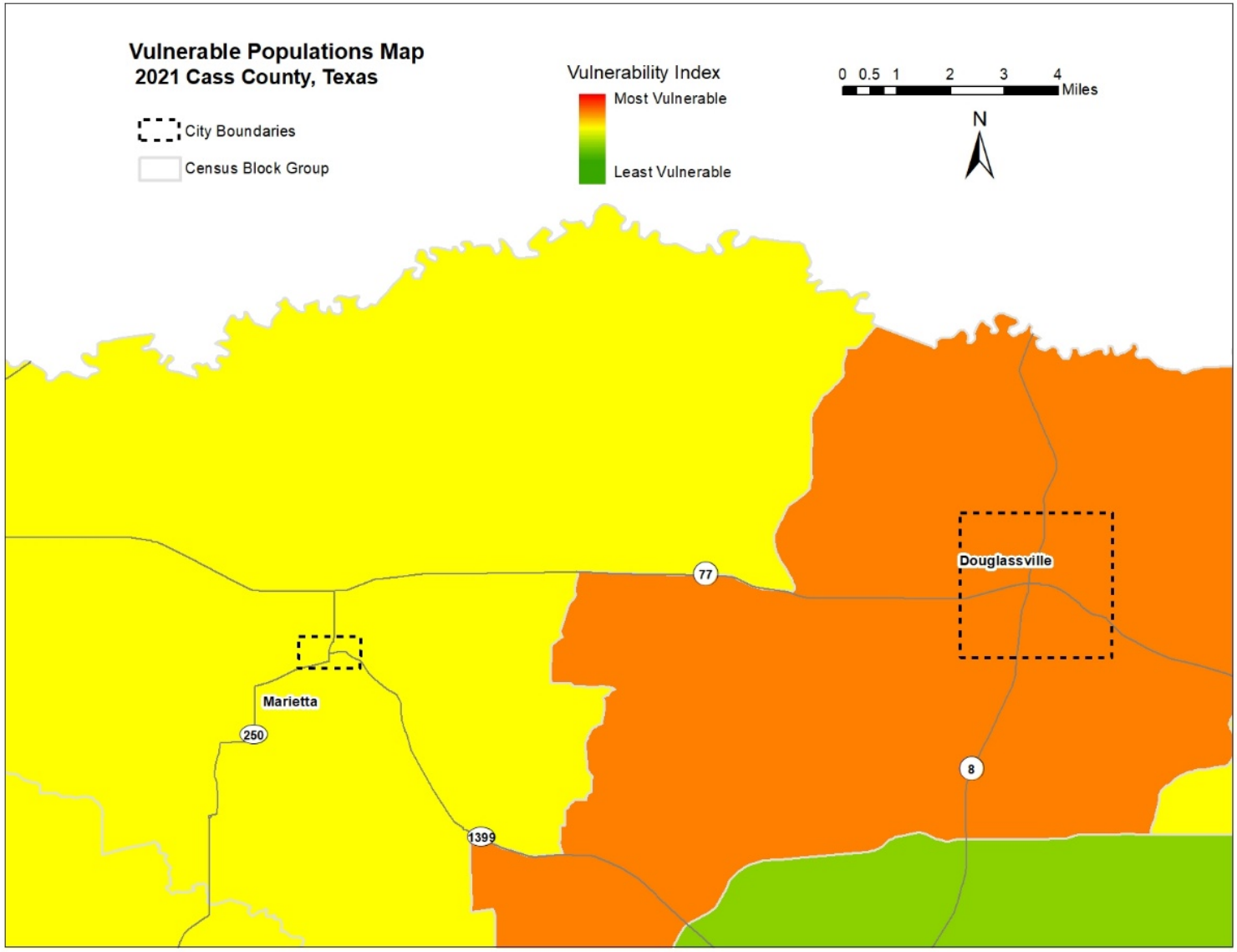


Figure 9: Douglassville & Marietta Social Vulnerability Index



Low Income and Subsidized Housing

Low-income residents in Cass County are primarily served through rental assistance programs and low-income housing. Within the County, there are multiple low-income housing complexes. the City of Atlanta Housing Authority, the City of Avinger Housing Authority, the City of Hughes Springs Housing Authority are the primary operators of low-income housing in the County. The Texas Department of Housing and Community Affairs offers 130 project-based Section 8 apartments[9] in the County. In addition to the units offering rental assistance, there are 60 low-income apartments[10] that do not offer rental assistance but are still considered affordable for low-income families.

Residents of low-income housing and/or subsidized housing facilities are expected to suffer disproportionate losses due to natural hazards because of their potentially limited means to prepare for and recover from a hazard event.

Housing Type and Condition

The participating jurisdictions have used housing type and housing conditions to identify additional vulnerable areas and concentrations of vulnerable residents.

I. Mobile / Manufactured Homes

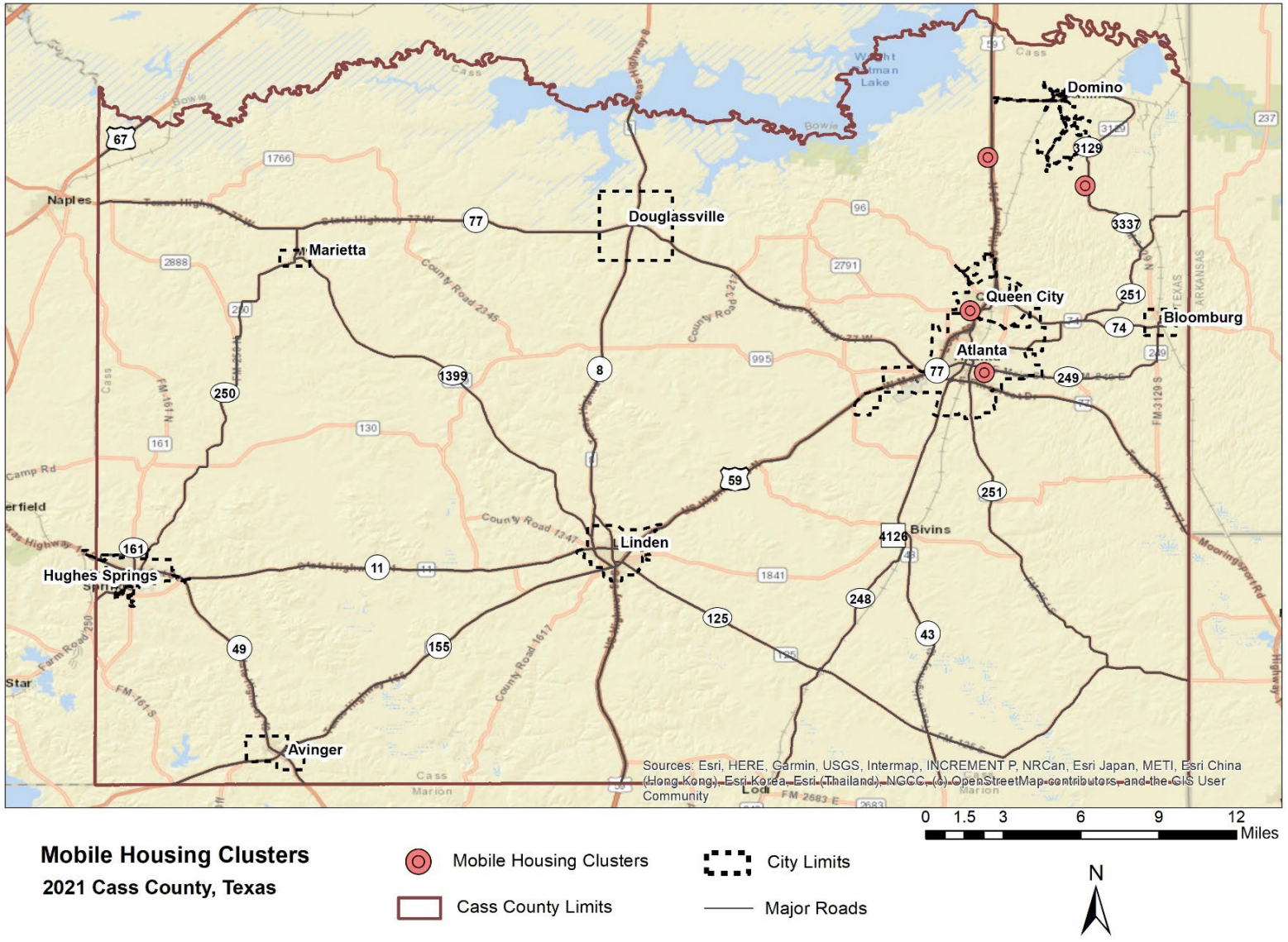
In particular, the jurisdictions have identified areas with clusters of mobile/manufactured housing, including mobile home parks, as being disproportionately vulnerable to certain hazards including but not limited to: hurricanes and tropical storms, floods, tornados, droughts, and severe winds.

In addition to the mobile / manufactured home communities, Cass County is also home to several RV parks. These parks' populations fluctuate on a seasonal basis. Due to the express portability of RVs, most of these structures are expected to evacuate ahead of hazard events with significant warning times. However, RVs may not have enough time to evacuate ahead of less predictable hazard events like tornados.

Locations with clusters of three or more mobile / manufactured homes, including named mobile home parks, are shown in Figure 5 below.

[9] County Office, 2021. https://www.countyoffice.org/tx-cass-county-housing-authorities/
[10] Affordable Housing Online, 2021. https://affordablehousingonline.com/housing-search/Texas/Cass-County

Figure 10: Mobile and Manufactured Housing Clusters in Cass County and the Participating Jurisdictions



II. Homes in Substandard Condition

The jurisdictions have determined that homes in sub-standard condition, regardless of structure type, may indicate that residents are low-income or otherwise means-limited and thus more vulnerable to certain hazards.

To be considered standard condition, a home must show few or no minor visible exterior defects such as:

- cracked, peeling, or missing paint
- cracked, sagging, rotting, or missing siding, steps, porch planks, or other wooden surfaces
- cracked or broken windowpanes
- cracked masonry, brick, or mortar surfaces
- missing or damaged roof shingles
- small rust spots on mobile homes

The home must generally meet building codes, and there cannot be any detriment to health and safety present.

Structures in sub-standard condition may provide less protection to residents during certain hazard events like tropical storms, tornados, or hurricanes. Furthermore, because they are already in a state of disrepair, additional damages due to hazard events may compound existing ones and potentially make these homes uninhabitable.

4. Drought

Drought is defined as the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length.

Droughts are one of the most complex natural hazards to identify because it is difficult to determine their precise beginning or end. In addition, droughts can lead to other hazards such as extreme heat and wildfires. Their impact on wildlife and area farming is enormous, often killing crops, grazing land, edible plants and even in severe cases, trees. A secondary hazard to drought is wildfire because dying vegetation serves as a prime ignition source. Therefore, a heat wave combined with a drought is a very dangerous situation.

Table 8: Drought Classifications

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

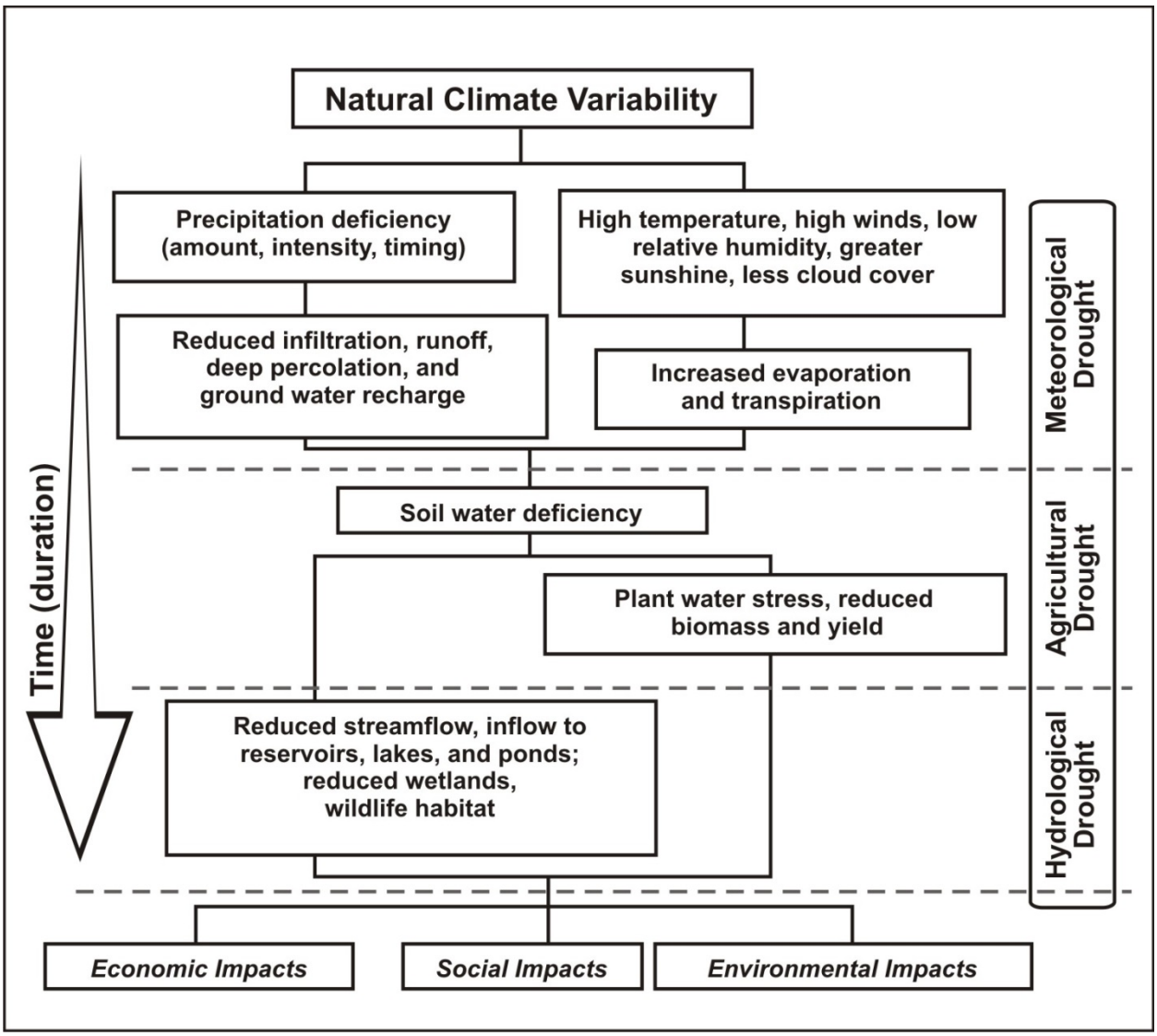
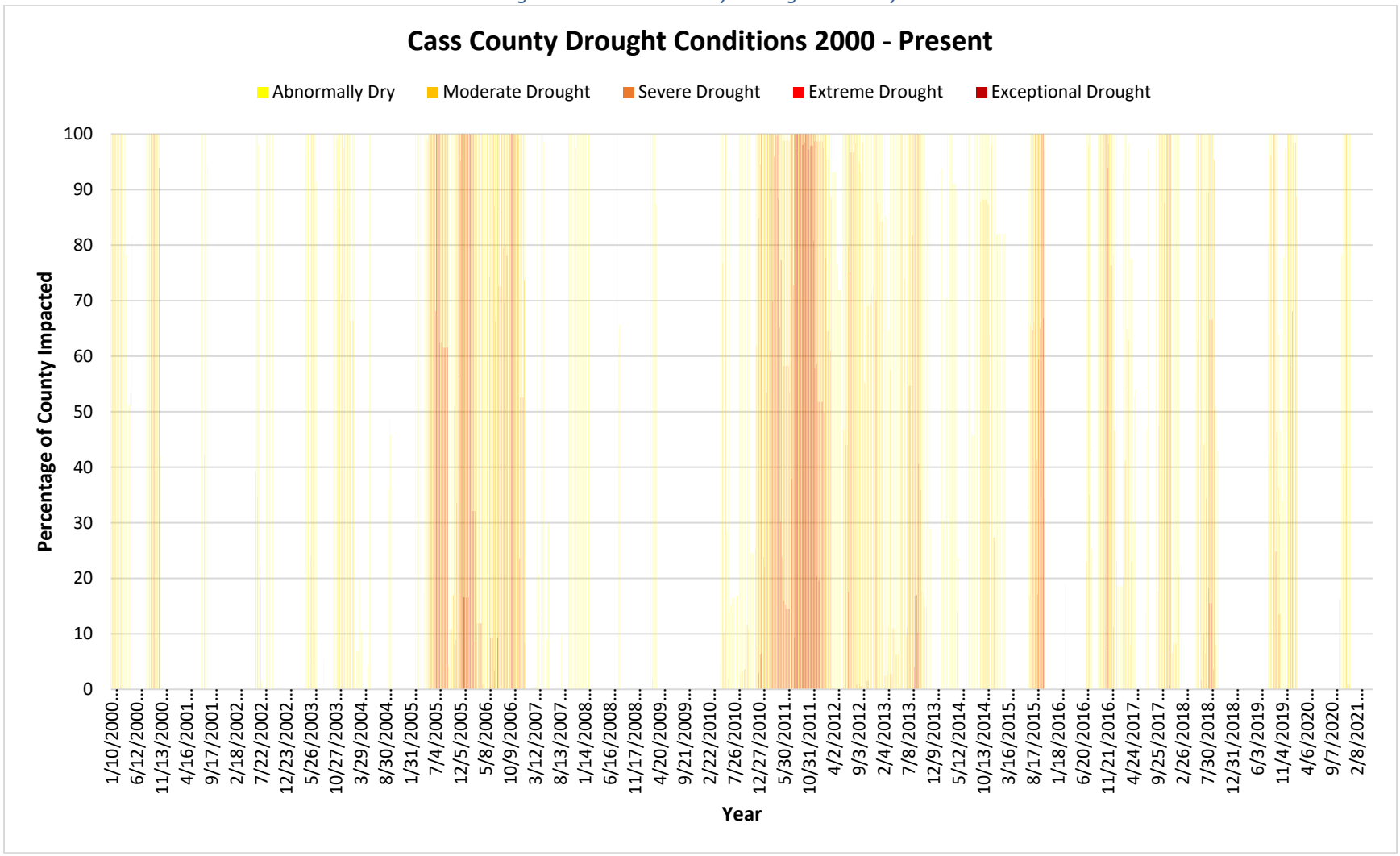


Figure 11: Sequence of Drought Occurrence and Impacts for Commonly Accepted Drought Types[11]

[11] Source: National Drought Mitigation Center, University of Nebraska-Lincoln, http://drought.unl.edu/DroughtBasics/TypesofDrought.aspx

1) Drought History

Figure 12: Cass County Drought History



Source: United States Drought Monitor www.droughtmonitor.unl.edu

Drought history is recorded at the county level. However, the data is measured by the percentage of the county affected by drought. Although no specific data regarding drought's occurrences in the individual cities is available, it's possible to use the data in Figure 12 to infer when the participating jurisdictions addressing the hazard previously experienced drought conditions due to the fact that the conditions impacted 100% of the county. According to the data, Cass County and the participating jurisdictions have regularly experienced drought conditions since 2000.

In the 2016 HMAP, Cass County and the participating jurisdictions reported a regular history of drought with 6 events from 1996 to 2013. The 2016 HMAP recorded $2014 estimates of about $40 million in potential crop and livestock loss. These drought events develop economic concerns such as high food prices, low municipal water quality, and increase likelihood of wildfires within the County; furthermore, drought conditions may have indirect effects on water reservoirs contamination and sinkhole formation resulting in wastewater infrastructure damages. Beginning in 2010, Texas experienced historical severe drought conditions that impacted Cass County with 16 months of drought, alongside the County's extreme forest fire incidence in 2011.

According to data from the NCEI, Cass County have experienced the following drought events and damages:

Table 9 Cass County Drought History

Location	Date Range	Number of Drought Events	Fatalities	Injuries	Property Damage 2021 ($)	Crop Damage 2021 ($)
Countywide	8/11/2015 - 1/1/2020	13	0	0	$0	$0

2) Likelihood of Future Occurrence

Based on historical drought in Texas and Cass County, it is likely that a future drought will affect Cass County and the participating jurisdictions, meaning an event affecting any or all the participating jurisdictions is probable in the next three years, and a major drought every 20 years.

3) Extent

Since 2000, Cass County has regularly experienced county-wide droughts classified as periods ranging from abnormal dryness to exceptional drought. Through 2005 to 2006 and 2010 to 2012, the entire County, including all participating jurisdictions, was in a state of extreme or exceptional drought, the most severe drought categories as shown in Figure 12.

The Palmer Drought Index is used to measure the extent of drought by measuring the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, with the intensity of drought during the current month dependent upon the current weather patterns plus the cumulative patterns of previous months. The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop.

Table 10: Palmer Drought Index

Drought Index	Drought Conditions Classifications						
	Extreme	Severe	Moderate	Normal	Mostly Moist	Very Moist	Extremely Moist
Z Index	-2.75 and below	-2.00 to -2.74	-1.25 to -1.99	-1.24 to +.99	+1.00 to +2.49	+2.50 to +3.49	n/a
Meteorological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.00	+3.00 to +3.00	+4.00 and above
Hydrological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.00	+3.00 to +3.00	+4.00 and above

Table 11: Palmer Drought Category Descriptions[12]

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

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

Based on the historical occurrences of drought, Cass County and all participating jurisdictions should anticipate experiencing droughts ranging from abnormally dry to exceptional drought or

[12] www.droughtmonitor.unl.edu

D0 to D4 based on the Palmer Drought Index. Given varying conditions, droughts may start on the low end of the Index but will intensify with duration and ongoing lack of precipitation. Future drought events may reach the intensity of D4 on the Palmer Drought Index.

4) Location and Impact

A) Location

Drought has no distinct geographic boundary and can occur across all participating jurisdictions.

B) Impact

General impacts may include water shortage, risk to public safety due to wildfire risk increases, respiratory impacts to the public due to affected air quality, and degradation of fish and wildlife habitat. Economic impacts may include increased prices for food, unemployment for farm workers and ranch hands, livestock mortality from limited grazing availability, and reduced tax revenues due to reduced supplies of agriculture products and livestock that are dependent on rainfall.

The City of Bloomburg adopted its current Drought Contingency Plan in May 2018. The plan describes three stages of water restrictions ranging from alternating day usage of water for outdoor purposes to directly limiting citizens' water usage based on specific stages.

The City of Hughes Springs adopted its current Drought Contingency Plan in April 2014. The plan describes four stages of water restrictions ranging from voluntary decreases in water usage to directly limiting citizens' water usage based on specific stages.

The City of Linden adopted its current Drought Contingency Plan in September 2009. The plan describes five stages of water restrictions ranging from voluntary decreases in water usage to directly limiting citizens' water usage based on specific stages.

The City of Marietta adopted its current Drought Contingency Plan in June 2000. The plan describes five stages of water restrictions ranging from voluntary decreases in water usage to directly limiting citizens' water usage based on specific stages.

The City of Queen City adopted its current Drought Contingency Plan in June 2017. The plan describes five stages of water restrictions ranging from voluntary decreases in water usage to directly limiting citizens' water usage based on specific stages.

None of the other participating jurisdictions have a drought contingency plan.

5) Vulnerability

Because drought has the potential to impact every jurisdiction equally, all improved property and the entire population is exposed to this hazard. General impacts may include water

shortage, risk to public safety due to wildfire risk increases, respiratory impacts to the public due to affected air quality, and degradation of fish and wildlife habitat.

Economic impacts may include increased prices for food, unemployment for farm workers and ranch hands, livestock mortality from limited grazing availability, and reduced tax revenues because of reduced supplies of agriculture products and livestock that are dependent on rainfall.

Lower income populations who may not have the resources to buy large quantities of bottled water in the event of a shortage may be more vulnerable than other populations.

A) Population

As described in Section 3 of Chapter 3, Cass County and the participating jurisdictions are home to many vulnerable residents. Increased vulnerability may be due to many factors such as age, physical ability, financial means, housing type, and housing conditions. Many of these vulnerabilities often overlap.

The jurisdictions recognize that vulnerable populations may need additional help preparing for and recovering from a drought. Lower income populations who may not have the resources to buy large quantities of bottled water in the event of a shortage may be more vulnerable than other populations.

B) Critical Facilities

In addition to triggering various components of participating jurisdictions' Drought Contingency plans, drought conditions may affect local critical facilities. Area fire departments may see increased demand for controlling wildland fire due to dry conditions. Drought is likely to require increased output from the local power companies in order to keep up with electrical demand. Depending on factors like time of year, temperature, and duration, increased electrical demand may cause brownouts that would impact critical facilities.

Table 12: Critical Facilities Vulnerable to Drought and Potential Impacts

Jurisdiction	Critical Facilities	Potential Drought Impacts	
		Increased Demand for Services	Economic Damages
Cass County	Cass County Emergency Services District 2	X	
Cass County	Cass County Precinct 2	X	
Cass County	Cass County Historic Courthouse	X	
Cass County	Cass County Extension	X	
Cass County	Cass County Tax Assessor	X	
Cass County	Cass County Jail	X	
Cass County	Cass Co. Emergency Services District 1-Mcleod Station	X	
Cass County	Cass Co. Emergency Services District 1-Kildare Station	X	
Cass County	Cass Co. Emergency Services District 1-Huffins Station	X	
Cass County	Cass Co. Emergency Services District 2-Antioch Station	X	
Cass County	Cass Co. Emergency Services District 2-Domino Station	X	
Cass County	Cass Co. Emergency Services District 3- Smyrna Station	X	
Cass County	Cass Co. Law Enforcement and Justice Center	X	
Cass County	Cass County Barn Precinct 3	X	
Cass County	Cass County Justice of Peace Precinct 3	X	
Cass County	Cass County Barn Precinct 2	X	
Cass County	Cass County Barn Precinct 1	X	
Cass County	County of Cass Barn Precinct 4	X	
Cass County	Cass County Justice of Peace Precinct 4	X	
Cass County	Law Enforcement Training Center	X	
Cass County	Cass County Annex	X	
Atlanta	City of Atlanta Police Department	X	
Atlanta	Atlanta Public Works (Water & Wastewater)		x
Atlanta	Golden Villa Nursing Home	X	
Atlanta	Rose Haven Retreat	X	
Atlanta	City of Atlanta Fire Department	X	
Atlanta	Atlanta High School	X	
Atlanta	Atlanta Elementary	X	

Atlanta	Atlanta Middle	X	
Atlanta	Atlanta Primary	X	
Atlanta	Christus St. Michael hospital	X	
Atlanta	Health Care Express	X	
Atlanta	Housing Authority of The City of Atlanta	X	
Atlanta	Atlanta City Hall	X	
Atlanta	Atlanta Public Library	X	
Atlanta	Mattie Lanier Richey Center	X	
Atlanta	Atlanta Water Department	X	
Avinger	Avinger City Hall	X	
Avinger	Avinger High School	X	
Avinger	Avinger Fire Department	X	
Avinger	Housing Authority of The City of Avinger	X	
Bloomburg	Bloomburg VFD Non-Emergency	X	
Bloomburg	Bloomburg High School	X	
Bloomburg	Bloomburg Elementary	X	
Douglassville	City Hall Fire Station	X	
Douglassville	Water Department	X	x
Douglassville	Fire Station	X	
Douglassville	Douglassville Dollar General	X	
Douglassville	Mikes Food Mart	X	
Hughes Springs	Hughes Springs Fire Station	X	
Hughes Springs	Hughes Springs Police Department	X	
Hughes Springs	Hughes Springs Junior High	X	
Hughes Springs	Hughes Springs Elementary	X	
Hughes Springs	Hughes Springs High School	X	
Hughes Springs	Hugh Springs Clinic	X	
Hughes Springs	Hughes Springs Housing Authority	X	
Hughes Springs	City Hall	X	
Hughes Springs	Medical Shop Pharmacy	X	
Hughes Springs	Hill's Grocery	X	

Linden	Center Hill Volunteer Fire Department	X	
Linden	City of Linden Police Department	X	
Linden	Linden Elementary	X	
Linden	Linden Kildare High School	X	
Linden	Mae Luster Stephens Junior High	X	
Linden	City Hall	X	
Linden	Crump Food Store	X	
Linden	Focus Care at Linden	X	
Linden	Linden Life Center	X	
Linden	Linden VFD Station	X	
Linden	Mary Dougherty Senior Citizens Center	X	
Marietta	Marietta Natural Gas Department	X	
Marietta	Marietta Water Department	X	x
Marietta	Marietta City Hall/Municipal Building	x	
Marietta	Marietta Volunteer Fire Department	x	
Marietta	Oakridge Baptist Church	x	
Queen City	Morris Upchurch Middle	x	
Queen City	Queen City High School	x	
Queen City	J K Hileman Elementary	x	
Queen City	City Hall	x	
Queen City	Queen City Waterworks	X	x

C) Vulnerable Parcels and Infrastructure

Given drought's geographic reach, all parcels within the participating jurisdictions are equally vulnerable to the hazard. However, given the limited damages inflicted by previous droughts, future damages are expected to be similarly limited.

Table 13: Parcels Vulnerable to Drought

Jurisdiction	Parcel Count[13]	Estimated Potential Damage Value
Cass County	**32,596**	**$2,176,936,888**
City of Atlanta	3,775	$261,595,449
City of Avinger	344	$14,030,240
City of Bloomburg	330	$16,243,440
City of Domino	15	$228,080
City of Douglassville	199	$12,155,680
City of Hughes Springs	1,063	$54,655,450
City of Linden	1,391	$94,588,741
City of Marietta	115	$4,535,750
City of Queen City	1,013	$52,974,647

I. Agricultural Production

According to the USDA 2017 Census of Agriculture[14], the total market value of agricultural products sold, including direct sales, in Cass County was $53,444,000. Between 1995 and 2018[15], $172,222 in indemnities was paid to farmers in Cass County. That is roughly $7,487 per year. Although the proportion of indemnities paid to cover losses due to drought is not identifiable, given Cass County's recent drought history, it is likely that at least some of the dollars paid were related to drought-caused damages.

Given agriculture's role in the County, drought-caused losses will have impacts beyond any individual and may lead to contraction in the wider economy. However, because the data is recorded at the county level, there is no specific information regarding agricultural losses to due drought for the individual participating jurisdictions.

[13] County Parcel Count Includes All Parcels in Cass County

[14] https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Texas/st48_2_0001_0001.pdf

[15] https://farm.ewg.org/cropinsurance.php?fips=48067&summpage=SUMMARY

5. Hailstorm

Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass. Frozen droplets gradually accumulate into ice crystals until they fall as precipitation that is round or irregularly shaped masses of ice. The size[16] of hailstones is a direct result of the size and severity of the storm.

High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a byproduct of heating on the Earth's surface. Higher temperature gradients above Earth's surface result in increased suspension time and hailstone size.

Texas officials estimate that up to 40 percent of all homeowners' insurance claims in the state result from hail damage.

1) Hailstorm History

In the 2016 HMAP, Cass County and the participating jurisdictions noted that there have been 173 days of hail events between 1959 and April 2010. Historically, the participating jurisdictions have reported high probability of hailstorms due to the high frequency of thunderstorms in the area. Injuries or fatalities associated with hailstorms were not recorded for these events. The 2016 HMAP reported impacts of hailstorms to be limited, however 2% residential property loss in the case of large hailstorm events could equate to about $9.8 million.

The following tables identify the most comprehensive list available of hailstorm events and associated damages in Cass County and the participating jurisdictions. Overall, there have been 14 reported hailstorms between 2015 and 2020 in Cass County. No participating jurisdiction has recorded a hailstorm more recently than what is listed below.

Table 14: Cass County Hailstorm History

Location	Date Range	Number of Hailstorms	Hail Diameter in inches	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
County	4/19/2015 - 4/24/2020	14	1 – 1.75	0	0	$0	$0

Table 15: City of Atlanta Hailstorm History

Location	Date Range	Number of Hailstorms	Hail Diameter in inches	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Atlanta	7/30/2016 - 4/12/2020	2	0.75 - 1	0	0	$0	$0

[16] As of January 5, 2010, the national minimum size for severe hail increased from ¾" to 1".

Table 16: City of Bloomburg Hailstorm History

Location	Date Range	Number of Hailstorms	Hail Diameter in inches	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Bloomburg	4/19/2015 - 4/24/2020	2	1 – 1.25	0	0	$0	$0

Table 17: City of Douglassville Hailstorm History

Location	Date Range	Number of Hailstorms	Hail Diameter in inches	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Douglassville	5/21/2020	1	1	0	0	$0	$0

Table 18: City of Hughes Springs Hailstorm History

Location	Date Range	Number of Hailstorms	Hail Diameter in inches	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Hughes Springs	4/6/2018	1	1	0	0	$0	$0

Table 19: City of Linden Hailstorm History

Location	Date Range	Number of Hailstorms	Hail Diameter in inches	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Linden	4/26/2017 - 4/6/2018	2	0.88 - 1	0	0	$0	$0

According to the best information available, there have been no hail events in the Cities of Avinger, Domino, Marietta, or Queen City since the 2016 Hazard Mitigation Action Plan.

2) Likelihood of Future Occurrence

Despite the incomplete nature of the hailstorm history in Cass County and each of the participating jurisdictions, the data and local experience suggests that a hailstorm in any or all of them is highly likely, meaning that an event is probable within the next year.

3) Extent

The severity of hail events ranges based on the size of the hail, wind speed, and the number and types of structures in the path of the hailstorm. Storms that produce high winds in addition to hail are most damaging and can result in numerous broken windows and damaged siding.

When hail breaks windows, water damage from accompanying rains can also be significant. A major hailstorm can easily cause damage running into the millions of dollars. Nationwide hail is

responsible for over $1 billion in property and crop damages per year. The scale showing intensity categories in Table 20 was developed by combining data from National Climatic Data Center (NCDC) and the Tornado and Storm Research Organization (TORRO).

Table 20: Hailstorm Intensity[17,18]

Size Code	Intensity Category	Size (Diameter in inches)	Descriptive Term	Typical Damage
H0	Hard Hail	Up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33-.060	Mothball	Slight damage to plants and crops
H2	Significant	.060-.080	Penny	Significant damage to fruit, crops, and vegetation
H3	Severe[19]	0.80-1.20	Nickel – Half dollar	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1.2-1.6	Half dollar – Ping pong ball	Widespread glass damage and vehicle bodywork damage
H5	Destructive	1.6-2.0	Ping pong ball – hen egg	Wholesale destruction of glass, damage to tiled roofs, and significant risk of injuries
H6	Destructive	2.0-2.4	Hen egg – tennis ball	Bodywork of grounded aircraft dented, and brick walls pitted
H7	Destructive	2.4-3.0	Tennis ball – Baseball	Severe roof damage and risk of serious injuries
H8	Destructive	3.0-3.5	Hockey puck	Severe damage to aircraft bodywork
H9	Super Hailstorms	3.5-4.0	Softball	Extensive structural damage could cause fatal injuries
H10	Super Hailstorms	4.0+	Greater than softball-sized	Extensive structural damage could cause fatal injuries

According to NCEI data, the worst hailstorms in Cass County and the participating jurisdictions have produced hail up to 1.75" in diameter, H5 on the Hailstorm Intensity Scale.

Future hailstorms may meet previous worst-case H5 storms in terms of hailstone size, damage dollars inflicted, and the number of residents injured or killed.

4) Location and Impact

A) Location

Hailstorms vary in terms of size, location, intensity, and duration but are considered frequent occurrences in the planning area. Each jurisdiction is uniformly exposed to hail events just as each is uniformly exposed to the thunderstorms that typically produce the hail events.

[17] http://www1.ncdc.noaa.gov/pub/data/cmb/extremes/scec/reports/SCEC-Hail-Guide.pdf
[18] http://www.torro.org.uk/hscale.php
[19] Hail must be 1" or larger to be classified as severe

B) Impact

The severity of a hailstorm's impact is considered limited since they generally result in injuries treatable with first aid, shut down critical facilities and services for 24 hours or less, and less than ten percent of affected properties are destroyed or suffer major damage. All existing and future buildings, facilities, and populations are in the participating jurisdictions are considered exposed to this hazard and could potentially be impacted.

5) Vulnerability

A) Population

As described in Section 3 of Chapter 3 above, Cass County and the participating jurisdictions are home to many vulnerable residents. Increased vulnerability may be due to many factors including but not limited to age, physical ability, financial means, housing type, and housing condition. Many of these vulnerabilities often overlap.

Since hailstorms arise with little to no warning, the participating jurisdictions recognize that vulnerable populations may primarily need additional help recovering from a hailstorm. Residents of sub-standard structures are of particular concern. Structures in sub-standard condition ahead of a hailstorm, whether due to structural damages, missing windows or doors, holes in exterior walls or the roof, may sustain more damages than structures in standard condition.

Existing weaknesses, especially those related to the condition of a structure's roof, due to housing type or existing damages, may lead to compounded damages, injuries, or loss of life.

B) Critical Facilities

Due to the presence of structures with flat roofs and the increased vulnerability a flat roof creates the presence of older structures that have not been hardened against hailstorms, and/or the presence of metal buildings that may be more susceptible to hail, the following critical facility was determined to be especially vulnerable to hailstorms:

Table 21: Critical Facilities Vulnerable to Hailstorms and Potential Impacts

Jurisdiction	Critical Facilities	Potential Hailstorm Impacts		
		Damaged or Destroyed Roof	Damaged Windows	Water damage due to Physical Damages
Atlanta	City of Atlanta Police Department	x	x	x
Atlanta	Rose Haven Retreat	x	x	X
Atlanta	Atlanta High School	x	x	x
Atlanta	Atlanta Primary	x	x	X
Atlanta	Christus St. Michael Hospital	x	x	x
Avinger	City Hall	x	x	x
Avinger	Avinger High School	x	x	x
Bloomburg	Volunteer Fire Department	x	x	x
Bloomburg	Bloomburg High School	x	x	x
Bloomburg	Bloomburg Elementary	x	x	x
Cass County	Emergency Services District 2	x	x	x
Cass County	Courthouse	x	x	x
Cass County	Cass Count Extension	x	x	x
Cass County	Tax Assessor	x	x	x
Cass County	Cass County Annex	x	x	x
Douglassville	Dollar General	x	x	x
Douglassville	Mike's Food Mart	x	x	x
Hughes Springs	Fire Station	x	x	x
Hughes Springs	Hughes Springs Junior High	x	x	x
Hughes Springs	Hughes Springs High School	x	x	x
Hughes Springs	Hughes Springs Elementary	x	x	x
Hughes Springs	City Hall	x	x	x
Hughes Springs	Med Shop Pharmacy	x	x	x
Hughes Springs	Hill's Grocery	x	x	x
Linden	City of Linden Police Department	x	x	x
Linden	Linden Kildare High School	x	x	x
Linden	Mae Luster Stephens Junior High	x	x	x
Linden	City Hall	x	x	x
Linden	Crump Food Store	x	x	x
Marietta	City Hall	x	x	x
Marietta	Volunteer Fire Department	x	x	x
Queen City	Queen City High School	x	x	x
Queen City	J.K. Hileman Elementary	x	x	x
Queen City	Waterwork Department	x	x	x

C) Vulnerable Commercial Structures

Every structure is vulnerable to damage from hail. However, commercial structures with large and/or flat roofs are especially vulnerable due to the increased exposure that large and/or flat roofs create. According to the Texas State Comptroller's 2019 Property Value Study, Cass County has commercial real property valued at $114,572,792[20].

D) Vulnerable Parcels

Table 22: All Parcels Vulnerable to Hailstorms

Jurisdiction	Parcel Count	Estimated Potential Damage Value
Cass County	**32,596**	**$2,176,936,888**
City of Atlanta	3,775	$261,595,449
City of Avinger	344	$14,030,240
City of Bloomburg	330	$16,243,440
City of Domino	15	$228,080
City of Douglassville	199	$12,155,680
City of Hughes Springs	1,063	$54,655,450
City of Linden	1,391	$94,588,741
City of Marietta	115	$4,535,750
City of Queen City	1,013	$52,974,647

[20] https://comptroller.texas.gov/auto-data/PT2/PVS/2019F/0340000001A.php

6. Flood

According to the Texas State Hazard Mitigation Plan, Floods are defined as:

> [T]he accumulation of water within a water body and the overflow of excess water into adjacent floodplain lands.
>
> In hydrologic analysis, runoff is that portion of rainfall which, in combination with other factors, contributes to the stream flow of any surface drainage way. When runoff exceeds the carrying capacity of the stream or drainage, flooding occurs. Runoff is a product of two major groups of factors, climate and physiographic. Climatic factors may include precipitation, evaporation, transpiration, and interception. Physiographic factors would include the characteristics of the watershed such as size, shape and slope of the basin's drainage area, the general land use within the basin. Average annual runoff decreases unevenly moving east to west across Texas, the localized variations based on these factors listed above.
>
> When surface water runoff enters streams, rivers, or dry creek beds, riverine flooding conditions occur whenever the water carrying capacity of the water channel is compromised by excess runoff.
>
> If the local basin drainage area is relatively flat, shallow, slow-moving floodwater can last for days. In drainage areas with substantial slope, or the channel is narrow and confined, rapidly moving, and extreme high-water conditions, called a flash flood, can occur.

1) Flood History

The planning team relied on data from the National Centers for Environmental Information (NCEI) to develop a flood history for the County and each participating jurisdiction.

According to Cass County's 2016 HMAP plan, the County and jurisdictions addressing the hazard recorded 22 flood events between February 1997 and December 2009. None of the flooding events was reported to have caused any injuries, or fatalities. The 2016 HMAP reported prevalent flooding impacts in rural areas and densely populated cities such as Queen City and Atlanta; furthermore, 25% estimated property loss in the case of major flooding events could equate to about $177 million.

The following tables identify the most comprehensive list available of flood events and associated damages in Cass County and the participating jurisdictions. No participating jurisdiction has recorded a damaging flood more recently than 2017.

Table 23: Cass County Flood History

Location	Date Range	Number of Flood Events	Flood Types	Local Fatalities	Local Injuries	Local Property Damage $2021	Local Crop Damage $2021
Cass County	4/30/2016 - 2/12/2020	5	Flood, Flash Flood	0	0	$0	$0

Table 24: City of Atlanta Flood History

Location	Date Range	Number of Flood Events	Flood Types	Local Fatalities	Local Injuries	Local Property Damage $2021	Local Crop Damage $2021
Atlanta	3/9/2016 - 5/8/2019	2	Flash Flood	0	0	$0	$0

Table 25: City of Hughes Springs Flood History

Location	Date Range	Number of Flood Events	Flood Types	Local Fatalities	Local Injuries	Local Property Damage $2021	Local Crop Damage $2021
Hughes Springs	4/30/2016	2	Flash Flood	0	0	$0	$0

Table 26: City of Linden Flood History

Location	Date Range	Number of Flood Events	Flood Types	Local Fatalities	Local Injuries	Local Property Damage $2021	Local Crop Damage $2021
Linden	4/10/2017	2	Flash Flood	0	0	$0	$0

According to the best information available, there have been no flood events in the Cities of Avinger, Bloomburg, Domino, Douglassville, Marietta, or Queen City since the 2016 Hazard Mitigation Plan.

A) National Flood Insurance Program

The National Flood Insurance Program (NFIP) is administered by FEMA to provide flood insurance coverage to the nation. All jurisdictions except for the City of Avinger, City of Douglassville, and City of Marietta are listed as participating NFIP communities in the FEMA Community Status Book Report.

The City of Bloomburg and Queen City have adopted and enforced flood damage prevention ordinances in their respective jurisdictions. The City of Bloomburg's Flood Damage Prevention Ordinance designates the City Mayor as the Floodplain Administrator responsible for implementing its floodplain management regulations and ensuring regulations meet or exceed the minimum NFIP requirements. Queen City's Flood Damage Prevention Ordinance designates the City Secretary as the Floodplain Administrator responsible for enforcing its floodplain management regulations and ensuring regulations meet or exceed the minimum NFIP requirements.

The Cities of Hughes Springs and Linden do not have flood damage prevention ordinances though they are participating in the NFIP. Both cities have proposed mitigation action items in Chapter 15 to create and implement flood damage prevention ordinances and identify floodplain managers in their respective jurisdictions, which will satisfy compliance with the NFIP.

Floodplain management ordinances and any future updates will guide each jurisdiction as it continues to comply with NFIP requirements through permitting, inspection, and recordkeeping, especially for new and substantially redeveloped construction. Each jurisdiction will continue to encourage residents to purchase flood insurance to reduce their flood risk. The Cities of Avinger, Douglassville, and Marietta will work to become NFIP participants as soon as is feasible.

The flood mitigation actions outlined in Chapter 14 below were developed with flood mitigation and NFIP compliance in mind. Public engagement will be an ongoing effort in each participating jurisdiction to reduce future losses due to flooding, and will continue even after recommended corrective actions have been implemented.

As of May 31, 2021, there are 5 NFIP policies in force in unincorporated Cass County. These policies cover property worth $1,438,000.

There are 19 NFIP policies in force in the City of Atlanta covering property worth $4,307,600.

There are six NFIP policies in force in the City of Hughes Springs covering property worth $639,400.

There are two NFIP policies in force in the City of Linden covering property work $410,000.

According to Table 27, there are zero NFIP policies in force in the Cities of Avinger, Bloomburg, Domino, Douglassville, Marietta, and Queen City. As mentioned above, the Cities of Avinger, Douglassville, and Marietta do not currently participate in the NFIP.

Table 27: NFIP Claims and Payments

Jurisdiction Name	Policies	Insurance in Force	Total Paid Losses	Total Paid Amount

Cass County	5	$1,438,000	3	$45,279
Atlanta	19	$4,307,600	22	$668,040
Hughes Springs	6	$639,400	0	$0
Linden	2	$410,000	0	$0

A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period, since 1978. According to the best information available, there are 4 repetitive loss properties in the City of Atlanta. The properties, which consist of residential and non-residential properties, account for about $540,030 in total repetitive loss payments.

A severe repetitive loss property is: "a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property. According to the best information available, there are two repetitive loss properties in the City of Atlanta. The properties, which are both non-residential, account for about $434,634 in severe loss payments.

2) Likelihood of Future Occurrence

The local planning team determined it is probable that Cass County and the participating jurisdictions will experience a flood event in the next year, meaning an event is highly likely.

3) Extent

The worst flooding events in Cass County and the participating jurisdictions has caused flooding as deep as 6' in multiple locations. Future worst-case flood events in Cass County and the participating jurisdictions may meet previous worst-case 6' flood depths.

4) Location and Impact

A) Location

I. Cass County

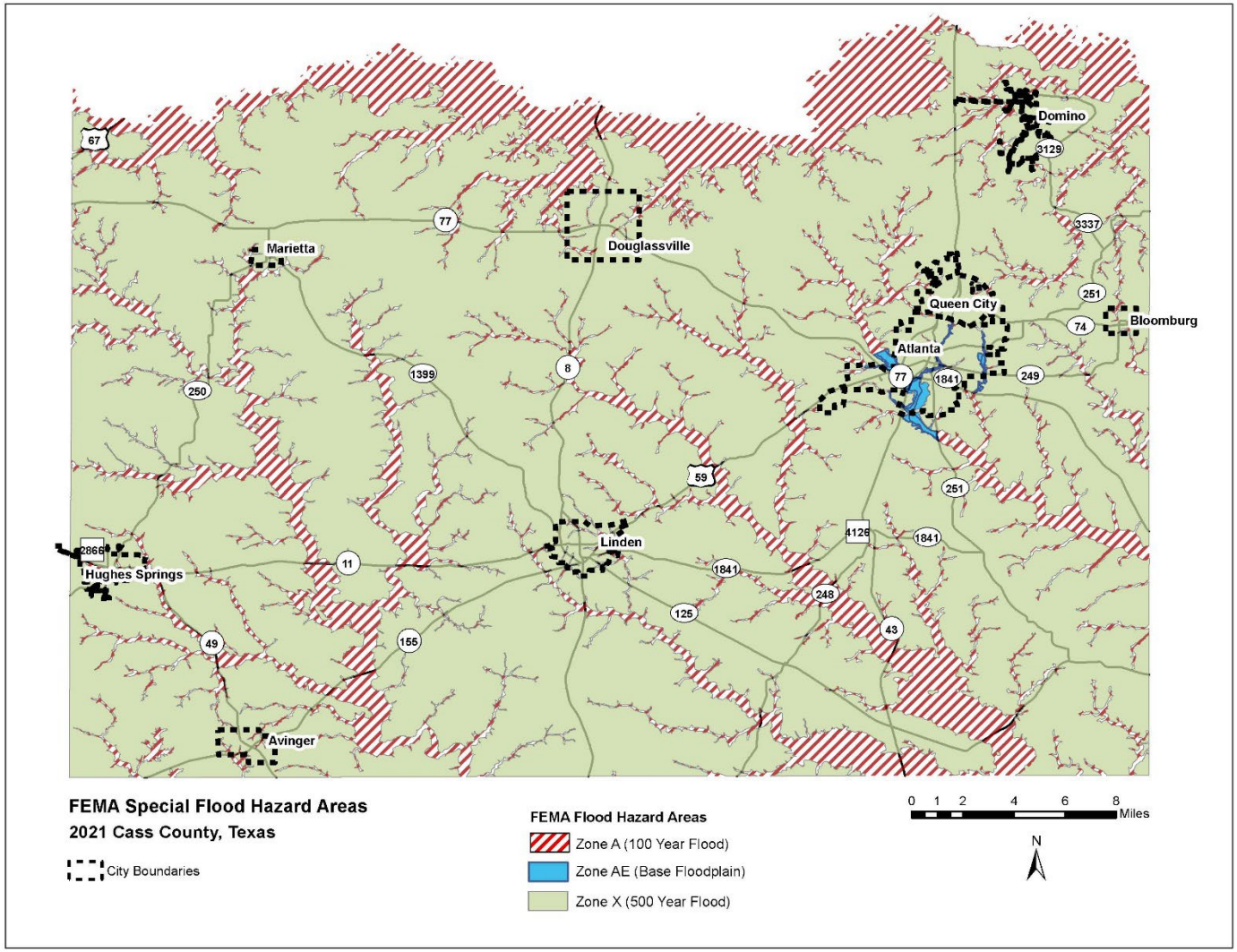


Figure 13: Cass County FEMA Special Flood Hazard Areas

II. City of Atlanta & Queen City

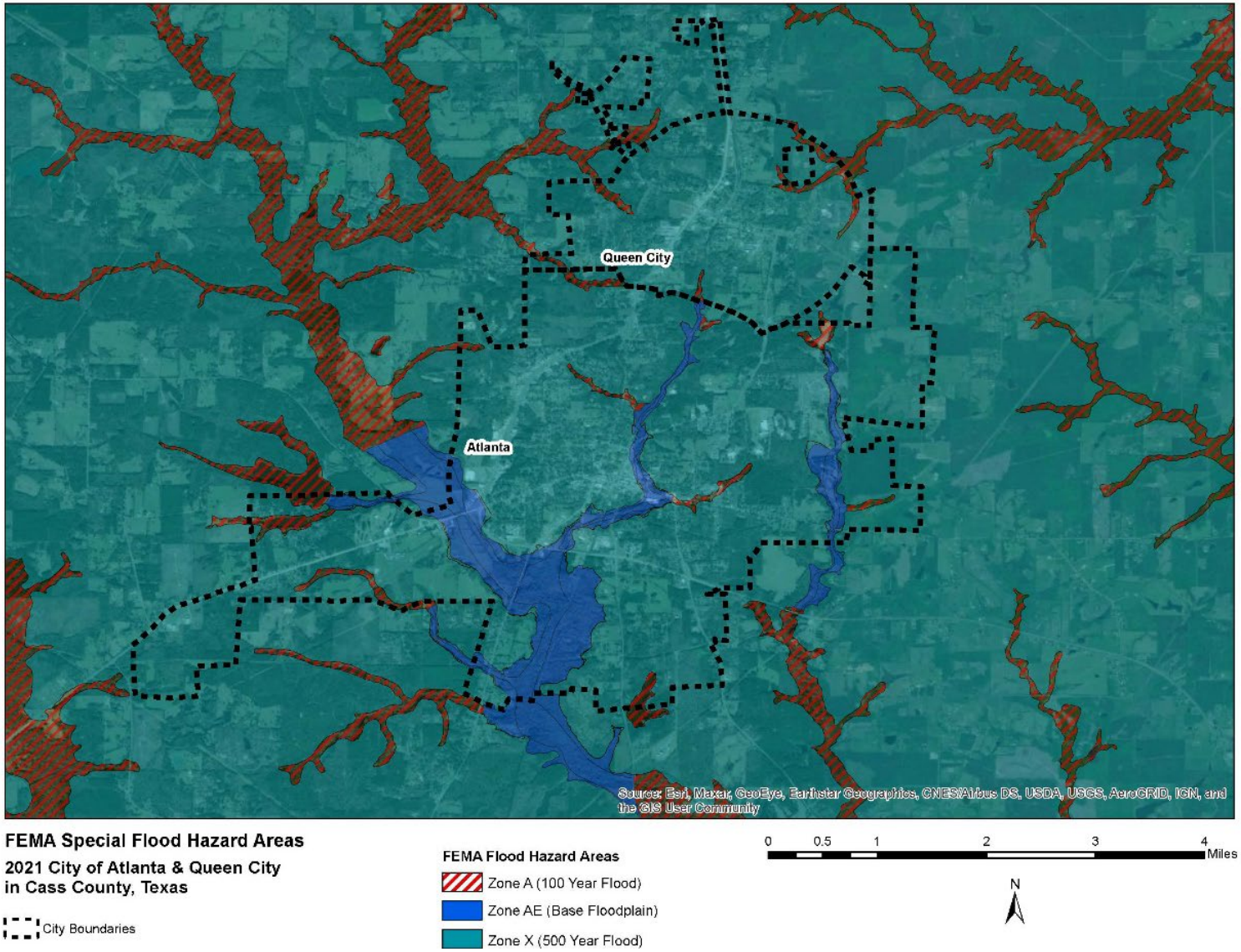


Figure 14: City of Atlanta & Queen City FEMA Special Flood Hazard Areas

III. City of Avinger

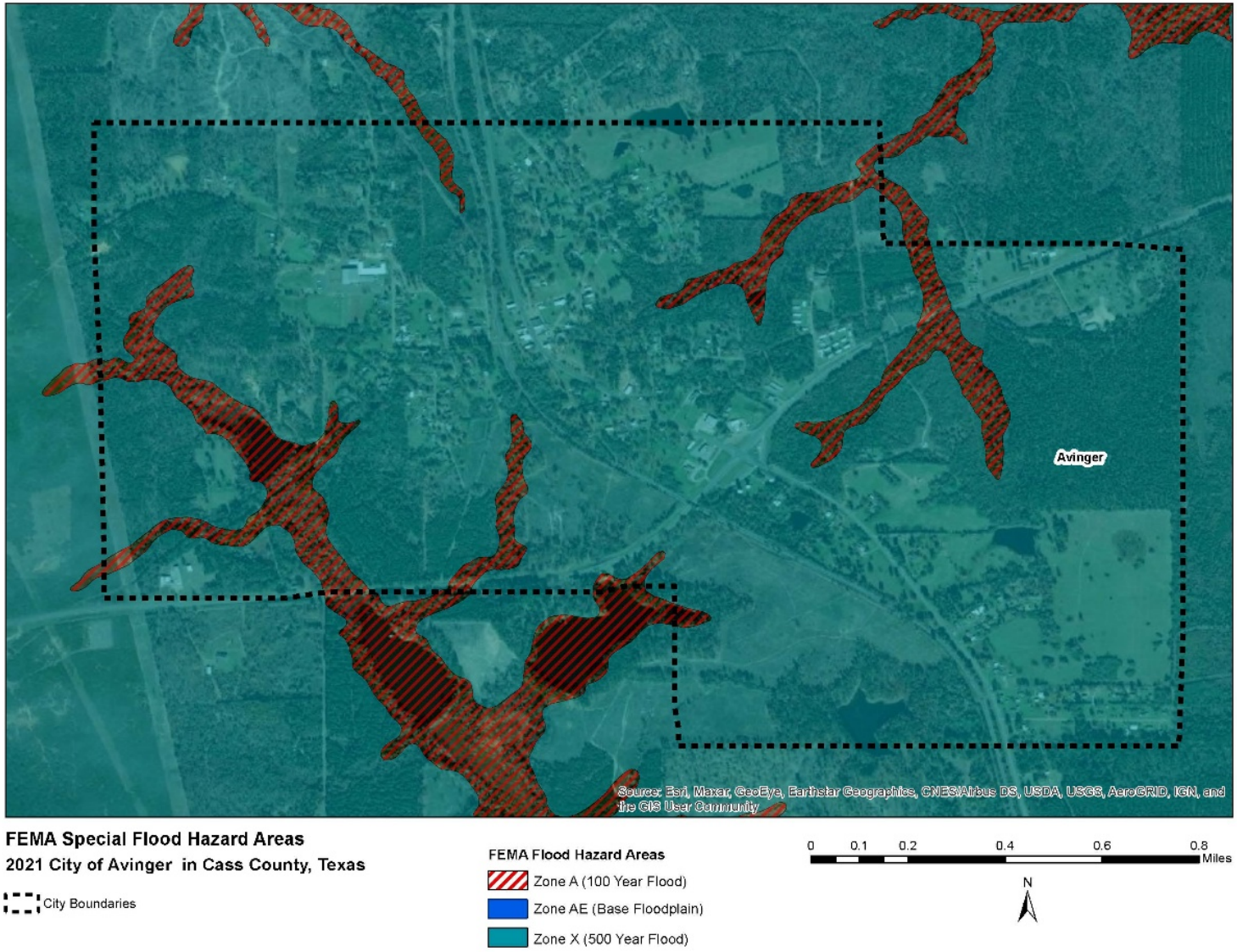


Figure 15: City of Avinger FEMA Special Flood Hazard Areas

IV. City of Bloomburg

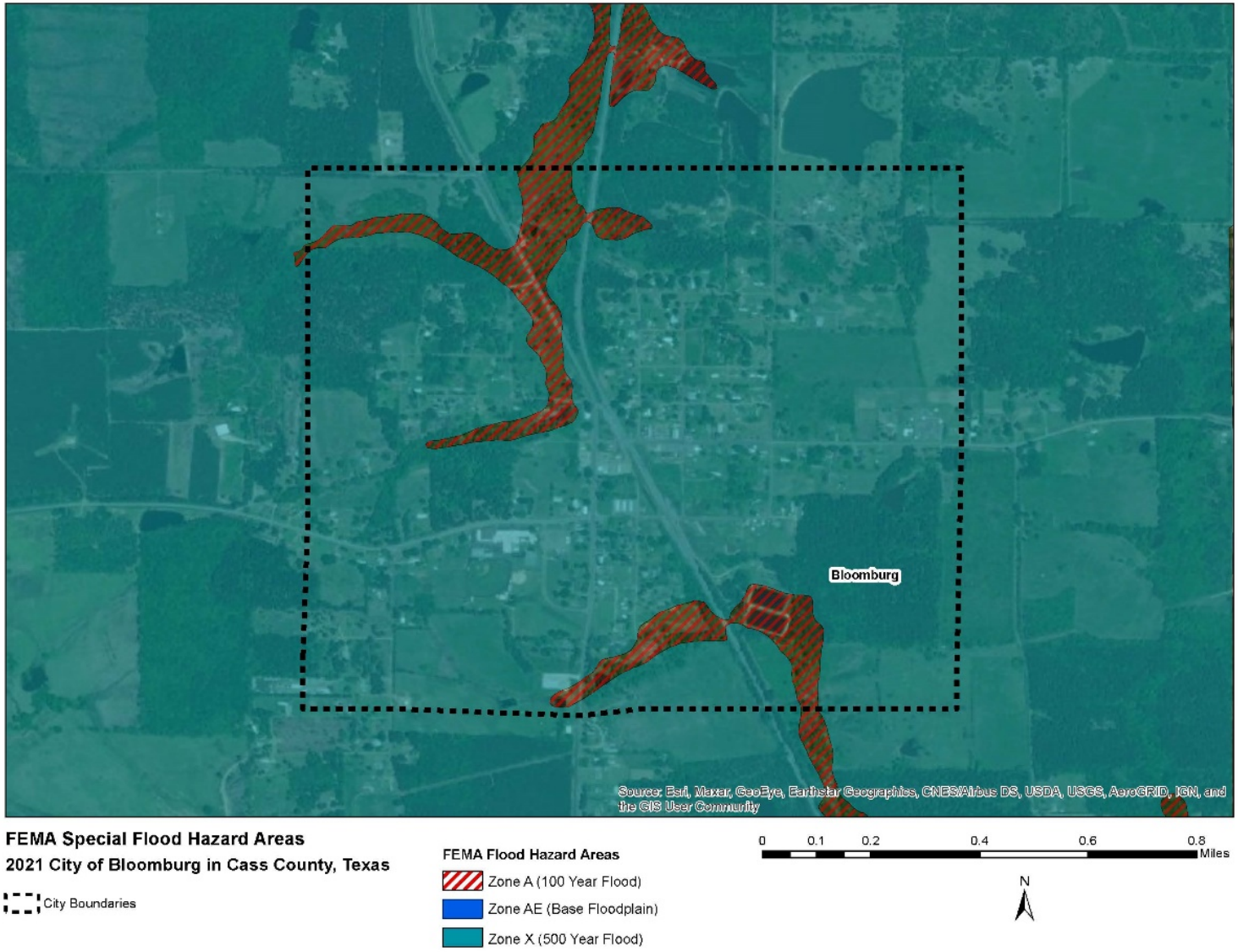


Figure 16: City of Bloomburg FEMA Special Flood Hazard Areas

V. City of Domino

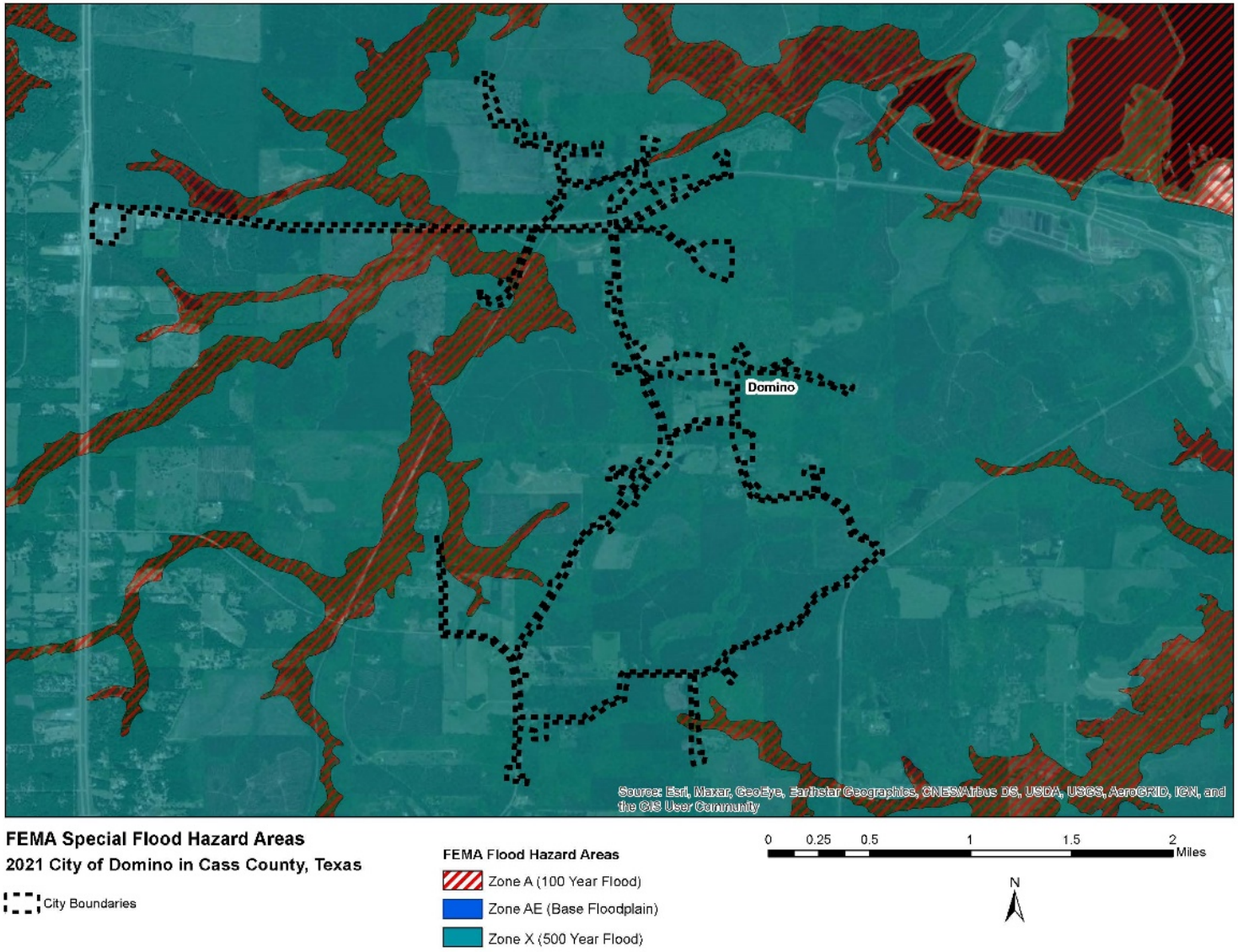


Figure 17: City of Domino FEMA Special Flood Hazard Areas

VI. City of Douglassville

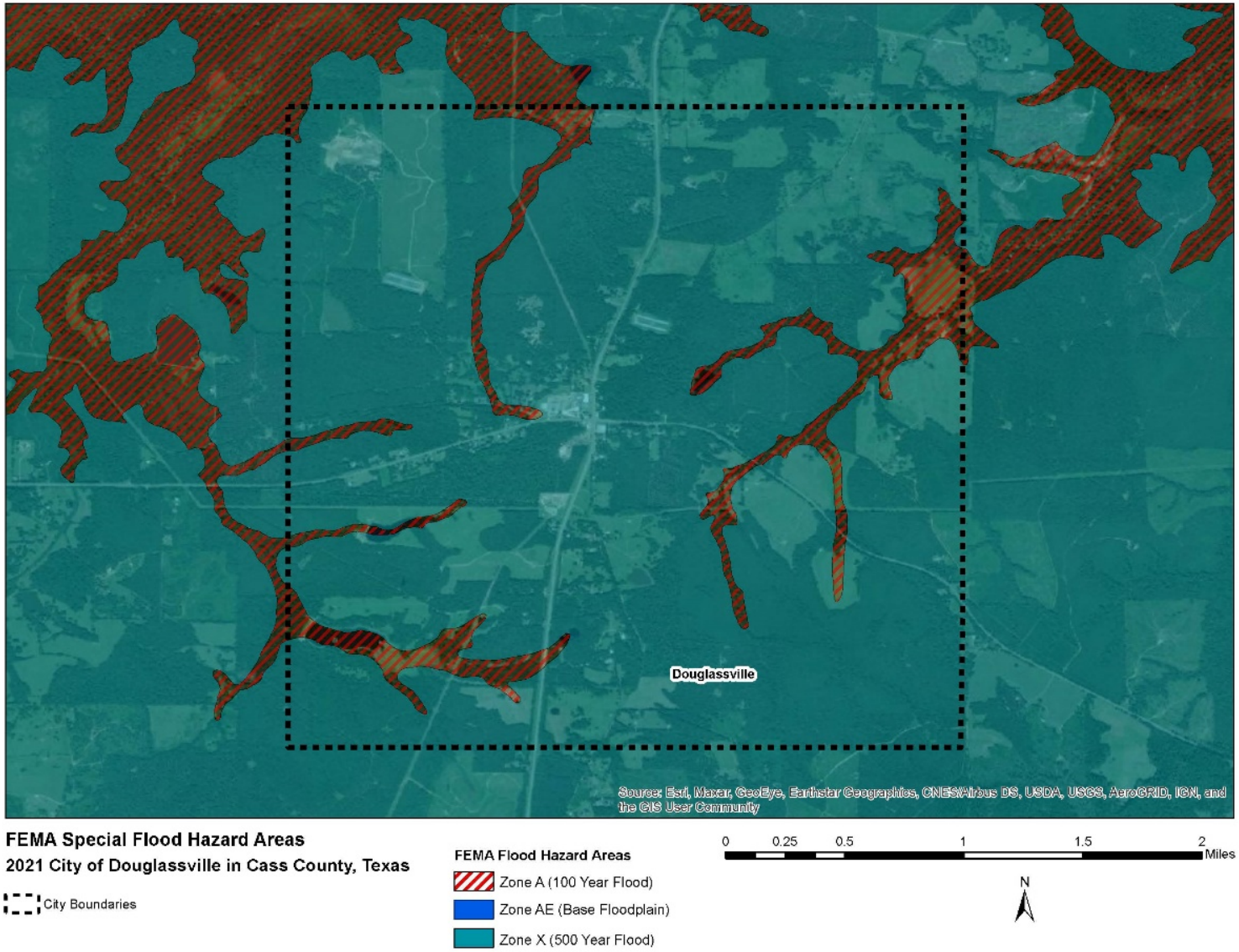


Figure 18: City of Douglassville FEMA Special Flood Hazard Areas

VII. City of Hughes Springs

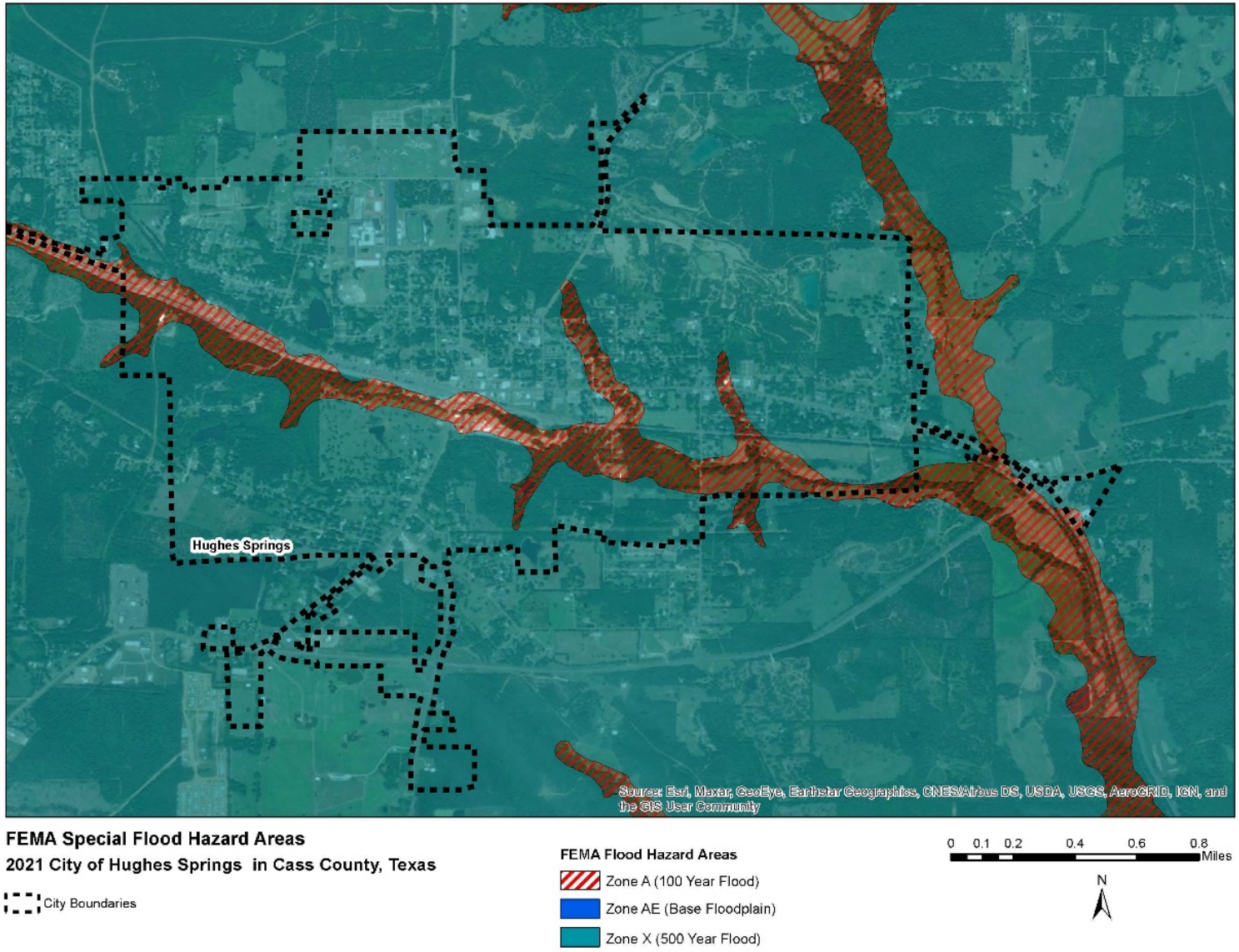


Figure 19: City of Hughes Springs FEMA Special Flood Hazard Areas

VIII. City of Linden

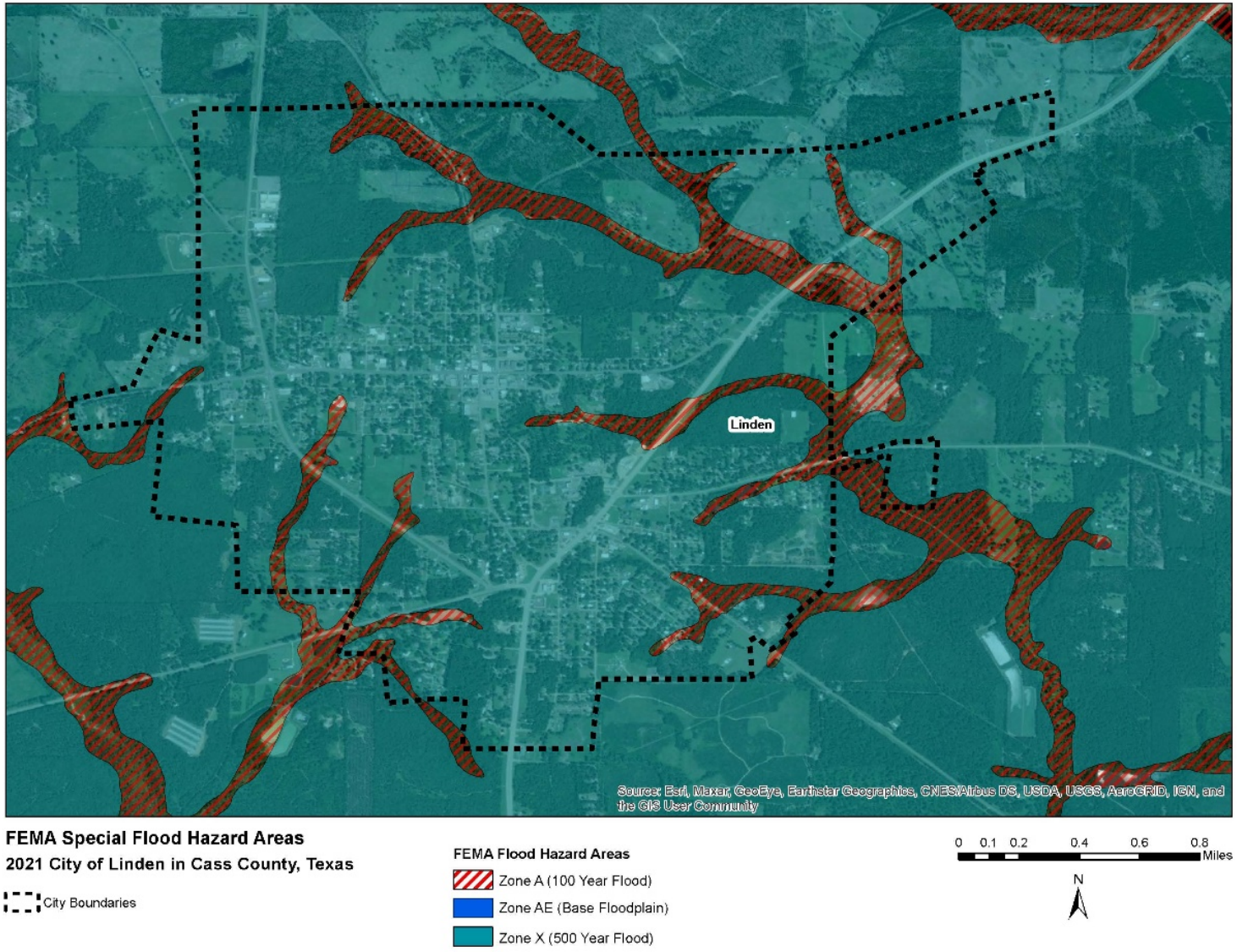


Figure 20: City of Linden FEMA Special Flood Hazard Areas

IX. City of Marietta

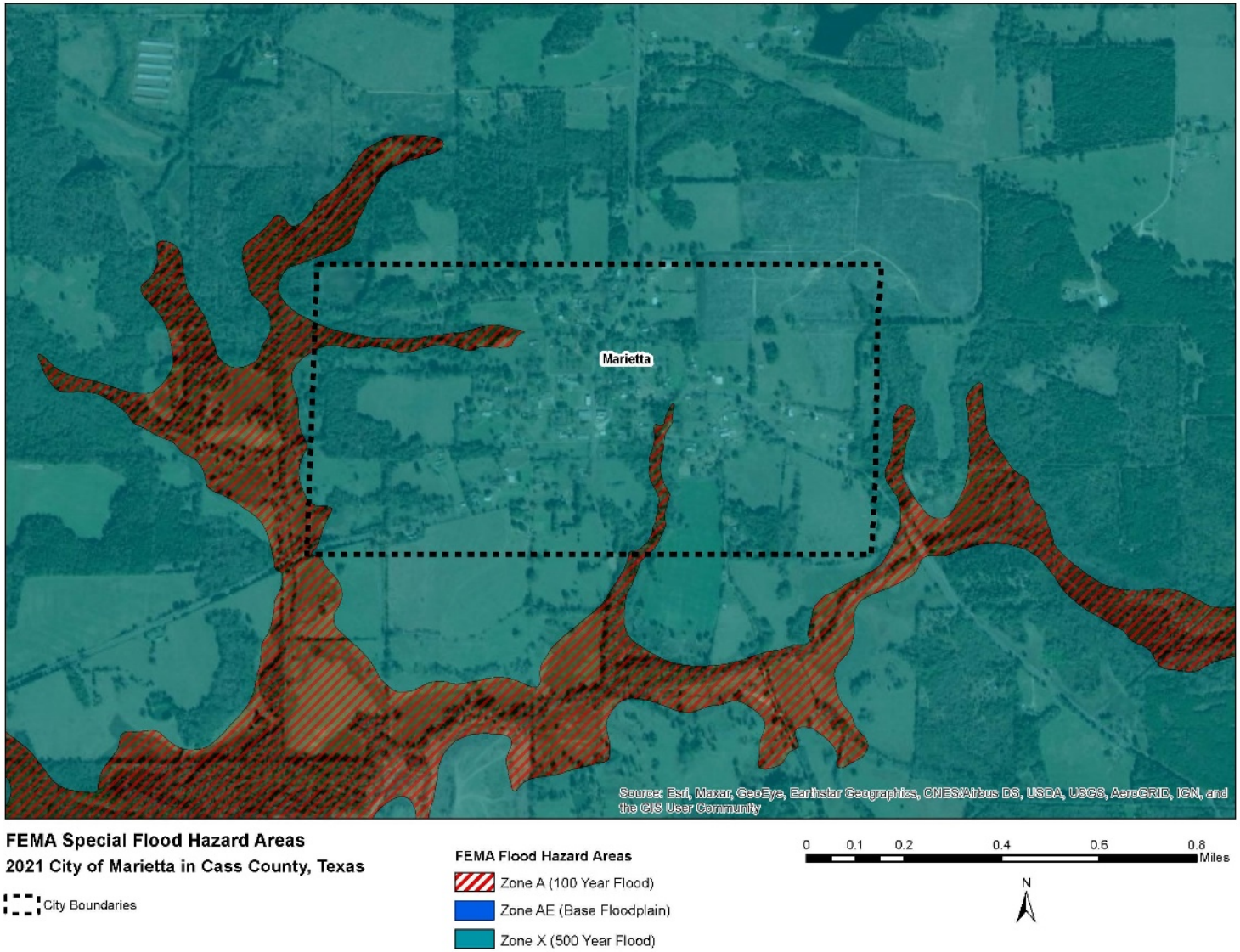


Figure 21: City of Marietta FEMA Special Flood Hazard Areas

B) Impact

Flood impact in Cass County and the participating jurisdictions will vary depending on the location, size of the affected area, and number of structures affected. Residents in the participating jurisdictions may temporarily lose power due to downed power lines. Motorists and residents throughout the County may be left stranded and needing rescue. Affected structures may be flooded, damaged by flood-borne contaminants, damaged by debris flow, or even completely washed away. Crops may be damaged or destroyed.

In addition to flooding's direct effects, the participating jurisdictions may be subject to indirect effects. These may include but aren't limited to loss of power, limited travel due to flooded and/or washed-out roads, and limited access to nearby emergency care centers.

5) Vulnerability

A) Population

As described in Section 3 of Chapter 3 above, Cass County and the participating jurisdictions are home to many vulnerable residents. Increased vulnerability may be due to many factors including but not limited to age, physical ability, financial means, housing type, and housing condition. Many of these vulnerabilities often overlap.

The participating jurisdictions recognize that vulnerable populations may need additional help preparing for and recovering from a flood.

Residents of mobile / manufactured housing are of particular concern. These structures are never considered safe during a flood, and depending on tie-down methods, may threaten surrounding structures.

Residents of sub-standard structures are also of particular concern. Structures in sub-standard condition ahead of a flood, whether due to structural damages, missing windows or doors, holes in exterior walls or the roof, may be less safe during a flood than structures in standard condition. Existing structural weaknesses may mean increased damages, injuries, or loss of life.

B) Critical Facilities

The planning team identified 77 critical facilities spread across the County and participating jurisdictions. All 77 critical facilities were located in a known FEMA Special Flood Hazard Area (SFHA); therefore, all critical facilities are considered vulnerable to flooding and have been listed below.

Table 28: Cass County Critical Facilities Vulnerable to Flooding

Jurisdictions	Critical Facilities
Cass County	Cass County Emergency Services District 2
Cass County	Cass County Precinct 2
Cass County	Cass County Historic Courthouse
Cass County	Cass County Extension
Cass County	Cass County Tax Assessor
Cass County	Cass County Jail
Cass County	Cass Co. Emergency Services District 1-Mcleod Station
Cass County	Cass Co. Emergency Services District 1-Kildare Station
Cass County	Cass Co. Emergency Services District 1-Huffins Station
Cass County	Cass Co. Emergency Services District 2-Antioch Station
Cass County	Cass Co. Emergency Services District 2-Domino Station
Cass County	Cass Co. Emergency Services District 3- Smyrna Station
Cass County	Cass Co. Law Enforcement and Justice Center
Cass County	Cass County Barn Precinct 3
Cass County	Cass County Justice of Peace Precinct 3
Cass County	Cass County Barn Precinct 2
Cass County	Cass County Barn Precinct 1
Cass County	County of Cass Barn Precinct 4
Cass County	Cass County Justice of Peace Precinct 4
Cass County	Law Enforcement Training Center
Cass County	Cass County Annex
Atlanta	City of Atlanta Police Department
Atlanta	Atlanta Public Works (Water & Wastewater)
Atlanta	Golden Villa Nursing Home
Atlanta	Rose Haven Retreat
Atlanta	City of Atlanta Fire Department
Atlanta	Atlanta High School
Atlanta	Atlanta Elementary
Atlanta	Atlanta Middle
Atlanta	Atlanta Primary
Atlanta	Christus St. Michael hospital
Atlanta	Health Care Express
Atlanta	Housing Authority of The City of Atlanta
Atlanta	Atlanta City Hall
Atlanta	Atlanta Public Library
Atlanta	Mattie Lanier Richey Center
Atlanta	Atlanta Water Department
Avinger	Avinger City Hall
Avinger	Avinger High School
Avinger	Avinger Fire Department
Avinger	Housing Authority of The City of Avinger
Bloomburg	Bloomburg VFD Non-Emergency
Bloomburg	Bloomburg High School

Bloomburg	Bloomburg Elementary
Douglassville	City Hall
Douglassville	Water Department
Douglassville	Fire Station
Douglassville	Douglassville Dollar General
Douglassville	Mikes Food Mart
Hughes Springs	Hughes Springs Fire Station
Hughes Springs	Hughes Springs Police Department
Hughes Springs	Hughes Springs Junior High
Hughes Springs	Hughes Springs Elementary
Hughes Springs	Hughes Springs High School
Hughes Springs	Hugh Springs Clinic
Hughes Springs	Hughes Springs Housing Authority
Hughes Springs	City Hall
Hughes Springs	Medical Shop Pharmacy
Hughes Springs	Hill's Grocery
Linden	Center Hill Volunteer Fire Department
Linden	City of Linden Police Department
Linden	Linden Elementary
Linden	Linden Kildare High School
Linden	Mae Luster Stephens Junior High
Linden	City Hall
Linden	Crump Food Store
Linden	Focus Care at Linden
Linden	Linden Life Center
Linden	Linden VFD Station
Linden	Mary Dougherty Senior Citizens Center
Marietta	Marietta Natural Gas Department
Marietta	Marietta Water Department
Marietta	Marietta City Hall/Municipal Building
Marietta	Marietta Volunteer Fire Department
Marietta	Oakridge Baptist Church
Queen City	Morris Upchurch Middle
Queen City	Queen City High School
Queen City	JK Hileman Elementary
Queen City	City Hall
Queen City	Queen City Waterworks

A) Vulnerable Parcels

Parcels vulnerable to flooding have been identified by their complete or partial location within the FEMA 100-year floodplain and the FEMA 500-year floodplain. While some parcels are not affected by Zone A, all parcels have the potential to experience 100-year floods.

Table 29: Vulnerable Parcels by Flood Zone in Cass County

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
Cass County	295	$11,526,910
FEMA 500-Year Flood Zone		
Cass County	26,494	$1,577,828,242

Table 30: Vulnerable Parcels by Flood Zone in the City of Atlanta

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
City of Atlanta	6	$101,260
FEMA 500-Year Flood Zone		
City of Atlanta	3,648	$251,736,549

Table 31: Vulnerable Parcels by Flood Zone in the City of Avinger

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
City of Avinger	0	$0
FEMA 500-Year Flood Zone		
City of Avinger	167	$ 12,719,570

Table 32: Vulnerable Parcels by Flood Zone in the City of Bloomburg

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
City of Bloomburg	1	$0
FEMA 500-Year Flood Zone		
City of Bloomburg	306	$ 15,793,170

Table 33: Vulnerable Parcels by Flood Zone in the City of Domino

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
City of Domino	0	N/A
FEMA 500-Year Flood Zone		
City of Domino	15	$228,080

Table 34: Vulnerable Parcels by Flood Zone in the City of Douglassville

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
City of Douglassville	1	$0
FEMA 500-Year Flood Zone		
City of Douglassville	164	$9,683,990

Table 35: Vulnerable Parcels by Flood Zone in the City of Hughes Springs

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
City of Hughes Springs	35	$616,020
FEMA 500-Year Flood Zone		
City of Hughes Springs	914	$48,877,890

Table 36: Vulnerable Parcels by Flood Zone in the City of Linden

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
City of Linden	1	$6,270
FEMA 500-Year Flood Zone		
City of Linden	1,299	$88,139,281

Table 37: Vulnerable Parcels by Flood Zone in the City of Marietta

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
City of Marietta	0	N/A
FEMA 500-Year Flood Zone		
City of Marietta	110	$4,409,870

Table 38: Vulnerable Parcels by Flood Zone in Queen City

Jurisdiction	Total Parcels	Estimated Potential Damage Value
FEMA 100-Year Flood Zone A		
Queen City	0	N/A
FEMA 500-Year Flood Zone		
Queen City	987	$52,057,607

7. Tornado

A tornado is defined as a rapidly rotating vortex or funnel of air extending ground-ward from a cumulonimbus cloud. Most of the time, vortices remain suspended in the atmosphere and are visible as a funnel cloud. However, when the lower tip of a vortex touches the ground, the tornado becomes a force of destruction. Tornado strength is currently measured using the Enhanced Fujita (EF) Scale. Like the previously used Fujita scale, the EF Scale uses damage to estimate tornado wind speeds and assign a number between 0 and 5. A rating of EF0 represents minor to no damage whereas a rating of EF5 represents destruction of buildings.

1) Tornado History

In the 2016 HMAP, Cass County and the participating jurisdictions reported 56 tornados between February 1950 and April 2011. The 2016 plan recorded $2.29 million in property damages during that time. Tornado events during 1950 and 1955 reported 8 injuries, however no fatalities were reported. Historically, the County has reported high frequency of tornados developing throughout unincorporated area, as opposed to the jurisdictions as they account for only 3% of the total area.

According to data from the National Centers for Environmental Information (NCEI), there have been no tornado events in any of the participating cities since the previous plan. The County experienced six tornado events from 2015 to 2020 which caused about $28 million in property damages adjusted to $2021.

Table 39: Cass County Tornado History

Location	Date Range	Number of Tornados	F / EF Magnitude Range	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Countywide	4/24/2015 – 5/16/2020	6	EFU – EF2	0	0	$28,326.55	$0

2) Likelihood of Future Occurrence

Because a tornado's path and movements are unpredictable and aren't geographically constrained, as well as the fact that nearly a third of the tornados in Cass County weren't assigned a specific location, the likelihood of future tornados will be considered in light of all tornados in Cass County.

Given the frequency of previous tornados in Cass County and the participating jurisdictions, tornados are considered a highly likely hazard, meaning one is possible in the next year.

3) Extent

Before 2007, the Fujita Scale was used for rating tornado strength. The Fujita Scale is based on damage intensity instead of wind speed, with estimated wind speed ranges based on the extent of observed damage.

Table 40: Fujita Scale

Fujita Scale			
Enhanced Fujita Category	Wind Speed (MPH)	Character	Potential Damage
Zero (F0)	40-72	Weak	Light Damage. Some damage to chimneys; branches broken off trees, shallow-rooted trees uprooted, sign boards damaged.
One (F1)	73-112	Weak	Moderate damage. Roof surfaces peeled off; mobile homes pushed foundations or overturned; moving autos pushed off road.
Two (F2)	113-157	Strong	Considerable damage. Roofs torn from frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light objects become projectiles.
Three (F3)	158-206	Strong	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
Four (F4)	207-260	Violent	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
Five (F5)	260-318	Violent	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yds.); high-rise buildings have significant structural deformation; incredible phenomena will occur.

Adopted after 2007, the Enhanced Fujita Scale, or EF Scale, is the scale for rating the strength of tornados via the damage they cause. Six categories from zero to five represent increasing degrees of damage. The scale considers how most structures are designed and is thought to be an accurate representation of the surface wind speeds in the most violent tornados.

Table 41: Enhanced Fujita Scale[21]

Enhanced Fujita (EF) Scale		
Enhanced Fujita Category	Wind Speed (MPH)	Potential Damage
EF0	65-85	Light damage. Peels surface off some roofs; some damage to gutters or siding;

[21] Texas State Hazard Mitigation Plan, 2013 Update.

		branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	200+	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yds.); high-rise buildings have significant structural deformation; incredible phenomena will occur.

The most recent tornados in Cass County and the participating jurisdictions have been classified as EF2s and EF1 on the Enhanced Fujita Scale. Cass County sits within Zone IV (250 mph winds) of the ICC's wind speed map. Based on that information, the worst tornados in Cass County and the participating jurisdictions may be as bad as EF5.

4) Location and Impact

A) Location

Tornados are not constrained by any distinct geographic boundary and occur across all participating jurisdictions, traveling from one jurisdiction into another. Tornadoes are not equally distributed across Texas but appear to occur more frequently in what is referred to as "Tornado Alley", a line of activity that stretches from Central Texas, north into Oklahoma and beyond. Cass County is located in proximity to "Tornado Alley".

Tornadoes occur annually and frequently in the northern two-thirds of the state, caused by frontal systems that enter from the north and west. In the remainder of the state, tornadoes are primarily caused as a cascading hazard from tropical storms.

B) Impact

Impacts from a tornado may include but are not limited to damaged or destroyed personal property including vehicles, damaged or destroyed agricultural, residential, commercial, and industrial buildings. Crops may be damaged or destroyed. Pets and livestock may be injured or killed by tornados or flying debris. Pets and livestock may escape due to damaged or destroyed structures and fences.

In the worst cases, tornados may cause injuries and/or be deadly.

5) Vulnerability

Tornados have the potential to impact the entire planning area. All existing and future buildings, critical facilities, critical infrastructure, improved property, and the population of the participating jurisdictions are considered vulnerable to this hazard.

A) Population

As described in Section 3 of Chapter 3 above, Cass County and the participating jurisdictions are home to many vulnerable residents. Increased vulnerability may be due to many factors including but not limited to: age, physical ability, financial means, housing type, and housing condition. Many of these vulnerabilities often overlap.

The participating jurisdictions recognize that vulnerable populations may need additional help preparing for and recovering from a tornado.

Residents of mobile / manufactured homes are of particular concern. These structures are never considered safe during a tornado.

Residents of sub-standard structures are also of particular concern. Structures in sub-standard condition ahead of a tornado, whether due to structural damages, missing windows or doors, holes in exterior walls or the roof, may be less safe during a tornado than structures in standard condition.

Existing structural weaknesses, due to housing type or existing damages, may lead to compounded damages, injuries, or loss of life.

B) Critical Facilities and Infrastructure

Certain critical facilities and infrastructure in each jurisdiction may be particularly vulnerable to tornados. These facilities have been identified for reasons including: the number of people who use the facility or infrastructure, the facility's role in providing basic services to begin the cleanup process and get the jurisdictions running again, and the facility's ability to offer goods and materials residents will need to resume normalcy as quickly as possible. The selected critical facilities are built from a variety of materials with varying levels of resistance to tornadic damages. Additionally, their varying ages mean they weren't constructed to uniform building standards. Given tornados' violent nature, these facilities may experience increased levels of vulnerability to the hazards. Damage to any of these facilities may have a disproportionately negative impact on each jurisdiction's recovery from a tornado if that damage affects the facility's ability to reopen and resume normal business right away.

Table 42: Critical Facilities Vulnerable to Tornados and Potential Impacts

Jurisdiction	Critical Facilities	Potential Tornado Impacts								
		Loss of Power	Flying Debris	Uprooted Trees	Flooding Due to Physical Damages	Damaged or Destroyed Roofs	Damaged or Broken Windows	Wind Damage	Injuries	Death
Cass County	Cass County Emergency Services District 2	x	x	x	X			x	x	x
Cass County	Cass County Historic Courthouse	x	x		X	x	x	X	x	x
Cass County	Cass County Extension	X	X		X	x	X	X	x	x
Cass County	Cass County Tax Assessor	x	X		X	x	x	X	x	x
Cass County	Cass County Jail	x	X	X	x		x	X	x	x
Cass County	Emergency Services District 1-Mcleod Station	x	X	x	x	x		x	x	x
Cass County	Emergency Services District 1-Kildare Station	x	X	x	x	x		x	x	x
Cass County	Emergency Services District 1-Huffins Station	x	X	x	x	x	x	x	x	x
Cass County	Emergency Services District 2-Antioch Station	x	X	x	x		x	X	x	x
Cass County	Emergency Services District 2-Domino Station	x	X	x	x		x	X	x	x
Cass County	Emergency Services District 3- Smyrna Station	x	X	x	x		X	X	x	x
Cass County	Law Enforcement and Justice Center	x	X	x	x	x		x	x	x
Cass County	Cass County Barn Precinct 3	x	X	x	x	x	X		x	x
Cass County	Cass County Justice of Peace Precinct 3	x	X	x	x	x	X		x	x
Cass County	Cass County Barn Precinct 2	x	X	x	x			x	x	x
Cass County	Cass County Barn Precinct 1	x	X		x		x	X	x	x
Cass County	County of Cass Barn Precinct 4	x	X	x	X	X	x	x	x	x
Cass County	Cass County Justice of Peace Precinct 4	x	X	x	X	x	x	x	x	x
Cass County	Law Enforcement Training Center	x	X	x	X		x	x	x	x
Cass County	Cass County Annex	x	X	x		x	X		x	x
Atlanta	City of Atlanta Police Department	x	X			x	x	X	x	x
Atlanta	Atlanta Public Works (Water & Wastewater)	x	X			x	x	X	x	x
Atlanta	Golden Villa Nursing Home	x	X	x	x	x	x	X	x	x
Atlanta	Rose Haven Retreat	x	X	x	x		x	X	x	x
Atlanta	City of Atlanta Fire Department	x	X			x	x	X	x	x
Atlanta	Atlanta High School	x	X	x		x	x	x	x	x

Atlanta	Atlanta Elementary	x	X	x		x	x	X	x	x
Atlanta	Atlanta Middle	x	X			x	x	x	x	x
Atlanta	Atlanta Primary	x	X	X		x	x	x	x	x
Atlanta	Christus St. Michael hospital	x	X	X			x	x	x	x
Atlanta	Health Care Express	x	X	x	x	x	x	X	x	x
Atlanta	Housing Authority of The City of Atlanta	x	X				x	X	x	x
Atlanta	Atlanta City Hall	x	X			x	X	X	x	x
Atlanta	Atlanta Public Library	x	X				x	X	x	x
Atlanta	Mattie Lanier Richey Center	x	X	x	x	x	x	x	x	x
Atlanta	Atlanta Water Department	x	X			X	x	x	x	x
Avinger	Avinger City Hall	x	X	x		x	x	X	x	x
Avinger	Avinger High School	x	X	x	x		x	x	x	x
Avinger	Avinger Fire Department	x	X	x			x	x	x	x
Avinger	Housing Authority of The City of Avinger	x	X	x	x	x	x	x	x	x
Bloomburg	Bloomburg VFD Non-Emergency	x	X			x	x	X	x	x
Bloomburg	Bloomburg High School	x	X	x			x	x	x	x
Bloomburg	Bloomburg Elementary	x	X	x			x	x	x	x
Douglassville	City Hall	x	X	x		x	x	X	x	x
Douglassville	Fire Station	x	X	x			x	X	x	x
Douglassville	Water Department	x	X	x		x	x	X	x	x
Douglassville	Dollar General	x	X	x			x	X	x	x
Douglassville	Mike's Food Mart			x		x	x	x		
Hughes Springs	Hughes Springs Fire Station	x	X	x			x	X	x	x
Hughes Springs	Hughes Springs Police Department	x	X	x		X	x	x	x	x
Hughes Springs	Hughes Springs Junior High	x	X	x			x	X	x	x
Hughes Springs	Hughes Springs Elementary	x	X	x			x	X	x	x
Hughes Springs	Hughes Springs High School	x	X	x			x	x	x	x
Hughes Springs	Hugh Springs Clinic	x	X				x	X	x	x
Hughes Springs	Hughes Springs Housing Authority	x	X	x		x	x	X	x	x
Hughes Springs	City Hall	x	X	X			x	X	x	x
Hughes Springs	Medical Shop Pharmacy	x	X	X		x	x	x	x	x

Hughes Springs	Hill's Grocery	x	X				x	x	x	x
Linden	Center Hill Volunteer Fire Department	x	X	x	x	x	X	x	X	x
Linden	City of Linden Police Department	x	X		X	x	x	x	x	x
Linden	Linden Elementary	x	X	x	x	x	X	x	x	x
Linden	Linden Kildare High School	x	X	x		x	X	x	x	x
Linden	Mae Luster Stephens Junior High	x	X	x	X	x	x	x	x	x
Linden	City Hall	x	X			x	x	x	x	x
Linden	Crump Food Store	x	X	X		x	x	x	x	x
Linden	Focus Care at Linden	x	X	x	x	x	x	x	x	x
Linden	Linden Life Center	x	X	x		x	x	x	x	x
Linden	Linden VFD Station	x	X			x	x	X	x	x
Linden	Mary Dougherty Senior Citizens Center	x	X	X	x	x	x	x	x	x
Marietta	Marietta Natural Gas Department	x	X						x	x
Marietta	Marietta Water Department	x	X	x				x	x	x
Marietta	Marietta City Hall/Municipal Building	x	X			X	x	x	x	x
Marietta	Marietta Volunteer Fire Department	x	X	x			x	X	x	x
Marietta	Oakridge Baptist Church	x	X	x		x	x	x	x	x
Queen City	Morris Upchurch Middle	x	X			x	x	X	x	x
Queen City	Queen City High School	x	X	x			x	X	x	x
Queen City	J.K. Hileman Elementary	x	X	x	x		x	x	x	x
Queen City	City Hall	x	X	x			x	x	x	x
Queen City	Queen City Waterworks	x	X	x				x	x	x

C) Vulnerable Parcels

Table 43: Parcels Vulnerable to Tornados

Jurisdiction	Parcel Count	Estimated Potential Damage Value
Cass County	**32,596**	**$2,176,936,888**
City of Atlanta	3,775	$261,595,449
City of Avinger	344	$14,030,240
City of Bloomburg	330	$16,243,440
City of Domino	15	$228,080
City of Douglassville	199	$12,155,680
City of Hughes Springs	1,063	$54,655,450
City of Linden	1,391	$94,588,741
City of Marietta	115	$4,535,750
City of Queen City	1,013	$52,974,647

8. Severe Winds

A windstorm[22] is classified as any wind that is strong enough to cause at least light damage to trees and buildings and may or may not be accompanied by precipitation. Wind speeds during a windstorm typically exceed 41 knots. Damage can be attributed to gusts or longer periods of sustained winds.

Windstorms may last for just a few minutes when caused by downbursts from thunderstorms, or they may last for hours (and even several days) when they result from large-scale weather systems. A windstorm that travels in a straight line and is caused by the gust front (the boundary between descending cold air and warm air at the surface) of an approaching thunderstorm is called a derecho. Derechos are capable of causing widespread damage and landscape devastation.

1) Severe Wind History

In the 2016 HMAP, Cass County and the participating jurisdictions recorded 152 days windstorms between January 1993 and May 2014, which caused about $1.49 million in damages. None of the flooding events was reported to have caused any injuries, or fatalities. The 2016 HMAP reported all of Cass County to encounter thunderstorms, and therefore severe winds. Thus, Cass County has historically shown a high likelihood of windstorms and damages.

The following tables identify the most comprehensive list available of severe wind events and associated damages in Cass County and the participating jurisdictions. No participating jurisdiction has recorded a severe wind event more recently than 2020.

Table 44: Cass County Severe Wind History

Location	Date Range	Windstorm Events	Windspeed Range Knots	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Countywide	3/24/2016 - 6/9/2020	13	52 - 78	0	0	$0	$0

Table 45: City of Atlanta Severe Wind History

Location	Date Range	Windstorm Events	Windspeed Range Knots	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Atlanta	3/24/2017 - 5/8/2020	5	56-61	0	0	$0	$0

[22] https://www.britannica.com/science/windstorm

Table 46: City of Avinger Severe Wind History

Location	Date Range	Windstorm Events	Windspeed Range Knots	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Avinger	4/13/2018	1	78	0	0	$0	$0

Table 47: City of Hughes Springs Severe Wind History

Location	Date Range	Windstorm Events	Windspeed Range Knots	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Hughes Springs	4/9/2015 - 4/28/2020	4	54 - 70	0	0	$0	$0

Table 48: City of Linden Severe Wind History

Location	Date Range	Windstorm Events	Windspeed Range Knots	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Linden	3/24/2017 - 5/8/2020	7	52 - 78	0	0	$0	$0

Table 49: Queen City Severe Wind History

Location	Date Range	Windstorm Events	Windspeed Range Knots	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Queen City	7/3/2018 - 12/27/2018	2	56	0	0	$0	$0

According to the best information available, there have been no severe wind events in the Cities of Bloomburg, Domino, Douglassville, or Marietta since the 2016 Hazard Mitigation Plan.

2) Likelihood of Future Occurrence

Cass County and the participating jurisdictions experience generally experience one severe wind event every year. Given the frequency of past events, a severe wind event in the future is highly likely, meaning that an event is probable in the next year.

3) Extent

The generally accepted extent scale for wind events is the Beaufort Wind Scale. The following table lists categories, measurement, classification, and appearance descriptions.

Table 50: Beaufort Wind Scale[23]

Beaufort Wind Scale				
Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 feet becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 feet taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 feet, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 feet, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (13-20 feet) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41-47	Strong Gale	High waves (20 feet), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-30 feet) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high (30-45 feet) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 feet, sea completely white with driving spray, visibility greatly reduced	

[23] Source: www.spc.noaa.gov/faq/tornado/beaufort.html

The worst severe wind events in Cass County and the participating jurisdictions have ranged up to a 12 on the Beaufort Wind Scale. Future severe wind events may meet previous worst-case Force 12 events in terms of wind speed.

4) Location and Impact

A) Location

Severe wind events are not constrained by any distinct geographic boundary. They can occur across all participating jurisdictions.

B) Impact

Impacts from a severe wind event may include but are not limited to damaged or destroyed personal property including vehicles, damaged or destroyed agricultural, residential, commercial, and industrial buildings. Crops may be damaged or destroyed. Pets and livestock may be injured or killed by flying debris. Pets and livestock may escape due to damaged or destroyed structures and fences.

In the worst cases, severe wind events may cause injuries and/or be deadly.

5) Vulnerability

Severe wind events have the potential to impact all participating jurisdictions. Therefore, each jurisdiction is equally exposed to the hazard. Improved property, critical facilities, critical infrastructure, and the entire population are considered vulnerable to severe wind.

Based on severe wind data collected for the participating jurisdictions, severe winds primarily damage physical structures. However, there is no uniformity with respect to the type of structures that have been damaged by severe winds in any of the participating jurisdictions. Severe wind damages can be directly caused by the wind itself, flying debris, and falling trees, or indirectly by damages like power outages.

A) Population

As described in Section 3 of Chapter 3 above, Cass County and the participating jurisdictions are home to many vulnerable residents. Increased vulnerability may be due to many factors including but not limited to: age, physical ability, financial means, housing type, and housing condition. Many of these vulnerabilities often overlap.

The participating jurisdictions recognize that vulnerable populations may need additional help preparing for and recovering from a severe wind event.

Residents of mobile / manufactured homes are of particular concern. These structures may not be safe during severe winds.

Residents of sub-standard structures are also of particular concern. Structures in sub-standard condition ahead of a severe wind event, whether due to structural damages, missing windows or doors, holes in exterior walls or the roof, may be less safe during severe winds than structures in standard condition.

Existing structural weaknesses, due to housing type or existing damages, may lead to compounded damages, injuries, or loss of life.

B) Critical Facilities

Similar to tornados, certain critical facilities and infrastructure in each jurisdiction may be particularly vulnerable to severe winds. These facilities have been identified for reasons including: the number of people who use the facility or infrastructure, the facility's role in providing basic services to begin the cleanup process and get the jurisdictions running again, and the facility's ability to offer goods and materials residents will need to resume normalcy as quickly as possible. The selected critical facilities are built from a variety of materials with varying levels of resistance to wind damages. Additionally, their varying ages mean they weren't constructed to uniform building standards. Given severe wind's potentially violent nature, these facilities may experience increased levels of vulnerability to the hazards. Damage to any of these facilities may have a disproportionately negative impact on each jurisdiction's recovery from a severe wind event if that damage affects the facility's ability to reopen and resume normal business right away.

Table 51: Critical Facilities Vulnerable to Severe Wind and Potential Impacts

Jurisdiction	Critical Facilities	Potential Severe Wind Impacts								
		Loss of Power	Flying Debris	Uprooted Trees	Flooding Due to Physical Damages	Damaged or Destroyed Roofs	Damaged or Broken Windows	Wind Damage	Injuries	Death
Cass County	Cass County Emergency Services District 2	x	x	x	X			x	x	x
Cass County	Cass County Historic Courthouse	x	x		X	x	x	X	x	x
Cass County	Cass County Extension	X	X		X	x	X	X	x	x
Cass County	Cass County Tax Assessor	x	X		X	x	x	X	x	x
Cass County	Cass County Jail	x	X	X	x		x	X	x	x
Cass County	Emergency Services District 1-Mcleod Station	x	X	x	x	x		x	x	x
Cass County	Emergency Services District 1-Kildare Station	x	X	x	x	x		x	x	x
Cass County	Emergency Services District 1-Huffins Station	x	X	x	x	x	x	x	x	x
Cass County	Emergency Services District 2-Antioch Station	x	X	x	x		x	X	x	x
Cass County	Emergency Services District 2-Domino Station	x	X	x	x		x	X	x	x
Cass County	Emergency Services District 3- Smyrna Station	x	X	x	x		X	X	x	x
Cass County	Law Enforcement and Justice Center	x	X	x	x	x		x	x	x
Cass County	Cass County Barn Precinct 3	x	X	x	x	x	X		x	x
Cass County	Cass County Justice of Peace Precinct 3	x	X	x	x	x	X		x	x
Cass County	Cass County Barn Precinct 2	x	X	x	x			x	x	x
Cass County	Cass County Barn Precinct 1	x	X		x		x	X	x	x
Cass County	County of Cass Barn Precinct 4	x	X	x	X	X	x	x	x	x
Cass County	Cass County Justice of Peace Precinct 4	x	X	x	X	x	x	x	x	x
Cass County	Law Enforcement Training Center	x	X	x	X		x	x	x	x
Cass County	Cass County Annex	x	X	x		x	X		x	x
Atlanta	City of Atlanta Police Department	x	X			x	x	X	x	x
Atlanta	Atlanta Public Works (Water & Wastewater)	x	X			x	x	X	x	x
Atlanta	Golden Villa Nursing Home	x	X	x	x	x	x	X	x	x
Atlanta	Rose Haven Retreat	x	X	x	x		x	X	x	x
Atlanta	City of Atlanta Fire Department	x	X			x	x	X	x	x
Atlanta	Atlanta High School	x	X	x		x	x	x	x	x
Atlanta	Atlanta Elementary	x	X	x		x	x	X	x	x

Atlanta	Atlanta Middle	x	X			x	x	x	x	x
Atlanta	Atlanta Primary	x	X	X		x	x	x	x	x
Atlanta	Christus St. Michael hospital	x	X	X			x	x	x	x
Atlanta	Health Care Express	x	X	x	x	x	x	X	x	x
Atlanta	Housing Authority of The City of Atlanta	x	X				x	X	x	x
Atlanta	Atlanta City Hall	x	X			x	X	X	x	x
Atlanta	Atlanta Public Library	x	X				x	X	x	x
Atlanta	Mattie Lanier Richey Center	x	X	x	x	x	x	x	x	x
Atlanta	Atlanta Water Department	x	X			X	x	x	x	x
Avinger	Avinger City Hall	x	X	x		x	x	X	x	x
Avinger	Avinger High School	x	X	x	x		x	x	x	x
Avinger	Avinger Fire Department	x	X	x			x	x	x	x
Avinger	Housing Authority of The City of Avinger	x	X	x	x	x	x	x	x	x
Bloomburg	Bloomburg VFD Non-Emergency	x	X			x	x	X	x	x
Bloomburg	Bloomburg High School	x	X	x			x	x	x	x
Bloomburg	Bloomburg Elementary	x	X	x			x	x	x	x
Douglassville	City Hall	x	X	x		x	x	X	x	x
Douglassville	Fire Station	x	X	x			x	X	x	x
Douglassville	Water Department	x	X	x		x	x	X	x	x
Douglassville	Dollar General	x	X	x			x	X	x	x
Douglassville	Mike's Food Mart			x		x	x	x		
Hughes Springs	Hughes Springs Fire Station	x	X	x			x	X	x	x
Hughes Springs	Hughes Springs Police Department	x	X	x		X	x	x	x	x
Hughes Springs	Hughes Springs Junior High	x	X	x			x	X	x	x
Hughes Springs	Hughes Springs Elementary	x	X	x			x	X	x	x
Hughes Springs	Hughes Springs High School	x	X	x			x	x	x	x
Hughes Springs	Hugh Springs Clinic	x	X				x	X	x	x
Hughes Springs	Hughes Springs Housing Authority	x	X	x		x	x	X	x	x
Hughes Springs	City Hall	x	X	X			x	X	x	x
Hughes Springs	Medical Shop Pharmacy	x	X	X		x	x	x	x	x
Hughes Springs	Hill's Grocery	x	X				x	x	x	x

Linden	Center Hill Volunteer Fire Department	x	X	x	x	x	X	x	X	x
Linden	City of Linden Police Department	x	X		X	x	x	x	x	x
Linden	Linden Elementary	x	X	x	x	x	X	x	x	x
Linden	Linden Kildare High School	x	X	x		x	X	x	x	x
Linden	Mae Luster Stephens Junior High	x	X	x	X	x	x	x	x	x
Linden	City Hall	x	X			x	x	x	x	x
Linden	Crump Food Store	x	X	X		x	x	x	x	x
Linden	Focus Care at Linden	x	X	x	x	x	x	x	x	x
Linden	Linden Life Center	x	X	x		x	x	x	x	x
Linden	Linden VFD Station	x	X			x	x	X	x	x
Linden	Mary Dougherty Senior Citizens Center	x	X	X	x	x	x	x	x	x
Marietta	Marietta Natural Gas Department	x	X						x	x
Marietta	Marietta Water Department	x	X	x				x	x	x
Marietta	Marietta City Hall/Municipal Building	x	X			X	x	x	x	x
Marietta	Marietta Volunteer Fire Department	x	X	x			x	X	x	x
Marietta	Oakridge Baptist Church	x	X	x		x	x	x	x	x
Queen City	Morris Upchurch Middle	x	X			x	x	X	x	x
Queen City	Queen City High School	x	X	x			x	X	x	x
Queen City	J.K. Hileman Elementary	x	X	x	x		x	x	x	x
Queen City	City Hall	x	X	x			x	x	x	x
Queen City	Queen City Waterworks	x	X	x				x	x	x

C) Vulnerable Parcels

Table 52: Parcels Vulnerable to Severe Wind

Jurisdiction	Parcel Count	Estimated Potential Damage Value
Cass County	**32,596**	**$2,176,936,888**
City of Atlanta	3,775	$261,595,449
City of Avinger	344	$14,030,240
City of Bloomburg	330	$16,243,440
City of Domino	15	$228,080
City of Douglassville	199	$12,155,680
City of Hughes Springs	1,063	$54,655,450
City of Linden	1,391	$94,588,741
City of Marietta	115	$4,535,750
City of Queen City	1,013	$52,974,647

9. Wildfire

Wildfire is defined as a sweeping and destructive conflagration and can be further categorized as wildland, interface, or intermix fires.

Wildland fires are fueled almost exclusively by natural vegetation wildland/urban interface (WUI) fires include both vegetation and the built environment. The wildfire disaster cycle begins when homes are built adjacent to wildland areas. When what would have been rural wildfires occur, they advance through all available fuels, which can include homes and structures.

1) Wildfire History

The Texas A&M Forest Service Wildfire Risk Assessment Portal provides wildfire data on fires that occurred as recently as 2015. Additional data came from local planning team members.

In the 2016 plan, the County and participating jurisdictions looked at Texas A&M Forest Service Wildfire Risk Assessment Portal data from 2005 – 2009.

None of the participating jurisdictions have data available on fires past 2015.

According to NCEI data, there was one recorded wildfire in the County in 2011. It caused $6 million in damages adjusted to $2021. The 2011 fire caused one injury, but no fatalities.

The following tables show the wildfire history of each participant as recorded by the Texas A&M Forest Service. None of these events includes any information about damages, injuries, or fatalities.

Table 53: Cass County Wildfire History

Location	Date Range	Number of Wildfire Events	Range of Acres Burned	Total Acres Burned
Countywide	1/31/2005 – 12/06/2015	573	0 - 902	2,557

Table 54: City of Atlanta Wildfire History

Location	Date Range	Number of Wildfire Events	Range of Acres Burned	Total Acres Burned
Atlanta	12/27/2005 – 4/02/2010	36	.05 - 5	49

Table 55: City of Avinger Wildfire History

Location	Date Range	Number of Wildfire Events	Range of Acres Burned	Total Acres Burned
Avinger	5/01/2009 – 2/26/2013	16	0 - 20	46

Table 56: City of Bloomburg Wildfire History

Location	Date Range	Number of Wildfire Events	Range of Acres Burned	Total Acres Burned
Bloomburg	1/03/2009 – 12/20/2009	15	.5 - 5	25

Table 57: City of Douglassville Wildfire History

Location	Date Range	Number of Wildfire Events	Range of Acres Burned	Total Acres Burned
Douglassville	2/05/2002 – 2/05/2008	37	0 - 20	66

Table 58: City of Hughes Springs Wildfire History

Location	Date Range	Number of Wildfire Events	Range of Acres Burned	Total Acres Burned
Hughes Springs	1/15/2006 – 12/15/2015	68	0 - 10	151

Table 59: City of Linden Wildfire History

Location	Date Range	Number of Wildfire Events	Range of Acres Burned	Total Acres Burned
Linden	1/14/2005 – 12/22/2015	873	0 - 41,050	48,177

According to the best information available, there have been no severe wildfire events in the Cities of Domino and Queen City since the 2016 Hazard Mitigation Plan.

2) Likelihood of Future Occurrence

Although the County and participating jurisdictions haven't recorded a wildfire since 2015, given the prior frequency of wildfire events, a wildfire event in any of the jurisdictions addressing the hazard is highly likely, meaning an event is probable within the next year.

3) Extent

The Texas A&M Forest Service's Characteristic Fire Intensity Scale (FIS) specifically identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist. The FIS is a fire behavior output, which is influenced by three environmental factors - fuels, weather, and topography. According to Texas A&M Forest Service data, the majority of Cass County and the participating jurisdictions are rated between Class 1 and Class 3, while unincorporated areas are rated between Class 3 and 4.

Table 60: Characteristic Fire Intensity Scale[24]

Class 1 Very Low	Very small, discontinuous flames, usually less than one foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
Class 2 Low	Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
Class 3 Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
Class 4 High	Large flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
Class 5 Very High	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

The National Wildfire Coordinating Group (NWCG) provides an additional way to measure extent by accounting for fire size. Based on Texas A&M Forest Service data, the average fire in Cass County and the participating jurisdictions is a Class C event.

[24] https://www.texaswildfirerisk.com

Table 61: National Wildfire Coordinating Group Size Class of Fire[25]

Class A	¼ acre or less
Class B	More than ¼ acre, but less than 10 acres
Class C	10 acres or more, but less than 100 acres
Class D	100 acres or more, but less than 300 acres
Class E	300 acres or more, but less than 1,000 acres
Class F	1,000 acres or more, but less than 5,000 acres
Class G	5,000 acres or more

Previous wildfires in Cass County and the participating jurisdictions have ranged between Class 1 and Class 4 on the Characteristic Fire Intensity Scale, with flames possible of up to 30' or more in length, and between Class A and Class G on the National Wildfire Coordinating Group Size Class of Fire scale (NWCGSCF). Most fire events have been small and were contained quickly; However, the worst reported fire in Cass County burned about 41,050 acres.

Based on the historic events, future wildfires in Cass County and the participating jurisdictions may meet previous worst-case Class G (NWCGSCF) and Class 4 (FIS) wildfires.

4) Location and Impact

A) Location

Due to wildfire's ability to inflict damages to both structures and landscapes, wildfire risk and vulnerability, both full and partial, for the participating jurisdictions have been assessed based on TxWRAP's Wildland Urban Interface boundaries[26]. The Wildland Urban Interface is the area where people and their homes meet or mix with wildland vegetation. Many different types of land uses can be found within the WUI.

Because wildfires are dynamically unpredictable, the following maps and tables may not be representative of every jurisdiction at risk of wildfire. For the maps below, "No Data" means populated areas surrounded by sufficient non-burnable areas (i.e. interior urban areas) have been removed from the dataset, as these areas are not expected to be directly impacted by a wildfire, according to TxWRAP.

[25] http://www.nwcg.gov/term/glossary/size-class-of-fire
[26] https://texaswildfirerisk.com/the-wildland-urban-interface

I. Cass County Location

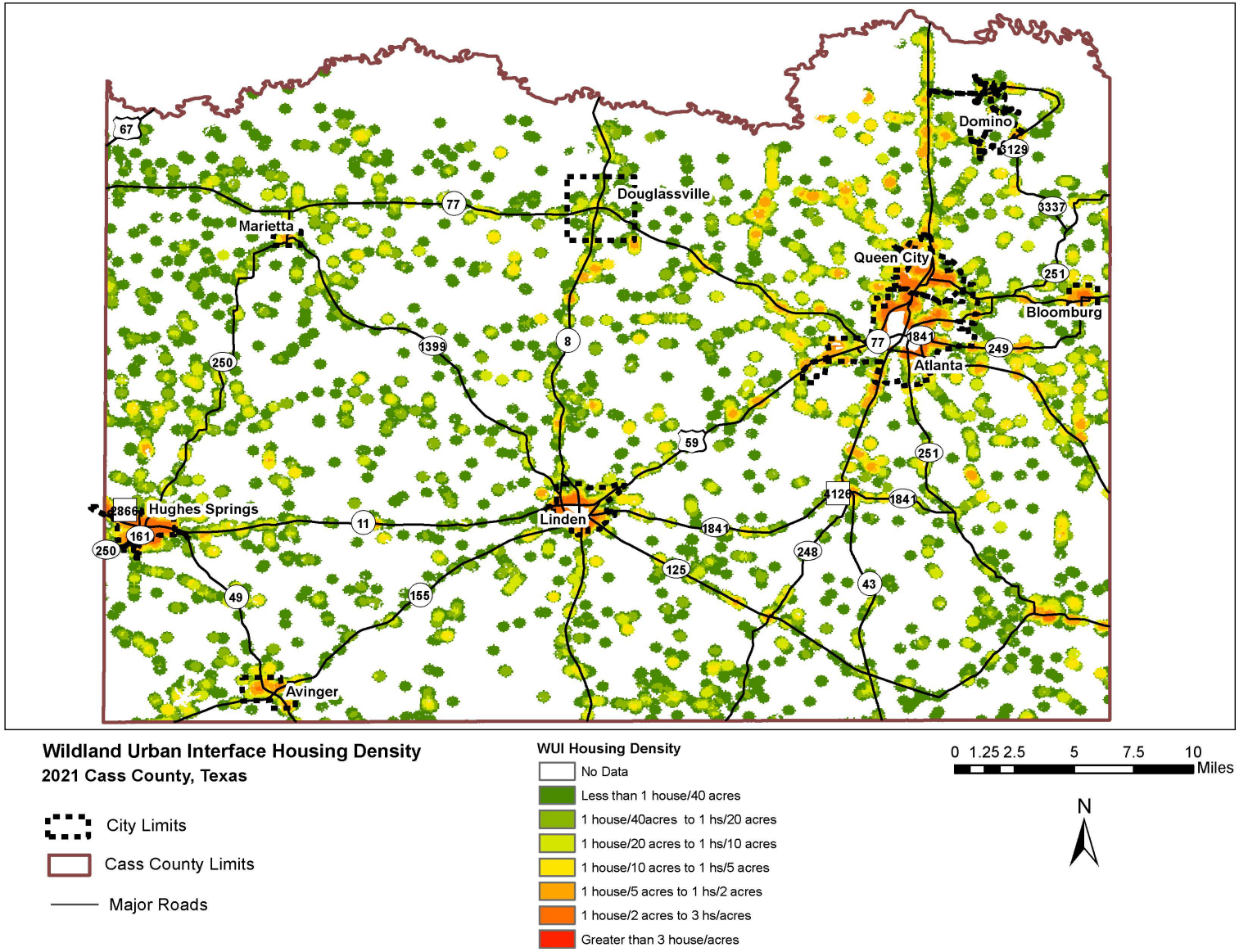


Figure 22: Cass County Wildland Urban Interface Housing Density

II. City of Atlanta Location

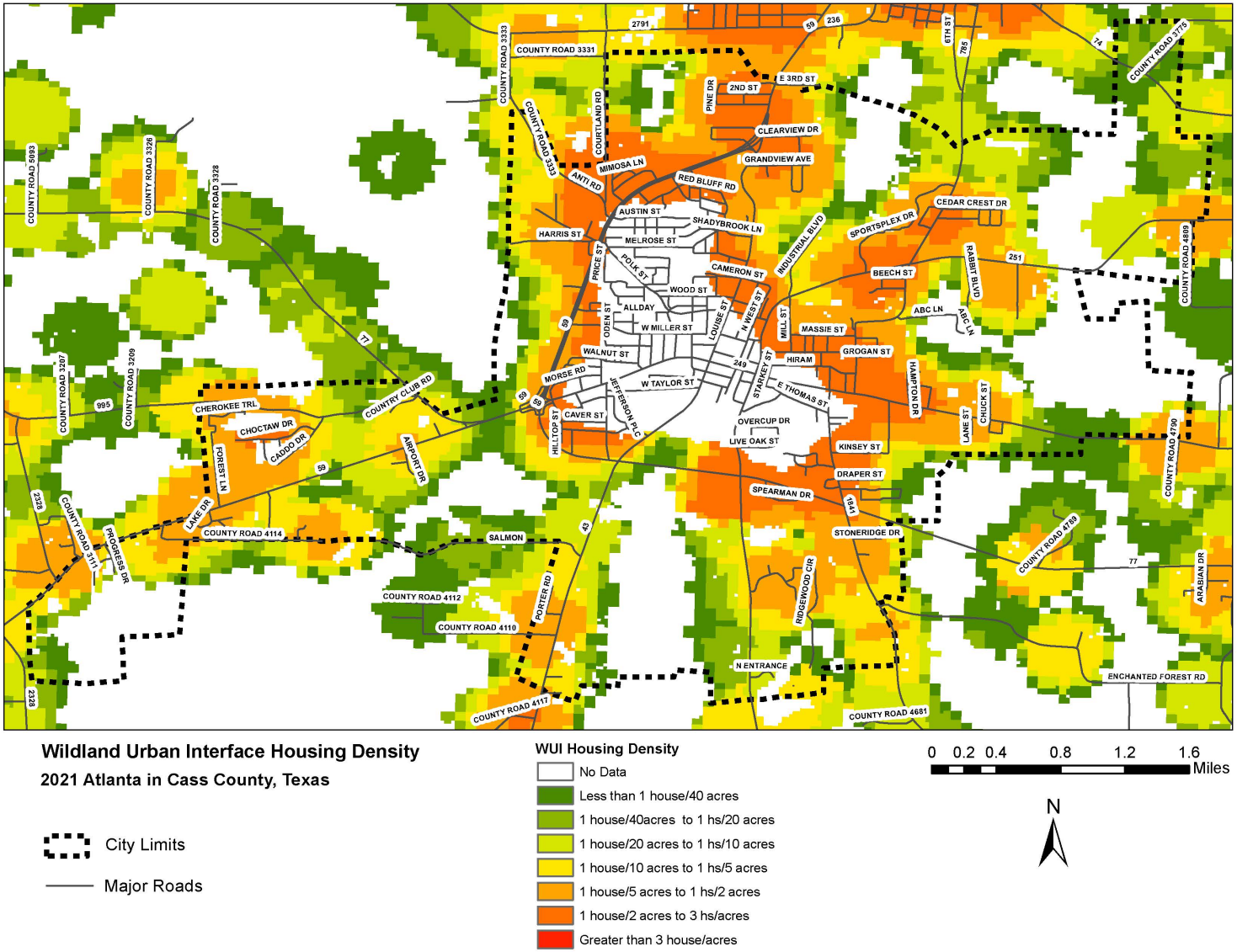


Figure 23: City of Atlanta Wildland Urban Interface Housing Density

III. City of Avinger Location

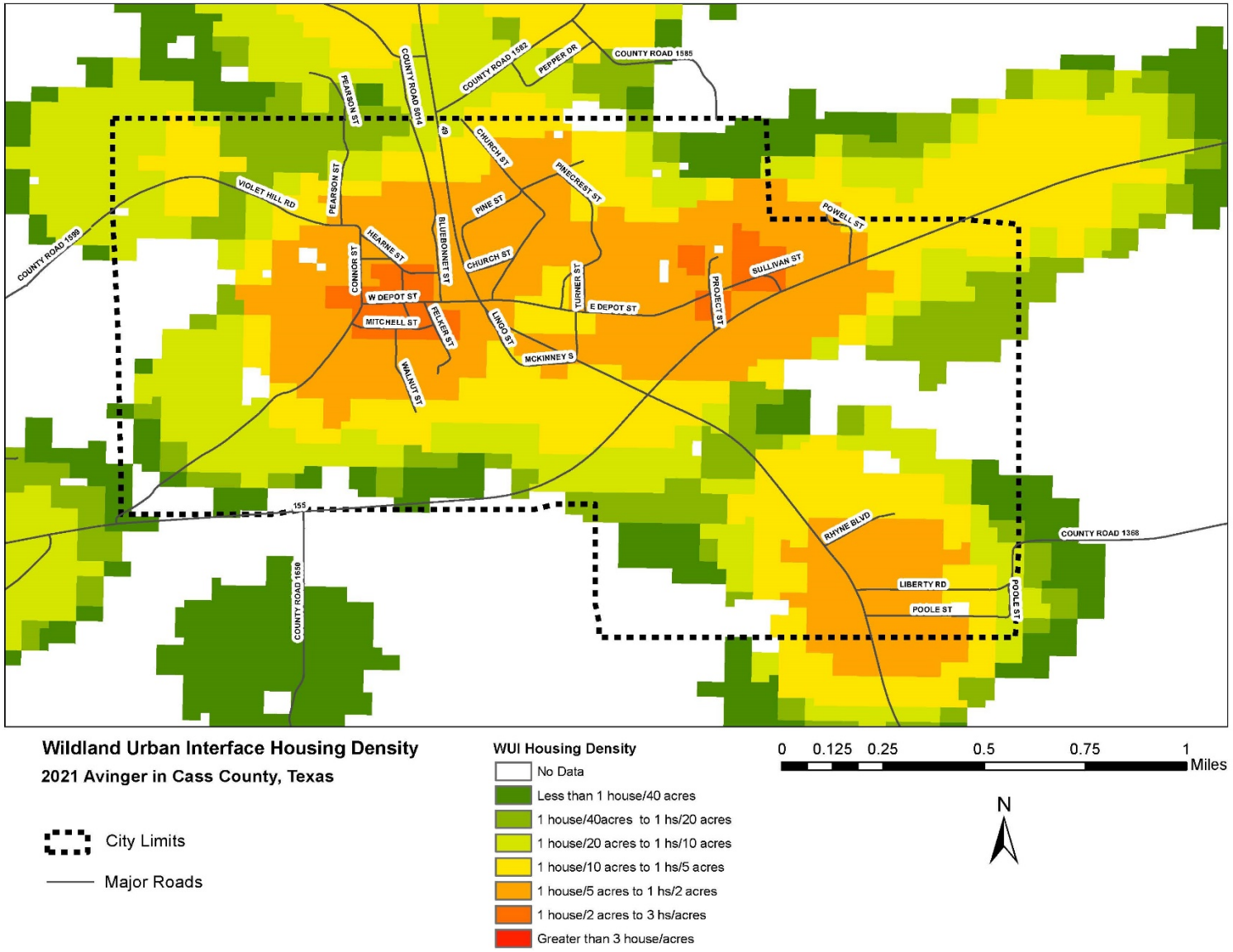


Figure 24: City of Avinger Wildland Urban Interface Housing Density

IV. City of Bloomburg Location

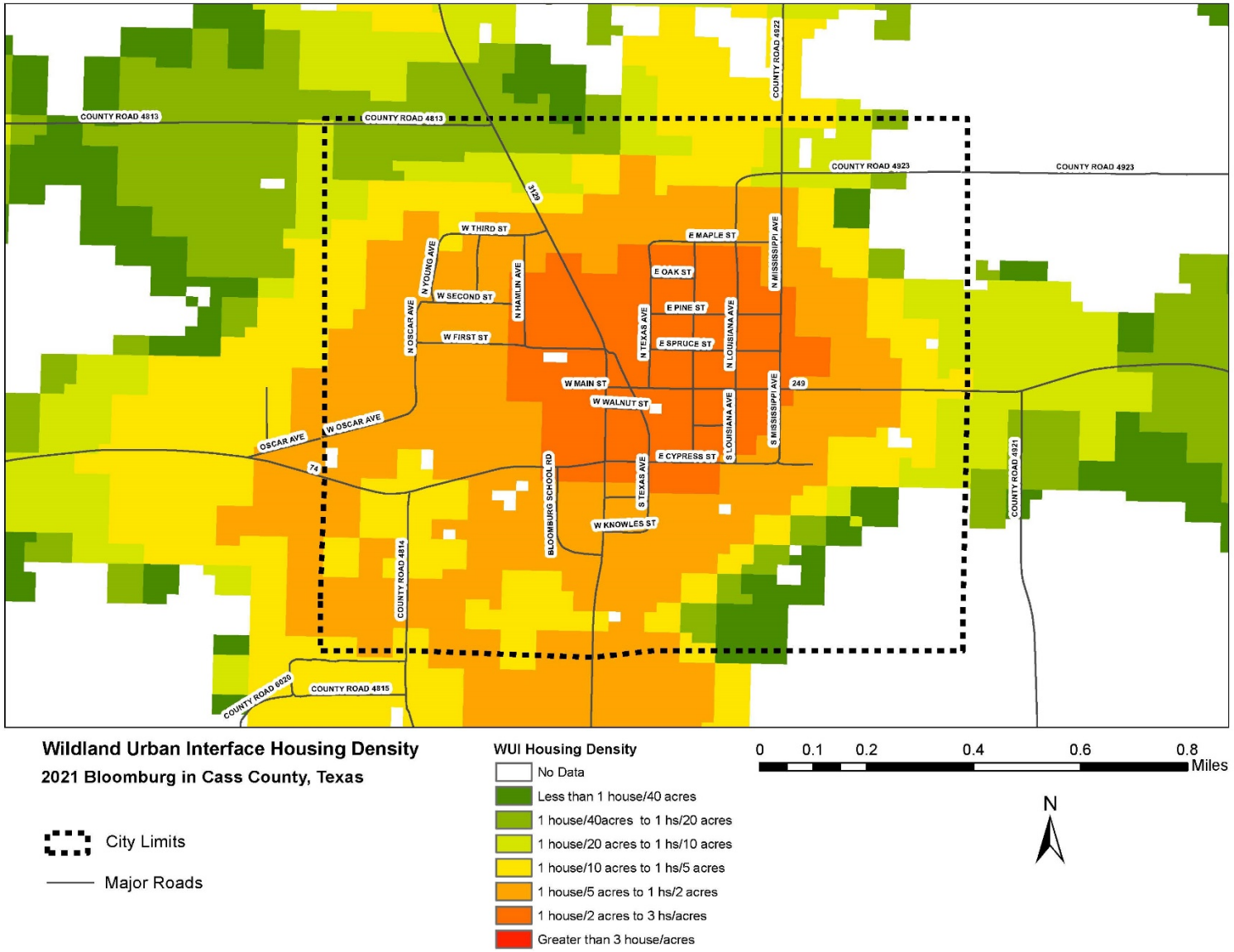


Figure 25: City of Bloomburg Wildland Urban Interface Housing Density

V. City of Domino Location

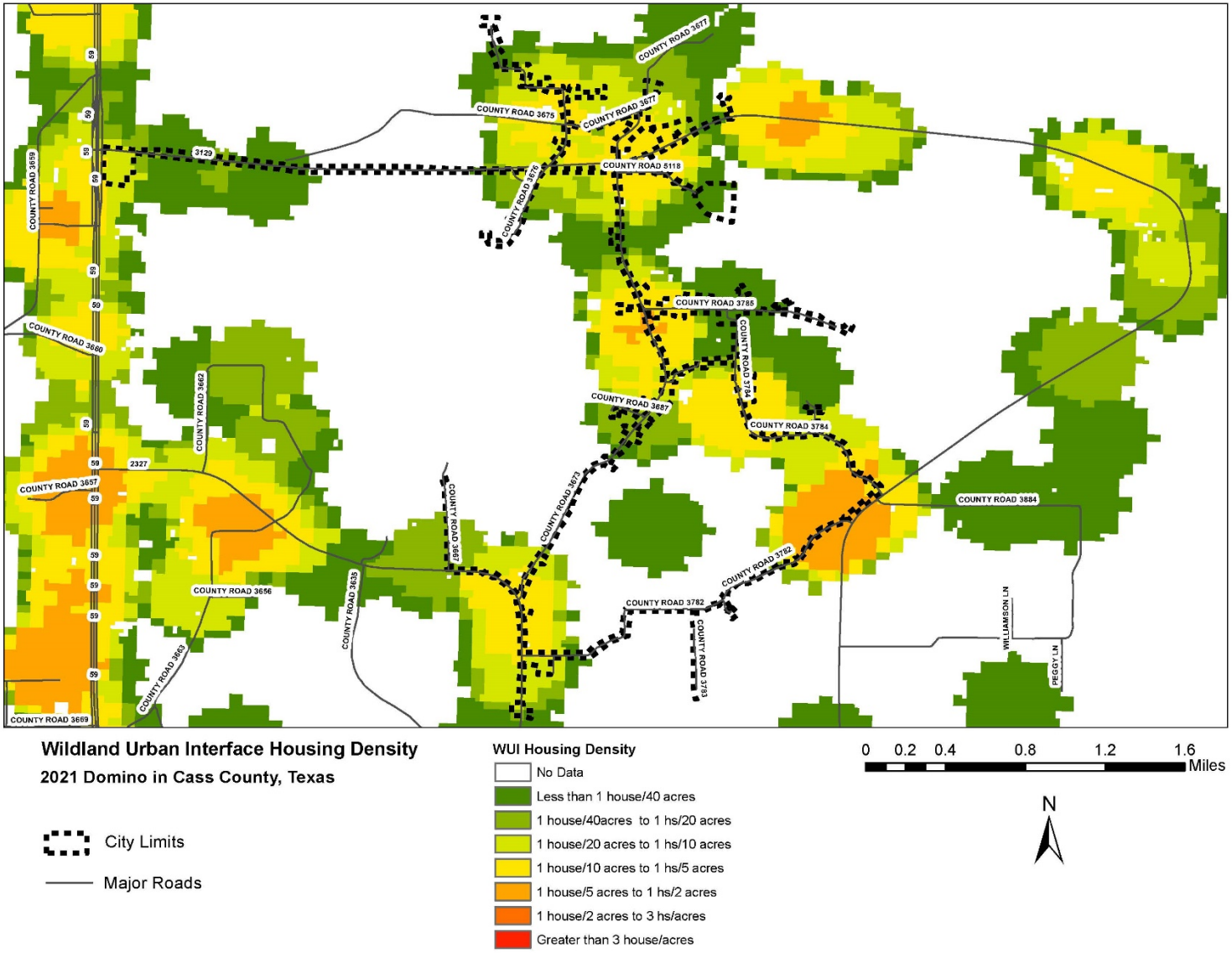


Figure 26: City of Domino Wildland Urban Interface Housing Density

VI. City of Douglassville Location

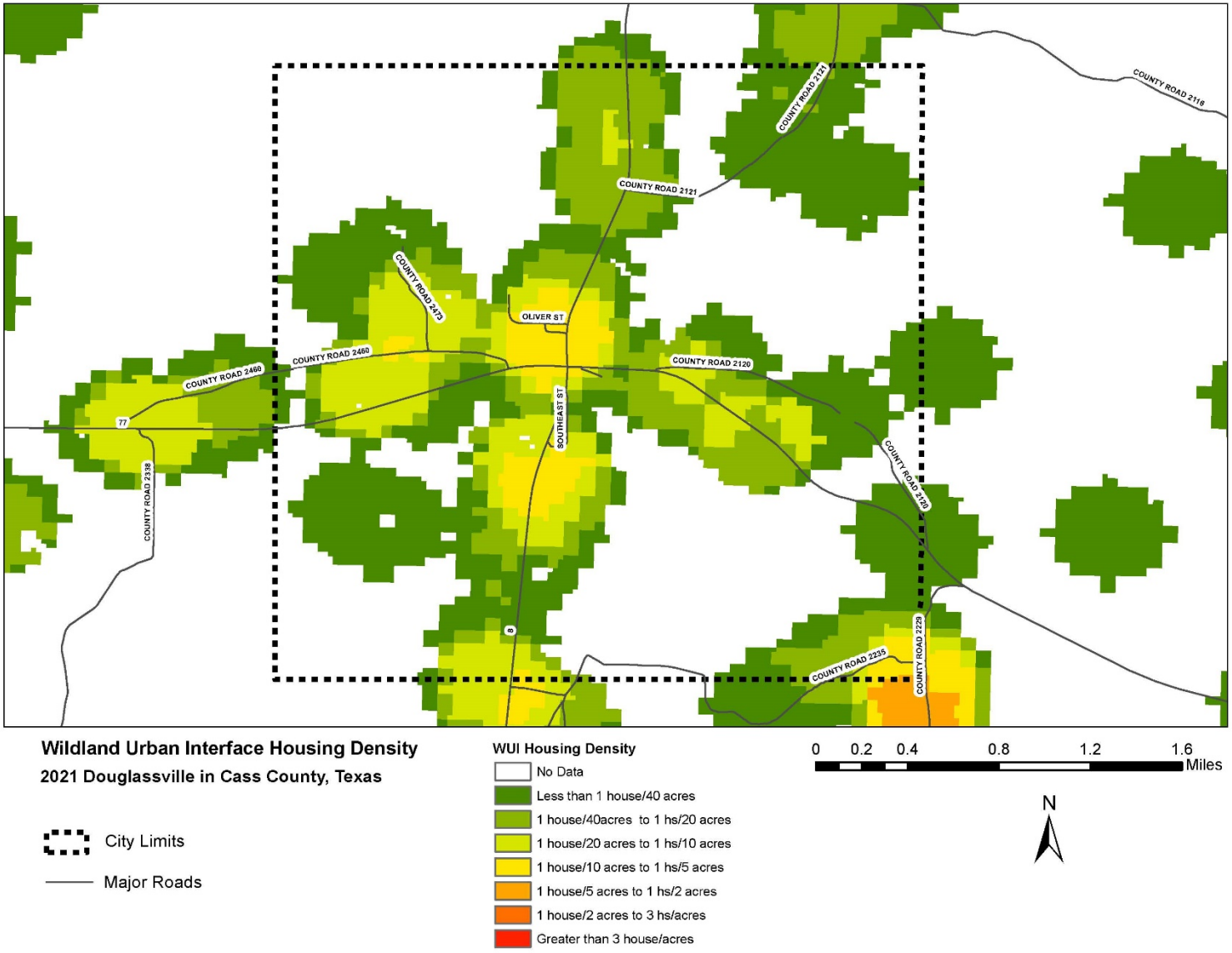


Figure 27: City of Douglassville Wildland Urban Interface Housing Density

VII. City of Hughes Springs Location

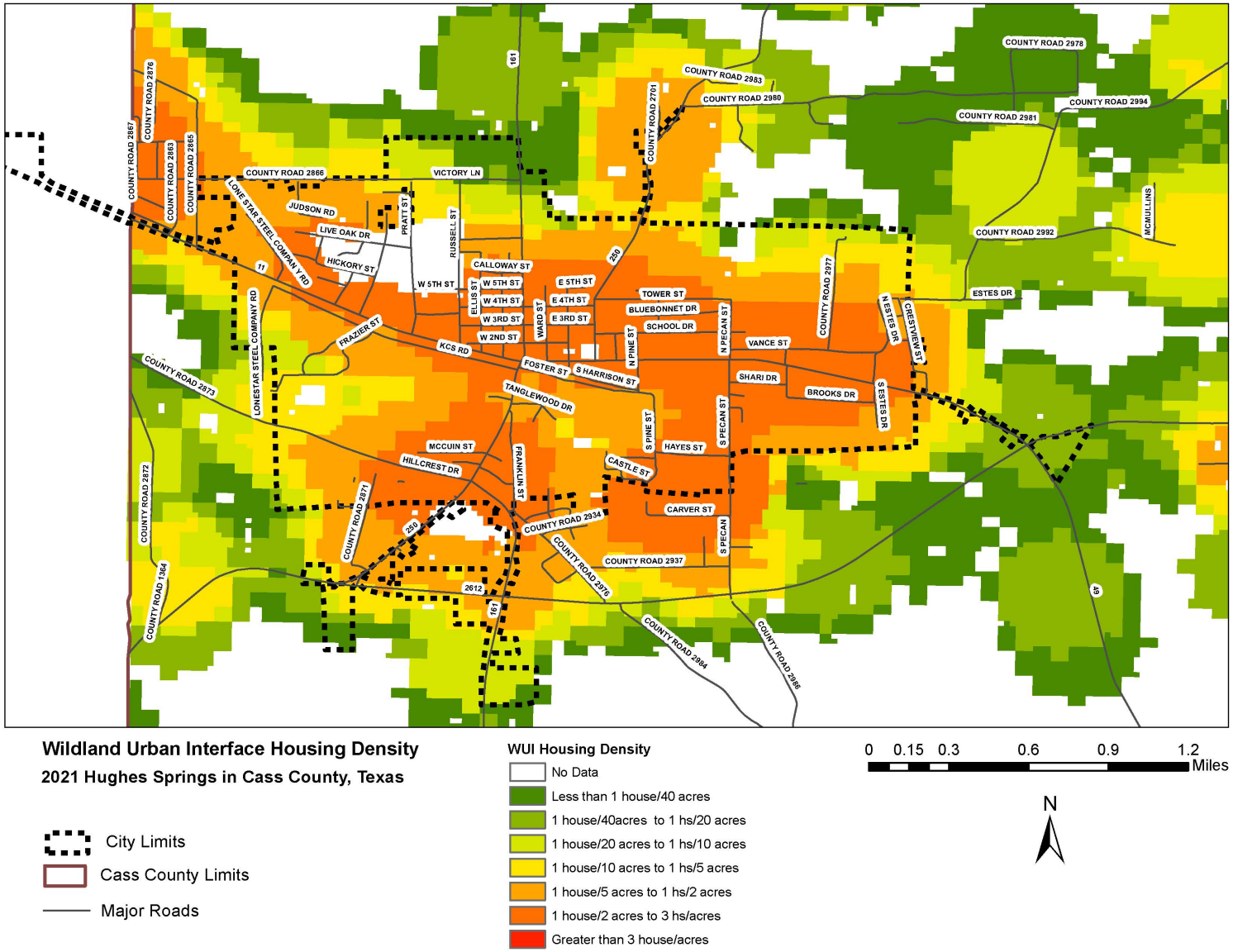


Figure 28: City of Hughes Springs Wildland Urban Interface Housing Density

VIII. City of Linden Location

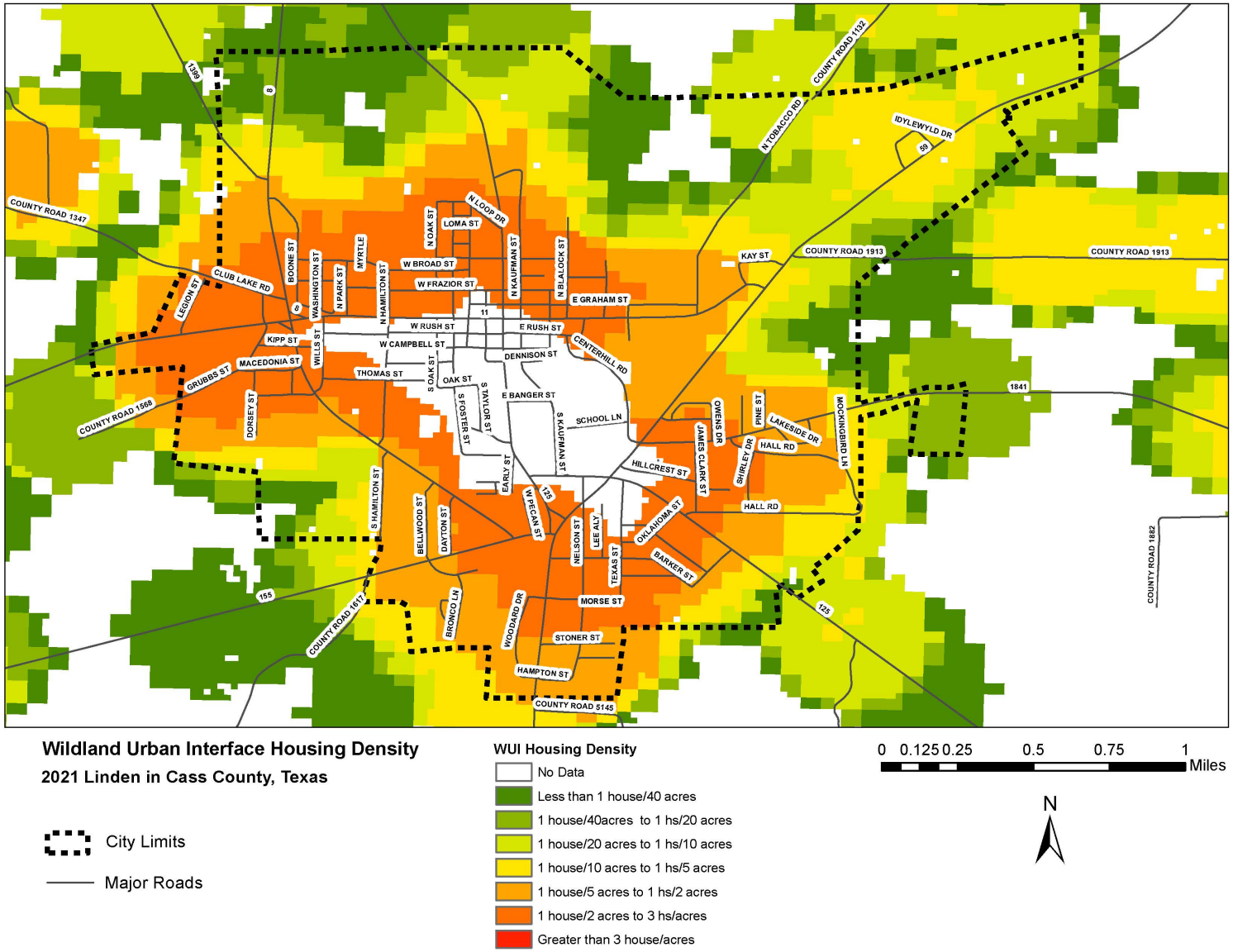


Figure 29: City of Linden Wildland Urban Interface Housing Density

IX. City of Marietta Location

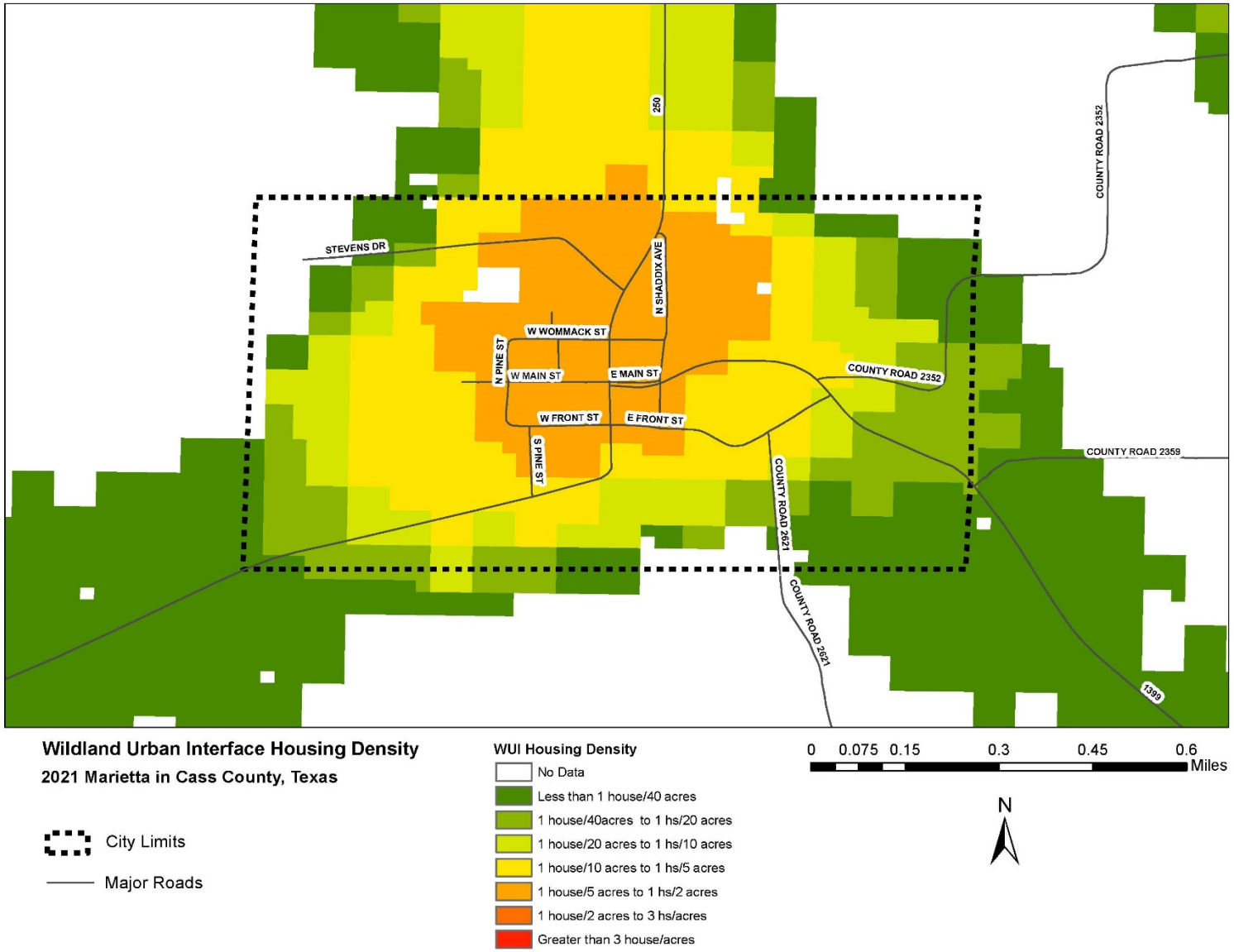


Figure 30: City of Marietta Wildland Urban Interface Housing Density

X. Queen City Location

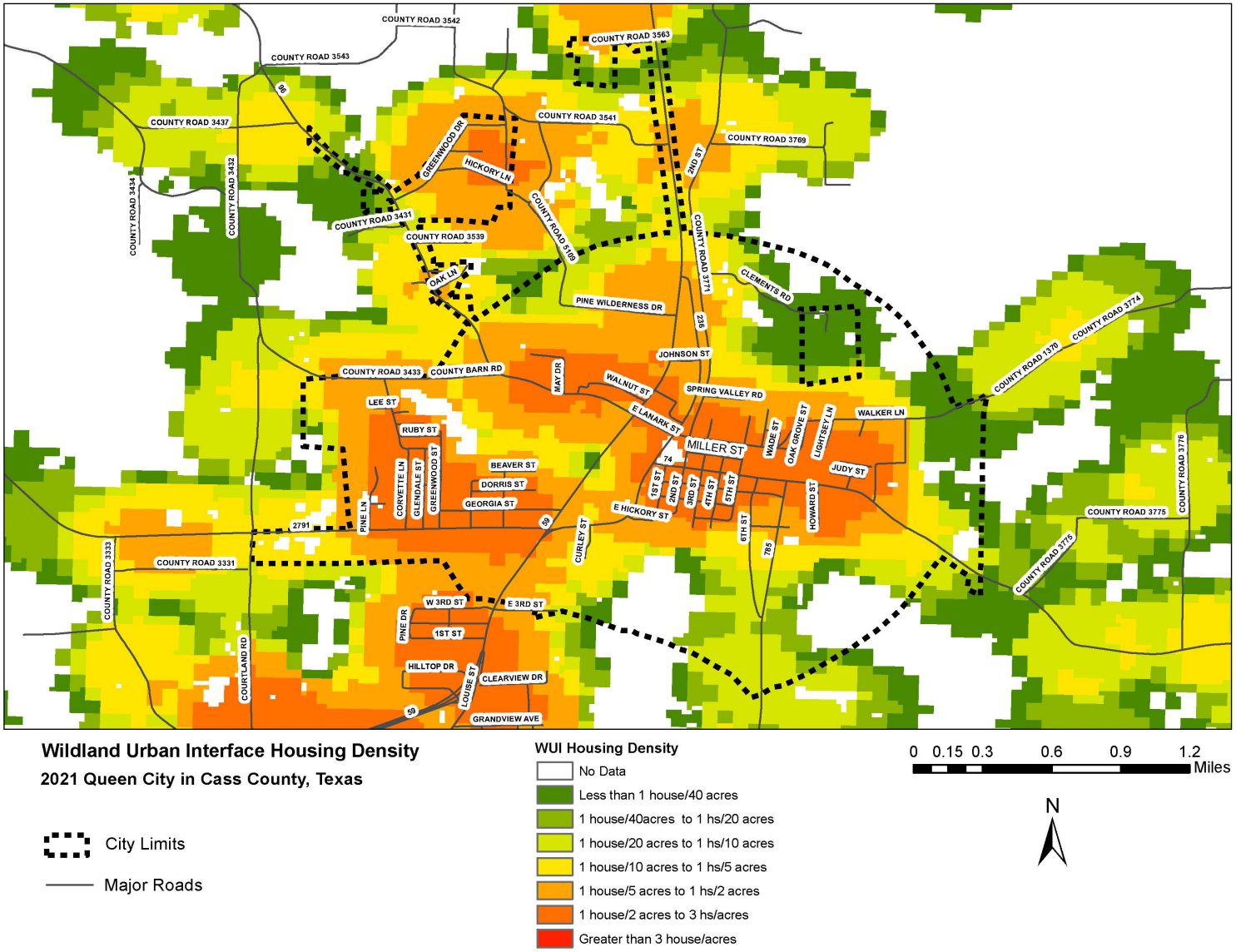


Figure 31: Queen City Wildland Urban Interface Housing Density

B) Impact

Impacts from a wildfire in Cass County and the participating jurisdictions may include but are not limited to: crop damage or destruction, damaged or destroyed agricultural, residential, commercial, and industrial buildings, escaped, lost, injured or killed livestock and pets. In the worst cases, residents may be injured or killed.

5) Vulnerability

A) Population

As described in Section 3 of Chapter 3 above, Cass County and the participating jurisdictions are home to many vulnerable residents. Increased vulnerability may be due to many factors including but not limited to: age, physical ability, financial means, housing type, and housing condition. Many of these vulnerabilities often overlap.

The jurisdictions recognize that vulnerable populations may need additional help preparing for and recovering from a wildfire.

Residents of mobile homes, specifically those built before HUD's Manufactured Housing and Standards requirements were introduced in 1976, are of particular concern[27]. These structures are more prone to fire and have a higher incidence of occupant death than modern manufactured homes.

Residents of sub-standard structures are also of particular concern. Structures in sub-standard condition ahead of a wildfire, whether due to structural damages, missing windows or doors, holes in exterior walls or the roof, may be less safe during a wildfire than structures in standard condition. Exterior damages may make the homes more prone to fire by more readily exposing flammable materials to flame. Missing windows and other exterior gaps may leave residents and structures prone to smoke inhalation and smoke damage.

All of these issues may increase damages and lead to injuries or loss of life.

[27] https://www.usfa.fema.gov/downloads/pdf/statistics/rural.pdf

B) Critical Facilities

There are 77 critical facilities located throughout the County and participating jurisdictions. 57 of the 77 critical facilities are located in the wildland urban interface (WUI), as defined by the Texas A&M Forest Service. Because of their location in the WUI, the density of development, and proximity to wildland areas, these facilities are believed to be particularly susceptible to future wildfire threats.

Table 62: Critical Facilities Vulnerable to Wildfire and Potential Impacts

Jurisdiction	Critical Facilities	Potential Wildfire Impacts				
		Destruction	Partial Destruction	Heat Damage	Smoke Damage	Water Damage
Cass County	Cass County Annex	x	x	x	x	x
Cass County	Cass County Barn Precinct 3	x	x	x	x	x
Cass County	Cass County Emergency Services District 1-Huffins Station	x	x	x	x	x
Cass County	Cass County Emergency Services District 1-Kildare Station	x	x	x	x	x
Cass County	Cass County Emergency Services District 1-Mcleod Station	x	x	x	x	x
Cass County	Cass County Emergency Services District 2-Antioch Station	x	x	x	x	x
Cass County	Cass County Emergency Services District 2-Domino Station	x	x	x	x	x
Cass County	Cass County Emergency Services District 3- Smyrna Station	x	x	x	x	x
Cass County	Cass County Jail	x	x	x	x	x
Cass County	Cass County Justice of Peace Precinct 3	x	x	x	x	x
Cass County	Cass County Law Enforcement and Justice Center	x	x	x	x	x
Cass County	Cass County Precinct 2	x	x	x	x	x
Cass County	Cass CountyEmergency Services District 2	x	x	x	x	x
Cass County	County of Cass Barn Precinct 4	x	x	x	x	x
Atlanta	Atlanta Public Works (Water & Wastewater)	x	x	x	x	x
Atlanta	Golden Villa Nursing Home	x	x	x	x	x
Atlanta	ATLANTA EL	x	x	x	x	x
Atlanta	ATLANTA H S	x	x	x	x	x
Atlanta	ATLANTA MIDDLE	x	x	x	x	x
Atlanta	CHRISTUS ST MICHAEL HOSPITAL - ATLANTA	x	x	x	x	x

Atlanta	Health Care Express	x	x	x	x	x
Atlanta	Atlanta City Hall	x	x	x	x	x
Atlanta	Mattie Lanier Richey Center	x	x	x	x	x
Atlanta	Atlanta Water Department	x	x	x	x	x
Avinger	Avinger City Hall	x	x	x	x	x
Avinger	Avinger High School	x	x	x	x	x
Avinger	Avinger Fire Department	x	x	x	x	x
Avinger	Housing Authority of The City of Avinger	x	x	x	x	x
Bloomburg	Bloomburg VFD Non-Emergency	x	x	x	x	x
Bloomburg	Bloomburg High School	x	x	x	x	x
Bloomburg	Bloomburg VFD Elementary	x	x	x	x	x
Douglassville	Douglassville City Hall, Water Department, Fire Station	x	x	x	x	x
Douglassville	Douglassville Dollar General	x	x	x	x	x
Douglassville	Mikes Food Mart	x	x	x	x	x
Hughes Springs	Hughes Springs Fire Station	x	x	x	x	x
Hughes Springs	Hughes Springs Police Department	x	x	x	x	x
Hughes Springs	HUGHES SPRINGS EL	x	x	x	x	x
Hughes Springs	HUGHES SPRINGS HS	x	x	x	x	x
Hughes Springs	Hugh Springs Clinic	x	x	x	x	x
Hughes Springs	Hughes Springs Housing Authority	x	x	x	x	x
Hughes Springs	Hughes Springs City Hall	x	x	x	x	x
Hughes Springs	Med Shop Pharmacy	x	x	x	x	x
Hughes Springs	Hill's Groceries	x	x	x	x	x
Linden	Center Hill Volunteer Fire Department	x	x	x	x	x
Linden	Linden Kildare High School	x	x	x	x	x
Linden	Crump Food Store	x	x	x	x	x
Linden	Focus Care at Linden	x	x	x	x	x
Linden	Linden Life Center	x	x	x	x	x
Marietta	Marietta Water Department	x	x	x	x	x
Marietta	Marietta City Hall/Municipal Building	x	x	x	x	x

Marietta	Marietta Volunteer Fire Department	x	x	x	x	x
Marietta	Oakridge Baptist Church	x	x	x	x	x
Queen City	Morris Upchurch Middle	x	x	x	x	x
Queen City	Queen City High School	x	x	x	x	x
Queen City	JK Hileman Elementary	x	x	x	x	x
Queen City	City Hall	x	x	x	x	x
Queen City	Queen City Waterworks	x	x	x	x	x

C) Vulnerable Parcels

Table 63: Cass County Parcels Vulnerable to Wildfire

Jurisdiction	Total	Estimated Potential Damage Value
Countywide	1,428	$222,467,146
City of Atlanta	24	$180,147,50
City of Avinger	6	$485,050
City of Bloomburg	3	$99,790
City of Domino	0	N/A
City of Douglassville	15	$2,605,130
City of Hughes Springs	0	N/A
City of Linden	5	$659,480
City of Marietta	0	N/A
Queen City	4	$ 473,540

10. Winter Weather

Winter weather is defined by extreme cold and heavy concentrations of snowfall or ice. Texas is disrupted more severely by winter weather than regions that experience severe winter weather more frequently. The types of winter weather which Texans are most familiar with are snowstorms, blizzards, cold waves, and ice storms.

Snowfall with an accumulation of four or more inches in a 12-hour period is considered a heavy snowfall. Snowfall of any amount is rare south of a line from Del Rio to Port Arthur, and it is this rarity of event, coupled with a lack of preparedness for such an event, that creates a severe weather condition.

Blizzards are the most perilous of all winter storms, characterized by low temperatures and strong winds in excess of 35 mph, bearing large amounts of blowing or drifting snow. Blizzards take a terrible toll on livestock and people caught in the open. In Texas, blizzards are most likely to occur in the Panhandle and South Plains Regions. The passage of a winter cold front with a drastic drop in temperature heralds the arrival of a cold wave, usually referred to as a "blue north'er."

An ice storm occurs when rain falls out of the warm and moist upper layers of the atmosphere into a cold and dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. If a half inch of rain freezes on trees and utility wires, damage can occur, especially if accompanied by high winds, thus half an inch is used as the criteria before an icing event is categorized as an "ice storm."

1) Severe Winter Weather History

In the 2016 HMAP, Cass County and the participating jurisdictions reported 17 winter storms between February 1994 and February 2014. These events caused $204.5 million in damages in Cass County and the participating jurisdictions. Historically, Cass County and the participating jurisdictions have reported high probability of freeze which may increase likelihood of winter storms.

NCEI data shows that the participating jurisdictions experienced 11 winter storm events between January 2015 and February 2021, which caused about $2 million in damages adjusted to $2021. None are reported to have caused any injuries or fatalities. The most recent winter weather event was Winter Storm Uri in February 2021. During that event, the City of Atlanta received 7 ½ inches of snow and the City of Hughes Springs received 7.2 inches of snow. The amount of snow and sleet made driving within the region impossible. The participating jurisdictions also experienced rolling blackouts further aggravated by the additional power outages the snow and

ice were responsible for. Many metal carport canopies also collapsed in the region due to the weight of accumulated snow and ice.

Table 64: Cass County Severe Winter Storm History

Location	Date Range	Number of Severe Winter Storms	Winter Storm Types	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Countywide	1/11/2015 - 2/16/2021	11	Winter Weather, Winter Storm	0	0	$2,000,000	$0

2) Likelihood of Future Occurrence

Future winter storms in Cass County and the participating jurisdictions are considered likely, meaning an event affecting any or all of the participating jurisdictions is probable in the next three years.

3) Extent

Table 65 below displays the magnitude of winter weather.

Table 65: Winter Weather Extent Scale[28]

Frost Advisory*	Issued when nighttime minimum temperatures are expected to range from 33°F to 36°F in the growing season.
Freeze Warning*	Issued when nighttime minimum temperatures are expected to reach 32°F or lower in the growing season. They are usually issued to highlight the first few freezes of the fall, or unusually late freezes in the spring. *A Freeze Watch is issued when these conditions may be met 12 to 48 hours in the future.*
Snow Advisory	Issued when accumulating snow of 2 to 4 inches is expected. An advisory may still be warranted if lesser accumulations will produce travel difficulties, especially early in the winter season.
Blowing Snow Advisory	Issued when blowing snow is expected to occasionally reduce visibilities to 1/4 mile or less with winds generally 25 to 34 mph. The event should last at least 3 hours.
Snow and Blowing Snow Advisory	Issued when winds of 25 to 34 mph are expected to be accompanied by falling snow and blowing snow, occasionally reducing the visibility to 1/4 mile or less. The event should last at least 3 hours
Freezing Rain / Drizzle Advisory	Issued for freezing rain when ice accumulations are expected to cause travel problems, but not exceed 1/4".
Sleet Advisory	Issued for accumulating sleet of 1/4" to 1". Because sleet usually occurs with other precipitation types, a winter weather advisory will almost always be used in such cases.

[28] Source: National Weather Service Weather Forecast Office; Norman, Oklahoma. http://www.srh.noaa.gov/oun/?n=spotter-wwa-definitions

Winter Weather Advisory	Issued for a winter weather event in which there is more than one hazard present, but all precipitation is expected to remain below warning criteria. For example, it would be issued if 2 inches of snow were expected with a small amount of sleet mixing in at times.
Wind Chill Advisory[29]	Issued when wind chill temperatures are expected to be a significant inconvenience to life with prolonged exposure, and, if caution is not exercised, could lead to hazardous exposure.
Wind Chill Warning[30]	Issued when wind chill temperatures are expected to be hazardous to life within several minutes of exposure.
Ice Storm Warning	Issued when a period of freezing rain is expected to produce ice accumulations of 1/4" or greater, or cause significant disruptions to travel or utilities.
Heavy Sleet Warning	Issued when a period of sleet is expected to produce ice accumulations of 1" or greater, or cause significant disruptions to travel or utilities.
Heavy Snow Warning	Issued when snow is expected to accumulate 4 inches or more in 12 hours, or 6 inches or more in 24 hours.
Winter Storm Warning	Issued for a winter weather event in which there is more than one hazard present, and one of the warning criteria listed above is expected to be met. For example, it would be issued if 5 inches of snow were expected in 12 hours, with some sleet mixing in at times. It is commonly issued for heavy snow with strong winds of 25-34 mph that will cause blowing and drifting of the snow. *A Winter Storm Watch is issued when these conditions may be met 12 to 48 hours in the future.*
Blizzard Warning	Issued for sustained wind or frequent gusts greater than or equal to 35 mph accompanied by falling and/or blowing snow, frequently reducing visibility to less than 1/4 mile for three hours or more. *A Blizzard Watch is issued when these conditions may be met 12 to 48 hours in the future.*

* - Non-precipitation watch / warning / advisory

Based on previous winter storm events, future storms in Cass County and the participating jurisdictions may see snow accumulation of up to 8.1” and see ice accumulation of up to 2”.

4) Location and Impact

A) Location – All Jurisdictions

Severe winter weather has no distinct geographic boundary. Severe winter weather can occur across the entire planning area and uniformly affect all participating jurisdictions.

B) Impact – All Jurisdictions

The potential impact of a severe winter storm is normally minor, resulting in few, if any, injuries. Because of the rarity of winter storm events in Cass County and the participating jurisdictions, drivers, especially those unfamiliar with or unable to drive in icy conditions, may be at the highest risk of crashing their vehicle and sustaining injuries.

[29] https://www.osha.gov/dts/weather/winter_weather/windchill.html
[30] https://www.osha.gov/dts/weather/winter_weather/windchill.html

Beyond accidents caused by icy conditions, severe winter weather has the potential to cause widespread power outages. Trees and other vegetation that grow along or near power lines and utility lines can become overburdened by ice and snow accumulation. Falling limbs or trees can easily take down power and utility lines. Neglected vegetation is especially at risk of failure due to increased weight loads. Power outages can create a cascading effect depending on residents' ability to heat their homes without electricity, especially for those young, elderly, and low-income residents as identified in Section 3 of Chapter 3 above. Although no deaths related to winter weather have been reported in the participating jurisdictions, in the worst cases, the hazard has the potential to be deadly.

Severe winter storms will likely cause only minor property damage and minimal disruption to the quality of life in the participating jurisdictions.

Depending on when the event happens, a severe winter storm may damage or destroy crops.

5) Vulnerability

A) Infrastructure

While all of the participating jurisdictions are exposed to extreme temperatures, existing buildings and infrastructure are not considered vulnerable to significant damage directly caused by severe winter storm events. This determination was made based on the expectation that most roofs can support 20 lbs. / square foot of snow[31]. The worst snowstorm in any participating jurisdiction dropped 8.1". Although it's not impossible[32] for that much snow to cause structural damage, given that the snow weight is well below the threshold where damage is likely, structural damages are not expected. Additionally, 1" of ice is roughly equivalent in weight per square foot to 10" of snow. Considering the worst ice storms in the participating jurisdictions cause ice accumulations of 2", it's unlikely, but not impossible, that an ice storm causing structural ice accumulations of less than 4" will cause significant structural damages.

However, significant damages may be incurred indirectly. Examples include, but are not limited to, trees and limbs that fall after being overburdened with snow or ice, building strikes due to vehicles losing traction on snow or ice-covered roads, and power outages that affect building temperature regulation and allow pipes to freeze and burst.

B) Population

As described in Section 3 of Chapter 3 above, Cass County and the participating jurisdictions are home to many vulnerable residents. Areas with concentrations of young, elderly, and low-

[31] https://disastersafety.org/freezing-weather/prevent-roof-collapse-homes/

[32] https://www.fema.gov/media-library-data/7d8c55d1c4f815edf3d7e7d1c120383f/FEMA957_Snowload_508.pdf - The weight of a foot a snow can vary widely based on how wet the snow is, between 3 and 21 lbs. per square foot. However, wet snow primarily affects the East Coast, Pacific Northwest, and southwestern Alaska.

income residents may feel greater impacts from severe winter weather due to those populations' limited ability to properly address the hazard. Deficiencies may include but aren't limited to: lack of heating in their homes or vehicles, lack of access to heated public spaces during the coldest part of the day or night, and frozen pipes that may jeopardize access to drinking water, and in the worst cases, lead to severe structural damage that can render a home unlivable. The consequences for these populations' exposure to severe winter weather can include but are not limited to: complications for those suffering from hypertension, hypothyroidism, and diabetes, as well as exhaustion, hypothermia, trench foot, or death.

C) Critical Facilities

Any shutdown of critical facilities due to severe winter weather is expected to be temporary. However, based on the proximity of trees and powerlines on their properties, the following critical facilities may be at a higher risk of losing power due to falling limbs.

Table 66: Critical Facilities Vulnerable to Winter Storms

Jurisdiction	Critical Facilities	Potential Severe Winter Storm Impacts
		Falling Tree Limbs
Cass County	Cass County Emergency Services District 2	x
Cass County	Cass County Precinct 2	x
Cass County	Cass County Extension	X
Cass County	Cass County Tax Assessor	x
Cass County	Cass County Jail	x
Cass County	Cass Co. Emergency Services District 1-Mcleod Station	X
Cass County	Cass Co. Emergency Services District 1-Kildare Station	X
Cass County	Cass Co. Emergency Services District 1-Huffins Station	X
Cass County	Cass Co. Emergency Services District 2-Antioch Station	X
Cass County	Cass Co. Emergency Services District 2-Domino Station	X
Cass County	Cass Co. Emergency Services District 3- Smyrna Station	X
Cass County	Cass Co. Law Enforcement and Justice Center	X
Cass County	Cass County Barn Precinct 3	X
Cass County	Cass County Justice of Peace Precinct 3	x
Cass County	Cass County Barn Precinct 1	x
Cass County	County of Cass Barn Precinct 4	X
Cass County	Cass County Justice of Peace Precinct 4	X
Cass County	Law Enforcement Training Center	x
Cass County	Cass County Annex	x
Atlanta	Golden Villa Nursing Home	x
Atlanta	Rose Haven Retreat	x
Atlanta	Atlanta High School	X

Atlanta	Atlanta Elementary	X
Atlanta	Atlanta Middle	x
Atlanta	Atlanta Primary	X
Atlanta	Christus St. Michael hospital	x
Atlanta	Health Care Express	X
Atlanta	Housing Authority of The City of Atlanta	X
Avinger	Avinger High School	x
Avinger	Avinger Fire Department	x
Avinger	Housing Authority of The City of Avinger	x
Bloomburg	Bloomburg High School	X
Bloomburg	Bloomburg Elementary	X
Douglassville	City Hall	X
Douglassville	Water Department	X
Douglassville	Fire Station	X
Hughes Springs	Hughes Springs Fire Station	X
Hughes Springs	Hughes Springs Police Department	X
Hughes Springs	Hughes Springs Junior High	X
Hughes Springs	Hughes Springs Elementary	X
Hughes Springs	Hughes Springs High School	X
Hughes Springs	Hugh Springs Clinic	X
Hughes Springs	Hughes Springs Housing Authority	x
Hughes Springs	City Hall	X
Hughes Springs	Medical Shop Pharmacy	X
Linden	Center Hill Volunteer Fire Department	x
Linden	Linden Elementary	x
Linden	Linden Kildare High School	X
Linden	Mae Luster Stephens Junior High	X
Linden	Crump Food Store	X
Linden	Focus Care at Linden	x
Linden	Mary Dougherty Senior Citizens Center	x
Marietta	Marietta Natural Gas Department	x
Marietta	Marietta Water Department	x
Marietta	Marietta City Hall/Municipal Building	x
Marietta	Marietta Volunteer Fire Department	x
Marietta	Oakridge Baptist Church	x
Queen City	JK Hileman Elementary	x
Queen City	City Hall	x
Queen City	Queen City Waterworks	x

11. Lightning

Lightning is a massive electrostatic discharge between electrically charged regions within clouds, or between a cloud and the Earth's surface.

Lightning damage can result in electrocution of humans and animals; vaporization of materials along the path of the strike; fire caused by the high temperature produced by the strike; and sudden power surges that can damage electrical and electronic equipment. Millions of dollars of direct and indirect damages result from lightning strikes on electric utility substations and distribution lines. While property damage is the major hazard associated with lightning, it should be noted that lightning strikes kill nearly 49 people[33] each year in the United States.

1) Lightning History

Cass County and the participating jurisdictions did not address lightning in their previous plan.

According to NCEI data, Cass County and the participating jurisdictions have experienced two lightning events between September 1996 and May 1997. Neither of the events are reported to have caused injuries nor fatalities. There is no data documenting a lightning event more recent than 1997. Cass County and the participating jurisdictions did not Lightning as a standalone hazard in the 2016 Hazard Mitigation Action Plan. However, the planning team determined that lightning events occur multiple times annually.

Table 67: Cass County Lightning History

Location	Date Range	Number of Lightning Events	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Countywide	9/20/1996 - 5/2/1997	2	0	0	$11,723.57	$0

2) Likelihood of Future Occurrence

Lightning is especially associated with thunderstorms. Despite the lack of officially reported instances of lightning-caused damages, a lightning event is highly likely, meaning an event affecting any or all the participating jurisdictions is probable in the next year. According to information from VAISALA[34], most of Cass County can expect between 6 and 12 lightning flashes per square mile per year.

3) Extent

The extent for lightning can be expressed in terms of the number of strikes within an interval. Given the lack of lightning history data, it is expected that Cass County and all participating

[33] https://www.weather.gov/safety/lightning-victims

[34] http://www.vaisala.com/VaisalaImages/Lightning/avg_fd_2005-2014_CONUS_2mi_grid.png

jurisdictions may experience lightning events between LAL 1 and LAL 5. Dry thunderstorms, LAL 6, are not expected.

Table 68: Lightning Activity Levels[35]

Lightning Activity Level (LAL)		
Activity levels are valuable guidance tools to aid in the preparation for possible fire initiation from cloud-to-ground lightning.		
LAL	Cloud and Storm Development	Lightning Strikes per 15 Minutes
1	No thunderstorms.	-
2	Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-8
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	9-15
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common and lightning is frequent.	16-25
5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy and lightning is frequent and intense.	25+
6	Similar to LAL 3 except thunderstorms are dry.	

4) Location and Impact

A) Location – All Jurisdictions

Lightning strikes have no distinct geographic boundary. Lightning can occur across each participating jurisdiction.

B) Impact – All Jurisdictions

Impacts from lightning in all jurisdictions may include but are not limited to loss of power due to electrical surges, damaged or destroyed personal property including computers and other electronics, damaged or destroyed agricultural, residential, commercial, and industrial buildings. Crops may be damaged or destroyed. Livestock may be injured or killed by lightning. In the worst cases, lightning may cause injuries or even loss of life.

5) Vulnerability

According to the Lightning Protection Institute, it is a myth[36] that lightning always strikes the tallest objects. Given lightning's indiscriminate nature, it is impossible to identify buildings that

[35] Source: http://www.prh.noaa.gov/hnl/pages/LAL.php

are at an increased risk of being struck by lightning. All existing and future buildings, critical facilities, critical infrastructure, improved property, and the population are exposed to this hazard. However, structures without adequate lightning protection and those with large concentrations of electronic equipment like computers, servers, and printers, are most vulnerable, as are locations that may have outside crowds during a lightning event.

A) Critical Facilities

Table 69: Critical Facilities Vulnerable to Lightning and Potential Impacts

Jurisdiction	Critical Facilities	Potential Lightning Impacts			
		Physical Damage	Electrical Damage	Data Damage or Loss	Fire
Cass County	Cass County Emergency Services District 2	x	x	x	x
Cass County	Cass County Precinct 2	x	x	x	x
Cass County	Cass County Historic Courthouse	x	x	x	x
Cass County	Cass County Extension	x	x	x	x
Cass County	Cass County Tax Assessor	x	x	x	x
Cass County	Cass County Jail	x	x	x	x
Cass County	Cass Co. Emergency Services District 1-Mcleod Station	x	x	x	x
Cass County	Cass Co. Emergency Services District 1-Kildare Station	x	x	x	x
Cass County	Cass Co. Emergency Services District 1-Huffins Station	x	x	x	x
Cass County	Cass Co. Emergency Services District 2-Antioch Station	x	x	x	x
Cass County	Cass Co. Emergency Services District 2-Domino Station	x	x	x	x
Cass County	Cass Co. Emergency Services District 3- Smyrna Station	x	x	x	x
Cass County	Cass Co. Law Enforcement and Justice Center	x	x	x	x
Cass County	Cass County Barn Precinct 3	x	x	x	x
Cass County	Cass County Justice of Peace Precinct 3	x	x	x	x
Cass County	Cass County Barn Precinct 2	x	x	x	x
Cass County	Cass County Barn Precinct 1	x	x	x	x
Cass County	County of Cass Barn Precinct 4	x	x	x	x
Cass County	Cass County Justice of Peace Precinct 4	x	x	x	x
Cass County	Law Enforcement Training Center	x	x	x	x
Cass County	Cass County Annex	x	x	x	x
Atlanta	City of Atlanta Police Department	x	x	x	x
Atlanta	Atlanta Public Works (Water & Wastewater)	x	x	x	x
Atlanta	Golden Villa Nursing Home	x	x	x	x
Atlanta	Rose Haven Retreat	x	x	x	x
Atlanta	City of Atlanta Fire Department	x	x	x	x
Atlanta	Atlanta High School	x	x	x	x
Atlanta	Atlanta Elementary	x	x	x	x
Atlanta	Atlanta Middle	x	x	x	x

[36] http://lightning.org/wp-content/uploads/2015/06/LPI_lightning_infographic_2015.jpg

Atlanta	Atlanta Primary	x	x	x	x
Atlanta	Christus St. Michael hospital	x	x	x	x
Atlanta	Health Care Express	x	x	x	x
Atlanta	Housing Authority of The City of Atlanta	x	x	x	x
Atlanta	Atlanta City Hall	x	x	x	x
Atlanta	Atlanta Public Library	x	x	x	x
Atlanta	Mattie Lanier Richey Center	x	x	x	x
Atlanta	Atlanta Water Department	x	x	x	x
Atlanta	Avinger City Hall	x	x	x	x
Atlanta	Avinger High School	x	x	x	x
Atlanta	Avinger Fire Department	x	x	x	x
Atlanta	Housing Authority of The City of Avinger	x	x	x	x
Avinger	Avinger City Hall	x	x	X	x
Avinger	Avinger High School	x	x	X	x
Avinger	Avinger Fire Department	x	x	x	x
Avinger	Housing Authority of The City of Avinger	x	x	x	x
Bloomberg	Bloomburg VFD Non-Emergency	x	x	x	x
Bloomberg	Bloomburg High School	x	x	x	x
Bloomberg	Bloomburg Elementary	x	x	x	x
Douglassville	City Hall Fire Station	x	x	x	x
Douglassville	Water Department	x	x	x	x
Douglassville	Fire Station	x	x	x	x
Douglassville	Douglassville Dollar General	x	x	x	x
Douglassville	Mikes Food Mart	x	x	x	x
Hughes Springs	Hughes Springs Fire Station	x	x	x	x
Hughes Springs	Hughes Springs Police Department	x	x	x	x
Hughes Springs	Hughes Springs Junior High	x	x	x	x
Hughes Springs	Hughes Springs Elementary	x	x	x	x
Hughes Springs	Hughes Springs High School	x	x	x	x
Hughes Springs	Hugh Springs Clinic	x	x	x	x
Hughes Springs	Hughes Springs Housing Authority	x	x	x	x
Hughes Springs	City Hall	x	x	x	x
Hughes Springs	Medical Shop Pharmacy	x	x	x	x
Hughes Springs	Hill's Grocery	x	x	x	x
Linden	Center Hill Volunteer Fire Department	x	x	x	x
Linden	City of Linden Police Department	x	x	x	x
Linden	Linden Elementary	x	x	x	x
Linden	Linden Kildare High School	x	x	x	x
Linden	Mae Luster Stephens Junior High	x	x	x	x
Linden	City Hall	x	x	x	x
Linden	Crump Food Store	x	x	x	x
Linden	Focus Care at Linden	x	x	x	x
Linden	Linden Life Center	x	x	x	x

Linden	Linden VFD Station	x	x	x	x
Linden	Mary Dougherty Senior Citizens Center	x	x	x	x
Marietta	Marietta Natural Gas Department	x	x	x	x
Marietta	Marietta Water Department	x	x	x	x
Marietta	Marietta City Hall/Municipal Building	x	x	x	x
Marietta	Marietta Volunteer Fire Department	x	x	x	x
Marietta	Oakridge Baptist Church	x	x	x	x
Marietta	Morris Upchurch Middle	x	x	x	x
Queen City	Queen City High School	x	x	x	x
Queen City	J K Hileman Elementary	x	x	x	x
Queen City	City Hall	x	x	x	x
Queen City	Queen City Waterworks	x	x	x	x

B) Vulnerable Parcels

Table 70: Parcels Vulnerable to Lightning

Jurisdiction	Parcel Count	Estimated Potential Damage Value
Cass County	**32,596**	**$2,176,936,888**
City of Atlanta	3,775	$261,595,449
City of Avinger	344	$14,030,240
City of Bloomburg	330	$16,243,440
City of Domino	15	$228,080
City of Douglassville	199	$12,155,680
City of Hughes Springs	1,063	$54,655,450
City of Linden	1,391	$94,588,741
City of Marietta	115	$4,535,750
City of Queen City	1,013	$52,974,647

12. Extreme Cold

Extreme cold can happen anywhere in the state, although its levels can range extensively. In the panhandle extreme cold means days below zero Fahrenheit while in the Rio Grande Valley it means reaching temperatures below freezing. Extreme cold is an issue any time winter temperatures drop significantly below normal and make staying warm and safe a challenge.

Extreme cold can accompany winter weather, but it can also be independent of those storms. For that reason, the impacts of extreme cold are presented here separately from the impacts of winter weather.

1) Extreme Cold History

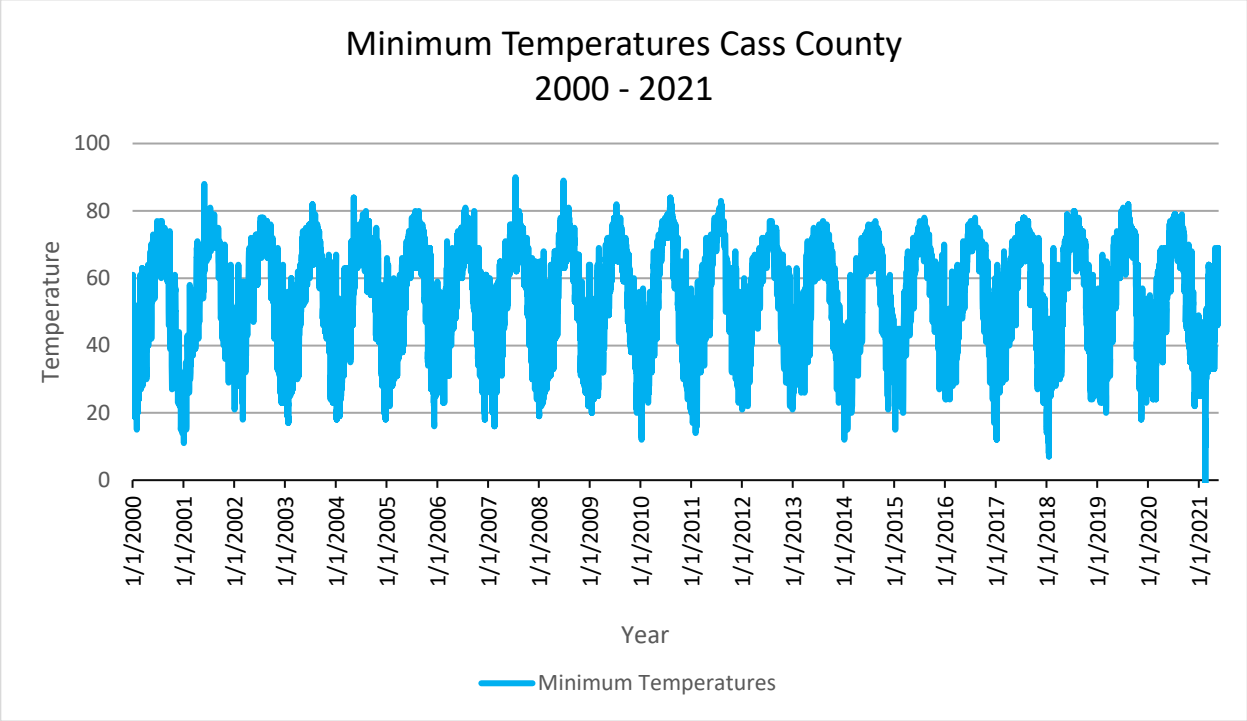


Figure 32: Minimum Recorded Daily Temperature 2000-Present[37]

Cass County and the jurisdictions addressing the hazard have not previously included extreme cold in their mitigation plan as a standalone hazard. Prior to the 2018 update to the State of Texas mitigation plan, extreme cold was considered part of the winter weather hazard.

Between 2000 and 2021, Cass County experienced 1,576 days with a minimum temperature of 32˚F or colder. At least 43 of those days had a maximum temperature of 32˚F or below.

During the same timeframe, the coldest temperature recorded was -4˚F on February 16, 2021.

[37] Source: National Centers for Environmental Information, https://www.ncdc.noaa.gov/cdo-web/datasets

Temperature data is recorded at the county level. However, given the nature of extreme cold and the proximity of all jurisdictions to each other, the jurisdictions addressing the hazard experienced the same extreme cold events.

One Extreme Cold/Wind Chill event was reported since the previous plan on February 14th, 2021, Winter Storm Uri. No injuries, deaths, property damages, or crop damages were reported in conjunction with this Extreme Cold/Winter Chill event.

2) Likelihood of Future Occurrence

Based on historic weather data, extreme cold in Cass County and the participating jurisdictions is highly likely, meaning an event affecting any or all of the participating jurisdictions is probable in the next year.

3) Extent

The magnitude or intensity of an extreme cold event is measured according to temperature in relation to wind speed. The relationship is referred to as the "Wind Chill," and is depicted in Figure 33.

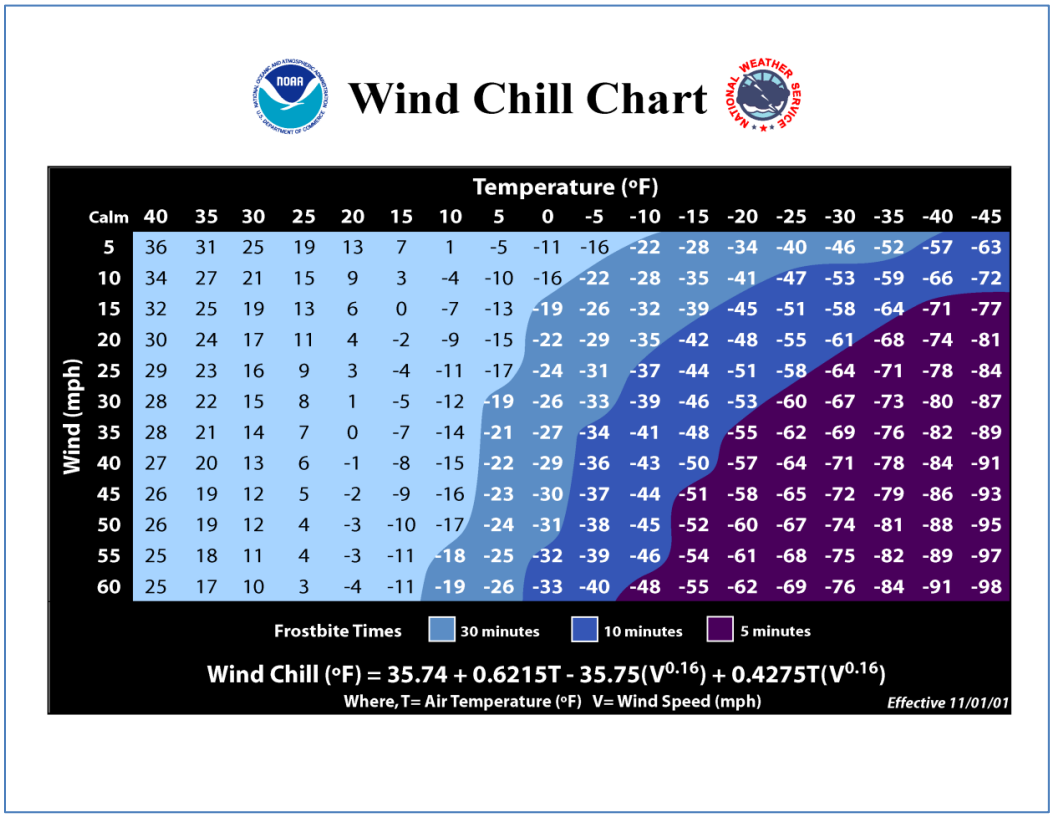


Figure 33: NOAA's NWS Wind Chill Index

As displayed in Figure 33, the wind chill temperature is a measurement of how cold the wind makes the air feel to the human body. Since wind can dramatically accelerate heat loss from the body, a 20° day could feel just as cold as a calm day with 0° temperatures. The Wind Chill Chart factors the wind chill; it is not applicable in calm winds or when the temperature is over 50°.

The coldest temperatures in Cass County and the participating jurisdictions may meet the current record temperature of -4˚F. Future extreme cold events may be as intense, long-lasting, and dangerous as previous ones.

4) Location and Impact

A) Location – All Jurisdictions

Extreme cold has no distinct geographic boundary. Extreme cold can occur across the entire planning area and uniformly affect all participating jurisdictions.

B) Impact – All Jurisdictions

The potential impact of extreme cold is normally minor, resulting in few, if any, injuries. No property or crop damage specifically tied to extreme cold events has been recorded in any of the participating jurisdictions. No deaths related to extreme cold have ever been reported in the participating jurisdictions. However, based on the hazard's potential, in the worst cases, especially if combined with winter weather, the hazard may inflict property or crop damages, and it can even be deadly. Any shutdown of facilities due to extreme cold is expected to be temporary.

5) Vulnerability

A) Population

As described in Section 3 of Chapter 3 above, Cass County and the participating jurisdictions are home to many vulnerable residents. Areas with concentrations of young, elderly, and low-income residents may feel greater impacts from extreme cold due to those populations' limited ability to properly address the hazard. Deficiencies may include but aren't limited to: lack of heating in their homes or vehicles, lack of access to heated public spaces during the coldest part of the day or night, and frozen pipes that may jeopardize access to drinking water, and in the worst cases, lead to severe structural damage that can render a home unlivable. The consequences for these populations' exposure to extreme cold may include but are not limited to: complications for those suffering from hypertension, hypothyroidism, and diabetes, as well as exhaustion, hypothermia, trench foot, or death.

B) Critical Facilities

While all of the jurisdictions are exposed to extreme temperatures, existing buildings, infrastructure, and critical facilities are not considered vulnerable to damages significant enough to interrupt or stop normal operations. Therefore, any estimated property losses associated with the hazard are anticipated to be minimal across the area.

13. Extreme Heat

Extreme heat is defined as summertime temperatures that are substantially hotter and/or more humid than average for a given location at that time of year. Humid conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground.

Although heat can damage buildings and facilities, it presents a more significant threat to the safety and welfare of citizens. The major human risks associated with severe summer heat include: heat cramps; sunburn; dehydration; fatigue; heat exhaustion; and heat stroke. The most vulnerable population to heat casualties are children and the elderly or infirm, who frequently live on low fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their wellbeing.

Severe summer heat is an invisible killer. Although a heat wave does not happen with the spectacle of other hazards such as tornados and floods, the National Center for Environmental Health reports that extreme heat caused 7,415 heat-related deaths in the United States from 1999 to 2010[38]. Extreme heat kills more people than hurricanes, floods, tornados, and lightning combined, according to the National Weather Service. In 2001, 300 deaths were caused by excessive heat exposure.

[38] http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp

1) Extreme Heat History

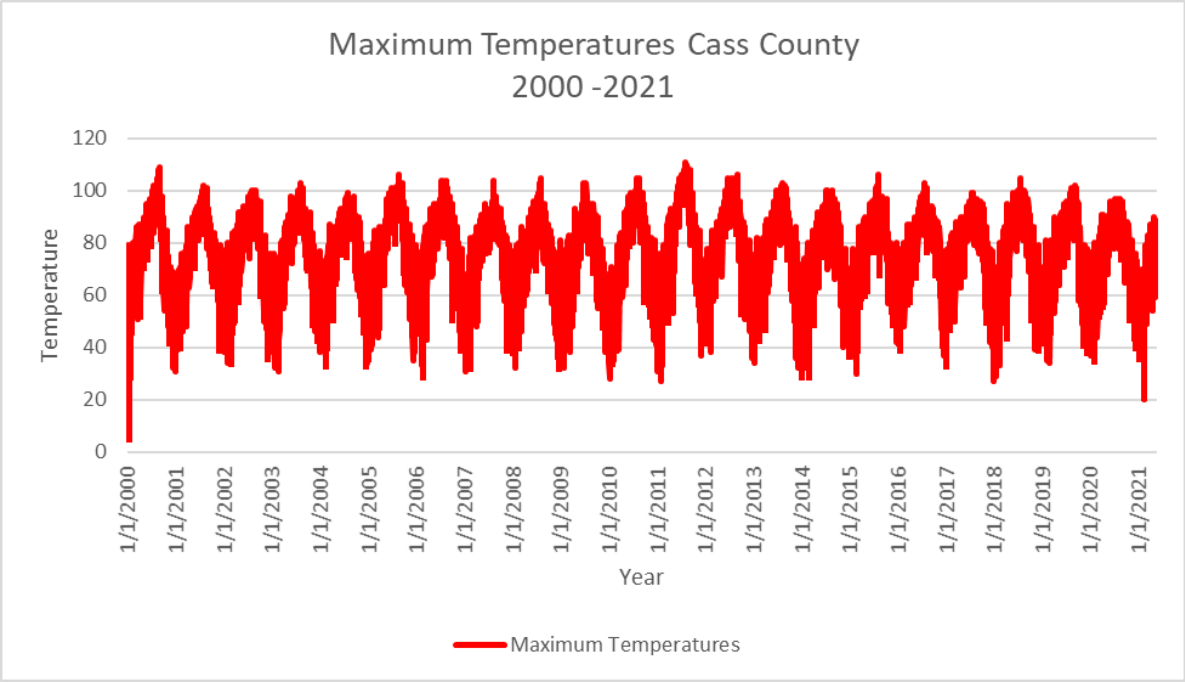


Figure 34: Maximum Recorded Daily Temperature 2000-2017[39]

In the 2016 HMAP, Cass County and the participating jurisdictions reported 703 days of extreme heat from June 2006 and August 2014. The 2016 HMAP also reported that it is highly likely Cass County, and its jurisdictions, will experience extreme heat since the region often sees three to four extreme heat occurrences every summer.

Between January 2000 and January 2021, Cass County and the participating jurisdictions experienced 329 days with a maximum temperature of 100˚F or hotter and 612 days where the combination of humidity and moderate-to-high temperatures warranted a heat advisory, if not an extreme heat warning.

Extreme heat data is recorded at the county level. However, given the nature of extreme heat and the proximity of all jurisdictions to each other, every jurisdiction experienced the same extreme heat events.

In addition to high temperatures, NCEI data shows that the participating jurisdictions have experienced 29 extreme heat events since 2015 shown in Table 71. These events did not cause any injuries, fatalities, or damages.

[39] Source: National Centers for Environmental Information, https://www.ncdc.noaa.gov/cdo-web/datasets

Table 71: Cass County Extreme Heat Events

Location	Date Range	Number of Extreme Heat Events	Fatalities	Injuries	Property Damage $2021	Crop Damage $2021
Countywide	7/13/2015 - 8/31/2020	29	0	0	0	0

No extreme heat events are reported to have caused any injuries, fatalities, or damages.

2) Likelihood of Future Occurrence

Based on historic weather data, extreme heat in Cass County and the participating jurisdictions is highly likely, meaning an event affecting any or all of the participating jurisdictions is probable in the next year.

3) Extent

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric Administration (NOAA), this relationship is referred to as the "Heat Index," and is depicted in Figure 35. This index measures how hot it feels outside when humidity is combined with high temperatures.

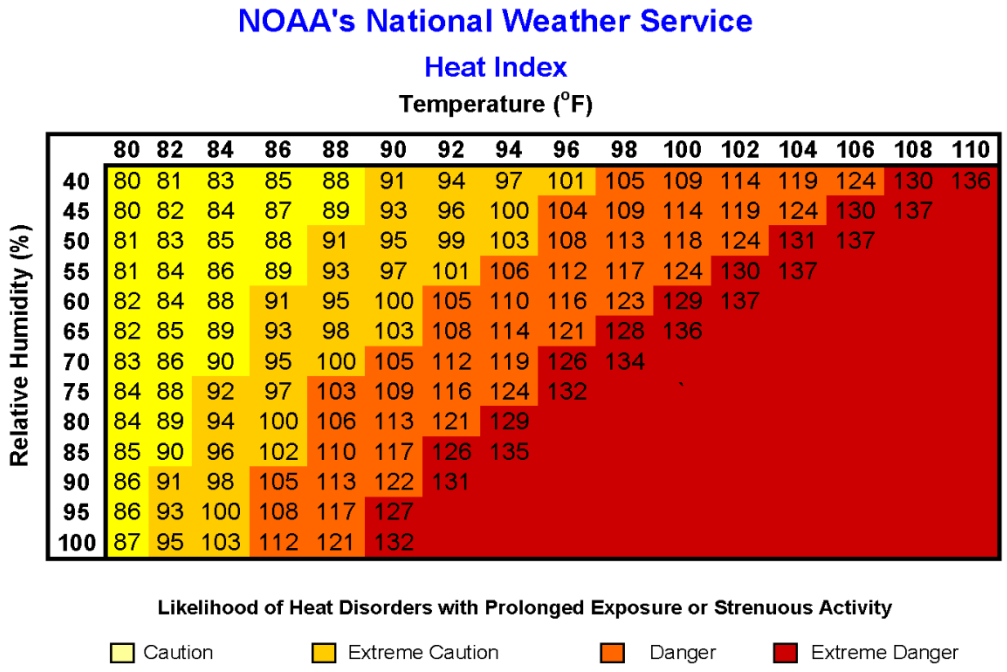


Figure 35: NOAA's NWS Heat Index Chart[40]

[40] Source: http://www.nws.noaa.gov/om/heat/ht-images/heatindexchart.png

The extent scale in Figure 35 displays varying degrees of caution depending on the relative humidity combined with the temperature. For example, when the temperature is below 90˚F, caution should be exercised if the humidity level is at or above 40 percent.

The shaded zones on the chart indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. “Caution” is the first level of intensity where fatigue due to heat exposure is possible. “Extreme Caution” indicates that sunstroke, muscle cramps or heat exhaustion are possible, whereas a “Danger” level means that these symptoms are likely. “Extreme Danger” indicates that heat stroke is likely.

The National Weather Service (NWS) initiates alerts based on the Heat Index as shown in Table 72.

Table 72: Heat Intensity

Intensity	Description
Heat Advisory	Extreme heat index making it feel hot, typically between 105˚F to 110˚F for 3 hours or more during the day and at or above 75˚F at night.
Excessive Heat Warning	Extreme heat index making it feel very hot, typically above 105˚F for 3 hours or more during the day and at or above 80˚F at night.

Given an estimated daily average relative humidity level of 65%[41], highs as low as 89˚F can produce a heat index temperature of over 100˚F. The combination of high humidity and moderate temperatures creates an environment that reaches the Danger Zone on NOAA’s Heat Index Chart, which may trigger an NWS Heat Advisory.

Between 2000 and 2021, Cass County and the participating jurisdictions experienced 612 days with highs of 89˚F or hotter and overnight lows of 75˚F or hotter. Based on the NWS descriptions in Table 72 above, and the average daily humidity level, these days likely warranted a heat advisory.

The hottest temperature recorded in Cass County in the recent past, 111˚F, was reached on August 4, 2011. Based on the NWS descriptions in Table 72 above, at least 38 of the 612 heat advisory days warranted an excessive heat warning based on daytime highs, the average daily humidity level, and overnight lows not falling below 80˚F.

Future extreme heat events may meet the heat index requirements for issuing an Excessive Heat Warning as described in the Heat Intensity scale in Table 72 above. The hottest temperatures in

[41] Used Dallas Average, closest to County - https://www.currentresults.com/Weather/Texas/humidity-annual.php

Cass County and the participating jurisdictions may meet the current record temperature of 111˚F. Future extreme heat events may be as intense, long-lasting, and dangerous as previous ones.

4) Location and Impact

C) Location – All Jurisdictions

Extreme heat has no distinct geographic boundary. Extreme heat can occur across the entire planning area and uniformly affect all participating jurisdictions.

D) Impact – All Jurisdictions

The potential impact of excessive summer heat is normally minor, resulting in few, if any, injuries. No property or crop damage specifically tied to extreme heat events has been recorded in any of the participating jurisdictions. No deaths related to extreme heat have ever been reported in the participating jurisdictions. However, based on the hazard's potential, in the worst cases, especially if combined with drought conditions, the hazard may inflict property or crop damages, and it can even be deadly. Any shutdown of facilities due to extreme heat is expected to be temporary.

5) Vulnerability

C) Population

As described in Section 3 of Chapter 3 above, Cass County and the participating jurisdictions are home to many vulnerable residents. Vulnerable populations may feel greater impacts from extreme heat due to these populations' limited ability to properly address the hazard due to deficiencies including but not limited to: lack of air conditioning in their homes or vehicles, lack of access to air-conditioned public spaces during the hottest part of the day, insufficient numbers of box or ceiling fans, or lack of access to other means of cooling. The consequences for these populations' exposure to extreme heat can include but are not limited to: heat cramps, sunburn, dehydration, fatigue, heat exhaustion, heat stroke, or death.

D) Critical Facilities

While all the jurisdictions are exposed to extreme temperatures, existing buildings, infrastructure, and critical facilities are not considered vulnerable to damages significant enough to interrupt or stop normal operations. Therefore, any estimated property losses associated with the hazard are anticipated to be minimal across the area.

14. Dam Failure

Dam failure is defined as a systematic failure of the dam structure resulting in the uncontrolled release of water, often resulting in floods that could exceed the 100-year flood plain boundaries. Dam failure can cause mass fatalities, mass structural damage and/or a cascading potential if a populated area is located below the dam structure.

1) Dam Failure History

According to the best information available, there is no history of dam failure in Cass County or any of the participating jurisdictions. Cass County elected to address this hazard because of the possibility that dam and / or levee failure may become a local issue within the current planning period.

The Cities of Atlanta, Avinger, Bloomburg, Domino, Douglassville, Hughes Springs, Linden, Marietta, and Queen City determined that the jurisdictions have no risk of inundation from any high-hazard dams and the history of impacts of Dam/Levee Failure have been negligible (or non-existent), therefore it is expected that future impacts will be negligible as well, and isn't addressing the hazard.

2) Likelihood of Future Occurrence

Given the lack of a prior dam or levee failure in the participating jurisdictions, dam / levee failure is considered unlikely, meaning that one is possible in the next 10 years.

As information on the hazard is gathered more closely moving forward, its likelihood will be revised accordingly.

3) Extent

A way to consider the hazard extent is to use the storage capacity behind the dam to estimate the ground surface that would be covered with a foot of water.

An acre-foot is 325,851 gallons and would cover one acre of land with a foot of water. A 1,000-acre-foot body of water could cover 40 acres with an average depth of 25 feet, and the volume of 1,000 acre-feet is approximately 326 million gallons of water.

Hazard potential is also measured by the likelihood of dam / levee failure or negligent management to cause loss of human life. There are three levels of classification: High Hazard, Significant Hazard, and Low Hazard.

Table 73: Dam Failure Extent Classification

Hazard Potential Classification	Loss of Human Life	Dam Storage Capacity

Low	None Expected	Less than 10,000 acre-feet
Significant	Probable (1-6)	Between 10,000 – 100,000 acre-feet
High	Loss of Life Expected (7 or more)	100,000 acre-feet or more

There are 25 dams in Cass County. According to the National Inventory of Dams, all of the dams are privately owned and are less than 10,000 acre-feet.

The majority of dams and levees in Cass County are considered low hazard. They hold less than 10,000 acre-feet of water, and no loss of life is expected should any fail. However, one dam, the Eagle Landing Lake Dam, is considered a high hazard dam. If any of these dams were to fail, Cass County could experience significant crop or property damage, injuries, or even death.

4) Location and Impact

A) Location

Figure 36 below shows the location of all dams within Cass County as well as their proximity to the participating jurisdictions.

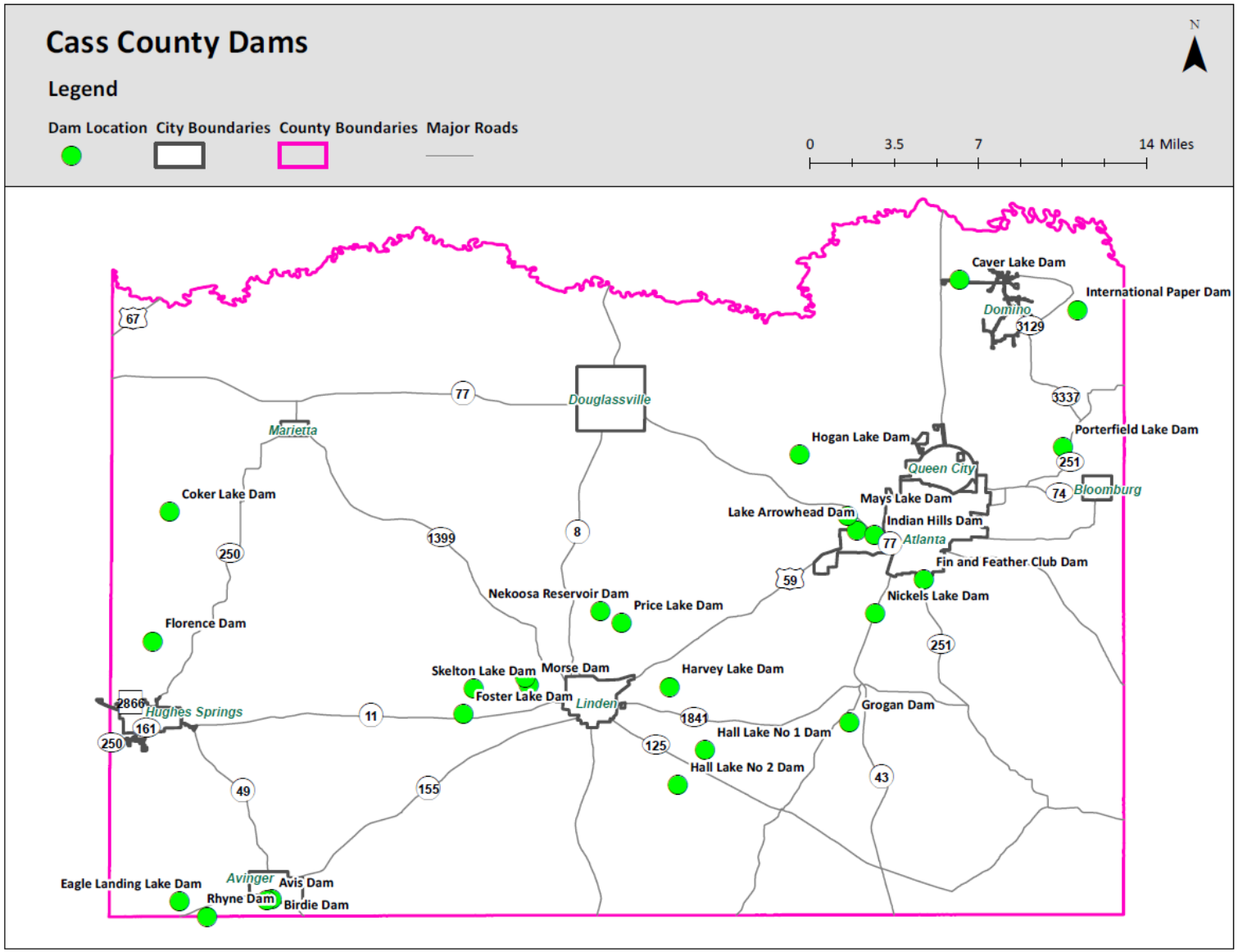


Figure 36: Cass County Dam Locations

B) Impact

Structures at risk of dam failure may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. Although no loss of life to dam failure is expected in Cass County, under the right conditions injury or loss of life are possible.

5) Vulnerability

A) Population

While the Eagle Landing Lake Dam is considered a High Hazard dam by TCEQ, meaning that property damage and loss of life could occur if the dam were to fail, the expected inundation zone is located in a primarily rural and sparsely populated area of Cass County. Therefore, negative impacts on the population is unlikely.

B) Critical Facilities

As shown in Figure 37 below, there are no critical facilities located downstream from the Eagle Landing Lake Dam.

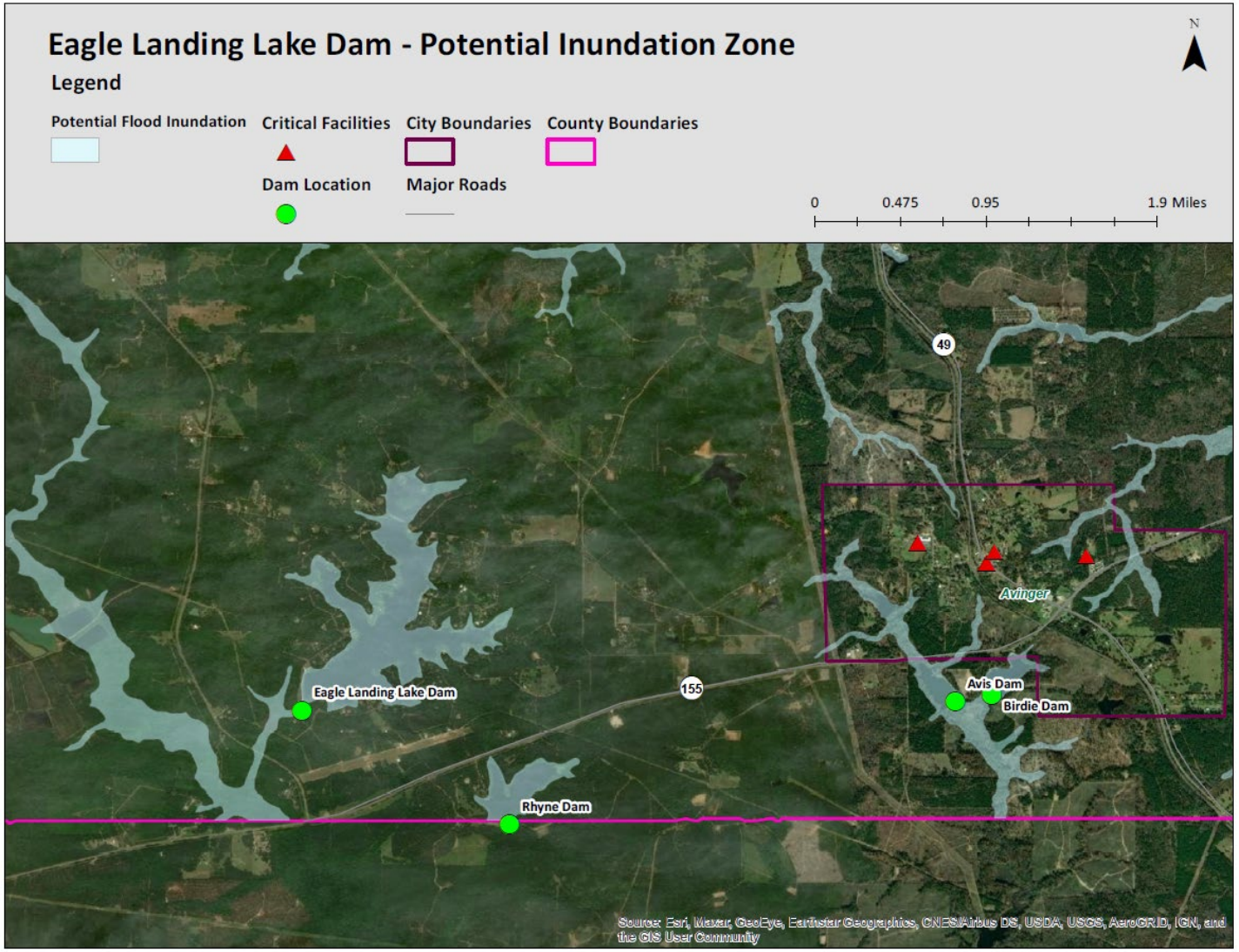


Figure 37: Critical Facilities and Potential Maximum Flood Inundation for Eagle Landing Lake Dam

15. Mitigation Strategy

1) Capability Assessment

Cass County and the participating jurisdictions have shown themselves to be highly capable, especially in terms of implementing hazard mitigation actions. All 10 jurisdictions participated in the 2016 plan. Each of these jurisdictions completed, or is in the process of completing, many of the actions recommended in the 2016 plan.

In addition to reviewing previous actions and the steps taken to implement them, the planning team reviewed existing regulatory capabilities and opportunities for establishing new capabilities and enhancing existing ones. At this time, all jurisdictions could improve their hazard mitigation capabilities through the following efforts: budgeting for mitigation actions and support, passing policies and procedures to implement mitigation actions, adopting and implementing stricter mitigation regulations, approving the hiring and training of staff for mitigation activities, and approving mitigation updates and additions to existing plans as new needs are recognized. The participating cities could further improve their capabilities by creating and adopting regularly updated comprehensive plans.

Table 74: Capability Assessment by Jurisdiction

Cass County Administrative, Financial, Regulatory, and Technical Abilities
Floodplain Management – 911 Addressing
Emergency Management
Subdivision
Economic Development
Road and Bridge Management
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Atlanta Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management

Emergency Management
Subdivision / Zoning
Building Code Enforcement
Nuisance Abatement
Substandard Structures Abatement
Water Conservation Planning
Comprehensive Planning
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Avinger Administrative, Financial, Regulatory, and Technical Abilities
Emergency Management
Building Code Enforcement
Substandard Structures Abatement
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Bloomburg Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Subdivision / Zoning
Building Code Enforcement
Substandard Structures Abatement
Drought Contingency Planning

Comprehensive Planning
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Domino Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Subdivision / Zoning
Building Code Enforcement
Substandard Structures Abatement
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Douglassville Administrative, Financial, Regulatory, and Technical Abilities
Emergency Management
Building Code Enforcement
Substandard Structures Abatement
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Hughes Springs Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Building Code Enforcement
Substandard Structures Abatement
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Linden Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Building Code Enforcement
Substandard Structures Abatement
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Marietta Administrative, Financial, Regulatory, and Technical Abilities
Emergency Management
Building Code Enforcement
Substandard Structures Abatement
Economic Development

Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Queen City Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Drought Contingency Planning
Subdivision / Zoning
Building Code Enforcement
Substandard Structures Abatement
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

2) Goals and Objectives Overview

The hazard analysis has shown that Cass County and the participating jurisdictions are at risk of multiple natural hazards. The following goals and objectives take a broad approach to improving outcomes before, during, and after these anticipated natural hazard events.

The mitigation actions the County and participating jurisdictions have selected are designed to address specific hazard-related issues in support of achieving the desired goals and objectives. They are seen as a direct continuation of the goals and objectives outlined in the 2016 plan.

3) Long-Term Vision

The hazard mitigation plan must strike a balance between identifying long-term goals and objectives and prioritized mitigation actions that may be addressed sooner, depending on funding availability and local priorities. The result is that certain goals and objectives don't have a corresponding mitigation action. Instead, by taking the long view, the local planning team has created a framework that can be developed as the plan is updated over time.

4) Goals

A) Goal 1: To reduce loss of life and injury to persons

Objective 1.1
Improve the delivery and effectiveness of warning messages

Objective 1.2
Preserve public and private emergency response capability (9-1-1, law enforcement, fire services, emergency medical services, hospitals).

Objective 1.3
Utilize available mitigation measures to prevent or reduce life-threatening impacts of natural hazards.

Objective 1.4
Reduce obstacles to timely and safe evacuation of flood hazard areas.

Objective 1.5
Reduce vulnerability of individuals living in mobile homes / manufactured housing.

Objective 1.6
Reduce life or health threatening impacts on individuals with special physical care requirements.

Objective 1.7
Reduce secondary impacts to health and safety from cascading effects.

Objective 1.8
Reduce long-term vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public.

B) Goal 2: To reduce disruptions to essential public services and infrastructure

Objective 2.1
Minimize disruption to and enhance rapid restoration of utilities.

Objective 2.2
Minimize disruption to and enhance rapid restoration of essential transportation infrastructure.

Objective 2.3
Minimize disruption to governmental, educational, and other institutions providing services to the public.

C) Goal 3: To reduce economic impacts to individuals, businesses, and area institutions

Objective 3.1
Increase home and business owner investment in available mitigation measures for private property.

Objective 3.2
Increase home and business owner participation in appropriate insurance programs.

Objective 3.3
Increase public and private sector development and use of operations continuity strategies.

Objective 3.4
Utilize available mitigation measures to prevent or reduce economic losses from natural hazards.

Objective 3.5
Reduce vulnerability of existing development by encouraging property owners to participate in buy-out or flood-proofing opportunities.

Objective 3.6
Reduce vulnerability of future development by utilizing available planning and structural standards.

D) Goal 4: To reduce losses to civic, cultural, and environmental resources

Objective 4.1
Protect public investment in community-owned facilities and infrastructure through appropriate structural, non-structural, and financial methods.

Objective 4.2
Reduce future losses to the non-profit sector through participation in available mitigation opportunities.

Objective 4.3
Reduce vulnerability of historically or culturally significant structures.

Objective 4.4
Minimize environmental impacts from cascading effects.

5) Mitigation Action Plan

A) Mitigation Action Prioritization

The planning team members have identified at least two mitigation actions per natural hazard. The previous plan used the STAPLEE criteria for prioritization. The priorities for this plan were expanded based due to community changes in priorities. For this update, action items were identified and prioritized in consideration of the following criteria:

1) Life safety and property protection improvements
2) Cost effectiveness – do the action's future benefits exceed its implementation costs
3) Technical feasibility – is the action reasonable given its technical requirements
4) Political acceptability
5) Administrative capabilities and legal authorities for implementation
6) Funding availability
7) The action's environmental impacts
8) The action's social acceptability
9) The action's ability to reduce risk to more than one hazard
10) The ease of implementation
11) The availability of a local champion
12) The action's relationship to other community objectives

In addition to considering an action's cost effectiveness as described above, the planning team considered TDEM's Cost-Effectiveness, Environmental Soundness and Technical Feasibility requirements as they relate to construction projects. Mitigation actions relating to physical infrastructure will meet the State's standards as outlined below:

A. Any state government construction project, regardless of potential funding source, has to be cost effective, technically feasible and meet all of the appropriate federal, state, and local environmental laws and regulations before it is started.
B. State government projects funded by Federal Mitigation Grant Programs administered by TDEM have to meet specific criteria related to cost effectiveness, environmental soundness and technical feasibility. These are outlined in the applicable FEMA grant program guidance for that particular funding program.

B) Incorporation and Integration of Existing Capabilities and Hazard Mitigation

As previously outlined, the planning team reviewed a range of codes, ordinances, and planning studies that have been adopted by the participating jurisdictions. The planning team's goal was to understand how these existing capabilities might affect mitigation actions in terms of implementation and enforcement.

Mitigation Action Status – 2016 plan

In addition to reviewing existing codes, ordinances, and planning studies, the planning team also examined the status of each mitigation action identified in the 2016 plan.

A slight increase in local development is not known to have affected local vulnerability to the natural hazards this plan addresses or to those addressed in the 2016 plan.

Mitigation actions marked as incomplete are no longer considered relevant as written to the participating jurisdictions.

Table 75: Previous Mitigation Actions – All Jurisdictions

Jurisdiction	Hazards Addressed	Mitigation Action	Status
Cass County	Flood	Develop and Implement the Turn Around, Don't Drown Program	*In Progress*
Cass County	Flood	Install permanent "Caution Road May Flood" warning signs on roadways that flood.	*In Progress*
Cass County	Tornado	Purchase and implement the CodeRED Weather alert system CodeRED Weather Warning – delivers advanced warning of severe weather as soon as a bulletin is issued by the National Weather Service. The System delivers voice calls, text messages, and emails to subscribed users within the direct path of the storm.	*In Progress*
Cass County	Tornado	Develop and implement a public education program that will provide the public with understanding of their risk to tornado events and the mitigation methods to protect themselves, their family, and their property.	*In Progress*
Cass County	Thunderstorm Winds	Require and enforce tie downs for mobile homes.	*In Progress*
Cass County	Thunderstorm Winds	Conduct a workshop on how to mitigate your homes from thunderstorm winds.	*In Progress*
Cass County	Winter Storms	Conduct workshops regarding how to mitigate your home from damages of winter storms.	*In Progress*
Cass County	Winter Storms	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Completed*
Cass County	Hail	Install hail resistant film on the windows of critical facilities.	*Abandoned*
Cass County	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*In Progress*
Cass County	Drought	Conduct xeriscaping and water conservation workshops for the County.	*In Progress*

Cass County	Drought	Replace municipal appliances or equipment with water-saving models or parts.	*In Progress*
Cass County	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*In Progress*
Cass County	Extreme Heat	Conduct fan drives for low-income and elderly who cannot afford air-conditioning.	*In Progress*
Cass County	Wildfire	Develop and implement a building vegetation clearance program.	*In Progress*
Cass County	Wildfire	Conduct a wildfire education program stressing the dangers of trash burning in order to help prevent wildfires.	*Completed*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Atlanta	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Abandoned*
City of Atlanta	Flood	Install permanent "Caution Road May Flood" warning signs on roadways that flood.	*Abandoned*
City of Atlanta	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Completed*
City of Atlanta	Tornado	Develop and implement a public education program that will provide the public with understanding of their risk to tornado events and the mitigation methods to protect themselves, their family, and their property.	*Completed*
City of Atlanta	Thunderstorm Winds	Create and enforce a city ordinance requiring approved mobile home tie-downs.	*Completed*
City of Atlanta	Thunderstorm Winds	Provide public workshops and information regarding mitigating homes against thunderstorm winds.	*Completed*
City of Atlanta	Winter Storms	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Completed*
City of Atlanta	Winter Storms	Educate citizens on how to mitigate their homes and property from the damaging effects of winter storms.	*Abandoned*
City of Atlanta	Hail	Install hail resistant film on the windows of critical facilities.	*Abandoned*
City of Atlanta	Hail	Conduct a workshop for residents about the prevalence of hailstorms and how to protect your home and property from hail damage.	*Abandoned*
City of Atlanta	Drought	Conduct xeriscaping and water conservation workshops for the County.	*Abandoned*

City of Atlanta	Drought	Develop and implement a water rationing program for times of severe drought.	*Abandoned*
City of Atlanta	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*Abandoned*
City of Atlanta	Extreme Heat	Conduct fan drives for low-income and elderly who cannot afford air-conditioning.	*Abandoned*
City of Atlanta	Wildfire	Develop and implement a building vegetation clearance program.	*Completed*
City of Atlanta	Wildfire	Conduct a wildfire education program stressing the dangers of trash burning in order to help prevent wildfires.	*Completed*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Avinger	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Deferred to Plan Update*
City of Avinger	Flood	Develop and implement the National Flood Insurance Program.	*Deferred to Plan Update*
City of Avinger	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Deferred to Plan Update*
City of Avinger	Tornado	Develop and implement a public education program that will provide the public with understanding of their risk to tornado events and the mitigation methods to protect themselves, their family, and their property.	*Deferred to Plan Update*
City of Avinger	Thunderstorm Winds	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Completed*
City of Avinger	Thunderstorm Winds	Create and enforce a city ordinance requiring approved mobile home tie-downs.	*Deferred to Plan Update*
City of Avinger	Winter Storms	Develop and implement a new program for removing dead limbs and overhangs that might fall during winter storms.	*Deferred to Plan Update*
City of Avinger	Winter Storms	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Abandoned*
City of Avinger	Hail	Install hail resistant film on the windows of critical facilities.	*Abandoned*
City of Avinger	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*Deferred to Plan Update*
City of Avinger	Drought	Conduct workshops on xeriscaping and water conservation.	*Deferred to Plan Update*

City of Avinger	Drought	Replace municipal appliances or equipment with water-saving models or parts.	*Abandoned*
City of Avinger	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*Abandoned*
City of Avinger	Extreme Heat	Organize a local fan drive to assist lower-income families and individuals during summer months.	*Abandoned*
City of Avinger	Wildfire	Develop and implement a building vegetation clearance program.	*Deferred to Plan Update*
City of Avinger	Wildfire	Conduct a wildfire education program stressing the dangers of trash burning in order to help prevent wildfires.	*Deferred to Plan Update*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Bloomburg	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Abandoned*
City of Bloomburg	Flood	Deepen the wastewater treatment tanks to increase the capacity of the tanks; prevent overflow during flash flooding.	*Deferred to Plan Update*
City of Bloomburg	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Abandoned*
City of Bloomburg	Tornado	Install sirens that will warn residents of imminent danger from tornadoes.	*Deferred to Plan Update Fire Department watches and issues warning when immediate danger is present.*
City of Bloomburg	Thunderstorm Winds	Create and enforce a city ordinance requiring approved mobile home tie-downs.	*In Progress Will make a revision to ordinance at next meeting.*
City of Bloomburg	Thunderstorm Winds	Provide public workshops and information regarding mitigating homes against thunderstorm winds.	*Abandoned*
City of Bloomburg	Winter Storms	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Deferred to Plan Update Water system is equipped with generator.*
City of Bloomburg	Winter Storms	Educate citizens on how to mitigate their homes and property from the damaging effects of winter storms.	*Abandoned*
City of Bloomburg	Hail	Install hail resistant film on the windows of critical facilities.	*Abandoned*

City of Bloomburg	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*Abandoned*
City of Bloomburg	Drought	Conduct xeriscaping and water conservation workshops for the County.	*Abandoned*
City of Bloomburg	Drought	Develop and implement a water rationing program for times of severe drought.	*Deferred to Plan Update*
City of Bloomburg	Extreme Heat	Conduct fan drives for low-income and elderly who cannot afford air-conditioning.	*Deferred to Plan Update*
City of Bloomburg	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*Deferred to Plan Update*
City of Bloomburg	Wildfire	Develop and implement a vegetation management program to reduce the danger of wildfire reaching dwellings.	*Deferred to Plan Update*
City of Bloomburg	Wildfire	Develop and implement the Community Wildfire Protection Plan, a collaborative approach to help protect life, property, and natural resources through community-based planning.	*Deferred to Plan Update*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Domino	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Deferred to Plan Update*
City of Domino	Flood	Develop and implement the National Flood Insurance Program.	*Deferred to Plan Update*
City of Domino	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Deferred to Plan Update*
City of Domino	Tornado	Develop and implement a public education program that will provide the public with understanding of their risk to tornado events and the mitigation methods to protect themselves, their family, and their property.	*Deferred to Plan Update*
City of Domino	Thunderstorm Winds	Provide a community awareness program concerning the risks and consequences of thunderstorm winds. By educating the public on high winds loss of life and property may be mitigated as they take steps to secure their property and respond to warnings.	*Deferred to Plan Update*
City of Domino	Thunderstorm Winds	Create and enforce a city ordinance requiring approved mobile home tie-downs.	*Deferred to Plan Update*

City of Domino	Winter Storms	Develop and implement a pre-emptive strategy for removing dead limbs and overhangs that might fall causing injury or property damage.	*Deferred to Plan Update*
City of Domino	Winter Storms	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Deferred to Plan Update*
City of Domino	Hail	Install hail resistant film on the windows of critical facilities.	*Deferred to Plan Update*
City of Domino	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*Deferred to Plan Update*
City of Domino	Drought	Replace municipal appliances or equipment with water-saving models or parts.	*Deferred to Plan Update*
City of Domino	Drought	Conduct public workshops on conserving water, xeriscaping, and managing drought impacts.	*Deferred to Plan Update*
City of Domino	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*Deferred to Plan Update*
City of Domino	Extreme Heat	Conduct fan drives for low-income and elderly who cannot afford air-conditioning.	*Deferred to Plan Update*
City of Domino	Wildfire	Conduct a wildfire education program stressing the dangers of trash burning in order to help prevent wildfires.	*Deferred to Plan Update*
City of Domino	Wildfire	Develop and implement a building vegetation clearance program.	*Deferred to Plan Update*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Douglassville	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Deferred to Plan Update*
City of Douglassville	Flood	Develop and implement the National Flood Insurance Program.	*Deferred to Plan Update*
City of Douglassville	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Deferred to Plan Update*
City of Douglassville	Tornado	Develop and implement a public education program that will provide the public with understanding of their risk to tornado events and the mitigation methods to protect themselves, their family, and their property.	*Deferred to Plan Update*
City of Douglassville	Thunderstorm Winds	Create and enforce a city ordinance requiring approved mobile home tie-downs.	*Deferred to Plan Update*

City of Douglassville	Thunderstorm Winds	Provide public workshops and information regarding mitigating homes against thunderstorm winds.	*Deferred to Plan Update*
City of Douglassville	Winter Storms	Provide and identify new community shelters for the most vulnerable populations of low-income elderly and children.	*Deferred to Plan Update*
City of Douglassville	Winter Storms	Conduct workshops regarding how to mitigate your home from damages of winter storms.	*Deferred to Plan Update*
City of Douglassville	Hail	Install hail resistant film on the windows of critical facilities.	*Deferred to Plan Update*
City of Douglassville	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*Deferred to Plan Update*
City of Douglassville	Drought	Conduct public workshops on conserving water, xeriscaping, and managing drought impacts.	*Deferred to Plan Update*
City of Douglassville	Drought	Install water saving appliances and devices for the city as old equipment wears.	*Deferred to Plan Update*
City of Douglassville	Extreme Heat	Conduct a fan drive so the most vulnerable of the population can stay safe during extreme heat weather events.	*Deferred to Plan Update*
City of Douglassville	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*Deferred to Plan Update*
City of Douglassville	Wildfire	Conduct a wildfire education program stressing the dangers of trash burning in order to help prevent wildfires.	*Deferred to Plan Update*
City of Douglassville	Wildfire	Develop and implement the Community Wildfire Protection Plan, a collaborative approach to help protect life, property, and natural resources through community-based planning.	*Deferred to Plan Update*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Hughes Springs	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Deferred to Plan Update*
City of Hughes Springs	Flood	Widen ditches to accommodate more flash flood waters.	*In Progress*
City of Hughes Springs	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Deferred to Plan Update*
City of Hughes Springs	Tornado	Develop and implement a public education program that will provide the public with understanding of their risk to tornado events and the mitigation methods to protect	*Deferred to Plan Update*

		themselves, their family, and their property.	
City of Hughes Springs	Thunderstorm Winds	Create and enforce a city ordinance requiring approved mobile home tie-downs.	*Deferred to Plan Update*
City of Hughes Springs	Thunderstorm Winds	Provide public workshops and information regarding mitigating homes against thunderstorm winds.	*Deferred to Plan Update*
City of Hughes Springs	Winter Storms	Develop and implement a pre-emptive strategy for removing dead limbs and overhangs that might fall causing injury or property damage.	*In Progress*
City of Hughes Springs	Winter Storms	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Deferred to Plan Update*
City of Hughes Springs	Hail	Install hail resistant film on the windows of critical facilities.	*Deferred to Plan Update*
City of Hughes Springs	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*Deferred to Plan Update*
City of Hughes Springs	Drought	Conduct public workshops on conserving water, xeriscaping, and managing drought impacts.	*Deferred to Plan Update*
City of Hughes Springs	Drought	Develop and implement a water rationing program for times of severe drought.	*Completed*
City of Hughes Springs	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*Deferred to Plan Update*
City of Hughes Springs	Extreme Heat	Conduct fan drives for low-income and elderly who cannot afford air-conditioning.	*Deferred to Plan Update*
City of Hughes Springs	Wildfire	Conduct a wildfire education program stressing the dangers of trash burning in order to help prevent wildfires.	*Deferred to Plan Update*
City of Hughes Springs	Wildfire	Develop and implement the Community Wildfire Protection Plan, a collaborative approach to help protect life, property, and natural resources through community-based planning.	*Deferred to Plan Update*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Linden	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Abandoned*
City of Linden	Flood	Widen ditches to increase volume capacity of flash flood waters.	*In Progress: Citywide drainage*

			improvement effort.
City of Linden	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Abandoned*
City of Linden	Tornado	Install sirens that will warn residents of imminent danger from tornadoes.	*Completed*
City of Linden	Thunderstorm Winds	Participate in the "StormReady Community" Program.	*Deferred to Plan Update*
City of Linden	Thunderstorm Winds	Purchase emergency mobile generators to use with emergency equipment during power outages at critical facilities.	*Completed*
City of Linden	Winter Storms	Conduct workshops regarding how to mitigate your home from damages of winter storms.	*Deferred to Plan Update.* *Community Services of Northeast Texas currently provides this service every summer.*
City of Linden	Winter Storms	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Completed*
City of Linden	Hail	Install hail resistant film on the windows of critical facilities.	*Abandoned*
City of Linden	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*In Progress: Developing social media hazard mitigation educational resources*
City of Linden	Drought	Conduct public workshops on conserving water, xeriscaping, and managing drought impacts.	*Deferred to Plan Update*
City of Linden	Drought	Develop and implement a water rationing program for times of severe drought.	*Completed*
City of Linden	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*In Progress: Identifying possible cooling centers and partnering with other organizations.*
City of Linden	Extreme Heat	Conduct fan drives for low-income and elderly who cannot afford air-conditioning.	*In Progress*
City of Linden	Wildfire	Develop and implement the Community Wildfire Protection Plan, a collaborative approach to help protect life, property, and natural resources through community-based planning.	*Deferred to Plan Update*

City of Linden	Wildfire	Develop and implement a vegetation management program to reduce the danger of wildfire reaching dwellings.	*Deferred to Plan Update*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Marietta	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Abandoned*
City of Marietta	Flood	Develop and implement the National Flood Insurance Program.	*Abandoned*
City of Marietta	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Abandoned*
City of Marietta	Tornado	Develop and implement a public education program that will provide the public with understanding of their risk to tornado events and the mitigation methods to protect themselves, their family, and their property.	*Abandoned*
City of Marietta	Thunderstorm Winds	Participate in the "StormReady Community" Program.	*Abandoned*
City of Marietta	Thunderstorm Winds	Purchase emergency mobile generators to use with emergency equipment during power outages for critical facilities.	*Completed The generators are stationary.*
City of Marietta	Winter Storms	Develop and implement a pre-emptive strategy for removing dead limbs and overhangs that might fall causing injury or property damage.	*Abandoned*
City of Marietta	Winter Storms	Conduct workshops regarding how to mitigate your home from damages of winter storms.	*Abandoned*
City of Marietta	Hail	Install hail resistant film on the windows of critical facilities.	*Abandoned*
City of Marietta	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*Abandoned*
City of Marietta	Drought	Conduct xeriscaping and water conservation workshops for the County.	*Abandoned*
City of Marietta	Drought	Develop and implement a water rationing program for times of severe drought.	*Completed Required by TCEQ*
City of Marietta	Extreme Heat	Develop and implement new cooling centers and advertise their locations for extreme heat events in existing, air-conditioned structures such as churches and county facilities. This would constitute a small investment yet provide a valuable service to people during episodes of extreme heat.	*Abandoned*
City of Marietta	Extreme Heat	Conduct a fan drive to supply fans for low-income elderly.	*Abandoned*

City of Marietta	Extreme Heat	Conduct a wildfire education program stressing the dangers of trash burning in order to help prevent wildfires.	*Abandoned*
City of Marietta	Wildfire	Develop and implement the Community Wildfire Protection Plan, a collaborative approach to help protect life, property, and natural resources through community-based planning.	*Abandoned*
City of Marietta	Wildfire	Develop and implement a vegetation management program to reduce the danger of wildfire reaching dwellings.	*Deferred to Plan Update*

Jurisdiction	Hazards Addressed	Mitigation Action	Status
City of Queen City	Flood	Develop and Implement the Turn Around, Don't Drown Program	*Deferred to Plan Update*
City of Queen City	Flood	Clearly mark roads that are prone to wash out with "Caution Road May Flood" signs.	*Some Completed. Deferred to Plan Update*
City of Queen City	Tornado	Develop and Implement the Texas Individual Tornado Safe Room Program.	*Completed*
City of Queen City	Tornado	Develop and implement a public education program that will provide the public with understanding of their risk to tornado events and the mitigation methods to protect themselves, their family, and their property.	*Completed New tornado siren at the fire department.*
City of Queen City	Thunderstorm Winds	Require structures on temporary foundations to be securely anchored to permanent foundations.	*Completed. An ordinance is in place.*
City of Queen City	Thunderstorm Winds	Participate in the "StormReady Community" Program.	*Completed*
City of Queen City	Winter Storms	Develop and implement a pre-emptive strategy for removing dead limbs and overhangs that might fall causing injury or property damage.	*Completed*
City of Queen City	Winter Storms	Provide and identify new community shelters for the most vulnerable populations of low-income elderly and children.	*Abandoned*
City of Queen City	Hail	Install hail resistant film on the windows of critical facilities.	*Deferred to Plan Update*
City of Queen City	Hail	Educate residents on the likelihood of hailstorms and how to mitigate their home and property from hail damage.	*Completed*
City of Queen City	Drought	Conduct xeriscaping and water conservation workshops for the County.	*Deferred to Plan Update*
City of Queen City	Drought	Develop and implement a water rationing program for times of severe drought.	*Abandoned*
City of Queen City	Extreme Heat	Conduct fan drives for low-income and elderly who cannot afford air-conditioning.	*Abandoned*

City of Queen City	Extreme Heat	Provide workshops on how to mitigate infrastructure from the effects of extreme heat.	*Deferred to Plan Update*
City of Queen City	Wildfire	Develop and implement a building vegetation clearance program.	*Completed*
City of Queen City	Wildfire	Conduct a wildfire education program stressing the dangers of trash burning in order to help prevent wildfires.	*Completed*

Incorporation and Integration Opportunities and Processes

Each jurisdiction has its own established process for integrating new actions, codes, ordinances, plans, and studies into its existing capabilities.

None of the participating jurisdictions undertook any actions to formally incorporate the previous plan into their normal operations. Instead, they relied on the plan itself, and pursued projects as funding and other resources became available.

The planning team will ensure that each jurisdiction's various departments continue to integrate hazard mitigation actions into their day-to-day processes. Opportunities for future integration are outlined below in Table 76.

Table 76: Plan Integration

Department	All Departments	Commissioners' Court, Road and Bridge, Mayor's Office, Council, Public Works, Economic Development,	Planning, Zoning, Economic Development, Public Works, Mayor's Office, Floodplain Manager	Office of Emergency Management, Mayor's Office, Mayor and Council, Commissioners' Court	Office of Emergency Management, Mayor's Office, Chief of Fire Department	Office of Emergency Management, Mayor's Office, Administrative Office	Floodplain Manager, Mayor's Office
Activity	Annual Budget	Capital Improvement Projects	Comprehensive Master Plan	Public Involvement	Emergency Operations	Grant Application	Floodplain Management
Time Frame	Quarterly/ Annual workshops	Bi-annually	Every 10 Years	As Needed	Annually	Annual Funding Cycles	Annually

Integration Process	Discuss integration of medium and high priority actions with Commissioners' Court or Council, (as appropriate) concerning feasibility, potential funding sources, and a preliminary cost benefit review.	Discuss inclusion of mitigation actions with CIPs. Ensure CIPs are consistent with mitigation actions, NFIP compliance, and any new land use development.	Review existing floodplain and land use controls to ensure that long term goals are consistent with actions in the HMAP.	Utilize jurisdictional web sites, social media, and other forms of advertising to make announcements of any periodic review activities concerning potential amendments or updating of the HMAP	Review prevention and protection projects for continued relevance. Ensure appropriate actions and information are included in the Emergency Operation Plan.	Review and update mitigation actions as necessary based on funding opportunities available through FEMA FMA, FEMA BRIC, FEMA HMGP, and other grant funding sources.	Update and maintain floodplain information including but not limited to: maps, construction practices, permitting, and NFIP compliance.
Jurisdiction							
Cass County	x	x	x	x	x	x	x
City of Atlanta	x	x	x	x	x	x	x
City of Avinger	x	x		x	x	x	
City of Bloomburg	x	x	x	x	x	x	x
City of Domino	x	x	x	x	x	x	x
City of Douglassville	x	x		x	x	x	
City of Hughes Springs	x	x	x	x	x	x	x
City of Linden	x	x	x	x	x	x	x
City of Marietta	x	x		x	x	x	
City of Queen City	x	x	x	x	x	x	x

Each new mitigation action below outlines the following requirements: the identified responsible department head or delegate will research all relevant information to confirm the action's feasibility and prioritization, will formulate a plan of action, and will confirm funding sources and identify any fiscal liabilities associated with the mitigation action.

As part of each jurisdiction's commitment to transparency, all relevant information, including but not limited to that described above and in each action's description, will be presented to the public before the action is formally adopted for implementation. After public notification, the integration process will resemble the one outlined in Table 77 below.

Table 77: Integration Process

Jurisdiction	Integration Process
Cass County	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the County Commissioners' Court and County Judge. Cass County will also use the Cass County Hazard Mitigation Plan as a technical reference and data source

	for identified and future mitigation actions, as well as future planning processes.
City of Atlanta	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Atlanta will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.
City of Avinger	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Avinger will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.
City of Bloomburg	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Bloomburg will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.
City of Domino	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Domino will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.
City of Douglassville	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Douglassville will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.
City of Hughes Springs	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Hughes Springs will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.
City of Linden	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Linden will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.
City of Marietta	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Marietta will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.
City of Queen City	After considering integrating mitigation actions with the activities outlined in Table 76 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor. The City of Queen City will also use the Cass County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.

C) Mitigation Actions by Jurisdiction and by Hazard

Each jurisdiction has selected actions that were identified as high or medium priority and that are in line with TDEM's recommended mitigation actions. However, many of the mitigation actions below are dependent upon outside grant funding for implementation. For all actions likely to require grant funding, potential sources have been identified. However, grant funding is awarded on a competitive basis, so applying for funding doesn't guarantee that funds will be received. Cass County and the participating jurisdictions have a successful history of applying for and receiving grant funding to implement physical infrastructure actions. Budget constraints will remain the determining factor for how and when each action is implemented.

Cass County

Multi-Hazard Actions

Mitigation Action	Educational Outreach
Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in NFIP, Wildfire Fuels Reduction, Structural Hardening, etc…
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat, Dam/Levee Failure
Priority	Medium
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source(s)	County, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department(s)	County Commissioners' Court
Implementation Schedule	Long Term 5-10 years+
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat, Dam/Levee Failure
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators

Potential Funding Source (s)	County, FEMA BRIC, FEMA HMGP
Responsible Department	County Commissioners' Court
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the jurisdiction that are connected to critical facilities and creating firebreaks.
Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium
Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	County, FEMA BRIC, FEMA HMGP
Responsible Department	County Commissioners' Court
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Install Impact and Wind-resistant Windows and Doors at Public Facilities
Objective	This action proposes hardening facilities. Hardening will include adding impact and wind-resistant doors and windows at public and critical facilities in the County.
Hazard	Tornados, Hailstorm, Severe Winds
Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	County, FEMA BRIC, FEMA HMGP
Responsible Department	County Commissioners' Court
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Set up Cooling and Warming Centers in Existing Facilities

Objective	The action's goal is to increase extreme heat and cold resilience by limiting vulnerable populations' exposure to extreme heat or extreme cold by creating new or using existing facilities as cooling centers or warming centers.
Hazard	Extreme Heat, Extreme Cold, Winter Weather
Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	County, FEMA BRIC, FEMA HMGP
Responsible Department(s)	County Commissioners' Court
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population

Mitigation Action	Harden Facilities
Objective	This action proposes hardening facilities. Hardening will include but is not limited to adding impact and wind-resistant doors, windows; reinforcing building foundations, elevating low-lying structures, upgrading and/or adding shatter-resistant films to all glazing, upgrading thermal insulation, building protective walls around exposed gas tanks and cylinders, shielding roof-mounted equipment, and adding bracing and tie-down clips to building roofs.
Hazard	Hailstorms, Winter Weather, Extreme Cold, Riverine Flooding, Tornados
Priority	High
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	County, FEMA FMA, FEMA BRIC, FEMA HMGP, CDBG MIT
Responsible Department	County Commissioners' Court
Implementation Schedule	5 Years
Target	Existing infrastructure

Single Hazard Actions

Mitigation Action	Purchase Portable Pumps
Objective	This action proposes purchasing portable pumps that can be deployed as needed to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding

Priority	Low
Estimated Cost	$250,000
Potential Funding Source (s)	County, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	County Commissioners' Court
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Construct Community Safe Rooms
Objective	The action's goal is to minimize local population vulnerability to Tornados by providing public safe rooms.
Hazard	Tornado
Priority	Medium
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	County, FEMA BRIC, FEMA HMGP
Responsible Department	County Commissioners' Court
Implementation Schedule	1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Develop and Implement a New Drought Contingency Plan
Objective	Re-evaluate all existing drought control measures to identify strengths and weaknesses in order to develop and enforce a new or updated drought contingency plan.
Hazard	Drought
Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	County, FEMA BRIC, FEMA HMGP
Responsible Department(s)	County Commissioners' Court
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population and infrastructure

Mitigation Action	Replace Water Fixtures with Low Flow Units
Objective	This action's goal is to limit water consumption at County-owned and maintained facilities by replacing traditional water fixtures with low flow units.
Hazard	Drought
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	County, FEMA BRIC, FEMA HMGP
Responsible Department	County Commissioners' Court
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing and Future infrastructure

Mitigation Action	Install Protective Window Shutters on Public Facilities
Objective	This action proposes adding protective shutters to public facilities. Doing so will help limit exposure to hailstorm damages.
Hazard	Hailstorm
Priority	Medium
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	County, FEMA BRIC, FEMA HMGP
Responsible Department	County Commissioners' Court
Implementation Schedule	Medium Term: 3 – 5 Years
Target	Existing infrastructure

Mitigation Action	Install Surge Protection and Grounding Systems to Protect Electronic Assets
Objective	This action will install surge protection at all critical facilities to prevent damage to critical electronic devices including but not limited to: computers, servers, audio/visual equipment, laboratory equipment, and appliances.
Hazard	Lightning
Priority	High
Estimated Cost	$1,000 - $50,000
Potential Funding Source (s)	County, FEMA BRIC, FEMA HMGP
Responsible Department	County Commissioners' Court

Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

City of Atlanta

Multi-Hazard Actions

Mitigation Action	Educational Outreach
Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in NFIP, Wildfire Fuels Reduction, Structural Hardening, etc…
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	Medium
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Long Term 5-10 years+
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Install Impact and Wind-resistant Windows and Doors at Public Facilities
Objective	This action proposes hardening facilities. Hardening will include adding impact and wind-resistant doors and windows at public and critical facilities in the County.
Hazard	Tornados, Hailstorm, Severe Winds
Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Harden Facilities
Objective	This action proposes hardening facilities. Hardening will include but is not limited to adding impact and wind-resistant doors, windows; reinforcing building foundations, elevating low-lying structures, upgrading and/or adding shatter-resistant films to all glazing, upgrading thermal insulation, building protective walls around exposed gas tanks and cylinders, shielding roof-mounted equipment, and adding bracing and tie-down clips to building roofs.
Hazard	Hailstorms, Winter Weather, Extreme Cold, Riverine Flooding, Tornados
Priority	High
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	City, FEMA FMA, FEMA BRIC, FEMA HMGP, CDBG MIT
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the jurisdiction that are connected to critical facilities and creating firebreaks.

Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium
Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Single Hazard Actions

Mitigation Action	Upgrade Existing Drainage Pump Stations
Objective	This action proposes upgrading existing drainage pump stations to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Medium
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3 – 5 Years
Target	Existing infrastructure

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	High
Estimated Cost	More than $1,000,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0-2 Years
Target	Existing infrastructure

Mitigation Action	Wildfire Fuels Reduction
Objective	The action's goal is to reduce wildfire fuels on City-maintained land. Unchecked wildfire fuels increase the potential for a wildfire's ability to spread quickly, potentially resulting in higher damage dollar totals.
Hazard	Wildfire
Priority	Medium
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	City, FEMA BRIC
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing and future infrastructure

Mitigation Action	Replace Water Fixtures with Low Flow Units
Objective	This action's goal is to limit water consumption at County-owned and maintained facilities by replacing traditional water fixtures with low flow units.
Hazard	Drought
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing and Future infrastructure

Mitigation Action	Replace Current Landscaping with Drought Resistant Plant Varieties
Objective	This action's goal is to limit water consumption at City-owned and maintained facilities by replacing existing landscaping with more drought resistant types.
Hazard	Drought
Priority	High
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration

Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future infrastructure

City of Avinger

Multi-Hazard Actions

Mitigation Action	Educational Outreach
Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in NFIP, Wildfire Fuels Reduction, Structural Hardening, etc…
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	Medium
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Long Term 5-10 years+
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the jurisdiction that are connected to critical facilities and creating firebreaks.
Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium
Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Harden Facilities
Objective	This action proposes hardening facilities. Hardening will include but is not limited to adding impact and wind-resistant doors, windows; reinforcing building foundations, elevating low-lying structures, upgrading and/or adding shatter-resistant films to all glazing, upgrading thermal insulation, building protective walls around exposed gas tanks and cylinders, shielding roof-mounted equipment, and adding bracing and tie-down clips to building roofs.
Hazard	Tornados, Hailstorms, Winter Weather, Extreme Cold, Riverine Flooding
Priority	High
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	City, FEMA FMA, FEMA BRIC, FEMA HMGP, CDBG MIT
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Install Impact and Wind-resistant Windows and Doors at Public Facilities
Objective	This action proposes hardening facilities. Hardening will include adding impact and wind-resistant doors and windows at public and critical facilities in the County.

Hazard	Tornados, Hailstorm, Severe Winds
Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Single Hazard Actions

Mitigation Action	Upgrade Existing Drainage Pump Stations
Objective	This action proposes upgrading existing drainage pump stations to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Medium
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3 – 5 Years
Target	Existing infrastructure

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	High
Estimated Cost	More than $1,000,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0-2 Years
Target	Existing infrastructure

Mitigation Action	Replace Water Fixtures with Low Flow Units
Objective	This action's goal is to limit water consumption at County-owned and maintained facilities by replacing traditional water fixtures with low flow units.
Hazard	Drought
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing and Future infrastructure

Mitigation Action	Install Protective Window Shutters on Public Facilities
Objective	This action proposes adding protective shutters to public facilities. Doing so will help limit exposure to hailstorm damages.
Hazard	Hailstorm
Priority	Medium
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3 – 5 Years
Target	Existing infrastructure

Mitigation Action	Install Surge Protection and Grounding Systems to Protect Electronic Assets
Objective	This action will install surge protection at all critical facilities to prevent damage to critical electronic devices including but not limited to: computers, servers, audio/visual equipment, laboratory equipment, and appliances.
Hazard	Lightning
Priority	High
Estimated Cost	$1,000 - $50,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration

Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

City of Bloomburg

Multi-Hazard Actions

Mitigation Action	Educational Outreach
Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in Wildfire Fuels Reduction, Tornado Saferooms, Structural Hardening, etc.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	Low
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Purchase Portable Digital Warning Signs
Objective	Warning signs will help limit local vulnerability to multiple hazards by providing residents with information they need where they're likely to see it.
Hazard	Riverine Flooding, Wildfire, Tornado, Extreme Heat, Winter Weather
Priority	High
Estimated Cost	Approximately $35,000 per device
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population

COMBINE

Mitigation Action	Install and Expand Warning Systems/Weather Radio
Objective	Warning systems will help limit local vulnerability to tornados by giving residents an opportunity to take shelter before one occurs.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	$1,000 - $100,000 per device
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population

Mitigation Action	Develop and Implement a New Tie-Down Ordinance for Manufactured / Mobile Homes, Temporary Buildings, and Unrestrained Advertisement Signs
Objective	Re-evaluate all existing tie-down measures to identify strengths and weaknesses in order to develop and enforce a new tie-down ordinance.
Hazard	Severe Wind, Tornado
Priority	Low
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration

Implementation Schedule	Short Term - 1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Set up Warming Centers in Existing Facilities
Objective	The action's goal is to increase severe winter storm resilience by limiting vulnerable populations' exposure to extreme cold.
Hazard	Extreme Cold, Winter Weather
Priority	High
Estimated Cost	$10,000 - $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Single Hazard Actions

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Medium
Estimated Cost	More than $1,000,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Deepen the Wastewater Treatment tanks
Objective	This action will deepen the wastewater treatment tanks to increase the capacity of the tanks; prevent overflow during flash flooding.
Hazard	Riverine Flooding

Priority	Medium
Estimated Cost	More than $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Wildfire Fuels Reduction in WUI
Objective	This action will develop and implement a program to identify and prioritize lands in the Wildland Urban Interface in need of fuels reduction and then reduce or remove wildfire fuels through various methods as appropriate.
Hazard	Wildfire
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement the Community Wildfire Protection Plan
Objective	Develop and implement the Community Wildfire Protection Plan, a collaborative approach to help protect life, property, and natural resources through community-based planning.
Hazard	Wildfire
Priority	Low
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population

Mitigation Action	Develop and Implement a New Water Conservation Ordinance
Objective	Jurisdiction will re-evaluate all existing water conservation and reduction measures to identify strengths and weaknesses in order to develop and enforce a new water conservation ordinance.
Hazard	Drought
Priority	Medium
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Develop and Implement a Flood Damage Prevention Ordinance
Objective	Jurisdiction will re-evaluate all existing flood damage prevention measures to identify strengths and weaknesses in order to develop and enforce a new flood damage prevention ordinance and identify a new floodplain manager, in compliance with the NFIP.
Hazard	Riverine Flooding
Priority	Low
Estimated Cost	Less than $50,000
Potential Funding Source (s)	City
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1-5 Years
Target	Existing and planned infrastructure

Mitigation Action	Set up Cooling Centers in Existing Facilities
Objective	The action's goal is to increase extreme heat resilience by limiting vulnerable populations' exposure to extreme heat by creating new, or opening up existing facilities as cooling centers.
Hazard	Extreme Heat
Priority	Medium
Estimated Cost	$200,000 - $1,000,000 or greater
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP

Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Conduct Fan Drives for At-Risk Residences without Air-Conditioning
Objective	The action's goal is to increase extreme heat resilience by limiting vulnerable populations' exposure to extreme heat through giving fans to residences without air conditioning.
Hazard	Extreme Heat
Priority	Low
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population

City of Domino

Multi-Hazard Actions

Mitigation Action	Educational Outreach
Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in Wildfire Fuels Reduction, Tornado Saferooms, Structural Hardening, etc.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	Low
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Harden Facilities
Objective	This action proposes hardening facilities. Hardening will include but is not limited to increasing thermal insulation; upgrading and/or adding shatter-resistant films to all glazing; installing impact and wind-resistant windows and doors; installing shutters; building protective walls around exposed gas tanks and cylinders; shielding roof-mounted equipment.
Hazard	Tornado, Hailstorm, Severe Winds, Drought, Severe Winds, Winter Weather
Priority	Low
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Purchase Portable Digital Warning Signs
Objective	Warning signs will help limit local vulnerability to multiple hazards by providing residents with information they need where they're likely to see it.
Hazard	Riverine Flooding, Wildfire, Tornado, Extreme Heat, Severe Winter Storm
Priority	High

Estimated Cost	Approximately $35,000 per device
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population

Mitigation Action	Install and Expand Warning Systems/Weather Radio
Objective	Warning systems will help limit local vulnerability to tornados by giving residents an opportunity to take shelter before one occurs.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	$1,000 - $100,000 per device
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the city that are connected to critical facilities and creating firebreaks.
Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium
Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement a New Tie-Down Ordinance for Manufactured / Mobile Homes, Temporary Buildings, and Unrestrained Advertisement Signs
Objective	Re-evaluate all existing tie-down measures to identify strengths and weaknesses in order to develop and enforce a new tie-down ordinance.
Hazard	Severe Winds, Tornado
Priority	Low
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term - 1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Install Impact and Wind-resistant Windows and Doors at Public Facilities
Objective	This action proposes hardening facilities. Hardening will include adding impact and wind-resistant doors and windows at critical facilities and public buildings.
Hazard	Tornados, Hailstorm, Severe Winds
Priority	Low
Estimated Cost	$100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Single Hazard Actions

Mitigation Action	Construct Community Safe Rooms
Objective	The action's goal is to minimize local population vulnerability to Tornados by providing public safe rooms.
Hazard	Tornado
Priority	Medium
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP

Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Wildfire Fuels Reduction in WUI
Objective	This action will develop and implement a program to identify and prioritize lands in the Wildland Urban Interface in need of fuels reduction and then reduce or remove wildfire fuels through various methods as appropriate.
Hazard	Wildfire
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Replace municipal appliances or equipment with water-saving models or parts
Objective	The city will replace or purchase new appliances with water-saving models or parts in order to conserve water.
Hazard	Drought
Priority	Medium
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Develop and Implement a Flood Damage Prevention Ordinance
Objective	The city will re-evaluate all existing flood damage prevention measures to identify strengths and weaknesses in order to develop and enforce a new flood damage prevention ordinance and identify a new floodplain

	manager, in compliance with the NFIP.
Hazard	Riverine Flooding
Priority	Low
Estimated Cost	Less than $50,000
Potential Funding Source (s)	City
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1-5 Years
Target	Existing and planned infrastructure

Mitigation Action	Replace Water Fixtures with Low Flow Units
Objective	This action's goal is to limit water consumption at jurisdiction-owned and maintained facilities by replacing traditional water fixtures with low flow units on an as-needed basis.
Hazard	Drought
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1-5 Years
Target	Existing and Future infrastructure

Mitigation Action	Set up Cooling Centers in Existing Facilities
Objective	The action's goal is to increase extreme heat resilience by limiting vulnerable populations' exposure to extreme heat by creating new, or opening up existing facilities as cooling centers.
Hazard	Extreme Heat
Priority	Medium
Estimated Cost	$200,000 - $1,000,000 or greater
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years

Target	Existing and future population

Mitigation Action	Set up Warming Centers in Existing Facilities
Objective	The action's goal is to increase severe winter storm resilience by limiting vulnerable populations' exposure to extreme cold.
Hazard	Winter Weather, Extreme Cold
Priority	High
Estimated Cost	$10,000 - $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Conduct Fan Drives for At-Risk Residences without Air-Conditioning
Objective	The action's goal is to increase extreme heat resilience by limiting vulnerable populations' exposure to extreme heat through giving fans to residences without air conditioning.
Hazard	Extreme Heat
Priority	Low
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population

City of Douglassville

Multi-Hazard Actions

Mitigation Action	Educational Outreach

Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in Wildfire Fuels Reduction, Tornado Saferooms, Structural Hardening, etc.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	Low
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the jurisdiction that are connected to critical facilities and creating firebreaks.
Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium

Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Single Hazard Actions

Mitigation Action	Purchase Portable Pumps
Objective	This action proposes purchasing portable pumps that can be deployed as needed to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Low
Estimated Cost	$250,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Wildfire Fuels Reduction in WUI
Objective	This action will develop and implement a program to identify and prioritize lands in the Wildland Urban Interface in need of fuels reduction and then reduce or remove wildfire fuels through various methods as appropriate.
Hazard	Wildfire
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Replace Water Fixtures with Low Flow Units

Objective	This action's goal is to limit water consumption at City-owned and maintained facilities by replacing traditional water fixtures with low flow units.
Hazard	Drought
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing and Future infrastructure

City of Hughes Springs

Multi-Hazard Actions

Mitigation Action	Educational Outreach
Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in Wildfire Fuels Reduction, Tornado Saferooms, Structural Hardening, etc.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	Low
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat

Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the jurisdiction that are connected to critical facilities and creating firebreaks.
Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium
Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Set up Cooling and Warming Centers in Existing Facilities
Objective	The action's goal is to increase extreme heat and cold resilience by limiting vulnerable populations' exposure to extreme heat or extreme cold by creating new or using existing facilities as cooling centers or warming centers.
Hazard	Extreme Heat, Extreme Cold, Winter Weather
Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years

Target	Existing and future population

Single Hazard Actions

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Medium
Estimated Cost	More than $1,000,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Install Check Valves
Objective	This action proposes installing check valves to prevent backflow and reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Medium
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	City, FEMA FMA, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing infrastructure

Mitigation Action	Wildfire Fuels Reduction in WUI
Objective	This action will develop and implement a program to identify and prioritize lands in the Wildland Urban Interface in need of fuels reduction and then reduce or remove wildfire fuels through various methods as appropriate.
Hazard	Wildfire
Priority	Low

Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement a Flood Damage Prevention Ordinance
Objective	Jurisdiction will re-evaluate all existing flood damage prevention measures to identify strengths and weaknesses in order to develop and enforce a new flood damage prevention ordinance and identify a new floodplain manager, in compliance with the NFIP.
Hazard	Riverine Flooding
Priority	Low
Estimated Cost	Less than $50,000
Potential Funding Source (s)	City
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1-5 Years
Target	Existing and planned infrastructure

Mitigation Action	Replace Current Landscaping with Drought Resistant Plant Varieties
Objective	This action's goal is to limit water consumption at City-owned and maintained facilities by replacing existing landscaping with more drought resistant types.
Hazard	Drought
Priority	High
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future infrastructure

City of Linden

Multi-Hazard Actions

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Install and Expand Warning Systems/Weather Radio
Objective	Warning systems will help limit local vulnerability to hazards by enabling employees, first responders, and residents to coordinate disaster preparedness and recovery efforts.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	$1,000 - $100,000 per device
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population

Mitigation Action	Set up Cooling and Warming Centers in Existing Facilities
Objective	The action's goal is to increase extreme heat and cold resilience by limiting vulnerable populations' exposure to extreme heat or extreme cold by creating new or using existing facilities as cooling centers or warming centers.

Hazard	Extreme Heat, Extreme Cold, Winter Weather
Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the jurisdiction that are connected to critical facilities and creating firebreaks.
Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium
Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Install Impact and Wind-resistant Windows and Doors at Public Facilities
Objective	This action proposes hardening facilities. Hardening will include adding impact and wind-resistant doors and windows at public buildings in the jurisdiction.
Hazard	Tornados, Hailstorm, Severe Winds
Priority	Low
Estimated Cost	$100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years

Target	Existing infrastructure

Mitigation Action	Harden Facilities
Objective	This action proposes hardening facilities. Hardening will include but is not limited to adding impact and wind-resistant doors, windows; reinforcing building foundations, elevating low-lying structures, upgrading and/or adding shatter-resistant films to all glazing, upgrading thermal insulation, building protective walls around exposed gas tanks and cylinders, shielding roof-mounted equipment or exposed utility and HVAC systems, and adding bracing and tie-down clips to building roofs.
Hazard	Hailstorms, Winter Weather, Extreme Cold, Riverine Flooding, Tornados
Priority	High
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	City, FEMA FMA, FEMA BRIC, FEMA HMGP, CDBG MIT
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Single Hazard Actions

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure to reduce the potential impacts of future flood events, including but not limited to upgrading ditches and culverts.
Hazard	Riverine Flooding
Priority	High
Estimated Cost	More than $1,000,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0-2 Years
Target	Existing infrastructure

Mitigation Action	Purchase Portable Pumps

Objective	This action proposes purchasing portable pumps that can be deployed as needed to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Low
Estimated Cost	$250,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Develop and Implement a Flood Damage Prevention Ordinance
Objective	Jurisdiction will re-evaluate all existing flood damage prevention measures to identify strengths and weaknesses in order to develop and enforce a new flood damage prevention ordinance and identify a new floodplain manager, in compliance with the NFIP.
Hazard	Riverine Flooding
Priority	Low
Estimated Cost	Less than $50,000
Potential Funding Source (s)	City
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1-5 Years
Target	Existing and planned infrastructure

Mitigation Action	Create Drainage Master Plan
Objective	This action proposes creating a drainage master plan for the City, in conjunction with other jurisdictions, that will provide the City with a comprehensive planning document that provides basic information and necessary guidance for the county-wide drainage system, including but not limited to an H&H study.
Hazard	Riverine Flooding
Priority	Medium
Estimated Cost	Less than $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA FMA, FEMA HMGP, CDBG-MIT
Responsible Department	Mayor and Council, City Administration

Implementation Schedule	5 Years
Target	Existing and future infrastructure

Mitigation Action	Wildfire Fuels Reduction in WUI
Objective	This action will develop and implement a program to identify and prioritize lands in the Wildland Urban Interface in need of fuels reduction and then reduce or remove wildfire fuels through various methods as appropriate.
Hazard	Wildfire
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Construct Community Safe Rooms
Objective	The action's goal is to minimize local population vulnerability to Tornados by providing public safe rooms.
Hazard	Tornado
Priority	Medium
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Develop and Implement a New Drought Contingency Plan
Objective	Re-evaluate all existing drought control measures to identify strengths and weaknesses in order to develop and enforce a new or updated drought contingency plan.
Hazard	Drought

Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population and infrastructure

Mitigation Action	Replace Water Fixtures with Low Flow Units
Objective	This action's goal is to limit water consumption at City-owned and maintained facilities by replacing traditional water fixtures with low flow units.
Hazard	Drought
Priority	Low
Estimated Cost	$10,000 - $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing and Future infrastructure

Mitigation Action	Replace Current Landscaping with Drought Resistant Plant Varieties
Objective	This action's goal is to limit water consumption at City-owned and maintained facilities by replacing existing landscaping with more drought resistant types.
Hazard	Drought
Priority	High
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement a New Water Conservation Ordinance

Objective	The City will re-evaluate all existing water conservation and reduction measures to identify strengths and weaknesses in order to develop and enforce a new water conservation ordinance.
Hazard	Drought
Priority	Medium
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Conduct Fan Drives for At-Risk Residences without Air-Conditioning
Objective	The action's goal is to increase extreme heat resilience by limiting vulnerable populations' exposure to extreme heat through giving fans to residences without air conditioning.
Hazard	Extreme Heat
Priority	Low
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population

Mitigation Action	Upgrade Wildfire Fighting Equipment
Objective	The action's goal is to increase the reliability of wildfire fighting equipment including but not limited to the purchase of a new brush truck.
Hazard	Wildfire
Priority	Medium
Estimated Cost	$50,000 or more
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP

Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population

Mitigation Action	Install Surge Protection and Grounding Systems to Protect Electronic Assets
Objective	This action will install surge protection at all critical facilities to prevent damage to critical electronic devices including but not limited to: computers, servers, audio/visual equipment, laboratory equipment, and appliances.
Hazard	Lightning
Priority	High
Estimated Cost	$1,000 - $50,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

City of Marietta

Multi-Hazard Actions

Mitigation Action	Educational Outreach
Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in Wildfire Fuels Reduction, Tornado Saferooms, Structural Hardening, etc.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	Low
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the jurisdiction that are connected to critical facilities and creating firebreaks.
Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium
Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Install Impact and Wind-resistant Windows and Doors at Public Facilities
Objective	This action proposes hardening facilities. Hardening will include adding impact and wind-resistant doors and windows at public and critical facilities in the County.
Hazard	Hailstorm, Severe Winds, Tornados
Priority	High

Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Single Hazard Actions

Mitigation Action	Install Check Valves
Objective	This action proposes installing check valves to prevent backflow and reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Medium
Estimated Cost	$10,000 to $100,000
Potential Funding Source (s)	City, FEMA FMA, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing infrastructure

Mitigation Action	Purchase Portable Pumps
Objective	This action proposes purchasing portable pumps that can be deployed as needed to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Low
Estimated Cost	$250,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Wildfire Fuels Reduction

Objective	The action's goal is to reduce wildfire fuels on City-maintained land. Unchecked wildfire fuels increase the potential for a wildfire's ability to spread quickly, potentially resulting in higher damage dollar totals.
Hazard	Wildfire
Priority	Medium
Estimated Cost	Greater than $100,000
Potential Funding Source (s)	City, FEMA BRIC
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Medium Term: 3-5 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement a New Drought Contingency Plan
Objective	Re-evaluate all existing drought control measures to identify strengths and weaknesses in order to develop and enforce a new or updated drought contingency plan.
Hazard	Drought
Priority	High
Estimated Cost	$10,000 to $100,000
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future population and infrastructure

Mitigation Action	Develop and Implement a New Water Conservation Ordinance
Objective	The City will re-evaluate all existing water conservation and reduction measures to identify strengths and weaknesses in order to develop and enforce a new water conservation ordinance.
Hazard	Drought
Priority	Medium
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP

Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term – 1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Set up Cooling Centers in Existing Facilities
Objective	The action's goal is to increase extreme heat resilience by limiting vulnerable populations' exposure to extreme heat by creating new, or opening up existing facilities as cooling centers.
Hazard	Extreme Heat
Priority	Medium
Estimated Cost	$200,000 - $1,000,000 or greater
Potential Funding Source(s)	City, FEMA BRIC, FEMA HMGP
Responsible Department(s)	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Install Surge Protection to Protect Electronic Assets
Objective	This action will install surge protection at all critical facilities to prevent damage to critical electronic devices including but not limited to: computers, servers, audio/visual equipment, laboratory equipment, and appliances.
Hazard	Lightning
Priority	Low
Estimated Cost	$1,000 - $50,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

City of Queen City

Multi-Hazard Actions

Mitigation Action	Educational Outreach
Objective	This action will create a program to educate the public about specific mitigation actions for all hazards, including but not limited to participation in Wildfire Fuels Reduction, Tornado Saferooms, Structural Hardening, etc.
Hazard	Drought, Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	Low
Estimated Cost	Less than $10,000 per hazard
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Purchase or Upgrade Back Up Power Generators
Objective	Installing or upgrading generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages. Portable generators will maintain additional systems functionality including but not limited to lift stations, pumps, and communications infrastructure.
Hazard	Hailstorm, Riverine Flooding, Tornados, Severe Winds, Wildfire, Winter Weather, Lightning, Extreme Cold, Extreme Heat
Priority	High
Estimated Cost	More than $100,000 Each for Fixed Generators, Including Associated Engineering Costs. Less than $100,000 Each for Portable Generators
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing infrastructure

Mitigation Action	Implement a Tree Trimming Program
Objective	This action will develop and implement a tree trimming program to reduce wildfire fuels and minimize the amount of debris generated during natural hazard events. Projects may include but are not limited to trees along power lines within the jurisdiction that are connected to

	critical facilities and creating firebreaks.
Hazard	Wildfire, Tornado, Hailstorm, Winter Weather, Severe Winds
Priority	Medium
Estimated Cost	$10,000 - $500,0000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Single Hazard Actions

Mitigation Action	Purchase Portable Pumps
Objective	This action proposes purchasing portable pumps that can be deployed as needed to reduce the potential impacts of future flood events.
Hazard	Riverine Flooding
Priority	Low
Estimated Cost	$250,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP, FEMA FMA, TWDB
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Install Surge Protection to Protect Electronic Assets
Objective	This action will install surge protection at all critical facilities to prevent damage to critical electronic devices including but not limited to: computers, servers, audio/visual equipment, laboratory equipment, and appliances.
Hazard	Lightning
Priority	Low
Estimated Cost	$1,000 - $50,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration

Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

Mitigation Action	Replace Current Landscaping with Drought Resistant Plant Varieties
Objective	This action's goal is to limit water consumption at City-owned and maintained facilities by replacing existing landscaping with more drought resistant types.
Hazard	Drought
Priority	High
Estimated Cost	Less than $10,000
Potential Funding Source (s)	City, FEMA BRIC, FEMA HMGP
Responsible Department	Mayor and Council, City Administration
Implementation Schedule	Short Term: 0 – 2 Years
Target	Existing and future infrastructure