



TDEM
THE TEXAS A&M UNIVERSITY SYSTEM

October 10, 2019

The Honorable Byron Ryder
County Judge
Leon County
P.O. Box 429
Centerville, TX 75833

RE: Approval of Multi-Jurisdictional Hazard Mitigation Plan for Leon County, Texas

Dear Judge Ryder:

This letter is to inform you of the FEMA approval for the Local Hazard Mitigation Plan for Leon County and participating jurisdictions. All participating jurisdictions who adopt the plan are eligible for Unified Hazard Mitigation Grant funding which includes: the Hazard Mitigation Grant Program (HMGP); Pre-Disaster Mitigation (PDM); Severe Repetitive Loss (SRL); and Flood Mitigation Assistance (FMA) programs. Your efforts demonstrate a commitment to reducing the risk to the citizens and property of Leon County.

See the attachment for the list of jurisdictions that have submitted adoption resolutions to date. Any remaining participants should submit resolutions within 90 days of the original plan approval date. This plan was approved on October 8, 2019 and will expire in five years on October 7, 2024. A current plan is required to remain eligible for Unified Hazard Mitigation Grant funding.

If you have any questions or concerns, please contact me at 512-424-7820 or via email at david.jackson@tdem.texas.gov.

Respectfully,

A handwritten signature in black ink, appearing to read "David Jackson", with a long horizontal flourish extending to the right.

David Jackson, CEM
Unit Chief, Mitigation
State Hazard Mitigation Officer
Recovery and Mitigation
Texas Division of Emergency Management

Below is the list of approved participating governments included in the October 8, 2019 review of the referenced Leon County, Texas Multi-Jurisdictional Hazard Mitigation Plan.

Leon County
Buffalo
Centerville
Jewett
Leona
Marquez
Normangee
Oakwood

cc: Carlos Beceiro, Planner, carlosb@grantworks.net
Shaun P. Miller, State Coordinator, shaun.miller@tdem.texas.gov
Ponch Gonzales, TDEM District Coordinator, ponch.gonzales@tdem.texas.gov
Kelly Brown, Mitigation Coordinator, kelly.brown@tdem.texas.gov
Hannah Rosette, Mitigation Coordinator, hannah.rosette@tdem.texas.gov

DJ/nj



LEON COUNTY, TEXAS

RESOLUTION

A RESOLUTION OF LEON COUNTY, TEXAS, ADOPTING THE FEMA APPROVED LEON COUNTY TEXAS MULTI-JURISDICTION HAZARD MITIGATION PLAN.

WHEREAS, Leon County recognizes the threat that natural hazards pose to people and property within the County; and

WHEREAS, Leon County has created a Hazard Mitigation Plan for itself and its participants which is in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the plan from impacts of future hazards and disasters; and

WHEREAS, adoption by the Commissioners Court demonstrates our commitment to hazard mitigation and achieving the goals outlined in the Plan; and

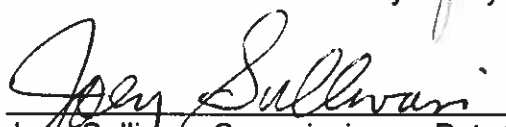
WHEREAS, The adoption of this plan will make Leon County eligible to apply for current open and future Hazard Mitigation Grants; and

NOW, THEREFORE, BE IT RESOLVED BY THE COMMISSIONERS COURT OF LEON COUNTY:

Section 1. That Leon County adopt the FEMA approved Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND APPROVED ON August 12, 2019.


Byron Ryder, County Judge

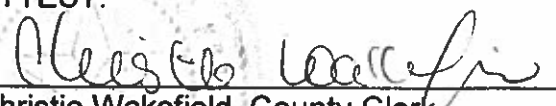

Joey Sullivan, Commissioner, Pct. 1

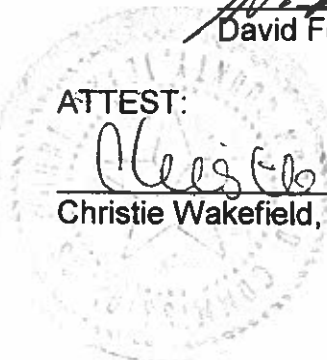

Dean Stanford, Commissioner, Pct. 3


David Ferguson, Commissioner, Pct. 2


David Grimes, Commissioner, Pct. 4

ATTEST:


Christie Wakefield, County Clerk



RESOLUTION

A RESOLUTION OF THE CITY OF BUFFALO, TEXAS, ADOPTING THE FEMA APPROVED LEON COUNTY TEXAS MULTI-JURISDICTION HAZARD MITIGATION PLAN.

WHEREAS, the City of Buffalo recognizes the threat that natural hazards pose to people and property within the City; and

WHEREAS, Leon County has created a Hazard Mitigation Plan for itself and other participants which is in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the plan from impacts of future hazards and disasters; and

WHEREAS, adoption by the City Council demonstrates our commitment to hazard mitigation and achieving the goals outlined in the Plan; and

WHEREAS, The adoption of this plan will make the City of Buffalo eligible to apply for current open and future Hazard Mitigation Grants; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF BUFFALO:

Section 1. That the City of Buffalo adopt the FEMA approved Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND APPROVED ON August 12, 2019.

ATTEST:


JERROD JONES, MAYOR


DEBRA L. WATERS, CITY SECRETARY

RESOLUTION

A RESOLUTION OF THE CITY OF CENTERVILLE, TEXAS, ADOPTING THE FEMA APPROVED LEON COUNTY TEXAS MULTI-JURISDICTION HAZARD MITIGATION PLAN.

WHEREAS, the City of Centerville recognizes the threat that natural hazards pose to people and property within the City; and

WHEREAS, Leon County has created a Hazard Mitigation Plan for itself and other participants which is in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the plan from impacts of future hazards and disasters; and

WHEREAS, adoption by the City Council demonstrates our commitment to hazard mitigation and achieving the goals outlined in the Plan; and

WHEREAS, The adoption of this plan will make the City of Centerville eligible to apply for current open and future Hazard Mitigation Grants; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF CENTERVILLE:

Section 1. That the City of Centerville adopt the FEMA approved Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND APPROVED ON August 7, 2019.

ATTEST:



N. R. GOOLSBY, MAYOR



TERESA BATES, CITY SECRETARY

RESOLUTION

A RESOLUTION OF THE CITY OF LEONA, TEXAS, ADOPTING THE FEMA APPROVED LEON COUNTY TEXAS MULTI-JURISDICTION HAZARD MITIGATION PLAN.

WHEREAS, the City of Leona recognizes the threat that natural hazards pose to people and property within the City; and

WHEREAS, Leon County has created a Hazard Mitigation Plan for itself and other participants which is in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the plan from impacts of future hazards and disasters; and

WHEREAS, adoption by the City Council demonstrates our commitment to hazard mitigation and achieving the goals outlined in the Plan; and

WHEREAS, The adoption of this plan will make the City of Leona eligible to apply for current open and future Hazard Mitigation Grants; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LEONA:


Section 1. That the City of Leona adopt the FEMA approved Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND APPROVED ON Sept 23rd, 2019.

ATTEST:



ERNEST ODEN, MAYOR



JOYCE STAFFORD, CITY SECRETARY

RESOLUTION

A RESOLUTION OF THE CITY OF JEWETT, TEXAS, ADOPTING THE FEMA APPROVED LEON COUNTY TEXAS MULTI-JURISDICTION HAZARD MITIGATION PLAN.

WHEREAS, the City of Jewett recognizes the threat that natural hazards pose to people and property within the City; and

WHEREAS, Leon County has created a Hazard Mitigation Plan for itself and other participants which is in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the plan from impacts of future hazards and disasters; and

WHEREAS, adoption by the City Council demonstrates our commitment to hazard mitigation and achieving the goals outlined in the Plan; and

WHEREAS, The adoption of this plan will make the City of Jewett eligible to apply for current open and future Hazard Mitigation Grants; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF JEWETT:

Section 1. That the City of Jewett adopt the FEMA approved Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND APPROVED ON August 19, 2019.

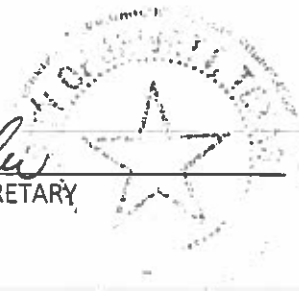
ATTEST:



JOHN SITTON, MAYOR



SHARON WEILER, CITY SECRETARY



RESOLUTION

A RESOLUTION OF THE CITY OF MARQUEZ, TEXAS, ADOPTING THE FEMA APPROVED LEON COUNTY TEXAS MULTI-JURISDICTION HAZARD MITIGATION PLAN.

WHEREAS, the City of Marquez recognizes the threat that natural hazards pose to people and property within the City; and

WHEREAS, Leon County has created a Hazard Mitigation Plan for itself and other participants which is in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the plan from impacts of future hazards and disasters; and

WHEREAS, adoption by the City Council demonstrates our commitment to hazard mitigation and achieving the goals outlined in the Plan; and

WHEREAS, The adoption of this plan will make the City of Marquez eligible to apply for current open and future Hazard Mitigation Grants; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MARQUEZ:

Section 1. That the City of Marquez adopt the FEMA approved Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND APPROVED ON August 7, 2019.

ATTEST:


STYNETTE CLARY, MAYOR


LAUREN POWERS, CITY MANAGER



RESOLUTION

A RESOLUTION OF THE CITY OF NORMANGEE, TEXAS, ADOPTING THE FEMA APPROVED LEON COUNTY TEXAS MULTI-JURISDICTION HAZARD MITIGATION PLAN.

WHEREAS, the City of Normangee recognizes the threat that natural hazards pose to people and property within the City; and

WHEREAS, Leon County has created a Hazard Mitigation Plan for itself and other participants which is in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the plan from impacts of future hazards and disasters; and

WHEREAS, adoption by the City Council demonstrates our commitment to hazard mitigation and achieving the goals outlined in the Plan; and

WHEREAS, The adoption of this plan will make the City of Normangee eligible to apply for current open and future Hazard Mitigation Grants; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF NORMANGEE:

Section 1. That the City of Normangee adopt the FEMA approved Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND APPROVED ON August 27, 2019.

ATTEST:



TROY NOEY, MAYOR



SUNNY WOBIG, CITY SECRETARY

RESOLUTION

A RESOLUTION OF THE CITY OF OAKWOOD, TEXAS, ADOPTING THE FEMA APPROVED LEON COUNTY TEXAS MULTI-JURISDICTION HAZARD MITIGATION PLAN.

WHEREAS, the City of Oakwood recognizes the threat that natural hazards pose to people and property within the City; and

WHEREAS, Leon County has created a Hazard Mitigation Plan for itself and other participants which is in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the plan from impacts of future hazards and disasters; and

WHEREAS, adoption by the City Council demonstrates our commitment to hazard mitigation and achieving the goals outlined in the Plan; and

WHEREAS, The adoption of this plan will make the City of Oakwood eligible to apply for current open and future Hazard Mitigation Grants; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF OAKWOOD:

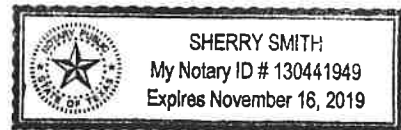
Section 1. That the City of Oakwood adopt the FEMA approved Leon County, Texas Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND APPROVED ON August 12, 2019.

ATTEST:


JACQUELYN MORROW, MAYOR


SHERRY SMITH, CITY SECRETARY



Leon County Multi-Hazard Mitigation Plan 2018

"Under the Federal Disaster Mitigation Act of 2000 (DMA 2000 or "the Act"), the participating jurisdictions are 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 participating jurisdictions and approval by FEMA will serve the dual objectives of providing direction and guidance on implementing hazard mitigation in the participating jurisdictions, and qualify them 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 participating jurisdictions. Nothing in this Plan is intended to be an admission, either expressed or implied, by or on behalf of the participating jurisdictions, of any obligation, responsibility, duty, fault or liability for any particular hazard or hazardous condition, and no such obligation, responsibility, duty, fault or liability for the participating jurisdictions should be inferred or implied from the Plan, except where expressly stated."

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1. Introduction and Background

1) Participating Jurisdictions

The Leon County Multi-Hazard Mitigation plan includes eight participating jurisdictions: Leon County, the City of Buffalo, the City of Centerville, the City of Jewett, the City of Leona, the City of Marquez, the City of Normangee, and the City of Oakwood.

2) Hazard Mitigation Plan History

All participating jurisdictions completed a Hazard Mitigation Action Plan in 2010. As such, this Multi-Hazard Mitigation Plan is an update.

The mitigation planning regulation of the Disaster Mitigation Act¹ requires that mitigation plans be reviewed and updated every five years to maintain eligibility for mitigation grant funding. As part of this plan, the participating jurisdictions will develop a schedule to ensure that its hazard mitigation plan is regularly updated.

Participating jurisdiction will address the following natural hazards: floods, hurricanes / tropical storms, wildfire, tornados, drought, riverine erosion, dam/levee failure, earthquakes, expansive soils, extreme heat, hailstorms, land subsidence, severe winter storms, windstorms, and lightning. No jurisdiction will address all hazards themselves, but all hazards will be addressed by at least some of the jurisdictions in this plan according to the following table:

¹ 44 CFR §201.6(d)(3)

Hazard	Jurisdiction							
	Leon County	City of Buffalo	City of Centerville	City of Jewett	City of Leona	City of Marquez	City of Normangee	City of Oakwood
Flood	x	x	x	x	x	x	x	x
Hurricanes / Tropical Storms	x	x	x	x	x	x	x	x
Wildfire	x	x	x	x	x	x	x	x
Tornados	x	x	x	x	x	x	x	x
Drought	x	x	x	x	x	x	x	x
Riverine Erosion	x							
Dam / Levee Failure	x						x	
Earthquakes				x				
Expansive Soils	x	x		x		x	x	x
Extreme heat	x	x	x	x	x	x	x	x
Hailstorms	x	x	x	x	x	x	x	x
Land Subsidence	x		x	x			x	x
Severe Winter Storms	x	x	x	x	x	x	x	x
Windstorms	x	x	x	x	x	x	x	x
Lightning	x	x	x	x	x	x	x	x

Omission Statements

Leon County will not be addressing the following hazard: Earthquakes. The history of impacts for the omitted hazard has been negligible (or non-existent), therefore the County expects that future impacts will be negligible as well, nor does the County anticipate submitting an application for grant funding to address any of them.

The City of Buffalo will not be addressing the following hazards: Riverine Erosion, Dam Failure, Earthquakes, and Land Subsidence. The history of impacts for all of the omitted hazards have been negligible (or non-existent), therefore the City expects that future impacts will be negligible as well, nor does the City anticipate submitting an application for grant funding to address any of them.

The City of Centerville will not be addressing the following hazards: Riverine Erosion, Dam Failure, Earthquakes, and Expansive Soils. The history of impacts for all of the omitted hazards have been negligible (or non-existent), therefore the City expects that future impacts will be negligible as well, nor does the City anticipate submitting an application for grant funding to address any of them.

The City of Jewett will not be addressing the following hazards: Riverine Erosion and Dam Failure. The history of impacts for all of the omitted hazards have been negligible (or non-existent), therefore the City expects that future impacts will be negligible as well, nor does the City anticipate submitting an application for grant funding to address any of them.

The City of Leona will not be addressing the following hazards: Riverine Erosion, Dam Failure, Earthquakes, Expansive Soils, and Land Subsidence. The history of impacts for all of the omitted hazards have been negligible (or non-existent), therefore the City expects that future impacts will be negligible as well, nor does the City anticipate submitting an application for grant funding to address any of them.

The City of Marquez will not be addressing the following hazards: Riverine Erosion, Dam Failure, Earthquakes, and Land Subsidence. The history of impacts for all of the omitted hazards have been negligible (or non-existent), therefore the City expects that future impacts will be negligible as well, nor does the City anticipate submitting an application for grant funding to address any of them.

The City of Normangee will not be addressing the following hazards: Riverine Erosion and Earthquakes. The history of impacts for all of the omitted hazards have been negligible (or non-existent), therefore the City expects that future impacts will be negligible as well, nor does the City anticipate submitting an application for grant funding to address any of them.

The City of Oakwood will not be addressing the following hazards: Riverine Erosion, Dam Failure, and Earthquakes. The history of impacts for all of the omitted hazards have been negligible (or non-existent), therefore the City expects that future impacts will be negligible as well, nor does the City anticipate submitting an application for grant funding to address any of them.

2. Planning Process

The Leon 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	Agency or Department
County Judge	Leon County	County Judge's Office
Emergency Management Coordinator	Leon County	Office of Emergency Management
Mayor	City of Marquez	Mayor's Office
Grant Administrator/Clerk	City of Buffalo	City Secretary's Office
Public Works Director	City of Buffalo	Public Works Department
City Secretary	City of Oakwood	City Secretary's Office
Waterworks Superintendent	City of Centerville	Public Works Department
City Secretary	City of Normangee	City Secretary's Office
City Secretary	City of Centerville	City Secretary's Office
City Secretary	City of Leona	City Secretary's Office
City Administrator	City of Jewett	City Administrator's Office

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

Proposed Timeline	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Actual Completion
Organize Resources and Identify Planning Team																	July
Create Outreach Strategy																	July
Review Community Capabilities																	October to January
Conduct Risk Assessment																	January to September
Identify Mitigation Goals and Actions																	October
Develop Action Plan for Implementation																	October
Identify Plan Maintenance Procedures																	October
Review Final Draft																	October
Submit Plan to State and FEMA																	October
Adopt Plan																	August and September 2019
Meetings																	
Local Contact																	7/29/2017
Planning Team																	8/24/2017
																	10/1/2018
																	10/2/2018
Public Outreach																	8/24/2017
																	October 2018

Stakeholder Outreach



October 2018

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
National Climatic Data Center (NCDC)	Hazard occurrences	Previous event occurrences, damage dollars, and mapping for all hazards
Texas Forest Service-Texas Wildfire Risk Assessment Summary Report	Wildfire Threat and Urban Interface	Mapping and wildfire vulnerability data
National Inventory of Dams	Dam information	High-hazard dam list
Federal Emergency Management Agency (FEMA) DFIRM Flood Zones	Flood zone maps	GIS mapping of flood zones
State of Texas Hazard Mitigation Plan 2013 Update	Hazard Descriptions	Official descriptions of hazards and their potential impacts
Region H 2016 Water Plan	Determining changing drought impacts	Review expected changes in type / volume of local water demands
Leon County 2013 CHAMPS Report	Natural hazard data	Review previously compiled natural hazard histories.
Leon County Appraisal District Data	Property values and parcel counts	Population counts, parcel data, and land use data
Leon County Flood Damage Prevention Order	Flood damage prevention building requirements	Identifying building requirements and restrictions for structures in the floodplain
City of Buffalo Drought Contingency Plan	Drought Stages and water restrictions	Review the measures already being taken to address the drought hazard and opportunities for additional measures
City of Buffalo Manufactured Housing Ordinance	Requirements for Manufactured Housing in City	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Buffalo Nuisance Ordinance	Nuisance definitions and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Buffalo Substandard Structures Ordinance	Substandard property definition and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Buffalo Street and Drainage Ordinance	Construction requirements and restrictions	Identifying development restrictions to limit future hazard exposure
City of Centerville Substandard Structures Ordinance	Substandard property definition and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Centerville Subdivision Ordinance	Subdivision requirements and restrictions	Identifying development restrictions to limit future hazard exposure
City of Centerville Drought Contingency Plan	Drought Stages and water restrictions	Review the measures already being taken to address the drought hazard and opportunities for additional measures
City of Jewett Minimum Property Standards	Minimum Standards for property owners	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Jewett Junked Vehicle Ordinance	Junked vehicle definition and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Jewett Flood Damage Prevention Ordinance	Flood damage prevention building requirements	Identifying building requirements and restrictions for structures in the floodplain
City of Jewett Drought Contingency Plan	Drought Stages and water restrictions	Review the measures already being taken to address the drought hazard and opportunities for additional measures

City of Jewett Substandard Structures Ordinance	Substandard property definition and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Jewett Subdivision Ordinance	Subdivision requirements and restrictions	Identifying development restrictions to limit future hazard exposure
City of Jewett Zoning Ordinance	Zoning requirements and restrictions	Identifying zone locations and restrictions to limit future hazard exposure
City of Marquez Drought Contingency Plan	Drought Stages and water restrictions	Review the measures already being taken to address the drought hazard and opportunities for additional measures
City of Marquez Manufactured Housing Ordinance	Requirements for Manufactured Housing in City	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Marquez Nuisance Ordinance	Nuisance definitions and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Marquez Junked Vehicle Ordinance	Junked vehicle definition and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Normangee Flood Damage Prevention Ordinance	Flood damage prevention building requirements	Identifying building requirements and restrictions for structures in the floodplain
City of Normangee Junked Vehicle Ordinance	Junked vehicle definition and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Normangee Nuisance Ordinance	Nuisance definitions and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Oakwood Substandard Structures Ordinance	Substandard property definition and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Oakwood Flood Damage Prevention Ordinance	Flood damage prevention building requirements	Identifying building requirements and restrictions for structures in the floodplain s
City of Oakwood Manufactured Housing Ordinance	Requirements for Manufactured Housing in City	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events
City of Oakwood Nuisance Ordinance	Nuisance definitions and methods for remedy	Identifying measures permitted by an existing ordinance to address issues that may change the impact of natural hazard events

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 within the participating jurisdictions and neighboring jurisdictions. In many cases of non-participation, the title listed is reflective of the office the planning team tried to contact:

Table 4: Local Stakeholders Contacted

Stakeholder	Title	Participated
Limestone County	Emergency Management Coordinator	Yes
Robertson County	Emergency Management Coordinator	No
Brazos County	Emergency Management Coordinator	No
Madison County	Emergency Management Coordinator	No
Houston County	Emergency Management Coordinator	No
Anderson County	Emergency Management Coordinator	Yes
Freestone County	Emergency Management Coordinator	No

Area stakeholders were contacted by phone and email. In an effort to increase participation, each stakeholder was contacted at least twice. 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 Meeting

The planning team met on one occasion. Additional communication was regularly carried out via email and over the phone.

The planning team meeting was held on August 24, 2017. 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 Emergency Management Coordinator provided additional knowledge and input to help the planning team's decision making process.

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. The planning team also reviewed each jurisdiction's capability assessment.

At the end of the meeting, Planning team members agreed to compile relevant data, including city ordinances, and begin identifying critical facilities. This work was completed through emails and phone calls over the next several months while the consultant wrote the bulk of the plan.

After the first meeting, however, it was determined that the number of participating jurisdictions combined with other extenuating circumstance were making planning team meetings very difficult to schedule. In order to keep the plan on track then, individual meetings with each participating jurisdiction to select mitigation actions for the hazards they selected were completed by the consultant between October 1 and October 2, 2018.

3) Public Input

In an effort to provide an open process and collect any missing information related to hazard history, vulnerability, and impact, members of the public were given the opportunity to review an in-progress draft of the plan. A public hearing was advertised and members of the public were invited to attend the public hearing that occurred after the planning team meeting on August 24, 2017. Members of the public were invited to review the plan in progress at local city halls and other locations within the participating jurisdictions including:

Leon County
Emergency Operations Center - Annex
155 N. Cass Street
Centerville, TX 75833

Leon County Judge's Office - Court House
130 E. St. Mary
Centerville, TX 75833

Buffalo City Library
812 N. Buffalo Ave.
Buffalo, TX 75831

City of Centerville - City Hall
325 E. St. Mary
Centerville, TX 75833

City of Jewett - City Hall
114 N. Broadway St.
Jewett, TX 75846

City of Marquez - City Hall
320 S. Austin St.
Marquez

City of Normangee - City Hall
107 E. Main St.
Normangee, TX 77871

The plans were distributed to these locations on October 2, 2018 and the public were alerted of the availability of the plan draft for review via newspaper ads that ran in the following papers on the following days:

Buffalo Express on October 9, 2018

Centerville News on October 10, 2018

Jewett Messenger on October 10, 2018

Normangee Star on October 10, 2018

Palestine Herald-Press on October 10, 2018

A more finalized plan was distributed to the same locations on October 18, 2018 and a second round of newspaper advertisements again alerted the public that a plan draft was available for review at the locations. These ads ran in the following newspapers on the following days:

Buffalo Express on October 23, 2018

Centerville News on October 24, 2018

Jewett Messenger on October 24, 2018

Normangee Star on October 24, 2018

Palestine Herald-Press on October 24, 2018

Despite planning team efforts to generate public interest and collect input, no member of the public attended any of the public hearings or offered comments on the plan drafts made available during the planning process.

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	Agency or Department
Emergency Management Coordinator	Leon County	Office of Emergency Management
County Judge	Leon County	County Judge's Office
Mayor	City of Marquez	Mayor's Office
Grant Administrator/Clerk	City of Buffalo	City Secretary's Office
Public Works Director	City of Buffalo	Public Works Department
City Secretary	City of Oakwood	City Secretary's Office
Public Works Director	City of Centerville	Public Works Department
City Secretary	City of Jewett	City Secretary's Office
City Secretary	City of Leona	City Secretary's Office
City Secretary	City of Normangee	City Secretary's Office

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.

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 opportunities for the public to make its views and concerns known. Leon County and the participating jurisdictions will provide notice to the public through announcements in the local paper, fliers posted at city hall, and on the city's website.

5) Plan Monitoring

The Leon County Emergency Management Coordinator (EMC) will be responsible for the overall continued coordination and monitoring of the mitigation plan and the actions assigned for each hazard. 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 EMC 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 EMC 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 Emergency Management 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:

- 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 EMC 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 light of its history, likelihood of future events, extent, jurisdictional vulnerability, location and impact.

Likelihood of Future Events is measured based on a hazard’s expected frequency of occurrence in light of its previous frequency. Each hazard’s likelihood of future events 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 Parcel Count and Potential Damage Values

Table 6: Estimated Values by Location

Jurisdiction	Estimated Potential Damage Value
County	\$1,656,299,949
City of Buffalo	\$88,731,470
City of Centerville	\$43,190,200
City of Jewett	\$29,209,150
City of Leona	Unavailable (no property tax)
City of Marquez	\$12,890,020
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

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 and Income

The populations of each jurisdiction were broken down into three categories: young residents, elderly 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. It is not expected that the participating jurisdictions' demographics have changed significantly from the data used in the table below, which comes from both 2010 Census and the 2016 ACS data, and so it is not expected that the jurisdictions' vulnerability to hazards has changed significantly since the publication of this demographic data.

Table 7: Vulnerable Populations by Jurisdiction

Estimated Vulnerable Population Totals			
Jurisdiction	Young²	Elderly³	% People below poverty level⁴
Leon County	4126	3615	16%
City of Buffalo	585	220	26.9%
City of Centerville	209	195	27.4%
City of Jewett	421	107	18.7%
City of Leona	52	28	10.8%
City of Marquez	74	42	10.4%
City of Normangee	209	92	12.7%
City of Oakwood	133	85	17.8%

In addition to identifying vulnerable population categories, the planning team worked to identify specific locations that are likely home to high concentrations of vulnerable residents.

² Table DP-1, 2010

³ Table DP-1, 2010

⁴ Table DP03, 2012-2016 ACS

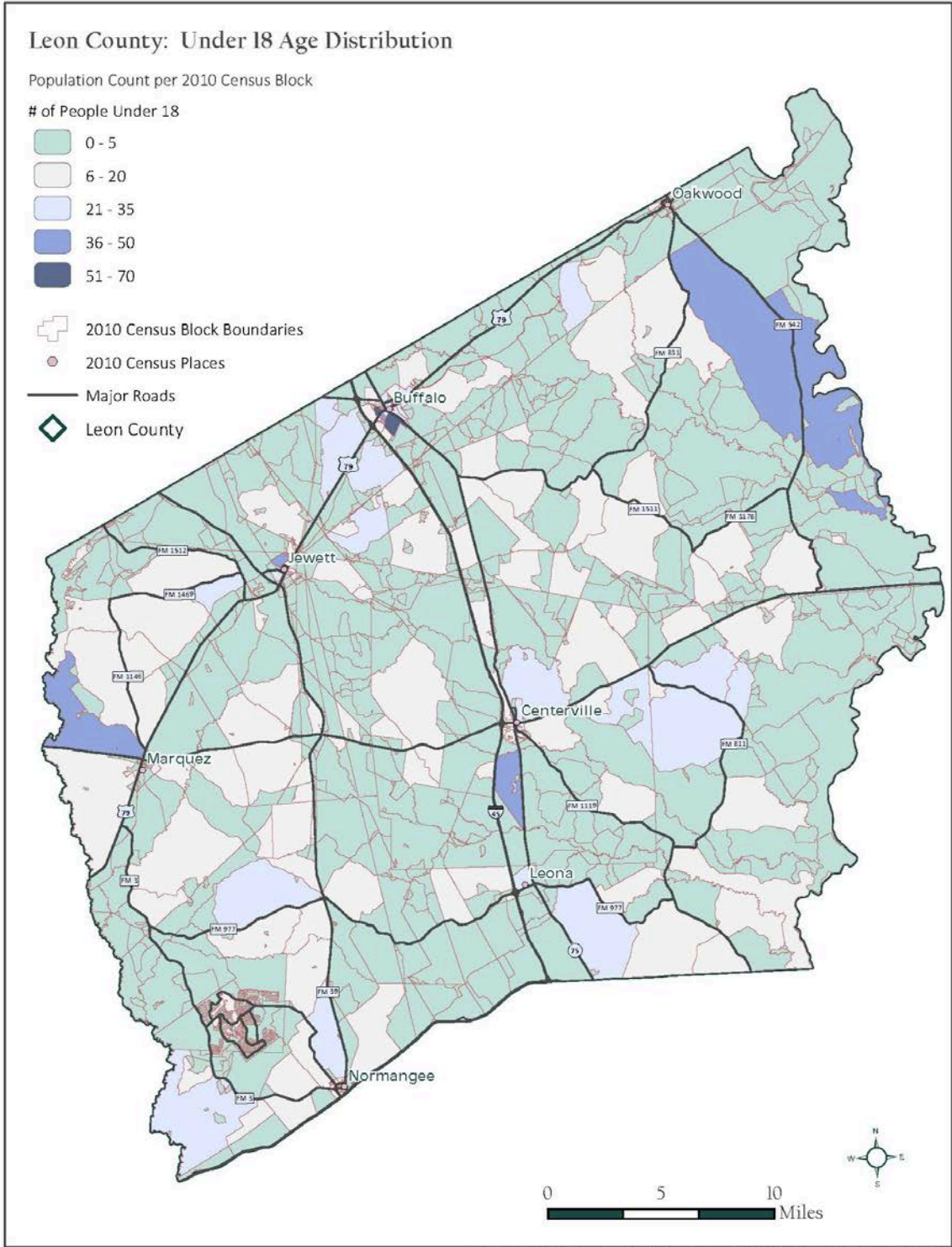


Figure 1: Leon County Age Distribution by Census Blockgroup, Under 18

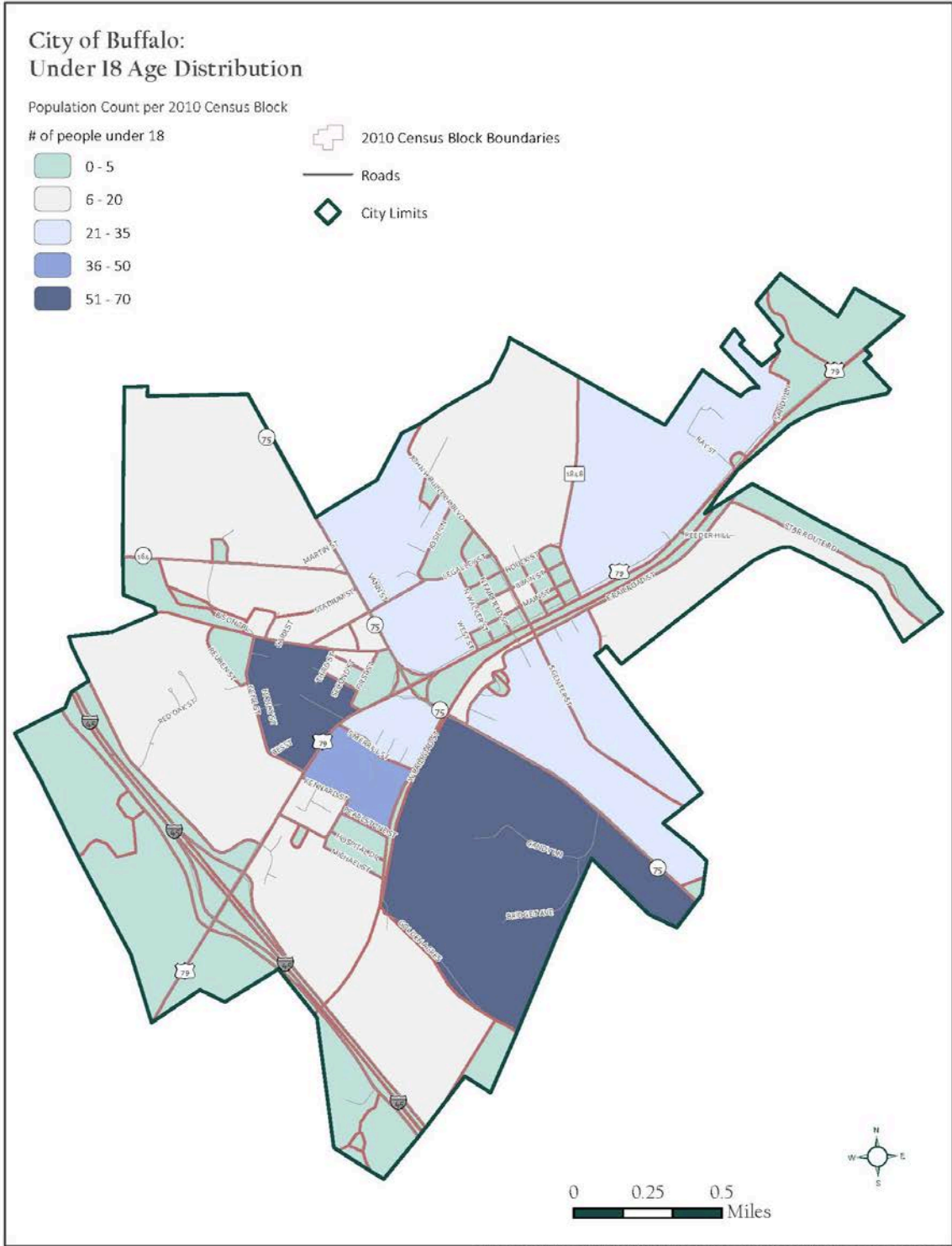


Figure 2: City of Buffalo Age Distribution by Census Blockgroup, Under 18

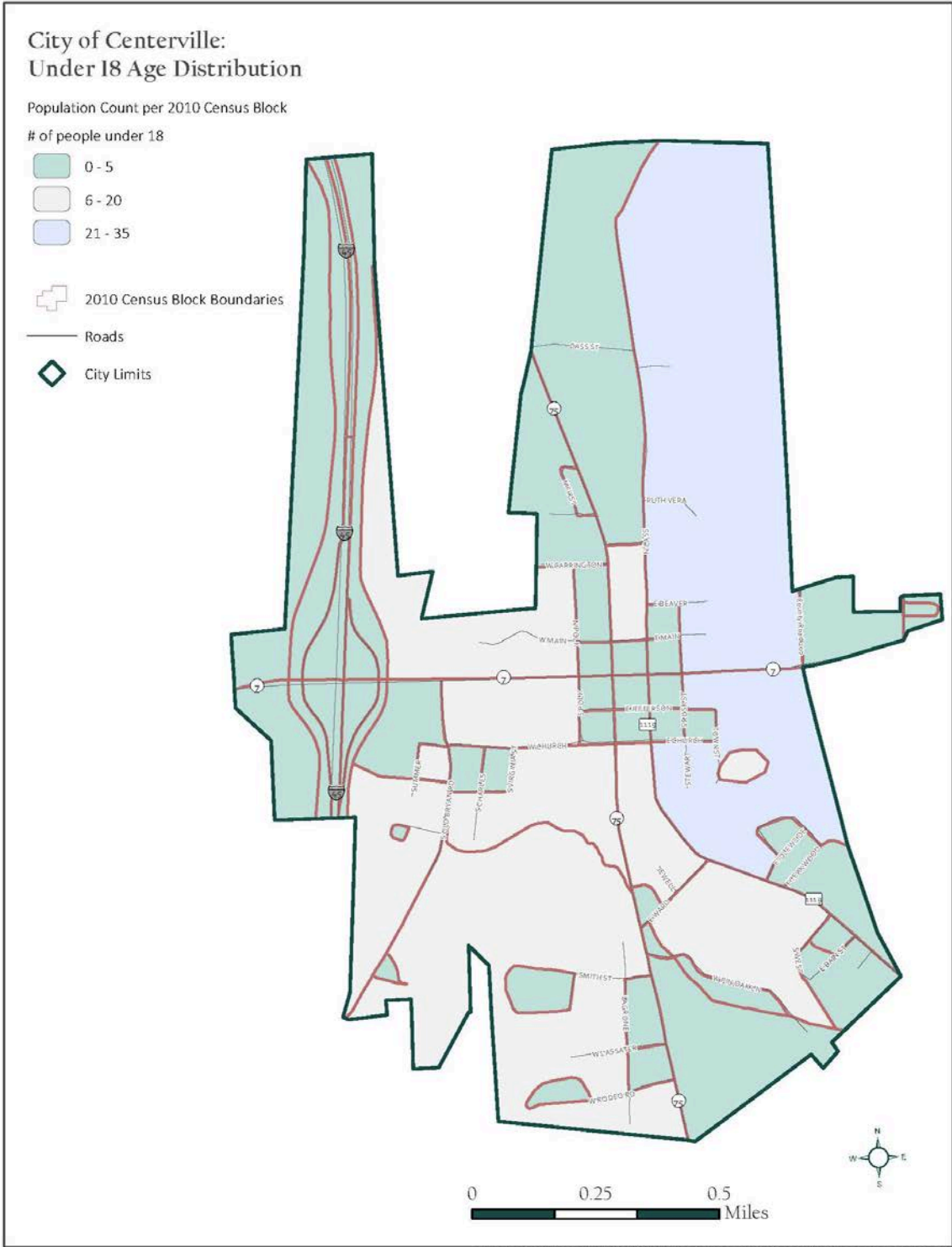


Figure 3: City of Centerville Age Distribution by Census Blockgroup, Under 18

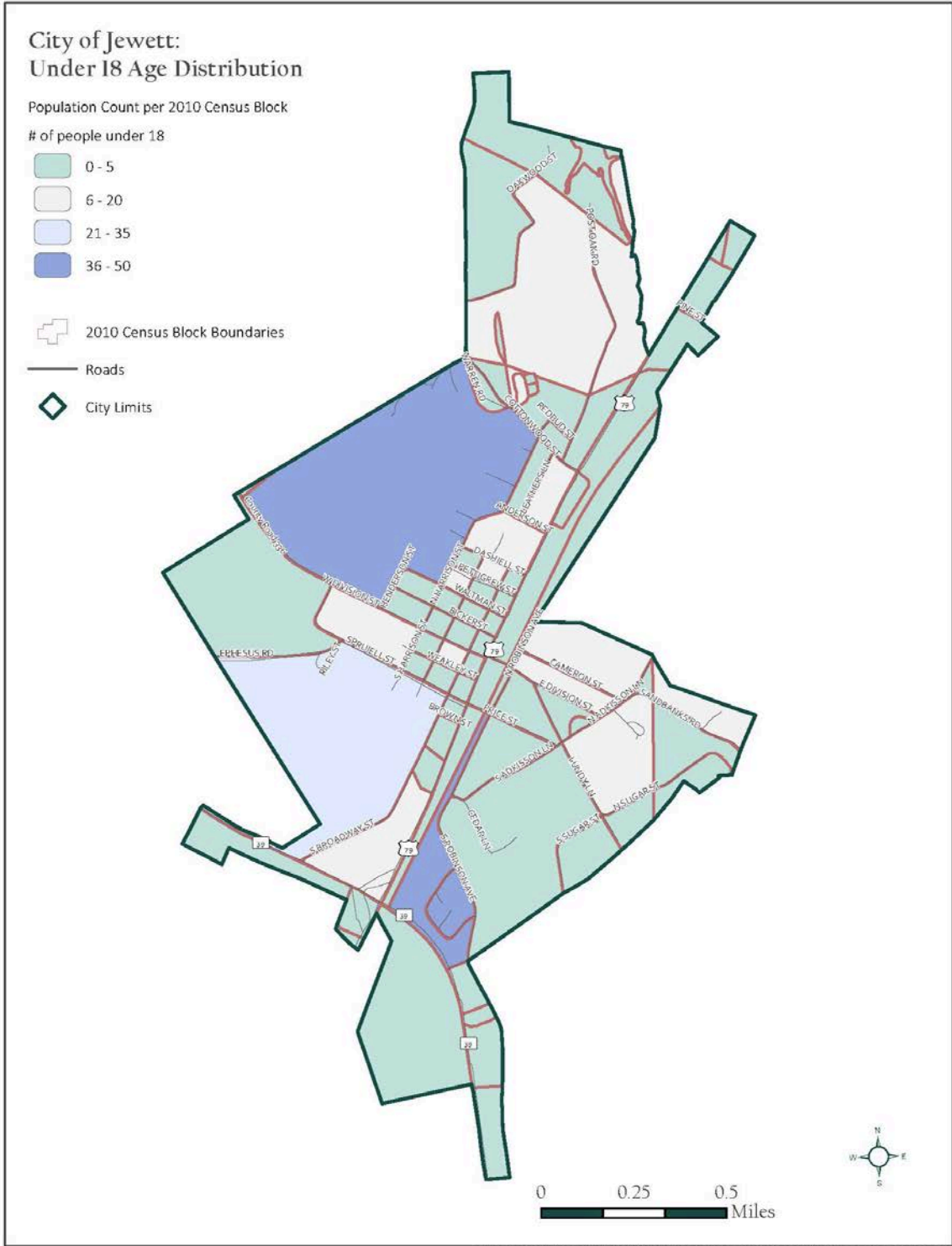


Figure 4: City of Jewett Age Distribution by Census Blockgroup, Under 18

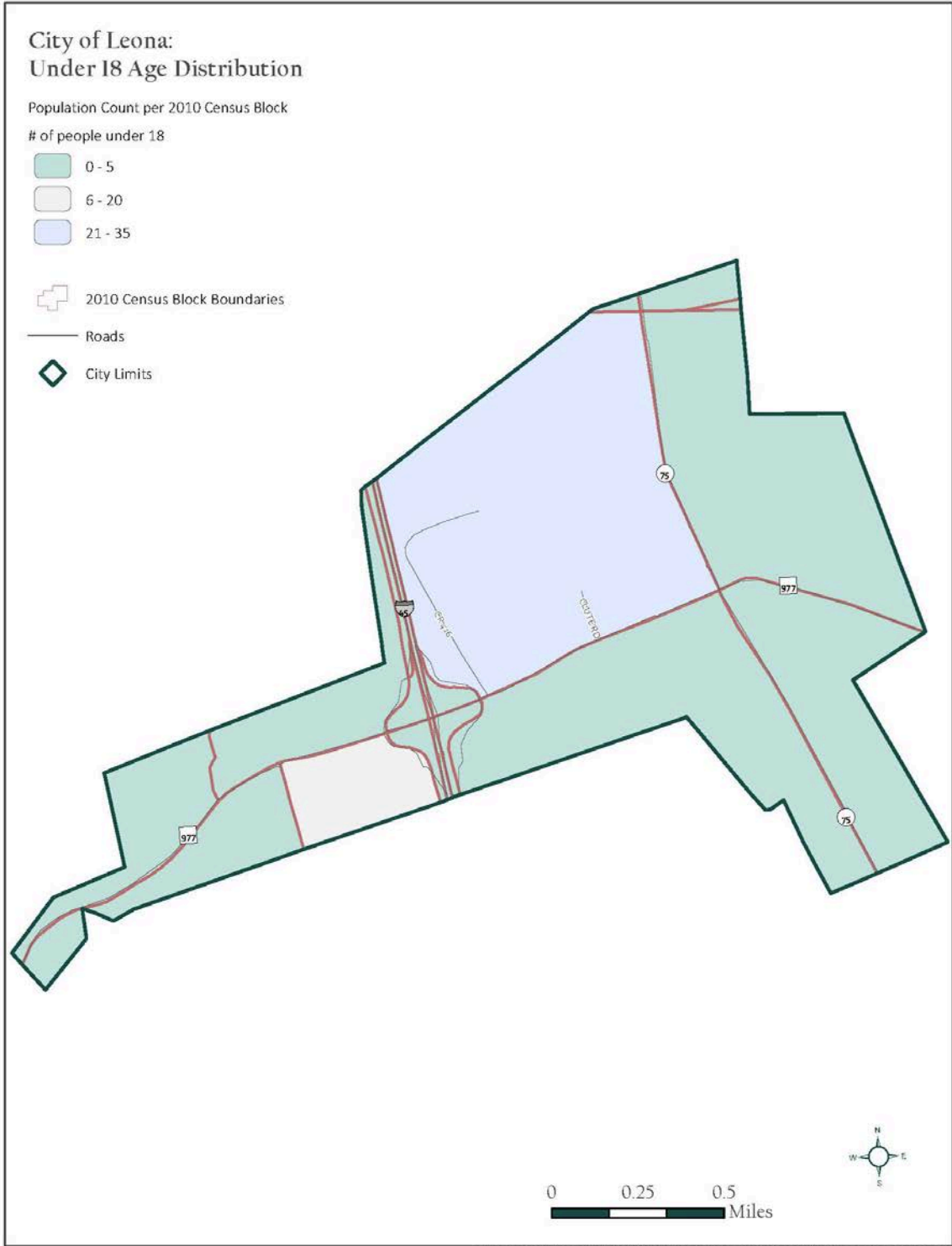


Figure 5: City of Leona Age Distribution by Census Blockgroup, Under 18

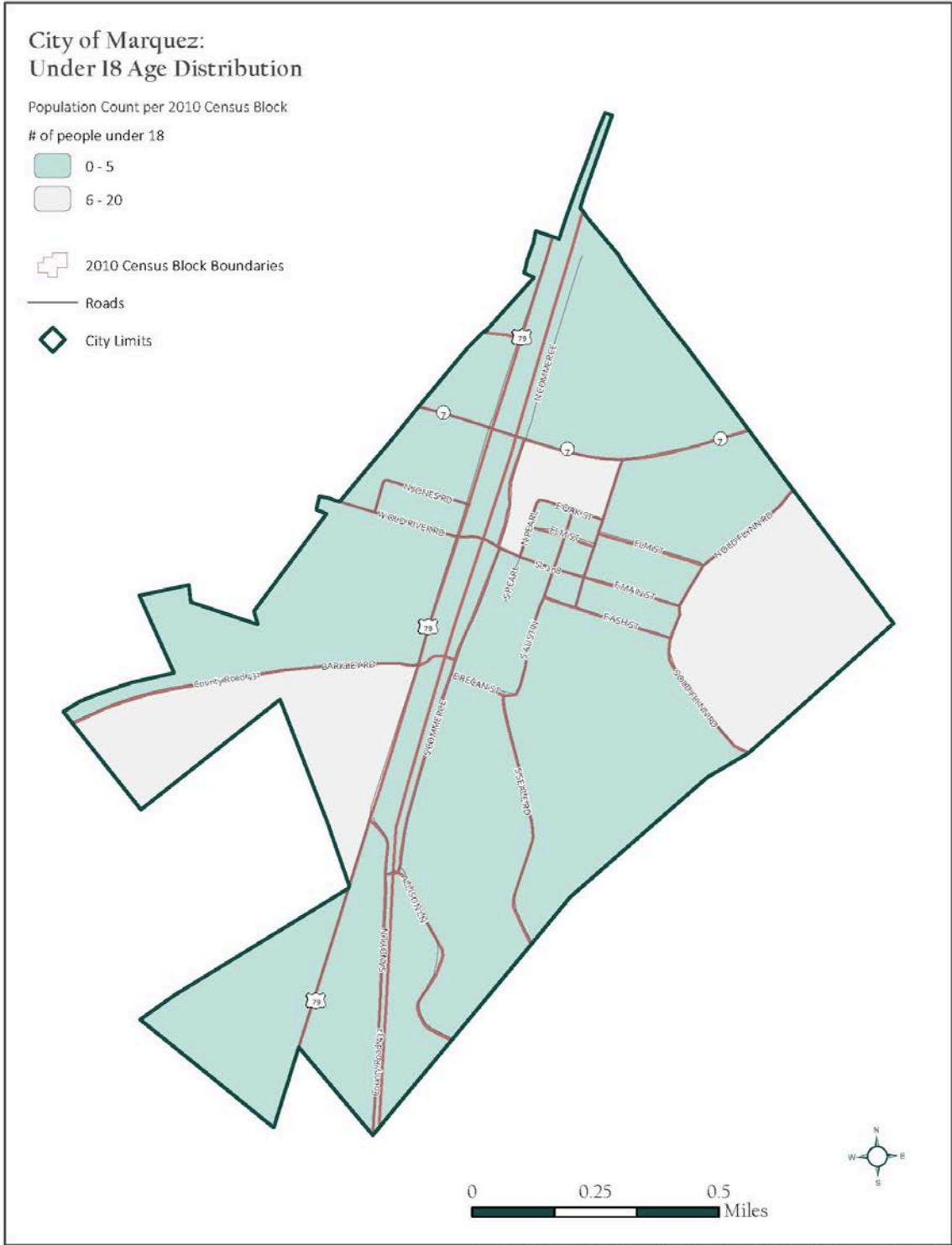


Figure 6: City of Marquez Age Distribution by Census Blockgroup, Under 18

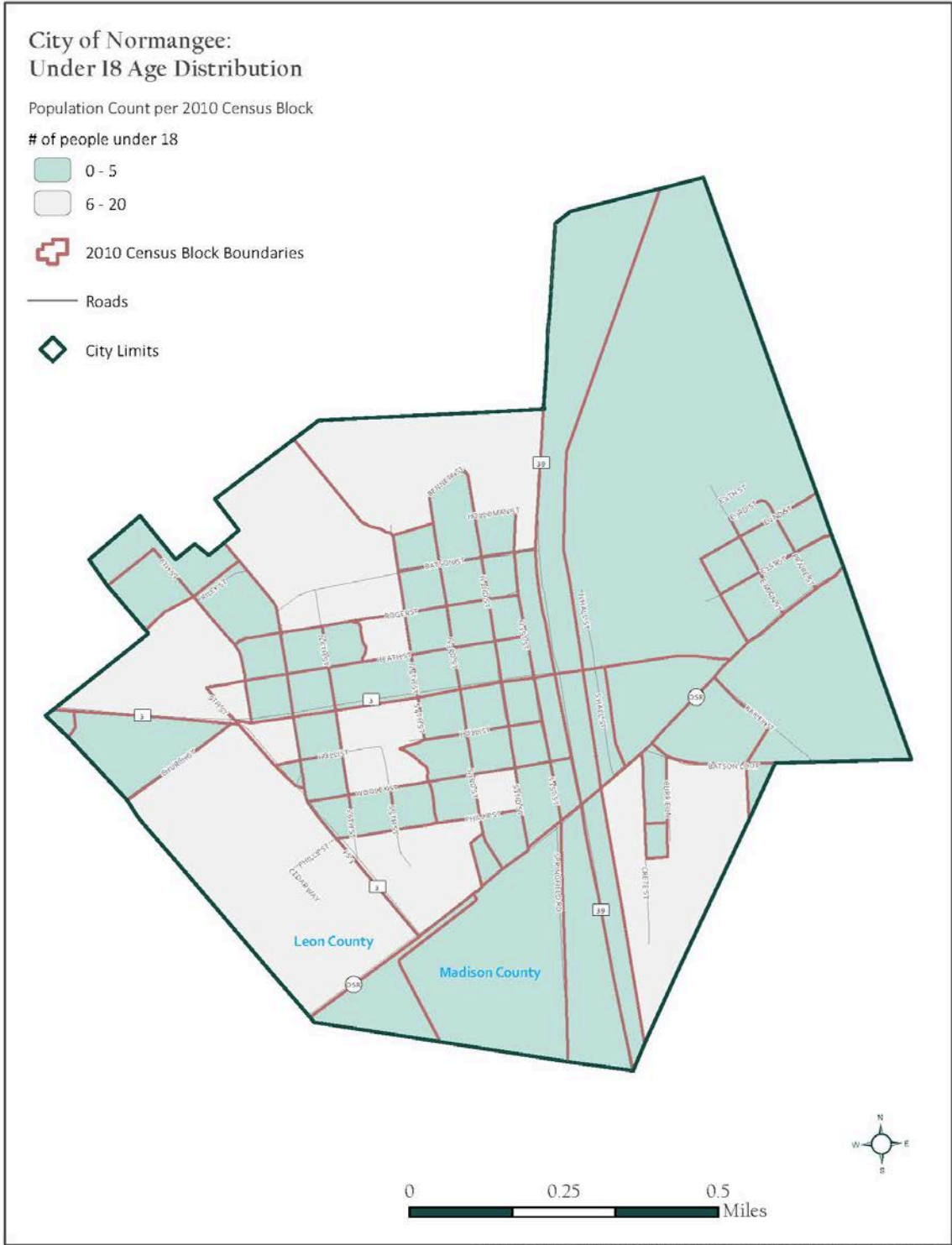


Figure 7: City of Normangee Age Distribution by Census Blockgroup, Under 18



Figure 8: City of Oakwood Age Distribution by Census Blockgroup, Under 18

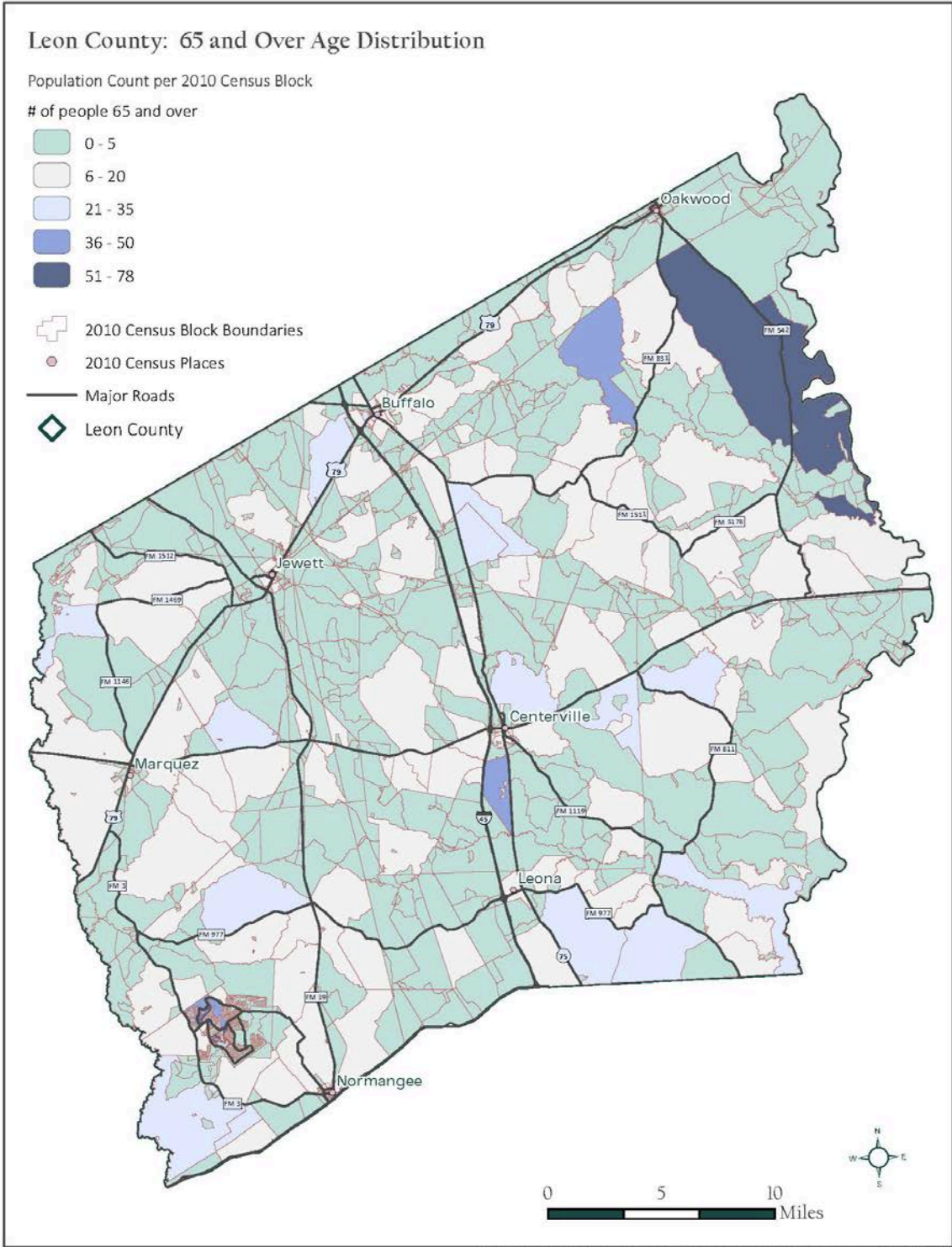


Figure 9: Leon County Age Distribution by Census Blockgroup, 65+

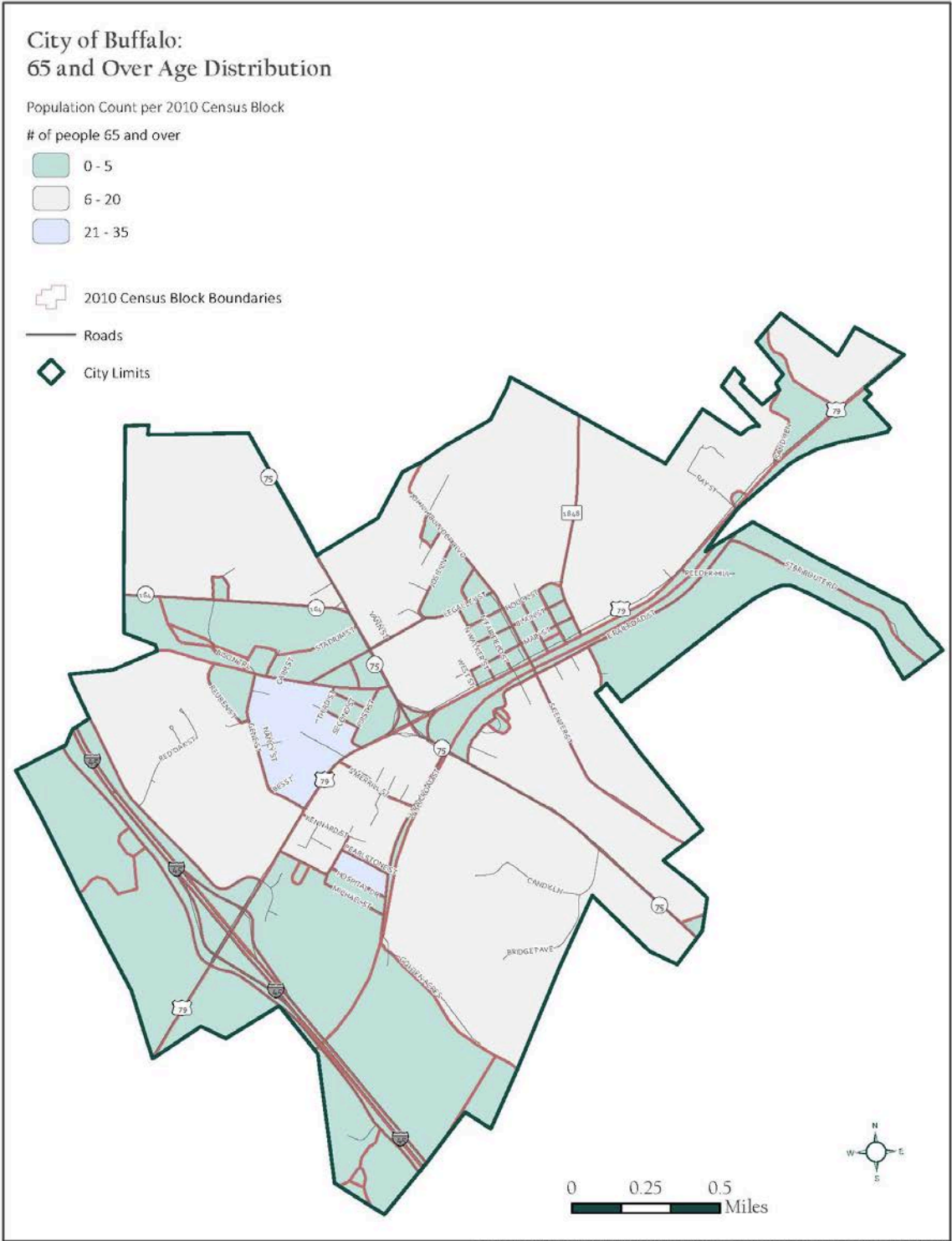


Figure 10: City of Buffalo Age Distribution by Census Blockgroup, 65+

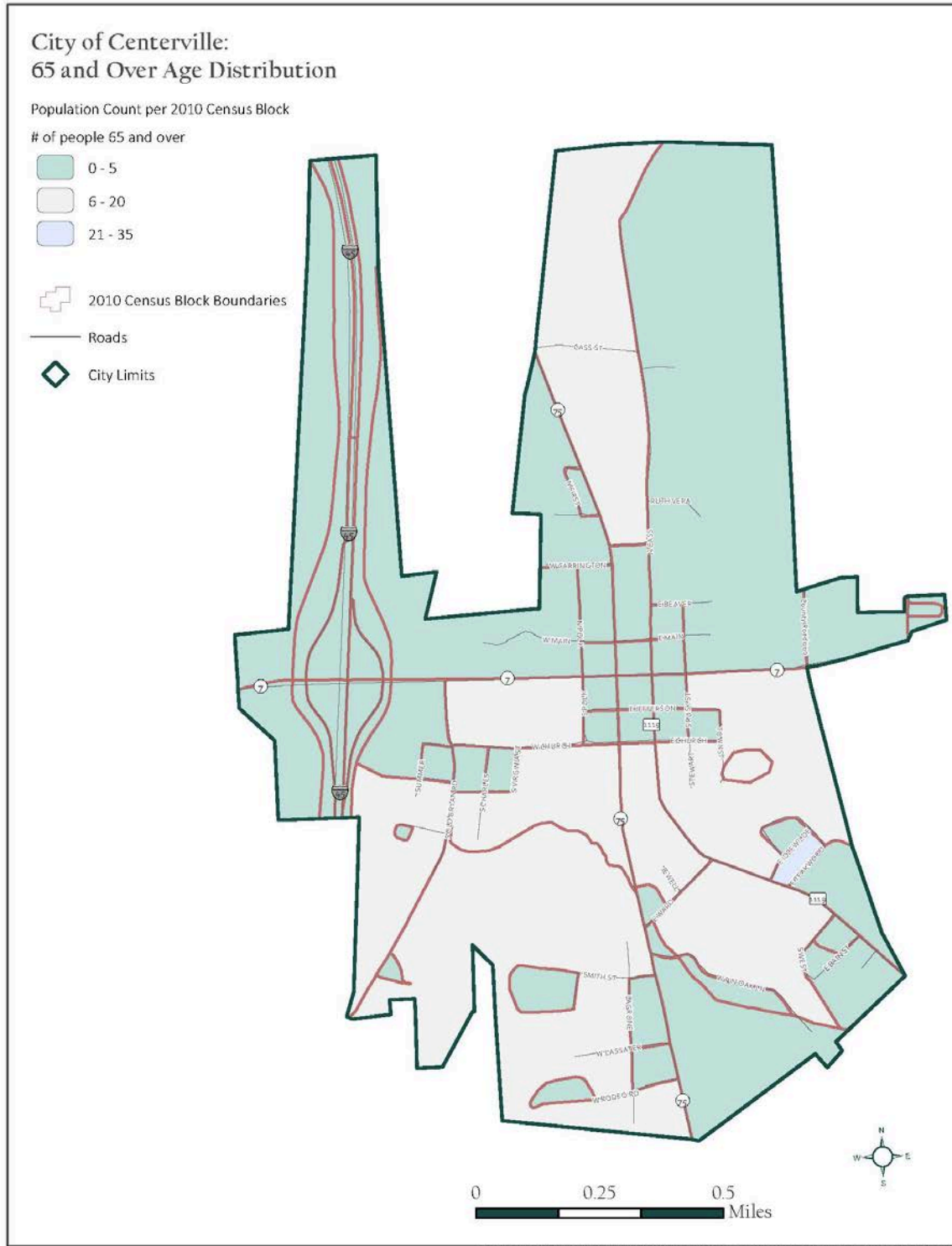


Figure 11: City of Centerville Age Distribution by Census Blockgroup, 65+



Figure 12: City of Jewett Age Distribution by Census Blockgroup, 65+



Figure 13: City of Leona Age Distribution by Census Blockgroup, 65+

City of Marquez: 65 and Over Age Distribution

Population Count per 2010 Census Block

of people 65 and over

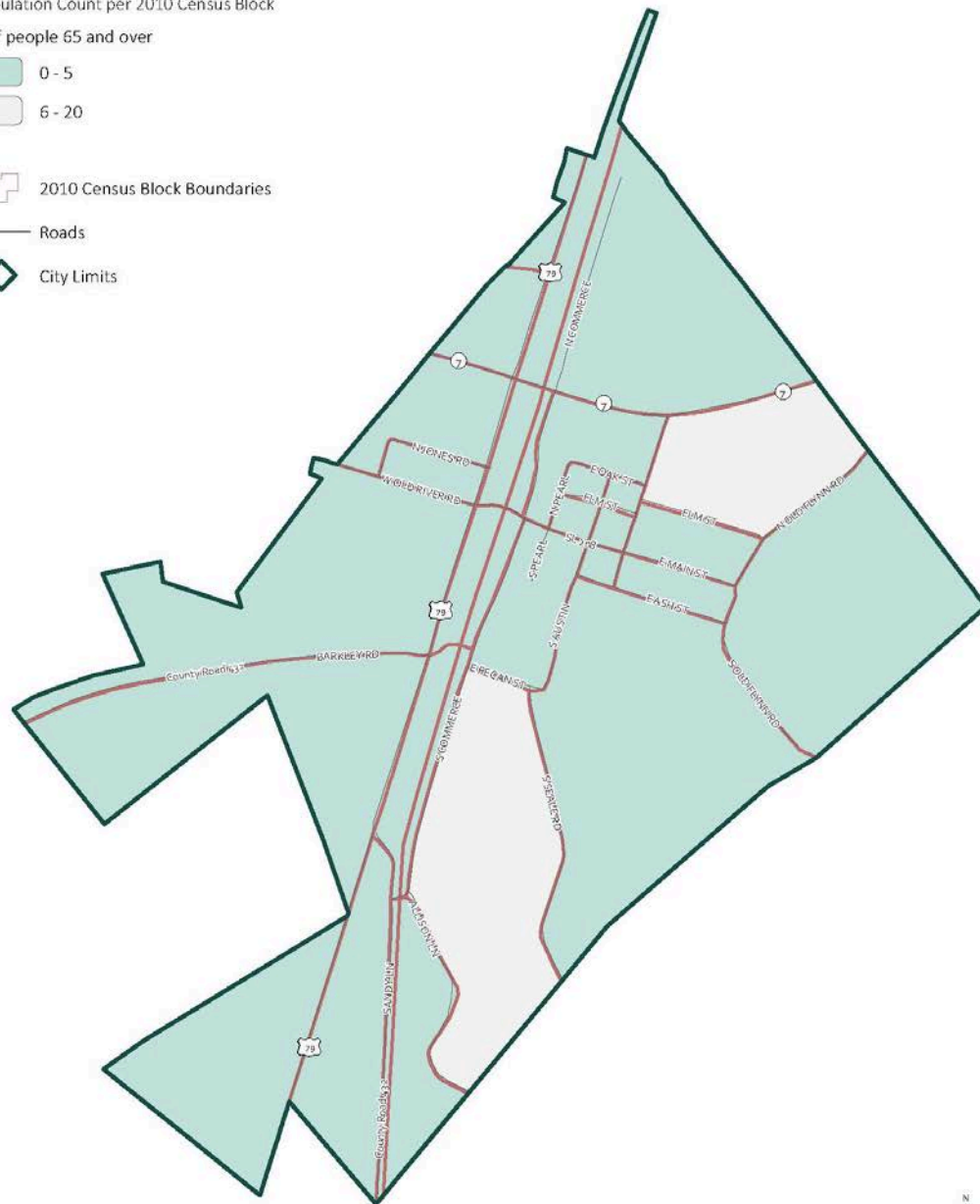
0 - 5

6 - 20

2010 Census Block Boundaries

Roads

City Limits



Source: U.S. Census Bureau, 2010 Census Summary File 1 (<http://www.census.gov/en.html>)

Figure 14: City of Marquez Age Distribution by Census Blockgroup, 65+

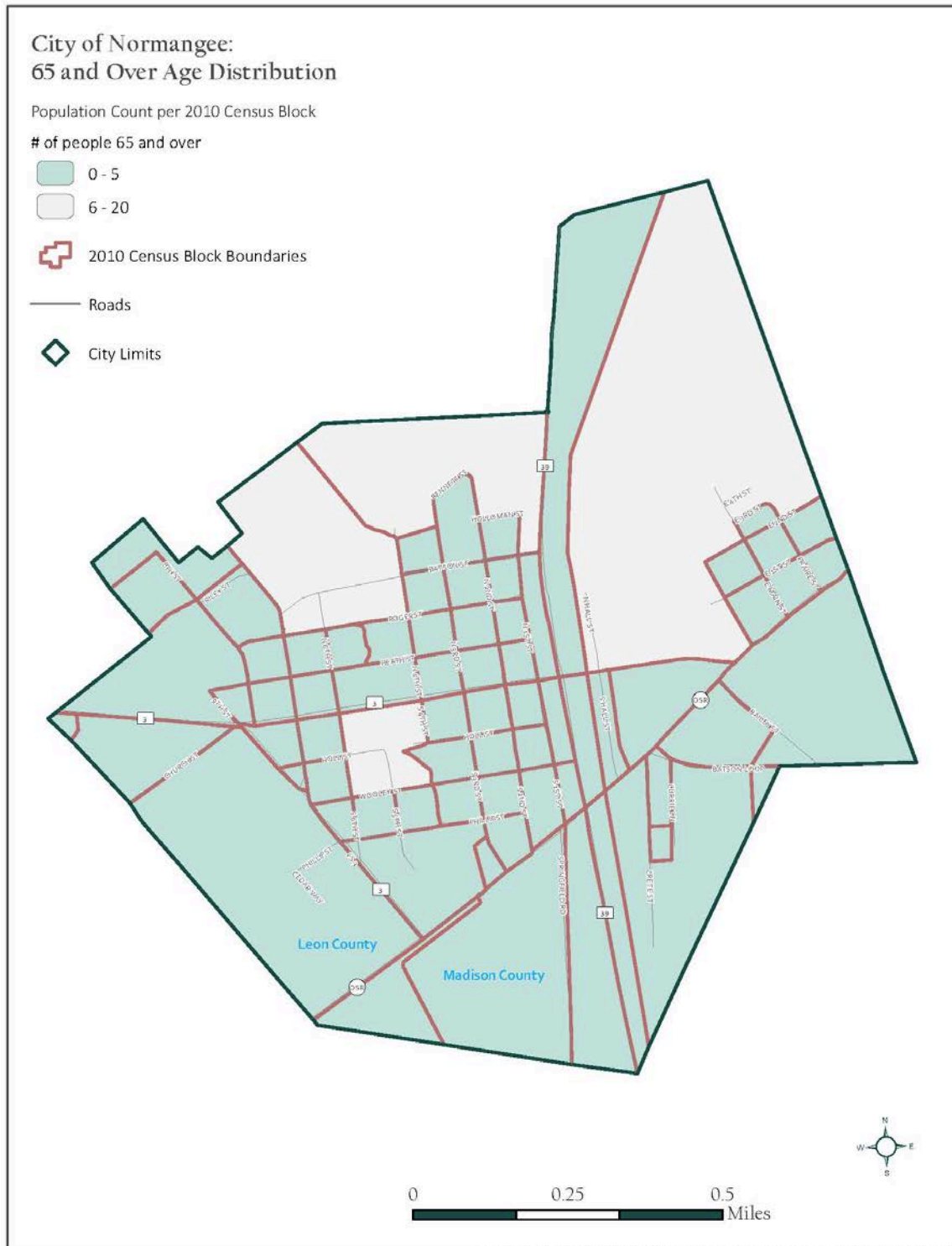
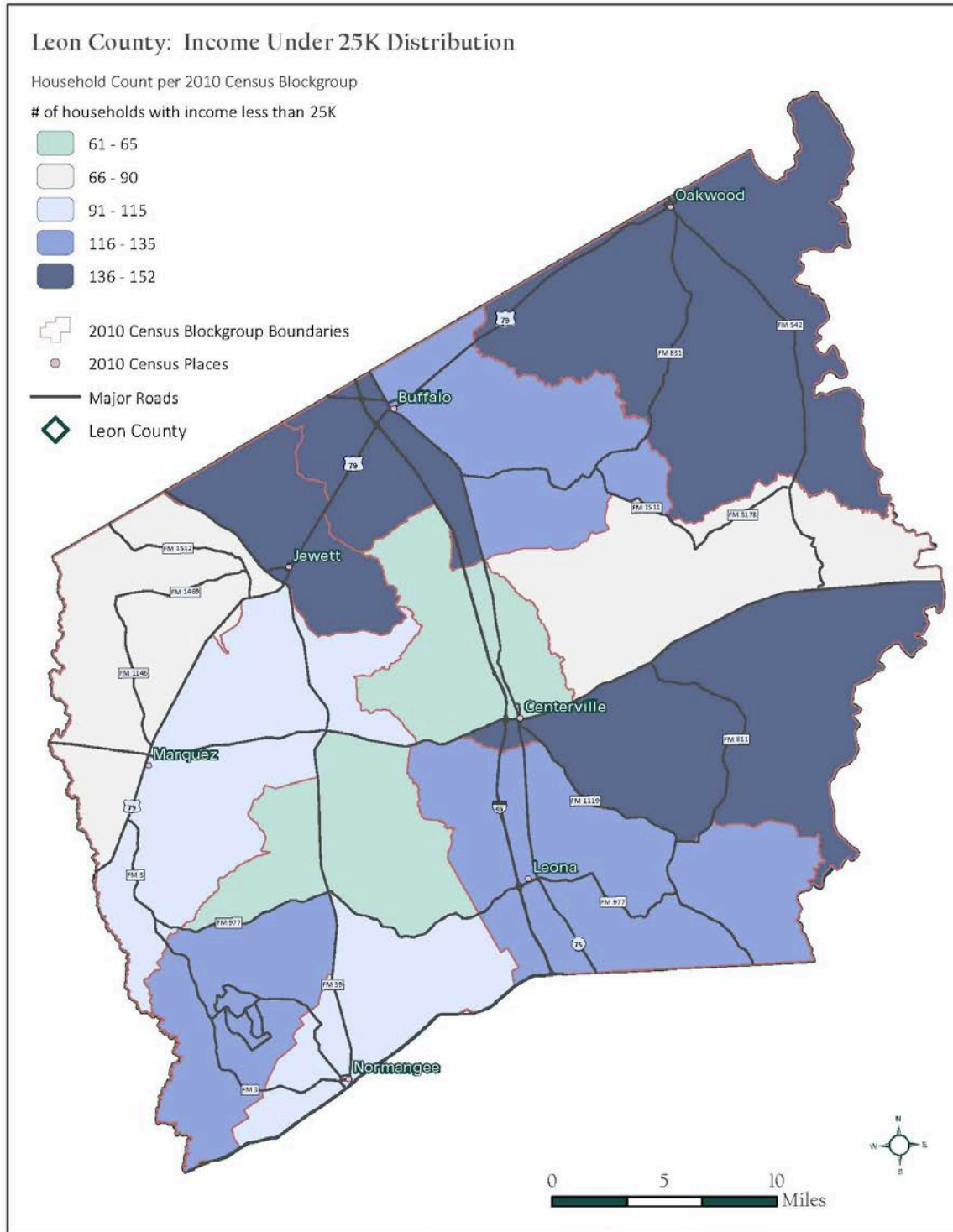


Figure 15: City of Normangee Age Distribution by Census Blockgroup, 65+



Figure 16: City of Oakwood Age Distribution by Census Block Group, 65+



Source: American Fact Finder; Table B19001 Household Income in the Past 12 Months, 2011-2015 American Community Survey 5-Year Estimates (<https://factfinder.census.gov/faqs/nav/jsf/pages/index.xhtml>)

Figure 17: Panola County Annual Household Income below \$25,000 by Census Blockgroup



Figure 18: City of Buffalo Annual Household Income below \$25,000 by Census Blockgroup

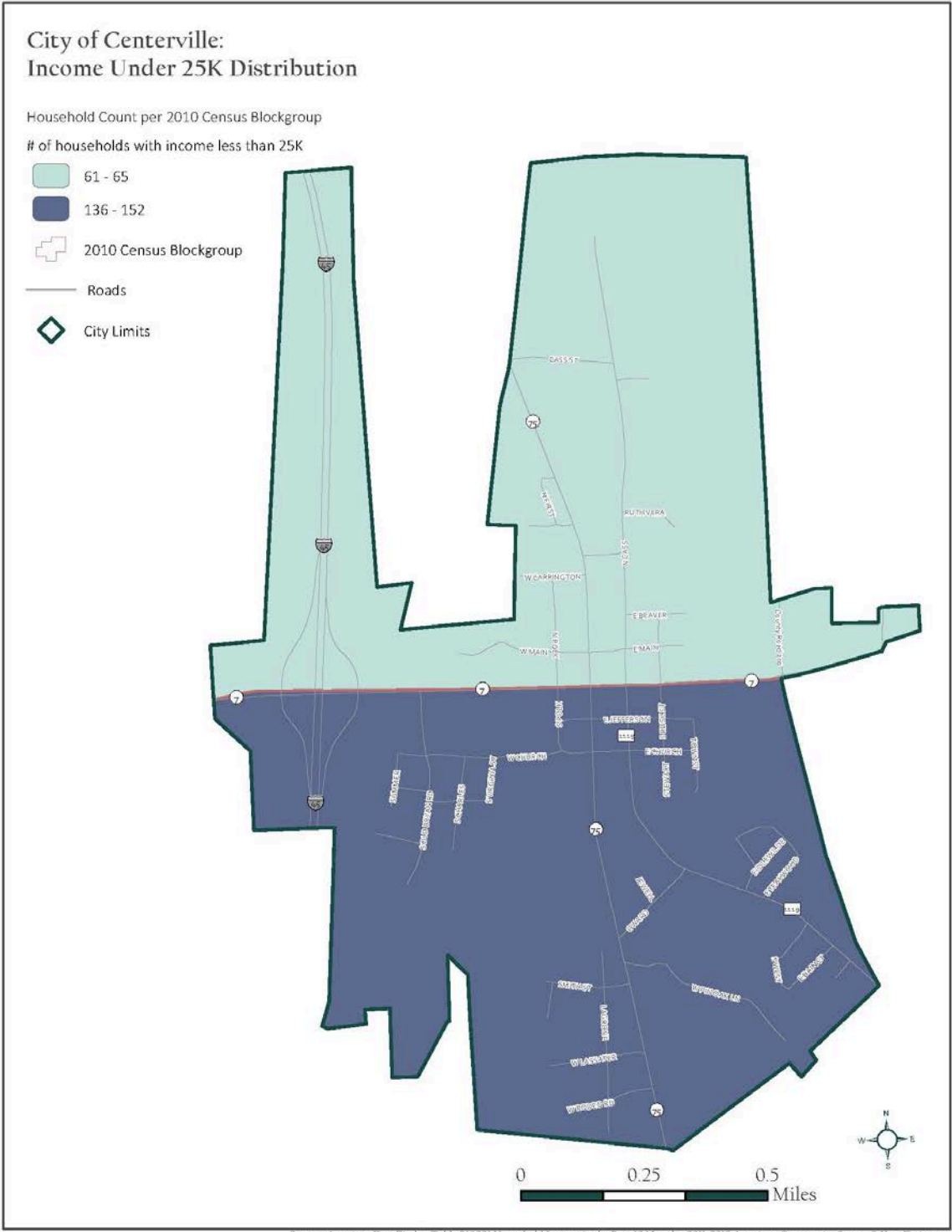


Figure 19: City of Centerville Annual Household Income below \$25,000 by Census Blockgroup



Figure 20: City of Jewett Annual Household Income below \$25,000 by Census Blockgroup

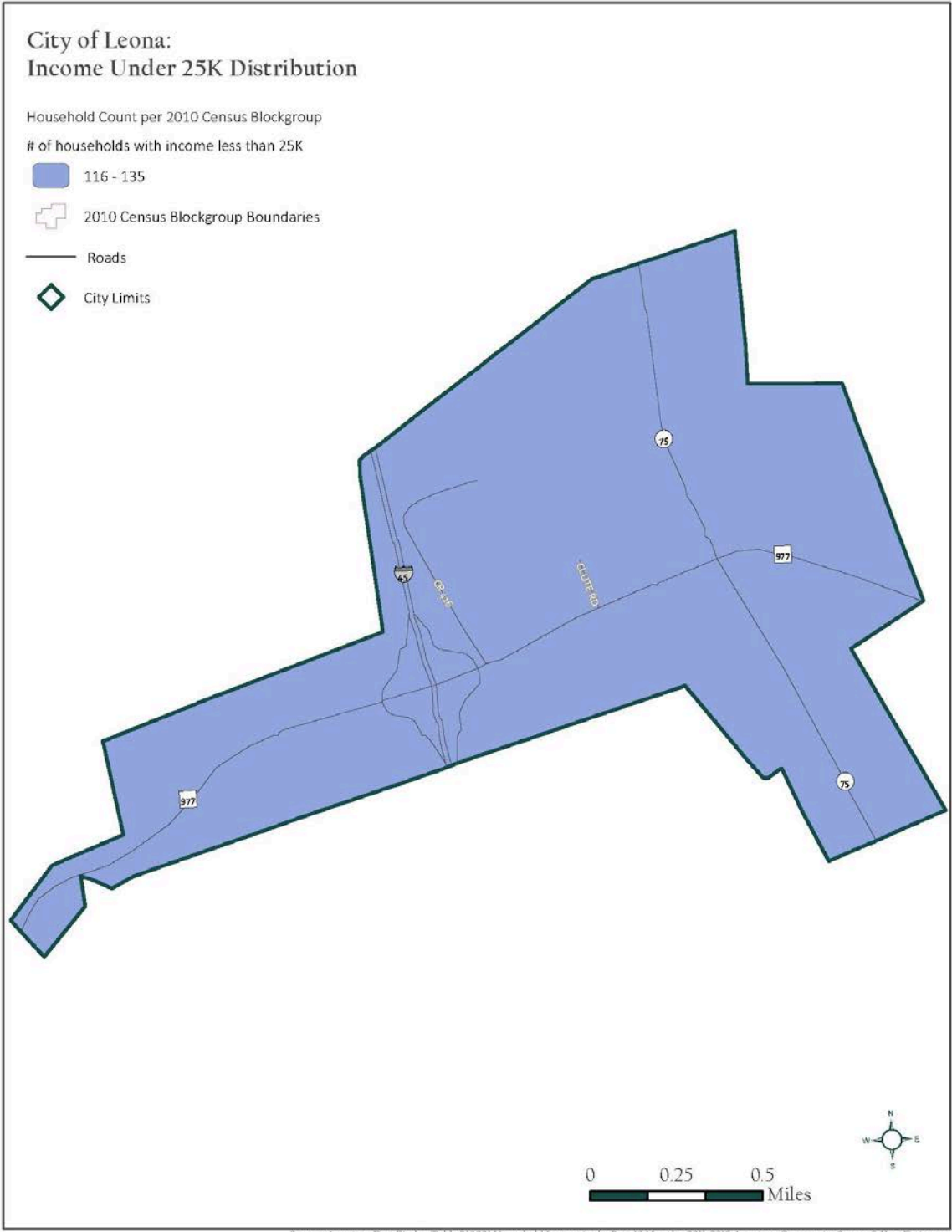


Figure 21: City of Leona Annual Household Income below \$25,000 by Census Blockgroup

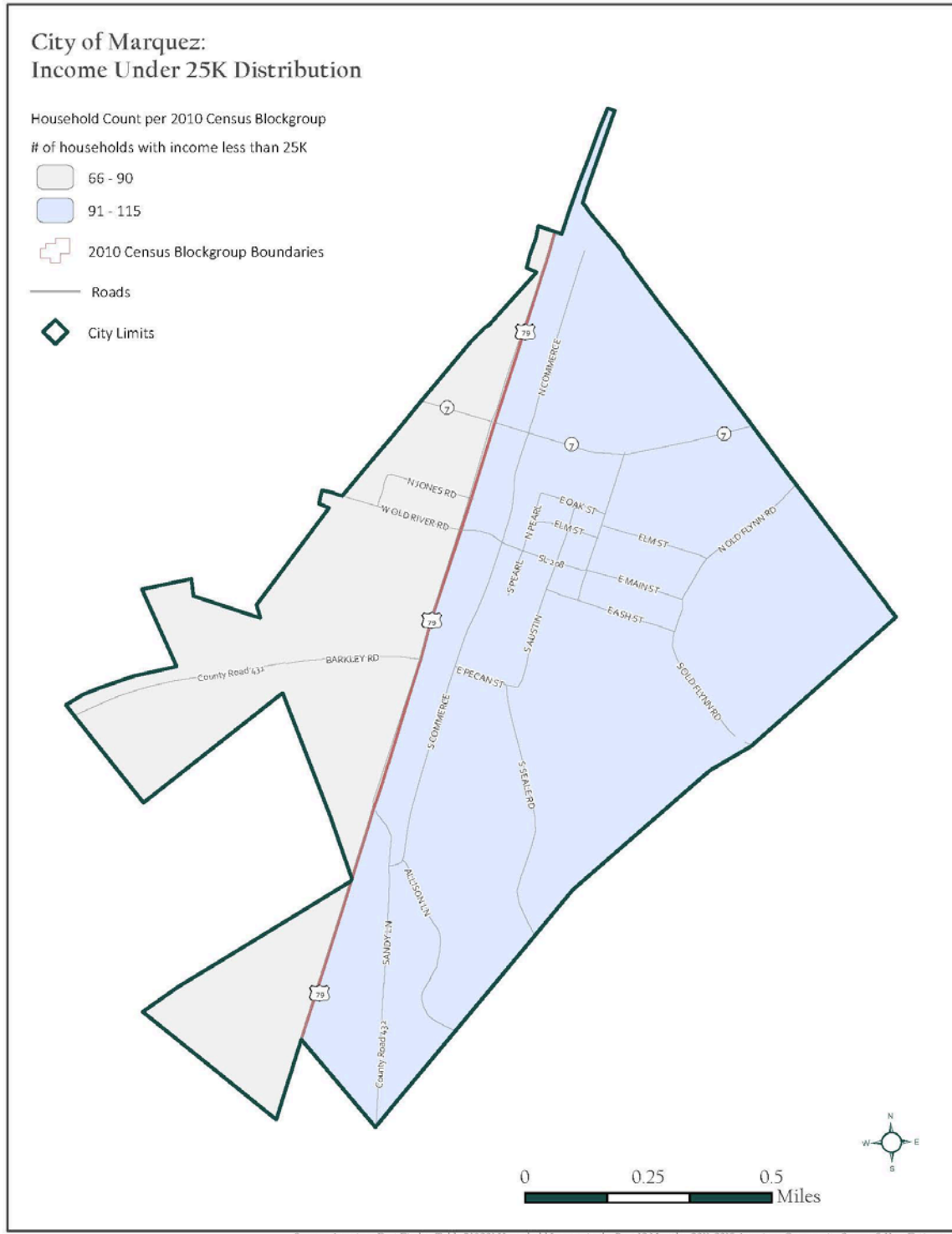


Figure 22: City of Marquez Annual Household Income below \$25,000 by Census Blockgroup

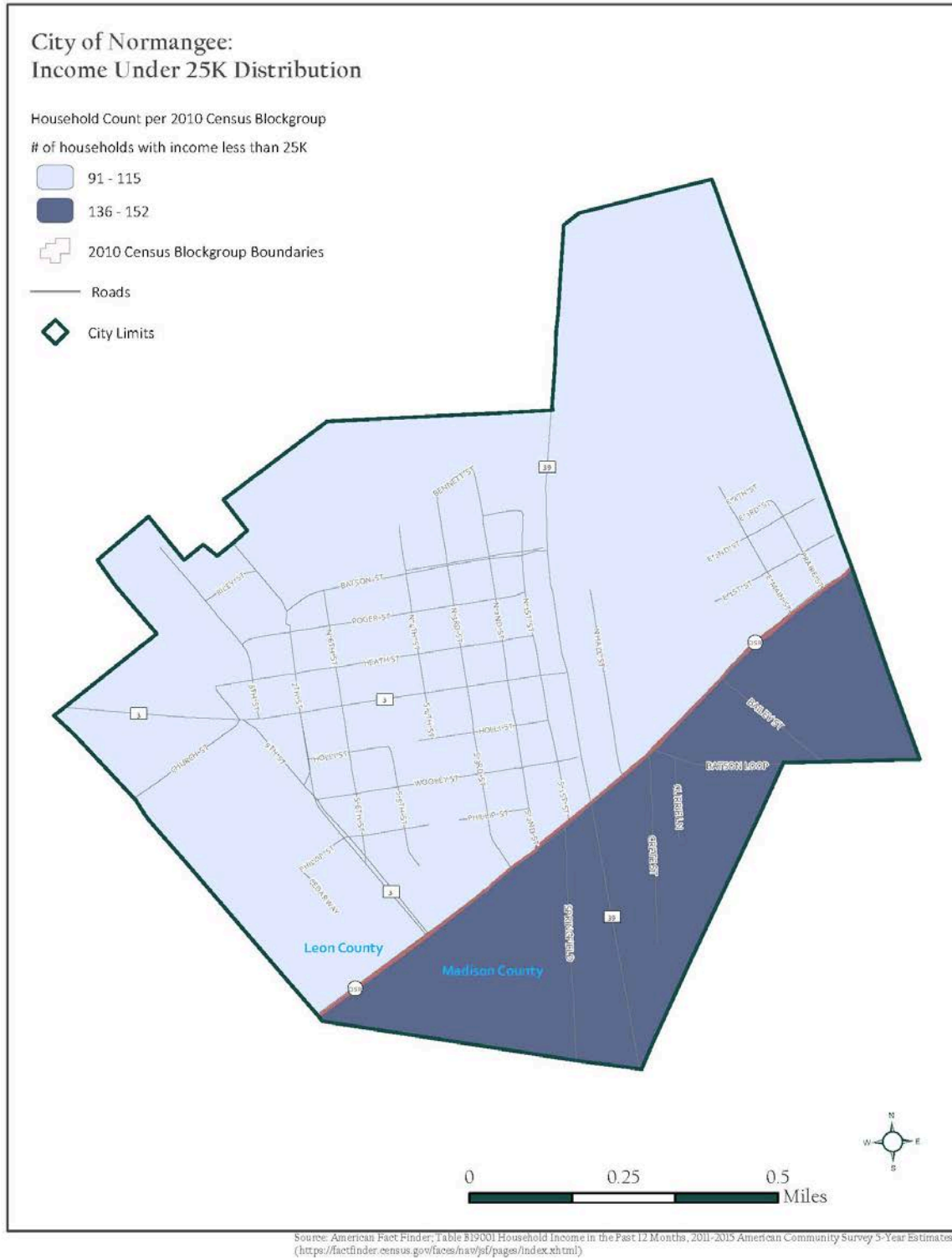


Figure 23: City of Normangee Annual Household Income below \$25,000 by Census Blockgroup



Figure 24: City of Oakwood Annual Household Income below \$25,000 by Census Blockgroup

Low Income and Subsidized Housing

Four of the seven participating cities have low income and/or subsidized housing.

The City of Buffalo has a housing authority that operates 22 low-income units and is also home to an LIHTC and USDA-subsidized apartment complex, Buffalo Apartments, with another 24 units of low-income housing.

The City of Centerville has a housing authority that operates 50 low-income units and is also home to a USDA-subsidized apartment complex, Centerville Plaza, with another 24 units of low-income housing.

The City of Jewett is home to a USDA-subsidized apartment complex, Willow Oaks, with 24 units of low-income housing.

The City of Normangee is home to a USDA-subsidized apartment complex, Normangee Apartments, with 20 units of low-income housing.

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.

Manufactured / Mobile Homes

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

Mobile and manufactured homes can be found throughout Leon County and the participating jurisdictions.

City of Buffalo

Although manufactured homes can be observed throughout the City of Buffalo, a small manufactured home community exists at the end of east Kennard Street that contains about 15 manufactured homes.

Additional manufactured homes are spread throughout the City.

City of Centerville

The City of Centerville is home to at least one manufactured home park on N. Cass Street which contains about 13 manufactured homes. Another smaller concentration along SH 7 on Hill Avenue contains around 5 manufactured homes.

Additional manufactured homes are spread throughout the City.

City of Jewett

The City of Jewett has a few areas where manufactured homes exist. A manufactured home park along Blackjack Street east of FM 337 contains about 28 manufactured homes. Another area along Yellow Creek Circle does not exclusively contain manufactured housing, but this area contains a high concentration of this kind of housing (about 18 units).

In addition to these, three small RV parks exist in Jewett. The first is along Broadway Road and contains around 12 RVs, while a second is along Ephesus Road and contains about ten RVs. The third RV park, the Kozy Lakes RV Park, is located on Robins Nest Drive and contains about 12 RVs.

Additional manufactured homes are spread throughout the City.

City of Leona

The City of Leona doesn't have any formal manufactured home parks or RV parks. Manufactured homes are scattered throughout the City but there do not seem to be any areas of major concentrations of this type of housing.

City of Marquez

The City of Marquez contains one formal RV park, the Country Comfort BBQ and RV Park, with around 23 RVs. Manufactured homes are otherwise scattered throughout the City and no one area of concentration is evident for this type of housing.

City of Normangee

The City of Normangee has two areas that are not formal manufactured home parks, but that do contain higher concentrations of manufactured housing than other parts of the City. The first is a large area south of FM 3, west of FM 39, and east of the High School. This area contains around 30 manufactured homes interspersed with regular stick-frame housing. The second area is much smaller and exists along Old San Antonio Road, Bailey Street, and Kizzee Street in east Normangee. This area contains around 20 manufactured homes.

City of Oakwood

The City of Oakwood doesn't have any formal manufactured home parks or RV parks. Manufactured homes are fairly evenly distributed throughout the City, but there is one area with higher than typical concentrations of manufactured homes. It is located in south Oakwood from Moody to Main Streets, and contains approximately 10 manufactured homes.

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 window panes
- 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 can't 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're already in a state of disrepair, additional damages due to hazard events may compound existing ones and potentially make these homes uninhabitable.

Historic Structures

Leon County is home to over 37 historic properties, some of which date back to the late 19th and early 20th centuries. One property, the Leon County Courthouse and Jails, are on the National Register of Historic Places.

Historic structures play an integral role in connecting residents and visitors to local, county, and state heritage, preserving community character, and as architectural points of interest.

These historic structures were not built to modern building codes, and some are in sub-standard condition. The inherent increase in vulnerability, due to age and condition, as well as the important cultural role these structures play, mean that damages to these structures may have a disproportionately negative impact on participating jurisdictions where they exist.

Changes in Development

Due to growing populations since the last plan, in this plan update there are two cities that are considered more vulnerable to hazards than they were in the last plan. As shown in the table below, the City of Jewett and the City of Marquez grew over 10% since the last plan, and so have more people and possibly a larger area that have the potential to be exposed to hazards. Other jurisdictions did not grow or shrink more than 10% and so are not considered to be substantially different in their exposure to potential hazards in this plan update compared to their risk in the previous plan.

Jurisdictions	2000	2010	% change
Leon County	15,335	16,081	4.86%
City of Buffalo	1,804	1,856	2.88%
City of Centerville	903	892	-1.22%
City of Jewett	861	1,167	35.54%
City of Leona	181	175	-3.31%
City of Marquez	220	263	19.55%
City of Normangee	719	685	-4.73%
City of Oakwood	471	510	8.28%

4. Floods

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 into 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 Climatic Data Center (NCDC) and the Leon County 2013 CHAMPS report to develop a flood history for the County and each participating jurisdiction. The data gathered reflects the most up-to-date flood data available for each jurisdiction at the time of writing.

Leon County

Table 8: Leon County Flood History

Location	Date	Time	Flood Type	Local Fatalities	Local Injuries	Local Property Damage	Local Crop Damage	Local Property Damage \$2017	Local Crop Damage \$2017
-	3/1/1970	-	-	0	0	\$624	\$0	\$3,939	\$0
-	7/27/1979	-	-	5	0	\$0	\$0	\$0	\$0
Countywide	1/28/1999	9:00 PM	Flash Flood	0	0	\$0	\$0	\$0	\$0
-	11/16/2003	-	-	0	0	\$2,004	\$0	\$2,667	\$0
Keechi	7/6/2007	1:06 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
-	7/14/2007	-	-	0	0	\$349,350	\$0	\$412,724	\$0
Newby	10/26/2009	8:30 AM	Flood	0	0	\$0	\$0	\$0	\$0
-	5/20/2011	-	-	0	0	\$9,987	\$0	\$10,876	\$0
Venetia	11/7/2015	4:00 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Robbins	12/12/2015	10:23 PM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Flynn	12/13/2015	5:00 AM	Flash Flood	0	0	\$10,000	\$0	\$10,335	\$0
Newby	12/13/2015	5:50 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Newby	12/13/2015	12:00 AM	Flood	0	0	\$0	\$0	\$0	\$0
Newby	12/13/2015	8:00 AM	Flood	0	0	\$100,000	\$0	\$103,349	\$0
Wealthy	12/27/2015	1:00 PM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Wealthy	12/27/2015	8:00 PM	Flood	0	0	\$0	\$0	\$0	\$0
Newby	5/26/2016	3:50 PM	Flash Flood	0	0	\$5,000	\$0	\$5,103	\$0
Newby	5/26/2016	9:00 PM	Flood	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Buffalo

Table 9: City of Buffalo Flood History

Location	Date	Time	Flood Type	Local Fatalities	Local Injuries	Local Property Damage	Local Crop Damage	Local Property Damage \$2017	Local Crop Damage \$2017
Buffalo	11/13/1998	6:30 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Buffalo	6/8/2004	12:44 PM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Buffalo	3/28/2006	8:36 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Buffalo	5/20/2011	6:28 PM	Flash Flood	0	0	\$10,000	\$0	\$10,890	\$0
Buffalo	5/26/2014	3:15 PM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Buffalo	12/12/2015	9:24 PM	Flash Flood	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Centerville

Table 10: City of Centerville Flood History

Location	Date	Time	Flood Type	Local Fatalities	Local Injuries	Local Property Damage	Local Crop Damage	Local Property Damage \$2017	Local Crop Damage \$2017
Centerville	11/4/2002	8:30 PM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Centerville	2/7/2005	7:00 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Centerville	11/7/2015	4:00 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Centerville	12/13/2015	5:06 AM	Flash Flood	0	0	\$5,000	\$0	\$5,171	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Jewett

Table 11: City of Jewett Flood History

Location	Date	Time	Flood Type	Local Fatalities	Local Injuries	Local Property Damage	Local Crop Damage	Local Property Damage \$2017	Local Crop Damage \$2017
Jewett	12/16/2001	9:10 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Jewett	7/14/2007	6:00 AM	Flash Flood	0	0	\$350,000	\$0	\$413,492	\$0
Jewett	12/27/2015	11:45 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0

- NOAA Data
- CHAMPS Data
- Reported by Both

City of Leona

Table 12: City of Leona Flood History

Location	Date	Time	Flood Type	Local Fatalities	Local Injuries	Local Property Damage	Local Crop Damage	Local Property Damage \$2017	Local Crop Damage \$2017
Leona	5/13/2004	9:10 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0
Leona	11/7/2015	4:00 AM	Flash Flood	0	0	\$0	\$0	\$0	\$0

- NOAA Data
- CHAMPS Data
- Reported by Both

City of Normangee

Table 13: City of Normangee Flood History

Location	Date	Time	Flood Type	Local Fatalities	Local Injuries	Local Property Damage	Local Crop Damage	Local Property Damage \$2017	Local Crop Damage \$2017
Normangee	11/16/2003	10:00 AM	Flash Flood	0	0	\$2,000	\$0	\$2,663	\$0

- NOAA Data
- CHAMPS Data
- Reported by Both

A) National Flood Insurance Program

The National Flood Insurance Program (NFIP) is administered by FEMA to provide flood insurance coverage to the nation.

All participating jurisdictions except for the City of Leona have adopted and enforce flood damage prevention ordinances in their respective jurisdictions. The City of Leona is not a participant in the National Flood Insurance Program simply because they have not experienced extensive damages or loss due to floods despite the fact that they have a history of flooding in the City. The City of Leona will consider participating in the NFIP program in the future.

The City of Jewett's floodplain administrator is the City's Director of Public Works. The City of Normangee's floodplain administrator is the City's Mayor.

Leon County's County Judge also serves as the County's Floodplain Administrator and oversees floodplain administration in unincorporated Leon County as well as all participating jurisdictions except the Cities of Jewett, Leona, and Normangee.

Leon County's flood damage prevention ordinance requires 1' of freeboard above the base flood elevation for residential and non-residential construction and for manufactured housing.

The City of Buffalo, Centerville, and Marquez follow the County's Flood Damage Prevention Ordinance.

The City of Jewett have their own flood damage prevention ordinance which states that all new construction of residential and non-residential structures, and of manufactured homes, be elevated to or above the base flood elevation.

The City of Normangee also have their own flood damage prevention ordinance. New construction of residential and non-residential structures, and of manufactured homes, be elevated to or above the base flood elevation.

The City of Oakwood also have their own flood damage prevention ordinance. New construction of residential and non-residential structures, and of manufactured homes, be elevated to or above the base flood elevation.

In addition to its flood damage prevention ordinance, the City of Jewett controls development in the floodplain through a floodplain overlay district in its zoning ordinance. Generally, buildings are restricted from being erected in the floodplain unless the City Engineer ascertains that it would not be subject to damage by flooding and would not endanger the value and safety of other property. Permitted uses in the floodplain include agriculture, forestry, parks, golf courses, and parking areas.

Each participating jurisdiction is responsible for enforcing floodplain management regulations and ensuring regulations meet or exceed the minimum NFIP requirements.

Their respective floodplain management ordinances and any future updates will guide each jurisdiction as it continues to comply with NFIP requirements through local 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 current FIRM maps covering Leon County and the participating jurisdictions became effective on November 20, 2013.

The flood mitigation actions outlined in Chapter 16 below were developed with flood mitigation and NFIP compliance in mind. Public awareness in particular will be an ongoing effort in each participating jurisdiction to reduce future losses due to flooding, and it will continue even after recommended corrective actions have been implemented.

As of February 28, 2018, there are 19 NFIP policies in force in unincorporated Leon County. These policies cover property worth \$3,023,700.

There are 2 NFIP policies in force in the City of Buffalo covering property worth \$210,000.

There is 1 NFIP policy in force in the City of Centerville covering property worth \$45,000.

There are 3 NFIP policies in force in the City of Normangee covering property worth \$220,000.

There are 5 NFIP policies in force in the City of Oakwood covering property worth \$1,242,600.

There are no NFIP policies in force in either the Cities of Jewett, Leona, or Marquez.

Table 14: NFIP Claims and Payments

Jurisdiction Name	Total Losses	Closed Losses	Open Losses	Losses Closed Without Payment	Total Payments
Leon County	-	-	-	-	-
City of Buffalo	-	-	-	-	-
City of Centerville	-	-	-	-	-
City of Jewett	-	-	-	-	-
City of Leona	-	-	-	-	-
City of Marquez	-	-	-	-	-
City of Normangee	2	2	0	0	\$10,676.13
City of Oakwood	1	1	0	0	\$6,860.52

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 no repetitive loss properties in Leon County or any of the participating jurisdictions.

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 no severe repetitive loss properties in Leon County or any of the participating jurisdictions.

2) Likelihood of Future Events

In the case of the FEMA 100-year floodplain, there's a 1% annual chance, and in the 500-year floodplain it's a 0.02% annual chance. The likelihood of a 100-year flood event is therefore occasional. The likelihood of a 500-year flood event is therefore unlikely.

However, based on the frequency of previous flood events, every jurisdiction can expect to experience some type of flooding that may meet the definition of a 100-year or 500-year event on a more regular basis.

Given the frequency of previous flood events, it is probable that Leon County and all other participating jurisdictions will experience a flood event in the next year, meaning an event is highly likely.

3) Extent

Throughout Leon County and the participating jurisdictions, the worst flood events have been associated with major riverine flooding.

The worst flooding events in Leon County and the participating jurisdictions have inflicted as high as \$413,492⁵ in property damages. Crop damages have not been reported from these events. The worst flood events in Leon County and the participating jurisdictions have caused up to 5 fatalities⁶ but no other injuries (event occurred on 7/27/1979). The worst flood in the county's inundation depth is 18 feet.

Future flood events in Leon County and the participating jurisdictions may meet previous worst-cases in terms of the inundation depth of 18 feet, property damages, and fatalities.

4) Location and Impact

A) Leon County

I. Location

Roughly 9.8% (67,668 acres out of 691,840) of Leon County is in the FEMA 100-year floodplain. Agricultural, Airport, Commercial, Industrial, Institutional, Oil and Gas, Recreational, Single Family, and Utility land use found in Leon County can be found in the FEMA 100-year floodplain.

⁵ Incident date: 7/14/2007, Leon County 2013 CHAMPS Report, Adjusted for inflation to \$2017

⁶ Leon County CHAMPS Report and NOAA Weather Data

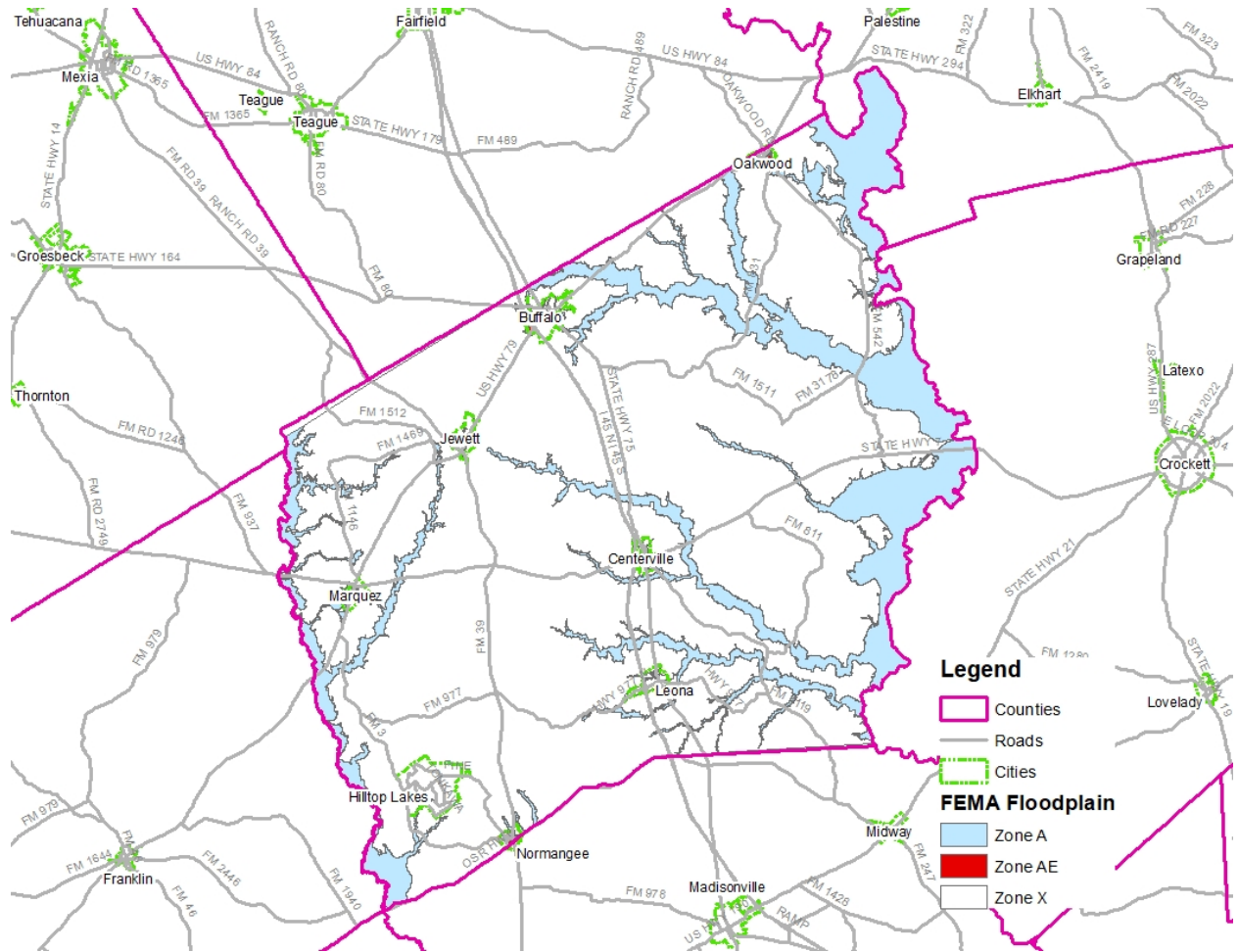


Figure 25: Leon County FEMA 100-Year Floodplain

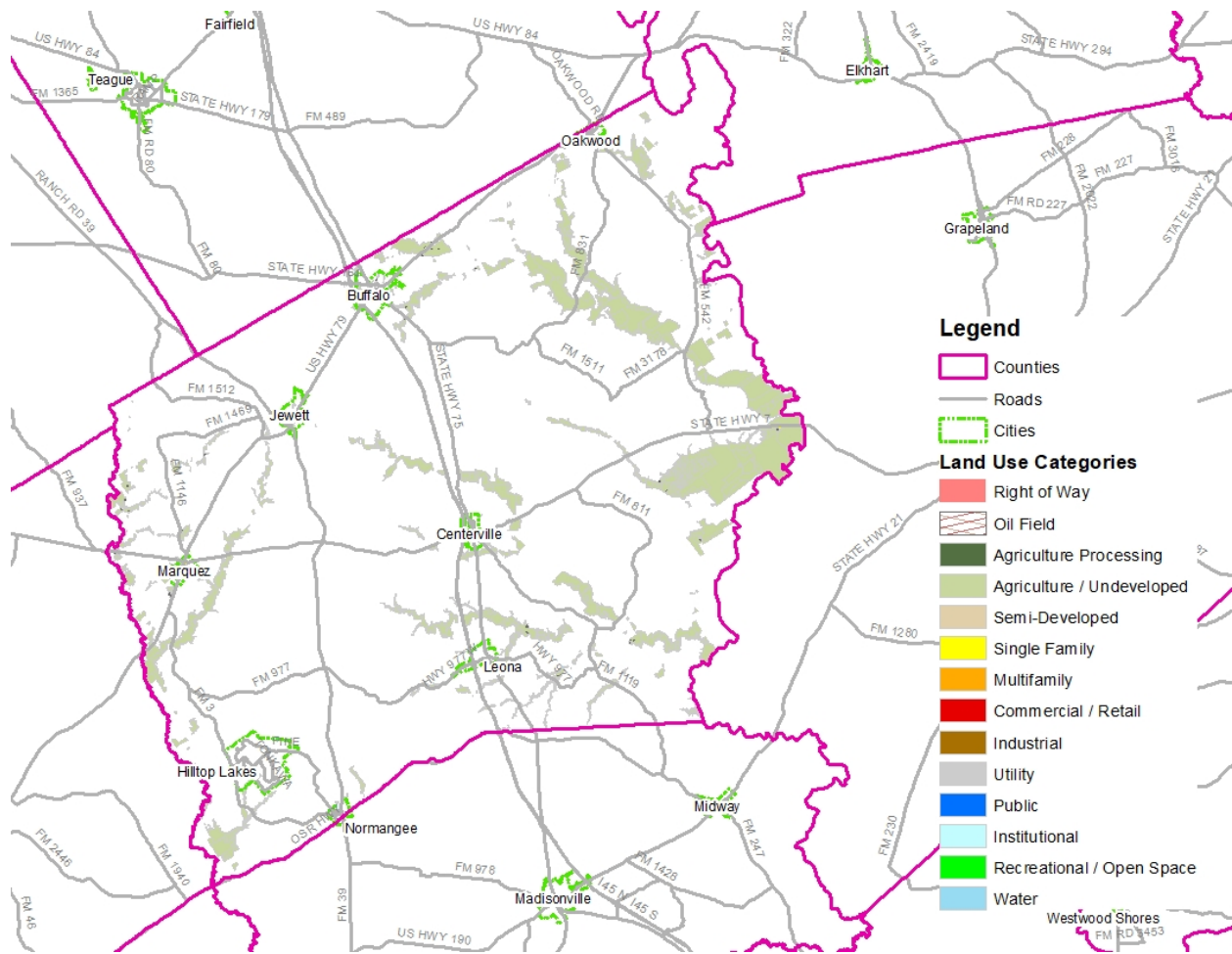


Figure 26: Leon County Land Use Types in Special Flood Hazard Areas

II. Impact

Although the likelihood of a FEMA 100-year flood event remains occasional, 1% in any given year, the floodplain crosses all of Leon County's major thoroughfares, potentially limiting travel across, within, and around the County.

The impact of a FEMA 100-year flood event will vary depending on the location, size of the affected area, and number of structures affected. Residents outside of the participating jurisdictions are evenly distributed throughout the county. Flooding in the County's Cities and Census Designated Places will impact more residents than flooding in less developed parts of the County. Residents in unincorporated Leon County 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 floodborne contaminants, damaged by debris flow, or even completely washed away. Crops may be damaged or destroyed. Estimated damage totals to vulnerable parcels affected during a 100-year flood event may meet the totals outlined in Table 8 above.

Despite the unlikely probability of a so-called 500-year flood, 0.02% in any given year, the danger isn't negligible. Moreover, the relatively limited information on the 500-year flood zone should not be interpreted to mean that a 500-year flood will only occur in the areas depicted in the 500-year flood zone on the County's NFIP maps. Parts of the County may temporarily lose power due to downed power lines. Motorists and residents may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. Crops may be damaged or destroyed. A 500-year flood event is expected to affect a larger area and more structures than a 100-year flood. Estimated damage totals to vulnerable parcels affected during a 500-year flood event may meet the totals outlined in Table 8 above.

B) City of Buffalo

I. Location

The FEMA 100-year floodplain covers 9.5% (265 acres out of 2,800) of the total land area within Buffalo's city limits.

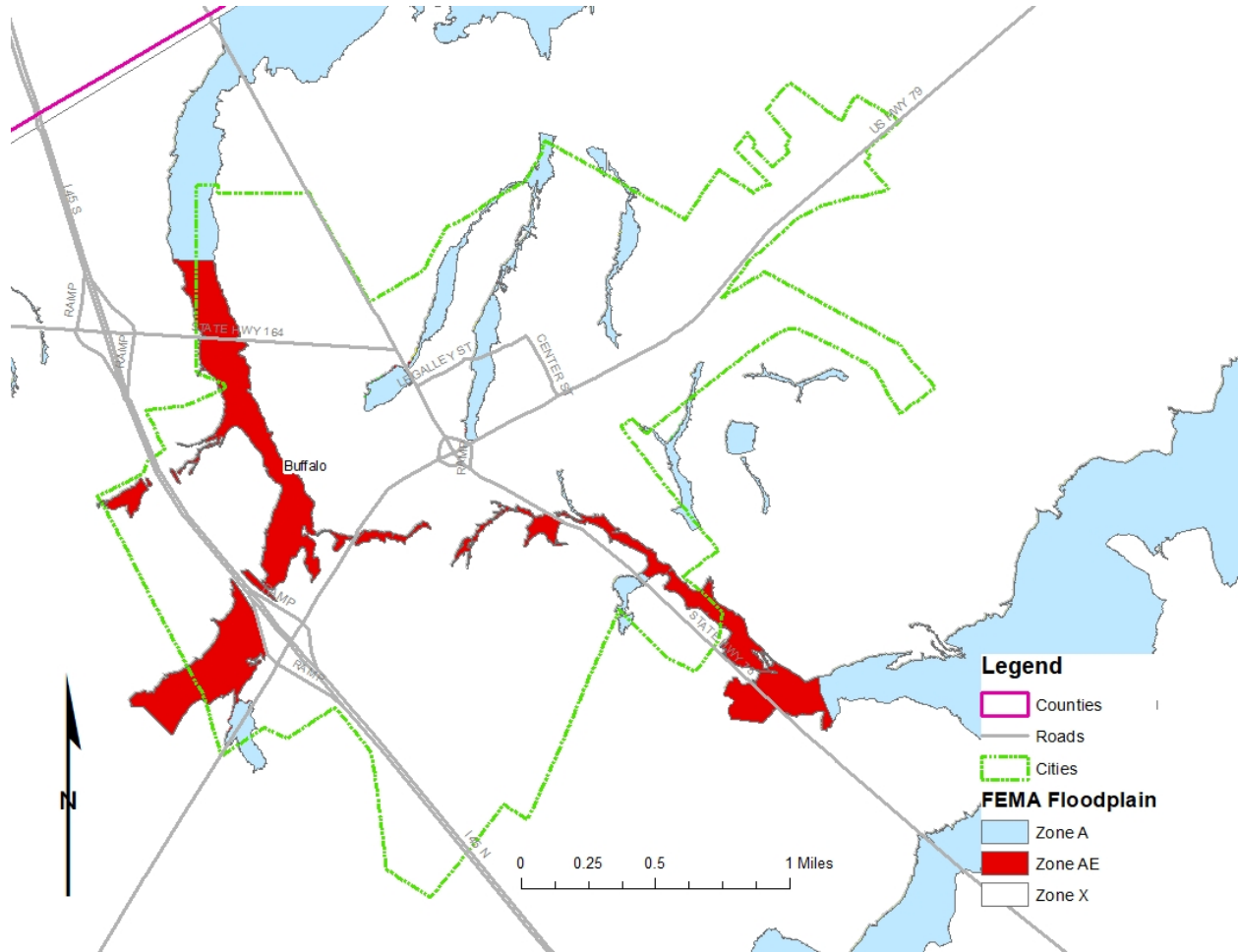


Figure 27: City of Buffalo FEMA 100-Year Floodplain

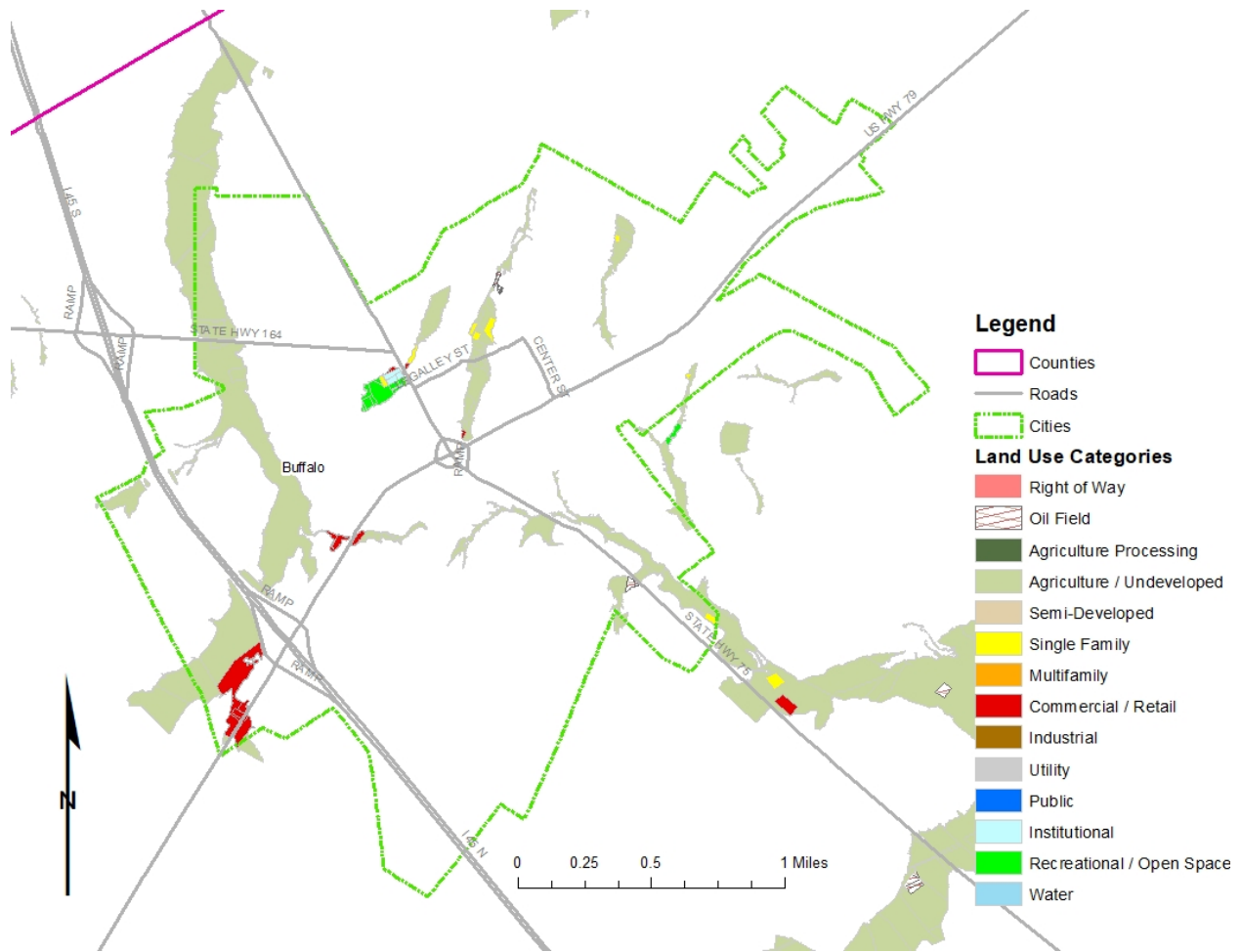


Figure 28: City of Buffalo Land Use Types in Special Flood Hazard Areas

II. Impact

Although the likelihood of a FEMA 100-year flood event remains occasional, 1% in any given year, the floodplain crosses all of the City of Buffalo’s major thoroughfares, potentially limiting travel across, within, and around the City. The impact of a FEMA 100-year flood event will vary depending on the specific location, size of the affected area, and number of structures affected. Parts of the community may temporarily lose power due to downed power lines. Motorists and residents may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. Estimated damage totals to vulnerable parcels affected during a 100-year flood event may meet the totals outlined in Table 9 above.

Despite the unlikely probability of a so-called 500-year flood, 0.02% in any given year, the danger isn’t negligible. Moreover, the relatively limited information on the 500-year flood zone should not be interpreted to mean that a 500-year flood will only occur in the areas depicted in the 500-year flood zone. Parts of the community may temporarily lose power due to downed

power lines. Motorists and residents may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. A 500-year flood event is expected to affect a larger area and more structures than a 100-year flood. Estimated damage totals to vulnerable parcels affected during a 500-year flood event may meet the totals outlined in Table 9 above.

C) City of Centerville

I. Location

The FEMA 100-year floodplain covers 10% (114 acres out of 1,088) of the total land area within Centerville's city limits.

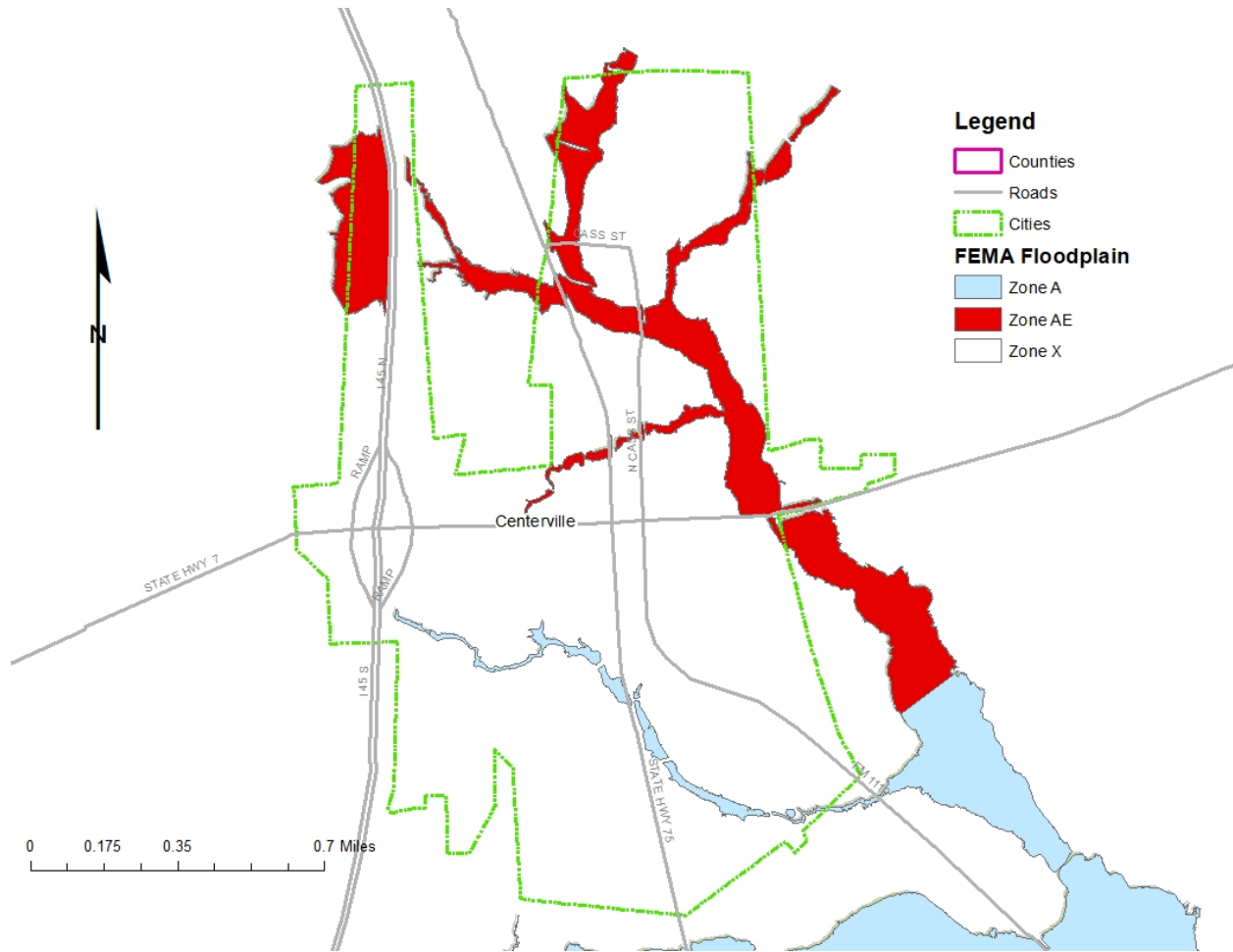


Figure 29: City of Centerville FEMA 100-Year Floodplain

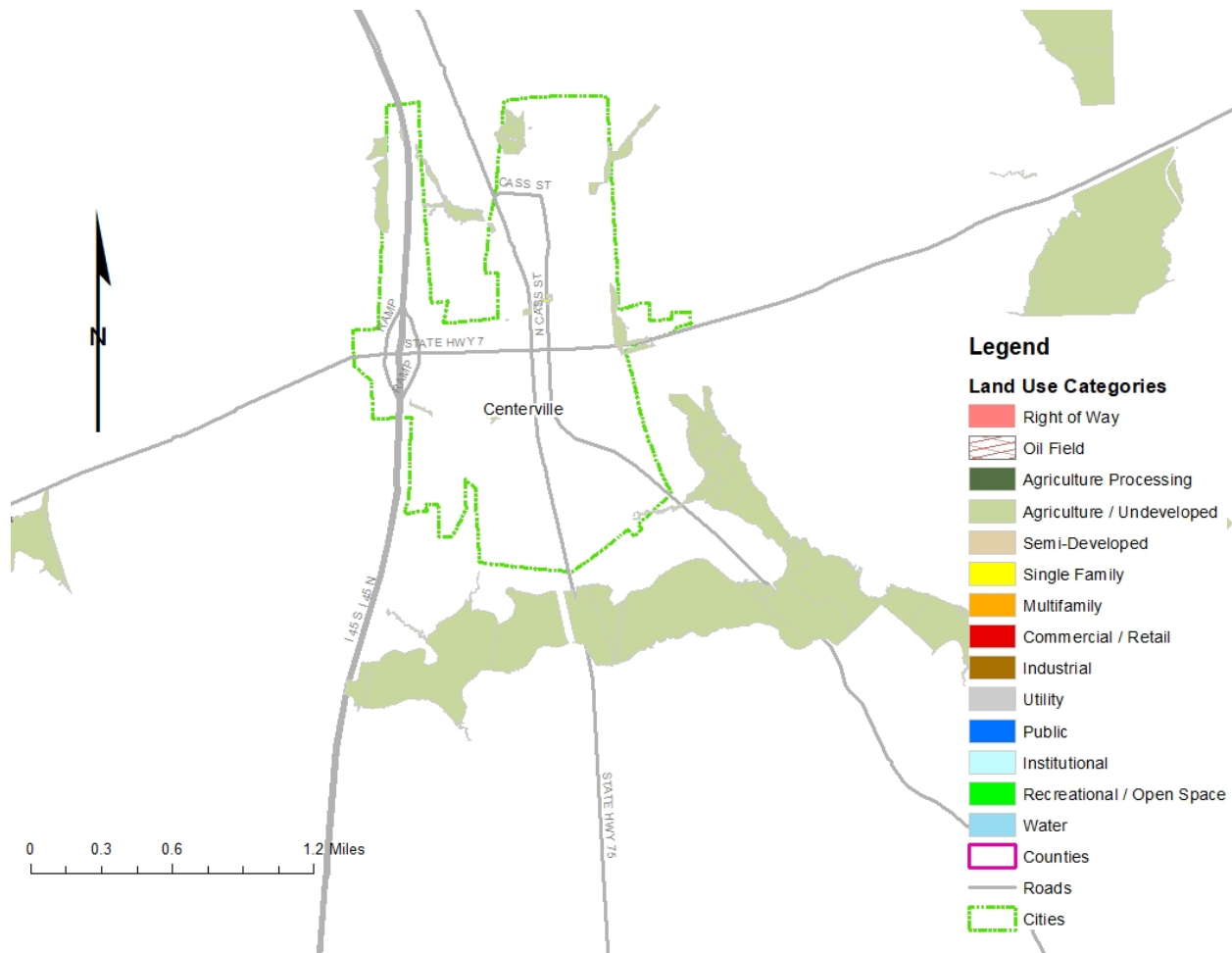


Figure 30: City of Centerville Land Use Types in Special Flood Hazard Areas

II. Impact

Most of Centerville is located outside of a designated FEMA Special Flood Hazard Area. The likelihood of a FEMA 100-year flood event remains occasional, 1% in any given year. The impact of a FEMA 100-year flood event will vary depending on the specific location, size of the affected area, and number of structures affected. Parts of the community may temporarily lose power due to downed power lines. Motorists may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. Occupants of these structures may require rescue or aid during and after a flood event. Estimated damage totals to vulnerable parcels affected during a 100-year flood event may meet the totals outlined in Table 10 above.

Despite the unlikely probability of a so-called 500-year flood, 0.02% in any given year, the danger isn't negligible. Moreover, the relatively limited information on the 500-year flood zone should not be interpreted to mean that a 500-year flood will only occur in the areas depicted in the 500-year flood zone. Parts of the community may temporarily lose power due to downed power lines. Motorists and residents may be left stranded and needing rescue. Affected

structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. A 500-year flood event is expected to affect a larger area and more structures than a 100-year flood. Estimated damage totals to vulnerable parcels affected during a 500-year flood event may meet the totals outlined in Table 10 above.

D) City of Jewett

I. Location

The FEMA 100-year floodplain covers 5.4% (70 acres out of 1,277) of the total land area within Jewett's jurisdiction. Nearly all of the floodplain in the jurisdiction is located outside of Jewett's city limits in its ETJ.

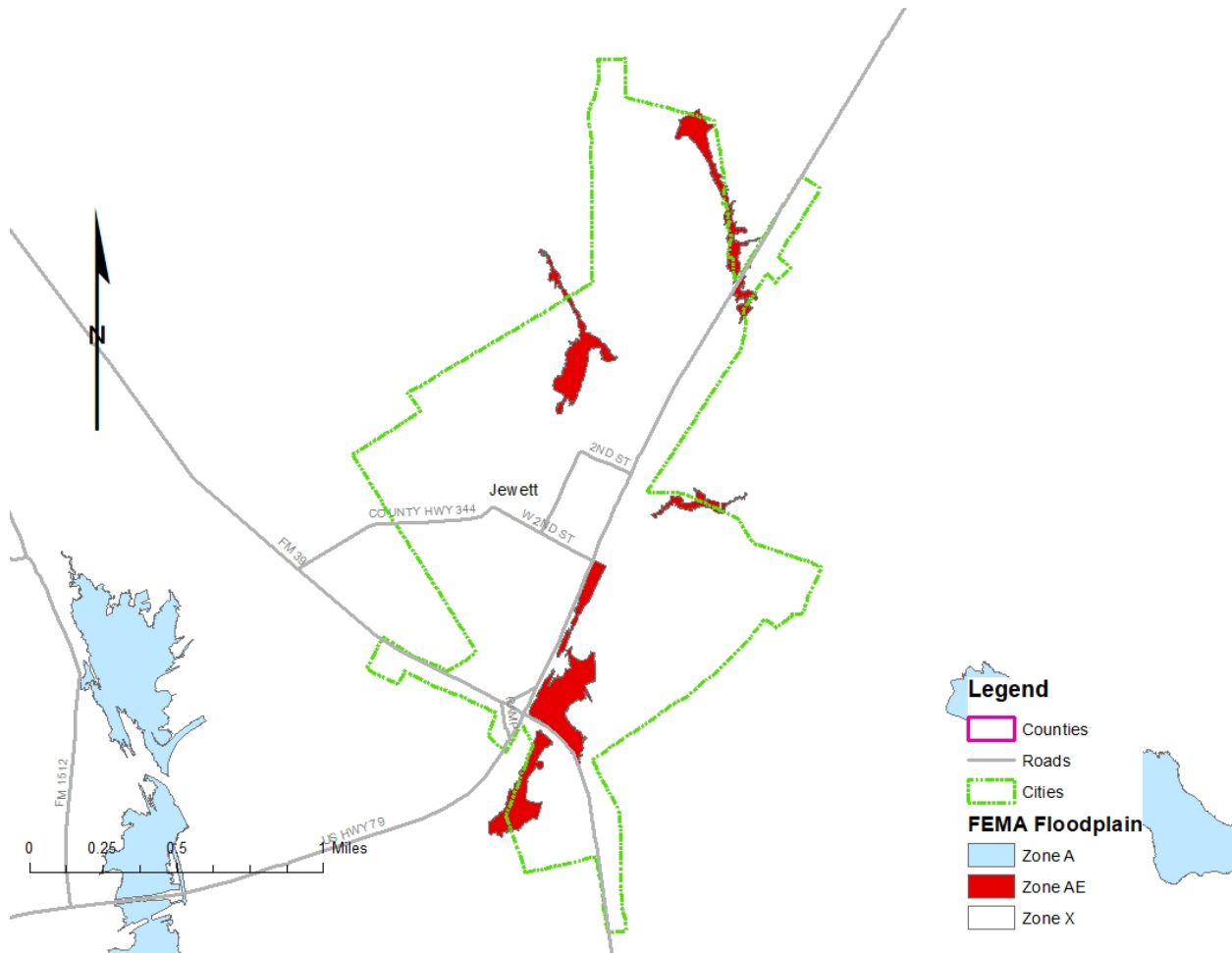


Figure 31: City of Jewett FEMA 100-Year Floodplain

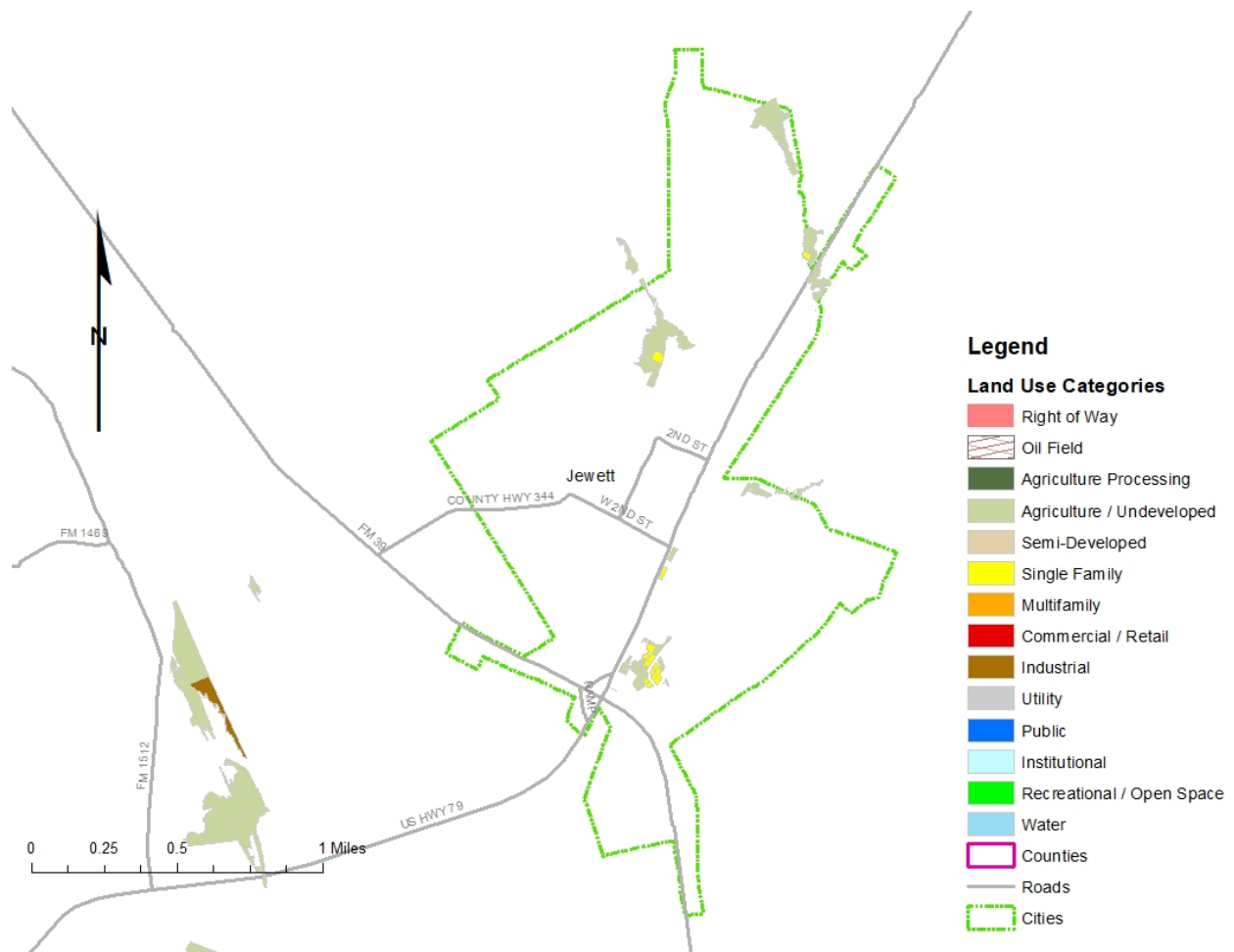


Figure 32: City of Jewett Land Use Types in Special Flood Hazard Areas

II. Impact

Most of Jewett is located outside of a designated FEMA Special Flood Hazard Area. The likelihood of a FEMA 100-year flood event remains occasional, 1% in any given year. The impact of a FEMA 100-year flood event will vary. Although structural damages are expected to be minimal, parts of the community may temporarily lose power due to downed power lines. Motorists may be left stranded and needing rescue. Estimated damage totals to vulnerable parcels during a 100-year flood event may meet the totals outlined in Table I I above.

Despite the unlikely probability of a so-called 500-year flood, 0.02% in any given year, the danger isn't negligible. Moreover, the relatively limited information on the 500-year flood zone should not be interpreted to mean that a 500-year flood will only occur in the areas depicted in the 500-year flood zone. Parts of the community may temporarily lose power due to downed power lines. Motorists and residents may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. A 500-year flood event is expected to affect a larger area and

more structures than a 100-year flood. Estimated damage totals to vulnerable parcels affected during a 500-year flood event may meet the totals outlined in Table II above.

E) City of Leona

I. Location

The FEMA 100-year floodplain covers 18% (254 acres out of 1,422) of the total land area within Leona's corporate limits.

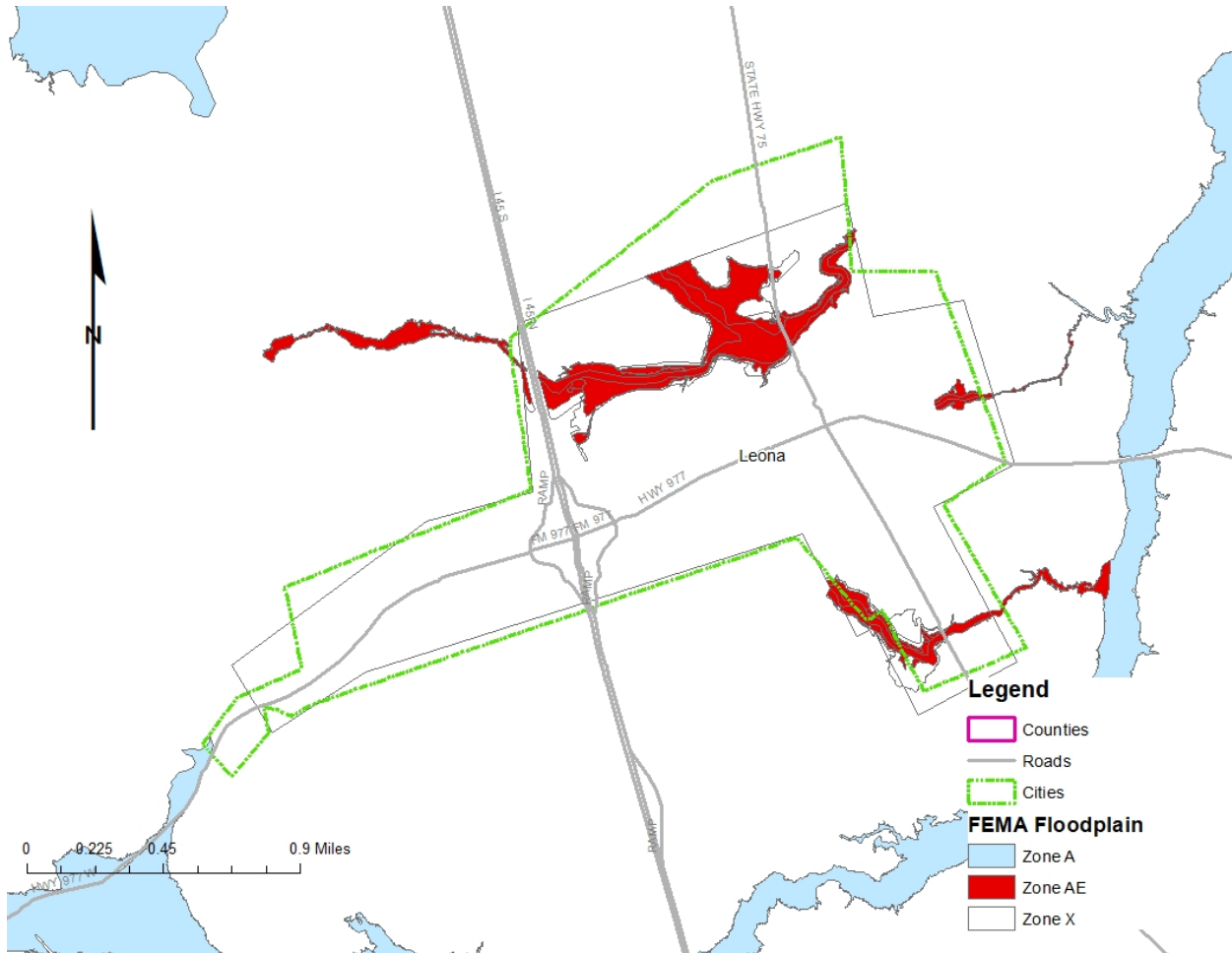


Figure 33: City of Leona FEMA 100-Year Floodplain

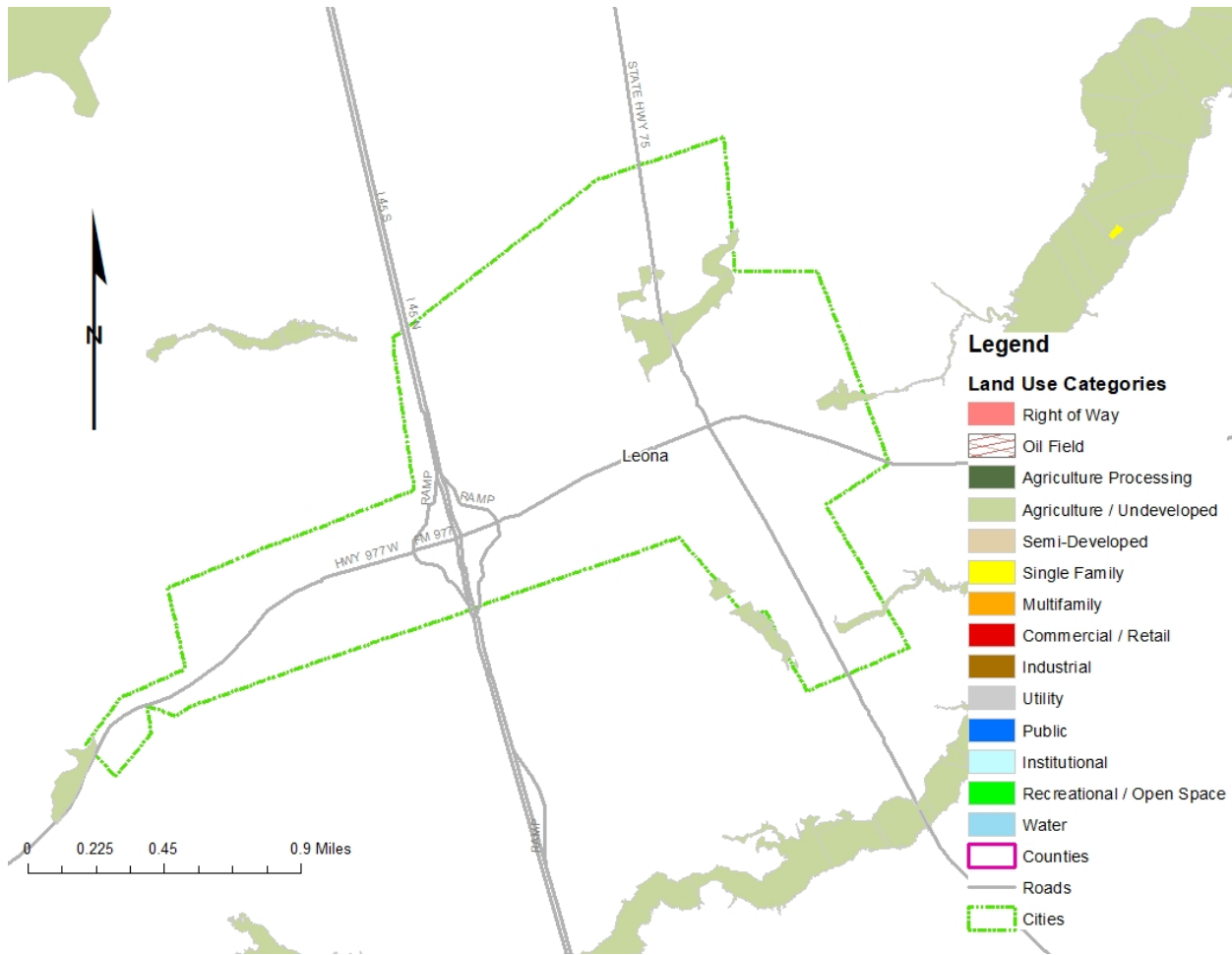


Figure 34: City of Leona Land Use Types in Special Flood Hazard Areas

II. Impact

Most of Leona’s jurisdictional territory is located outside of a designated FEMA Special Flood Hazard Area. Although the likelihood of a FEMA 100-year flood event remains occasional, 1% in any given year, the floodplain crosses all of the major thoroughfares leading to Leona, potentially limiting travel into and out of the City. The impact of a FEMA 100-year flood event will vary depending on the specific location, size of the affected area, and number of structures affected. Parts of the community may temporarily lose power due to downed power lines. Motorists may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. Occupants of these structures may require rescue or aid during and after a flood event. Estimated damage totals to vulnerable parcels affected during a 100-year flood event may meet the totals outlined in Table 12 above.

Despite the unlikely probability of a so-called 500-year flood, 0.02% in any given year, the danger isn’t negligible. Moreover, the relatively limited information on the 500-year flood zone

should not be interpreted to mean that a 500-year flood will only occur in the areas depicted in the 500-year flood zone. Parts of the community may temporarily lose power due to downed power lines. Motorists and residents may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. A 500-year flood event is expected to affect a larger area and more structures than a 100-year flood. Estimated damage totals to vulnerable parcels affected during a 500-year flood event may meet the totals outlined in Table 12 above.

F) City of Marquez

I. Location

The FEMA 100-year floodplain covers 23% (201 acres out of 871) of the total land area within Leona's corporate limits.

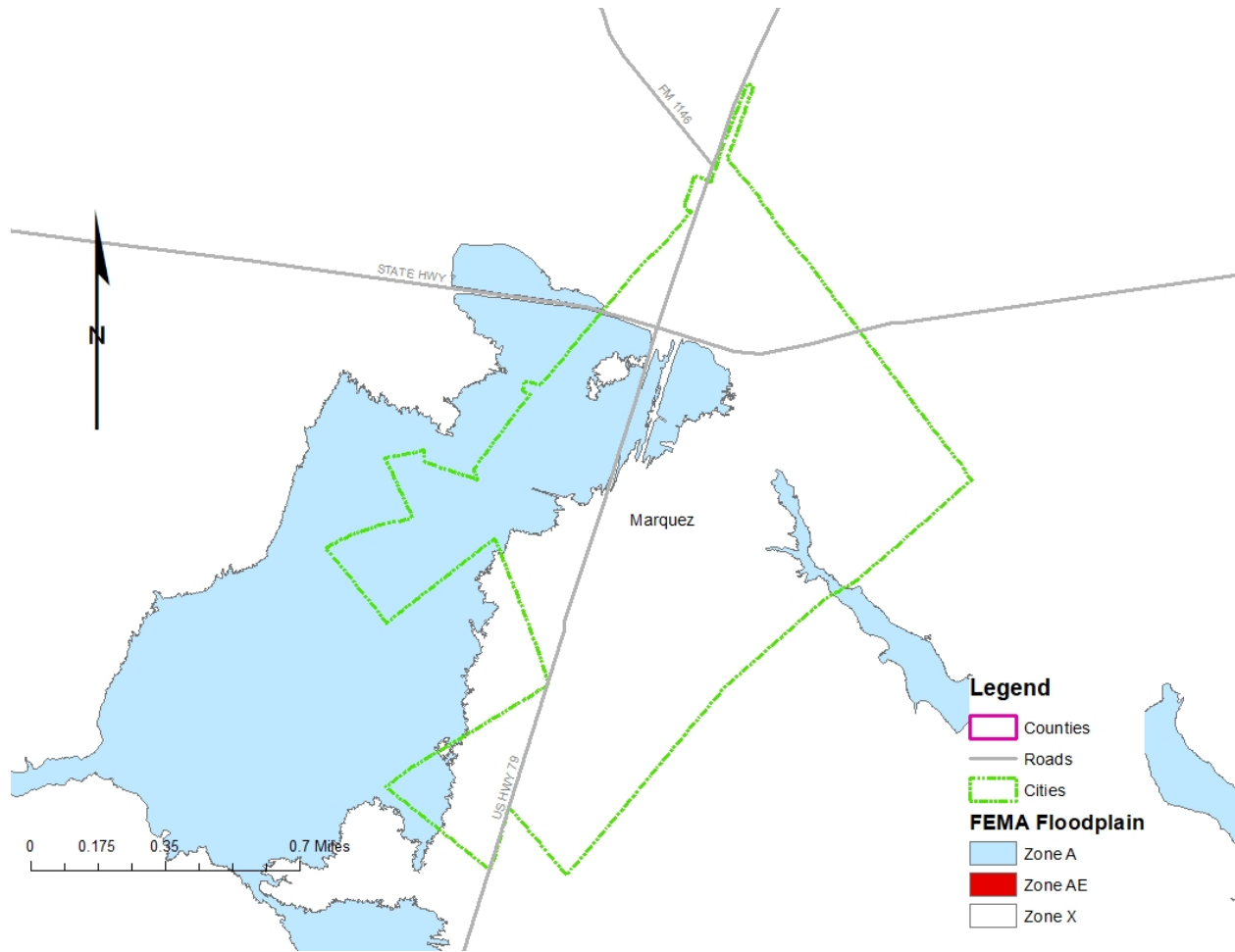


Figure 35: City of Marquez FEMA 100-Year Floodplain

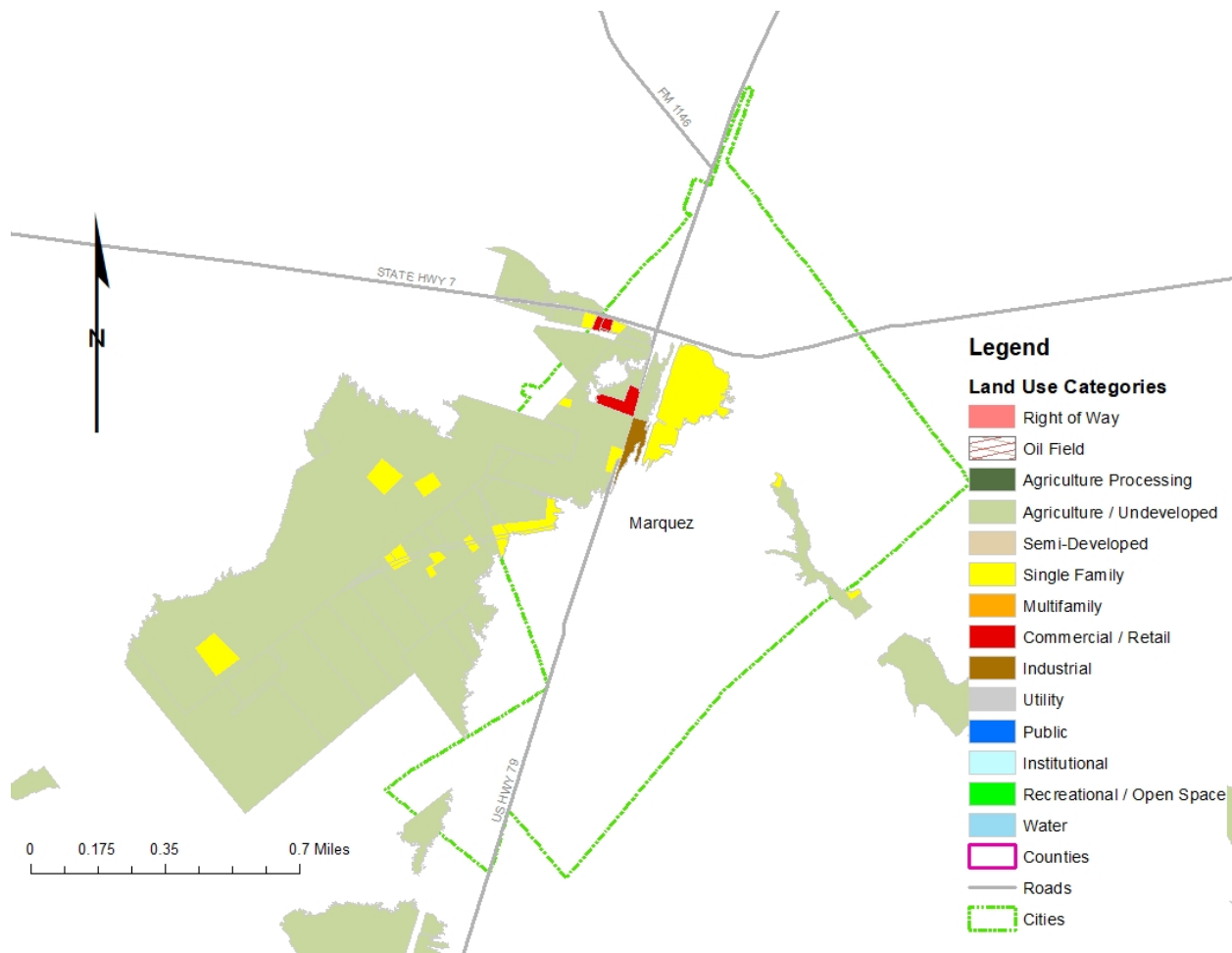


Figure 36: City of Marquez Land Use Types in Special Flood Hazard Areas

II. Impact

Most of Marquez’s jurisdictional territory is located outside of a designated FEMA Special Flood Hazard Area. Although the likelihood of a FEMA 100-year flood event remains occasional, 1% in any given year, the floodplain crosses all of the major thoroughfares leading to Marquez, potentially limiting travel into and out of the City. The impact of a FEMA 100-year flood event will vary depending on the specific location, size of the affected area, and number of structures affected. Parts of the community may temporarily lose power due to downed power lines. Motorists may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. Occupants of these structures may require rescue or aid during and after a flood event.

Despite the unlikely probability of a so-called 500-year flood, 0.02% in any given year, the danger isn’t negligible. Moreover, the relatively limited information on the 500-year flood zone

should not be interpreted to mean that a 500-year flood will only occur in the areas depicted in the 500-year flood zone. Parts of the community may temporarily lose power due to downed power lines. Motorists and residents may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. A 500-year flood event is expected to affect a larger area and more structures than a 100-year flood.

G) City of Normangee

I. Location

The FEMA 100-year floodplain covers 17.4% (124 acres out of 714) of the total land area within Normangee's corporate limits.

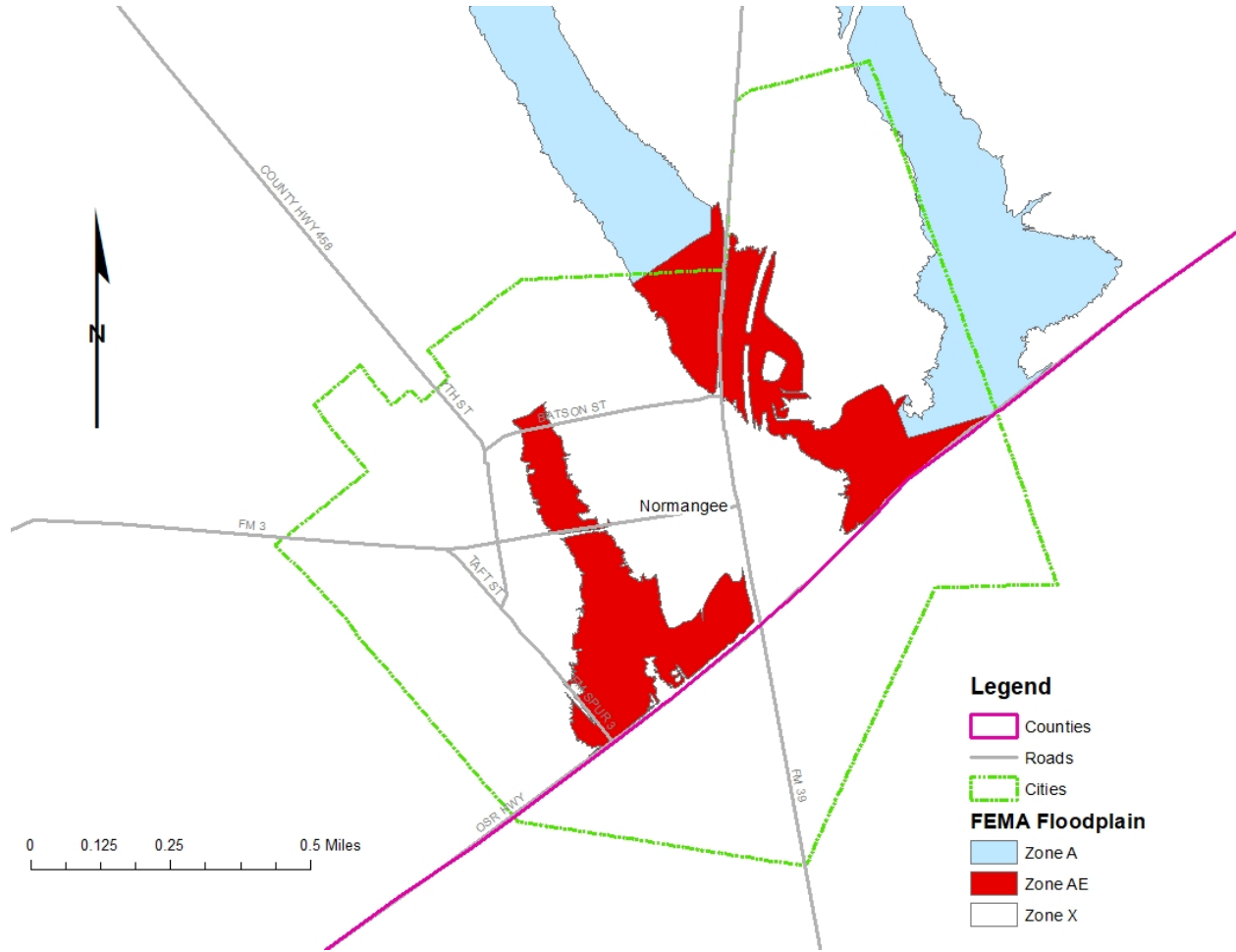


Figure 37: City of Normangee FEMA 100-Year Floodplain



Figure 38: City of Normangee Land Use Types in Special Flood Hazard Areas

II. Impact

Most of Normangee’s jurisdictional territory is located outside of a designated FEMA Special Flood Hazard Area. Although the likelihood of a FEMA 100-year flood event remains occasional, 1% in any given year, the floodplain crosses all of the major thoroughfares leading to Normangee, potentially limiting travel into and out of the City. The impact of a FEMA 100-year flood event will vary depending on the specific location, size of the affected area, and number of structures affected. Parts of the community may temporarily lose power due to downed power lines. Motorists may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. Occupants of these structures may require rescue or aid during and after a flood event. Estimated damage totals to vulnerable parcels affected during a 100-year flood event may meet the totals outlined in Table 13 above.

Despite the unlikely probability of a so-called 500-year flood, 0.02% in any given year, the danger isn’t negligible. Moreover, the relatively limited information on the 500-year flood zone should not be interpreted to mean that a 500-year flood will only occur in the areas depicted in

the 500-year flood zone. Parts of the community may temporarily lose power due to downed power lines. Motorists and residents may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. A 500-year flood event is expected to affect a larger area and more structures than a 100-year flood. Estimated damage totals to vulnerable parcels affected during a 500-year flood event may meet the totals outlined in Table 13 above.

H) City of Oakwood

I. Location

The FEMA 100-year floodplain covers 20% (146 acres out of 724) of the total land area within Oakwood's corporate limits.

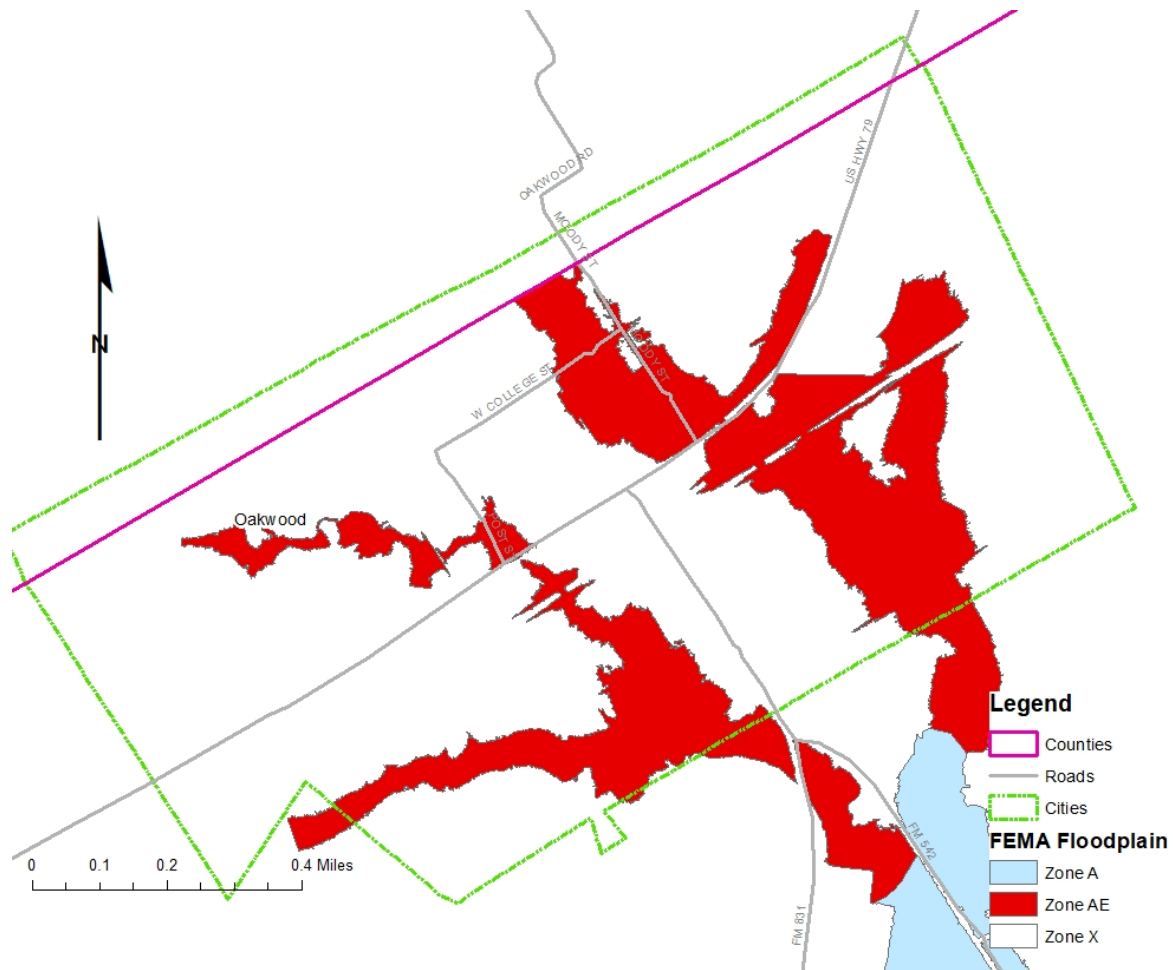


Figure 39: City of Oakwood FEMA 100-Year Floodplain

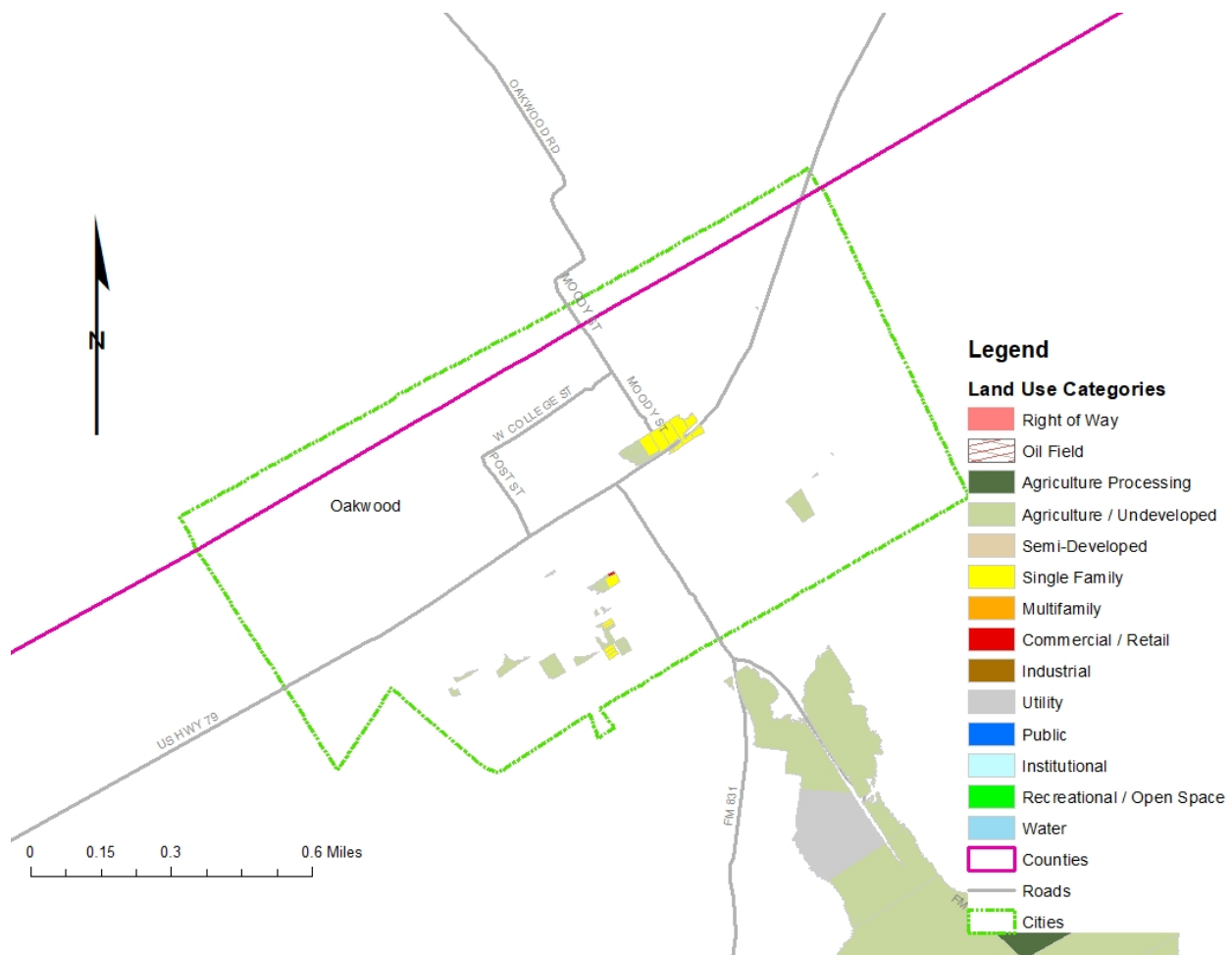


Figure 40: City of Oakwood Land Use Types in Special Flood Hazard Areas

II. Impact

Most of Oakwood’s jurisdictional territory is located outside of a designated FEMA Special Flood Hazard Area. Although the likelihood of a FEMA 100-year flood event remains occasional, 1% in any given year, the floodplain crosses all of the major thoroughfares leading to Oakwood, potentially limiting travel into and out of the City. The impact of a FEMA 100-year flood event will vary depending on the specific location, size of the affected area, and number of structures affected. Parts of the community may temporarily lose power due to downed power lines. Motorists may be left stranded and needing rescue. Affected structures may be flooded, damaged by floodborne contaminants, damaged by debris flow, or even completely washed away. Occupants of these structures may require rescue or aid during and after a flood event.

5) Vulnerability

A) Population

As described in Section 3 of Chapter 3 above, Leon 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 55 critical facilities spread across the County and participating jurisdictions. Forty seven were located in a known FEMA Special Flood Hazard Area (SFHA). Due to their location in a FEMA SFHA, these are considered especially vulnerable to flooding:

Table 15: Leon County Critical Facilities Vulnerable to Flooding

Leon County and Participating Jurisdictions	Potential Flood Impacts						
	Flooding	Damage Due to Debris Flow	Damage Due to Flood-borne Contaminants	Total Destruction	Loss of Power	Injuries	Death
Dillard Ranch Airport	x	x	x	x	x	x	x
Carter Ranch Airport	x	x	x	x	x	x	x
Buffalo Fire Department	x	x	x	x	x	x	x
Normangee Volunteer Fire Department	x	x	x	x	x	x	x
Oakwood Volunteer Fire Department	x	x	x	x	x	x	x
Centerville Volunteer Fire Department	x	x	x	x	x	x	x
Hilltop Lakes Volunteer Fire Department	x	x	x	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x	x	x	x
Marquez Volunteer Fire Department	x	x	x	x	x	x	x
Jewett Police Station	x	x	x	x	x	x	x

Buffalo Police Station	x	x	x	x	x	x	x
Leon County Sheriff's Office	x	x	x	x	x	x	x
Buffalo Elementary School	x	x	x	x	x	x	x
Buffalo High School	x	x	x	x	x	x	x
Buffalo Middle School	x	x	x	x	x	x	x
Centerville Elementary School	x	x	x	x	x	x	x
Centerville Jr. and Sr. High School	x	x	x	x	x	x	x
Leon Elementary School	x	x	x	x	x	x	x
Leon High School	x	x	x	x	x	x	x
Leon Junior High School	x	x	x	x	x	x	x
Normangee Elementary School	x	x	x	x	x	x	x
Normangee Middle School	x	x	x	x	x	x	x
Normangee High School	x	x	x	x	x	x	x
Oakwood Elementary School	x	x	x	x	x	x	x
City of Buffalo WWTP	x	x	x	x	x	x	x
City of Jewett WWTP	x	x	x	x	x	x	x
Guy's Lumber and Hardware in Centerville	x	x	x	x	x	x	x
Centerville Building Supplies	x	x	x	x	x	x	x
Lacey's Grocery in Centerville	x	x	x	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x	x	x	x
Buffalo City Hall	x	x	x	x	x	x	x
Centerville City Hall	x	x	x	x	x	x	x
Jewett City Hall	x	x	x	x	x	x	x
Marquez City Hall	x	x	x	x	x	x	x
Normangee City Hall	x	x	x	x	x	x	x
Oakwood City Hall	x	x	x	x	x	x	x
Leon County Courthouse and Annex	x	x	x	x	x	x	x
Moore Ranch Airport	x	x	x	x	x	x	x
Morris Lazy K Ranch Airport	x	x	x	x	x	x	x
Hilltop Lakes Airport	x	x	x	x	x	x	x
Miles Field Airport	x	x	x	x	x	x	x
Hub Field Airport	x	x	x	x	x	x	x
Wood Crest Ranch Airport	x	x	x	x	x	x	x
Reliant Energy Electric Power Plant	x	x	x	x	x	x	x
Centerville WWTP	x	x	x	x	x	x	x
Normangee WWTP	x	x	x	x	x	x	x
Oakwood WWTP	x	x	x	x	x	x	x

C) Vulnerable Infrastructure

Practically all major roads in Leon County are traversed by floodplains. I-45 and SH 75 are crossed by floodplains five and eight times respectively. US 79 is crossed seven times and SH 7 is crossed eight times by floodplains. Smaller FM roads in the county are also affected by floodplains. In addition, wastewater treatment plants in Buffalo, Centerville, Jewett, Normangee, and Oakwood are partially or completely in floodplains.

D) 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.

Table 16: Vulnerable Parcels by Flood Zone

Jurisdiction	Vulnerable Parcels by Land Use Type											Total	Estimated Potential Damage Value
	Agricultural	Commercial	Industrial	Institutional	Multi-Family	Oil & Gas	Public	Recreational	Single Family	Semi-Developed	Utility		
<u>FEMA 100-Year Flood Zone</u>													
Countywide	3130	38	3	15	0	39	0	30	124	0	2	3391	\$162,317,395
City of Buffalo	116	28	0	9	0	2	0	29	8	0	0	192	\$8,429,490
City of Centerville	44	0	0	0	0	0	0	0	0	0	0	44	\$4,319,020
City of Jewett	62	0	0	0	0	0	0	0	13	0	0	75	\$5,257,647
City of Leona	23	0	0	0	0	0	0	0	0	0	0	23	unavailable
City of Marquez	39	5	1	0	0	0	0	0	26	0	0	71	\$2,964,705
City of Normangee	7	0	0	6	0	0	0	0	26	0	0	39	\$4,168,892
City of Oakwood	64	1	0	0	0	0	0	0	22	0	0	87	\$2,515,938

5. Hurricanes / Tropical Storms

Once a tropical depression has intensified to the point where its maximum sustained winds are between 35-64 knots (39 – 73 mph), it becomes a tropical storm. At these wind speeds the storm becomes more organized and begins to become more circular in shape – resembling a hurricane. The rotation of a tropical storm is more recognizable than for a tropical depression. Tropical storms can cause many problems without becoming a hurricane. However, most of the problems a tropical storm causes stem from heavy rainfall and high winds.

According to National Oceanic and Atmospheric Administration (NOAA), a hurricane is an intense tropical weather system of strong thunderstorms with a well-defined surface circulation and maximum sustained winds of 74 mph or higher. Hurricanes are categorized according to the strength of their winds using the Saffir-Simpson Hurricane Scale. A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the highest. These are relative terms, because lower category storms can sometimes inflict greater damage than higher category storms, depending on where they strike and the particular hazards they bring. In fact, tropical storms can also produce significant damage and loss of life, mainly due to flooding.

The ingredients for a hurricane include a pre-existing weather disturbance, warm tropical oceans, moisture, and relatively light winds aloft. If the right conditions persist long enough, they can combine to produce the violent winds, incredible waves, torrential rains, and floods associated with this phenomenon.

1) Hurricanes / Tropical Storms History

The planning team relied on data from the National Climatic Data Center (NCDC) and the Leon County 2013 CHAMPS report to develop a hurricane history for the County and each participating jurisdiction. The data gathered reflects the most up-to-date hurricane and tropical storm data available for each jurisdiction. All data is reported at the County level, but because of every jurisdiction's proximity to each other, the countywide data is considered representative of local hurricane and tropical storm impacts.

Table 17: Leon County Hurricane History

Hurricane & Tropical Storm Events	Date	Hurricane Category	Maximum Wind Speed (MPH)	Local Fatalities	Local Injuries	Local Property Damage	Local Crop Damage	Local Property Damage \$2017	Local Crop Damage \$2017
Hurricane Carla	9/8/1961	5	175	0	4	\$493,295	\$493,295	\$4,041,307	\$4,041,307
Hurricane Ike	9/13/2008	2	130	0	0	\$150,000	\$0	\$170,658	\$0
Hurricane Ike	9/13/2008	2	130	0	0	\$54,150	\$0	\$61,607	\$0

NOAA Data

CHAMPS Data

On September 8, 1961, Hurricane Carla made landfall on the Texas Gulf Coast as a Category 4 hurricane. While causing extreme damage in coastal counties and cities, within a day, it had decreased to a tropical storm and started moving north-northeast, into Leon County and the participating jurisdictions. Damage totals are estimated to be over \$4 million in crop and property damage (in \$2017). Carla was a Tropical Storm when it hit Leon County.

2) Likelihood of Future Events

Hurricanes occur in seasonal patterns between June 1 and November 30. Based on historical frequency of hurricanes and tropical storms in Leon County and the participating jurisdictions outlined above, the likelihood of a hurricane or tropical storm affecting any or all of the participating jurisdictions is occasional, meaning an event is possible in the next five years.

3) Extent

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure, and storm surge potential. Wind, pressure, and surge are combined to estimate potential damage. Categories 3, 4 and 5 are classified as “major” hurricanes. Major hurricanes comprise only 20 percent of total tropical cyclone landfalls but they account for over 70 percent of the damage in the United States. Damage from hurricanes can result from spawned tornados, coastal flooding from storm surge, and inland flooding from heavy rainfall

Table 18: Saffir-Simpson Scale

Category	Maximum Sustained Wind Speed (MPH)	Minimum Surface Pressure (Millibars)	Storm Surge (Feet)
1	74-95	Greater than 980	3-5
2	96-110	979-965	6-8
3	111-130	964-945	9-12
4	131-155	944-920	13-18
5	155+	Less than 920	19+

Leon County and the participating jurisdictions are located far enough from the coast that storm surge is unlikely to have a local impact.

The worst hurricanes and tropical storms in Leon County and the participating jurisdictions have measured as high as Category 5 on the Saffir-Simpson scale, injured up to 4 people, and caused property and crop damages in excess of \$4 million.

Future hurricanes and tropical storms may meet previous worst-case Category 5 storms in terms of strength, rainfall, flooding, damage dollars, injuries, and deaths.

4) Location and Impact

A) Location

Location is often referred to in terms of Tier I and II counties, designated by the Texas Department of Insurance (TDI) for windstorm insurance purposes, to represent differing levels of loss exposure to coastal counties and adjacent counties. Tier I are those counties adjacent to the Gulf of Mexico and Tier II are those counties adjacent to Tier I counties.

Leon County is neither. However, the County and all participating jurisdictions are located within 140 to 170 miles of the Gulf coast. Although tropical storm and hurricane effects begin to diminish as they move inland, the winds alone from Hurricane Harvey reached as far as 140 miles from the eye of the storm. The County and all participating jurisdictions are considered especially susceptible to indirect impacts from hurricanes and tropical storms including high winds and flooding.

Tropical storms and hurricanes vary tremendously in terms of size, location, intensity and duration. According to the Leon County 2013 CHAMPS Report, Leon County's proximity to the coast places it among the middle 20% of all Texas counties in terms of recorded hurricane and tropical storm impacts including damage dollars, injuries, and deaths.

B) Impact

The planning team determined that Leon County is uniformly exposed to tropical storms and hurricanes.

Impacts from a Hurricane or Tropical Storm in Leon County and the participating jurisdictions may include but are not limited to: loss of power due to downed lines caused by flying debris or fallen trees, flooding, flooding due to damaged or destroyed roofs, damaged or broken windows, damage due to flying debris, wind damage, escaped livestock and pets, injured or killed livestock and pets, crop damage or destruction. In the worst storms, people may be injured or killed.

5) Vulnerability

A) Population

As described in Section 3 of Chapter 3 above, Leon 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 hurricane or tropical storm.

Residents of mobile / manufactured housing are of particular concern. These structures are never considered safe during a hurricane, and depending on tie-down methods, may also be unsafe during strong tropical storms.

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

B) Critical Infrastructure – I-45, US 79, SH 75 and 7

Interstate Highway 45, United States Highway 9, and State Highway 75 and 7 are major roads that cross through Leon County.

As previously noted in the flood chapter, all of these roads have portions that fall within floodplain boundaries in Leon County and participating jurisdictions.

Flooding along any of these routes could strand motorists. These drivers may need to be rescued, and could be injured or killed.

C) Critical Facilities

The planning team identified 55 critical facilities spread across the County and participating jurisdictions. Because of Leon County's relative proximity to the Gulf coast, the planning team determined that all critical facilities, no matter their jurisdictional location, are equally vulnerable to a hurricane or tropical storm.

Table 19: Critical Facilities Vulnerable to Tropical Storms and Hurricanes and Potential Impacts

Leon County and Participating Jurisdictions	Potential Hurricane / Tropical Storm Impacts									
	Loss of Power	Flying Debris	Uprooted Trees	Flooding	Flooding Due to Physical Damages	Damaged or Destroyed Roofs	Damaged or Broken Windows	Wind Damage	Injuries	Death
Dillard Ranch Airport	x	x	x	x	x	x	x	x	x	x
Moore Ranch Airport	x	x	x	x	x	x	x	x	x	x
Morris Lazy K Ranch Airport	x	x	x	x	x	x	x	x	x	x
Hilltop Lakes Airport	x	x	x	x	x	x	x	x	x	x
Miles Field Airport	x	x	x	x	x	x	x	x	x	x
Hub Field Airport	x	x	x	x	x	x	x	x	x	x
Wood Crest Ranch Airport	x	x	x	x	x	x	x	x	x	x
Carter Ranch Airport	x	x	x	x	x	x	x	x	x	x
Communications Tower for KTCJ	x	x	x		x	x	x	x	x	x
Communications Tower for KBHT	x	x	x		x	x	x	x	x	x
Communications Tower for KMVL-FM	x	x	x		x	x	x	x	x	x
Reliant Energy Limestone Electric Generating Plant	x	x	x	x	x	x	x	x	x	x
Buffalo Fire Department	x	x	x	x	x	x	x	x	x	x
Normangee Volunteer Fire Department	x	x	x	x	x	x	x	x	x	x
Oakwood Volunteer Fire Department	x	x	x	x	x	x	x	x	x	x
Centerville Volunteer Fire Department	x	x	x	x	x	x	x	x	x	x

Hilltop Lakes Volunteer Fire Department	x	x	x	x	x	x	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x	x	x	x	x	x	x
Marquez Volunteer Fire Department	x	x	x	x	x	x	x	x	x	x
Leona Fire Department	x	x	x		x	x	x	x	x	x
Jewett Police Station	x	x	x	x	x	x	x	x	x	x
Buffalo Police Station	x	x	x	x	x	x	x	x	x	x
Leon County Sheriff's Office	x	x	x	x	x	x	x	x	x	x
Buffalo Elementary School	x	x	x	x	x	x	x	x	x	x
Buffalo High School	x	x	x	x	x	x	x	x	x	x
Buffalo Middle School	x	x	x	x	x	x	x	x	x	x
Centerville Elementary School	x	x	x	x	x	x	x	x	x	x
Centerville Jr. and Sr. High School	x	x	x	x	x	x	x	x	x	x
Leon Elementary School	x	x	x	x	x	x	x	x	x	x
Leon High School	x	x	x	x	x	x	x	x	x	x
Leon Junior High School	x	x	x	x	x	x	x	x	x	x
Normangee Elementary School	x	x	x	x	x	x	x	x	x	x
Normangee Middle School	x	x	x	x	x	x	x	x	x	x
Normangee High School	x	x	x	x	x	x	x	x	x	x
Oakwood Elementary School	x	x	x	x	x	x	x	x	x	x
City of Buffalo WWTP	x	x	x	x	x	x	x	x	x	x

City of Centerville WWTP	x	x	x	x	x	x	x	x	x	x
City of Jewett WWTP	x	x	x	x	x	x	x	x	x	x
City of Leona WWTP	x	x	x		x	x	x	x	x	x
City of Normangee WWTP	x	x	x	x	x	x	x	x	x	x
City of Oakwood WWTP	x	x	x	x	x	x	x	x	x	x
Leona General Store	x	x	x		x	x	x	x	x	x
Guy's Lumber and Hardware in Centerville	x	x	x	x	x	x	x	x	x	x
Centerville Building Supplies	x	x	x	x	x	x	x	x	x	x
Lacey's Grocery in Centerville	x	x	x	x	x	x	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x	x	x	x	x	x	x
Buffalo Ace Hardware	x	x	x		x	x	x	x	x	x
Buffalo City Hall	x	x	x	x	x	x	x	x	x	x
Centerville City Hall	x	x	x	x	x	x	x	x	x	x
Jewett City Hall	x	x	x	x	x	x	x	x	x	x
Leona City Hall	x	x	x		x	x	x	x	x	x
Marquez City Hall	x	x	x	x	x	x	x	x	x	x
Normangee City Hall	x	x	x	x	x	x	x	x	x	x
Oakwood City Hall	x	x	x	x	x	x	x	x	x	x
Leon County Courthouse and Annex	x	x	x	x	x	x	x	x	x	x

D) Vulnerable Parcels

Central Appraisal District data was used to estimate potential damage values for each participating jurisdiction. Given the broad nature of vulnerability, damage values were calculated on the jurisdictional level.

Table 20: Estimated Potential Damage Values by Jurisdiction

Jurisdiction	Estimated Potential Damage Value
County	\$1,656,299,949
City of Buffalo	\$88,731,470
City of Centerville	\$43,190,200
City of Jewett	\$29,209,150
City of Leona	unavailable
City of Marquez	\$12,890,020
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

6. 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 while 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 between 2005 – 2015. During that time, there were 359 wildfire ignitions in Leon County. The Angelina River Fire Department responded to 12 fires, the Austonio VFD responded to one fire, the Buffalo VFD responded to 9 fires, the Centerville VFD responded to 19 fires, the State of Texas responded to 72 fires, the City of Jasper VFD responded to 3 fires, the Deanville VFD responded to one fire, the DeLeon VFD responded to 3 fires, the Dew VFD responded to 2 fires, the East Lake Limestone VFD responded to 22 fires, the Flo VFD responded to 61 fires, the Flynn VFD responded to 12 fires, the Hilltop Lakes VFD responded to 73 fires, the Jewett VFD responded to 10 fires, the Leona VFD responded to four fires, the Maydelle VFD responded to one fire, the Midway VFD responded to one fire, the Normangee VFD responded to 24 fires, the Porter Springs Community VFD responded to one fire, the Rust VFD responded to four fires, the Seale-Round Prairie VFD responded to 19 fires, The Snook VFD responded to one fire, the Teague Fire Dept. responded to 2 fires, and the West Lake Limestone Fire Dept. responded to 2 fires.

Wildfires burned 9764 acres. Debris burning was the leading cause of identified wildfire ignitions. The largest reported fire, known as the Concord Robbins Fire, burned 4689 acres in 2011. Its cause is listed as “miscellaneous.”

No damage dollars, neither structural nor agricultural, were reported for any of the wildfire events in any of the participating jurisdictions.

Although data beyond 2015 isn't available, based on members' expertise, the planning team determined that wildfires have continued to occur at a similar rate as they did between 2005 – 2015.

2) Likelihood of Future Events

A) Leon County

According to the data, fire departments respond to 35 or more wildfires per year in greater Leon County. Given prior frequency of wildfire events, a wildfire event in Leon County is highly likely, meaning an event is probable within the next year.

B) City of Buffalo

According to the data, the City of Buffalo responds to 0.9 wildfires per year. Given prior frequency of wildfire events, a wildfire event in the City of Buffalo is highly likely, meaning an event is probable within the next year.

C) City of Centerville

According to the data, the City of Centerville responds to 1.9 wildfires per year. Given prior frequency of wildfire events, a wildfire event in the City of Centerville is highly likely, meaning an event is probable within the next year.

D) City of Jewett

According to the data, the City of Jewett responds to 1 wildfire per year. Given prior frequency of wildfire events, a wildfire event in the City of Jewett is highly likely, meaning an event is probable within the next year.

E) City of Leona

According to the data, the City of Leona responds to 0.4 wildfires per year. Given prior frequency of wildfire events, the likelihood of a future event is likely, meaning an event is probable within the next three years.

F) City of Marquez

No wildfire events were found for the City of Marquez. However, given the proximity and frequency of wildfire events outside of the jurisdiction, the likelihood of a wildfire is considered occasional, meaning an event is possible in the next 5 years.

G) City of Normangee

According to the data, the City of Normangee responds to 2.4 wildfires per year. Given prior frequency of wildfire events, the likelihood of a future event is highly likely, meaning an event is probable within the next year.

H) City of Oakwood

No wildfire events were found for the City of Oakwood. However, given the proximity and frequency of wildfire events outside of the jurisdiction, the likelihood of a wildfire is considered occasional, meaning an event is possible in the next 5 years.

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, Leon County and the participating jurisdictions are rated between Class 1 and Class 4.5. 84.4% of the County is Class 2 or below.

Table 21: Characteristic Fire Intensity Scale⁷

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 NWCG numbers, the Concord Robbins Fire was a Class F event. Based on Texas A&M Forest Service data, the average fire in Leon County and the participating jurisdictions is a Class C event.

Table 22: National Wildfire Coordinating Group Size Class of Fire⁸

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

⁷ <https://www.texaswildfirerisk.com>

⁸ <http://www.nwcg.gov/term/glossary/size-class-of-fire>

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 Leon County and the participating jurisdictions have ranged between Class I and Class 4.5 on the Characteristic Fire Intensity Scale, with flames up to 30' in length, and between Class A and Class F on the National Wildfire Coordinating Group Size Class of Fire scale (NWCGSCF). Most fires have been small and were contained quickly. However, the worst reported fire in Leon County burned 4,689 acres. The location of that fire included areas rated between Class I and Class 3.5 on the FIS with expected flame lengths up to 8'.

Future fire events in Leon County and the participating jurisdictions may meet previous worst-case Class F (NWCGSCF) and Class 4.5 (FIS) wildfires in terms of intensity, acreage burned, and inflicted damage.

4) Location and Impact

A) Location

Due to wildfire's ability to inflict damages to both structures and landscapes, wildfire location has been assessed by parcel, rather than by structure. Parcels have been identified by land use type, and have been determined to be either partially or completely vulnerable to wildfire based on TxWRAP's Wildland Urban Interface boundaries. Certain parcels may contain various land uses. However, parcels have been identified based on the primary land use type.

Because wildfires are dynamically unpredictable, the following maps and tables may not be representative of every location and parcel at risk of wildfire.

I. Leon County Location

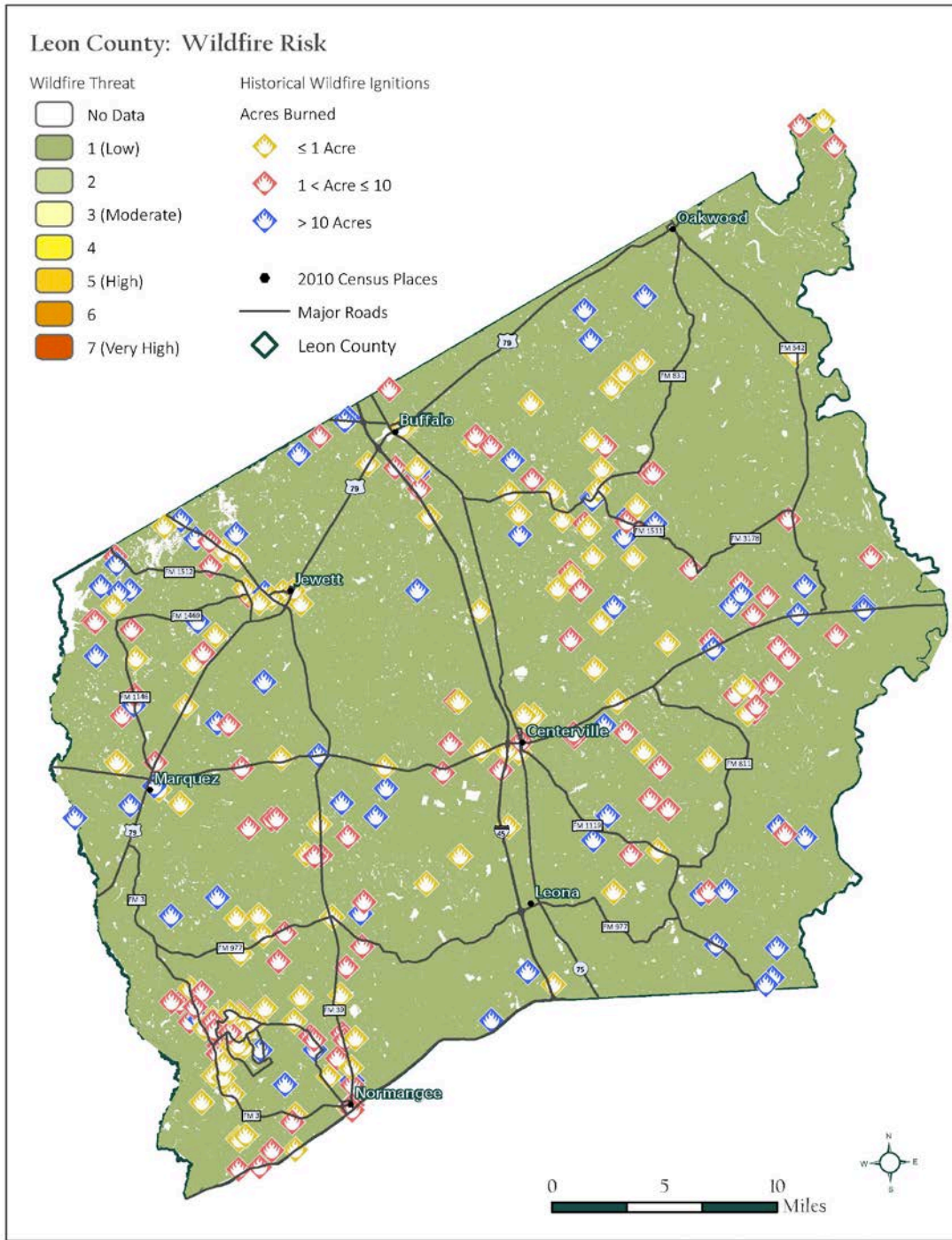


Figure 41: Leon County Wildfire Risk Location by Wildfire Threat⁹

⁹ The measure of wildfire threat used in the Texas Wildfire Risk Assessment (TWRA) is based on the Wildland Fire Susceptibility Index (WFSI). WFSI combines the probability of an acre igniting (Wildfire Ignition Density), and the expected final fire size based on rate of spread in four percentile weather categories. WFSI is defined as the likelihood of an acre burning.

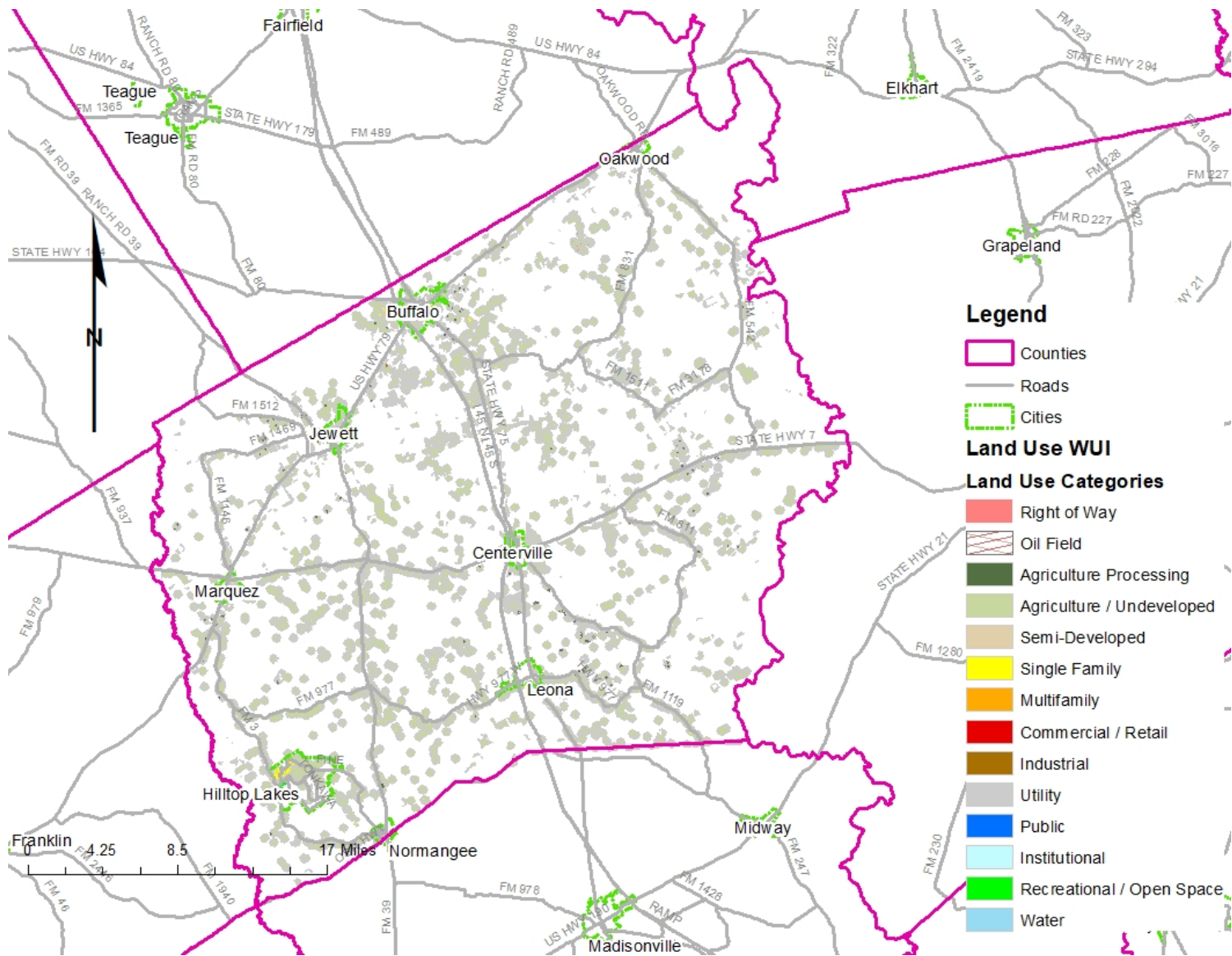
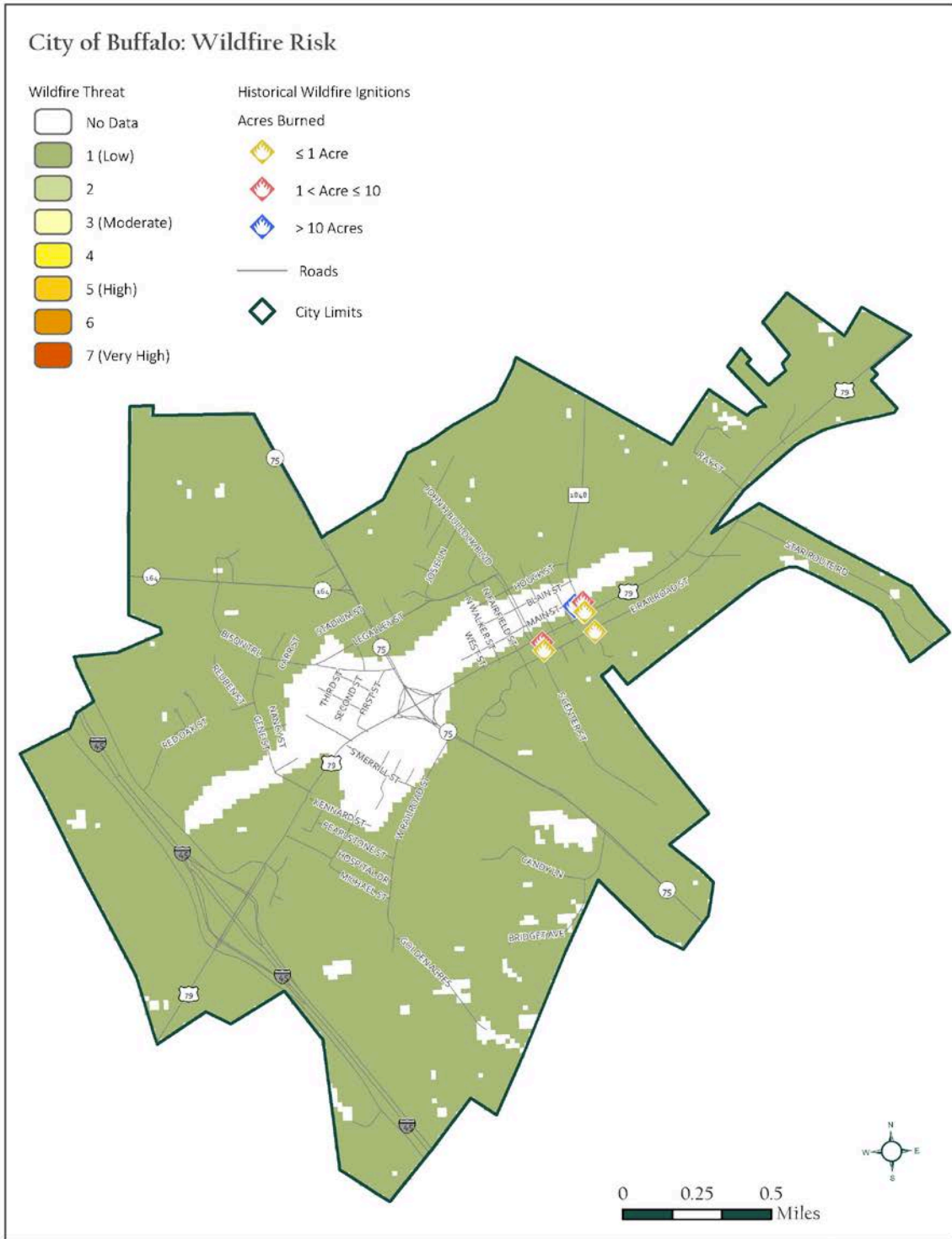


Figure 42: Leon County Wildland Urban Interface by Land Use Type

II. City of Buffalo Location



Source: Texas A&M Forest Service Wildfire Risk Assessment Portal (<https://www.texaswildfirerisk.com/map/Pro>)

Figure 43: City of Buffalo Wildfire Risk Location by Wildfire Threat

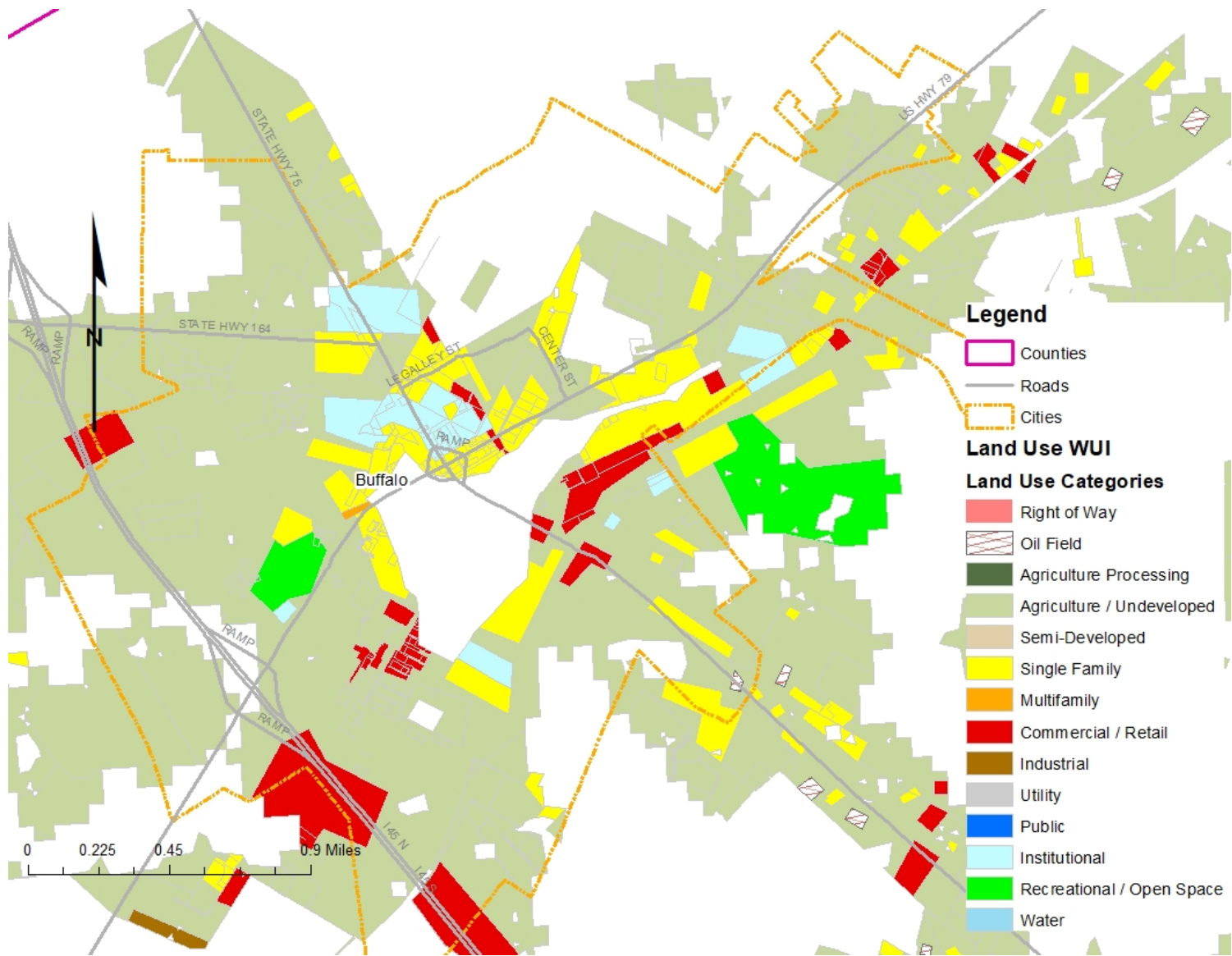


Figure 44: City of Buffalo Wildland Urban Interface by Land Use Type

III. City of Centerville Location

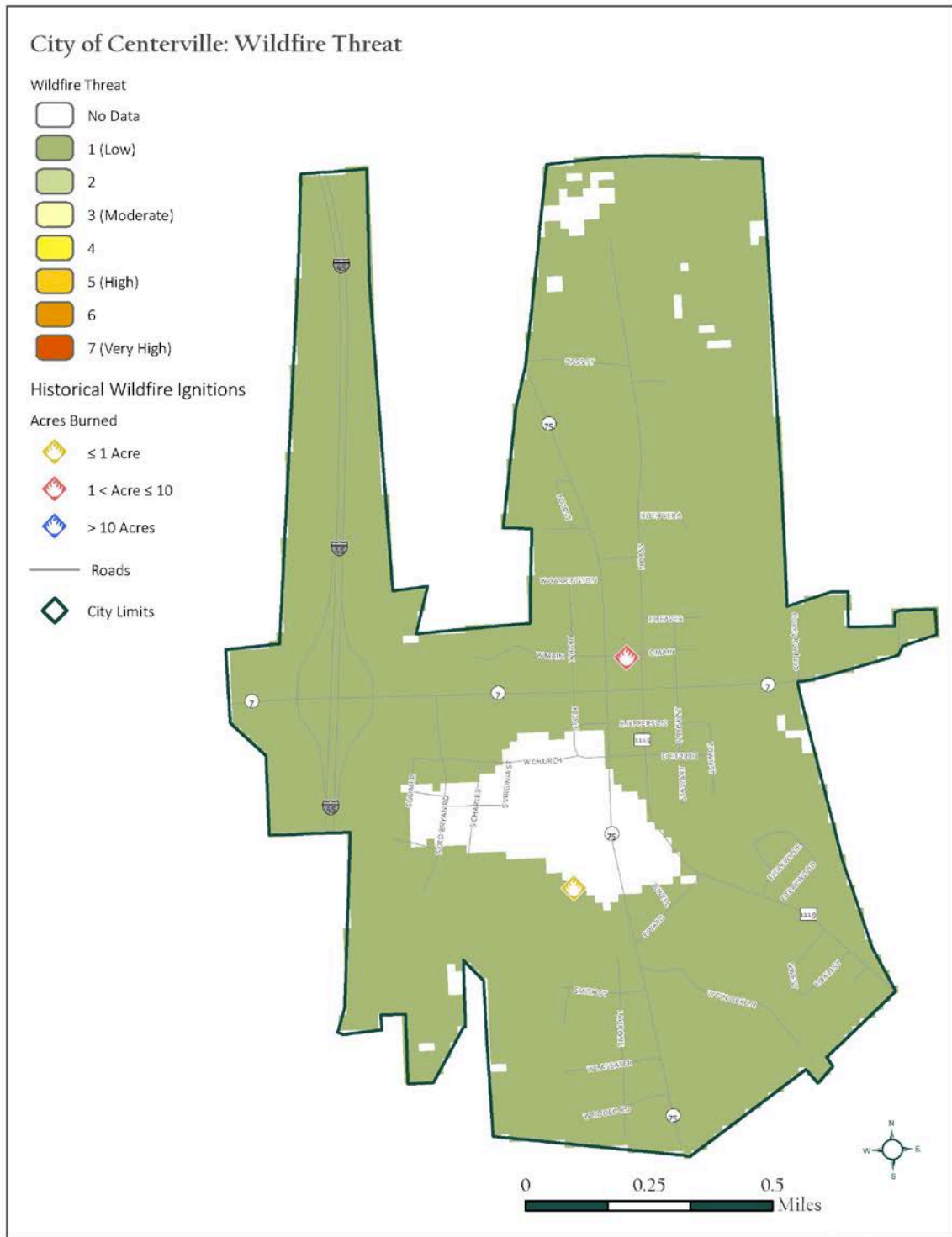


Figure 45: City of Centerville Wildfire Risk Location by Wildfire Threat

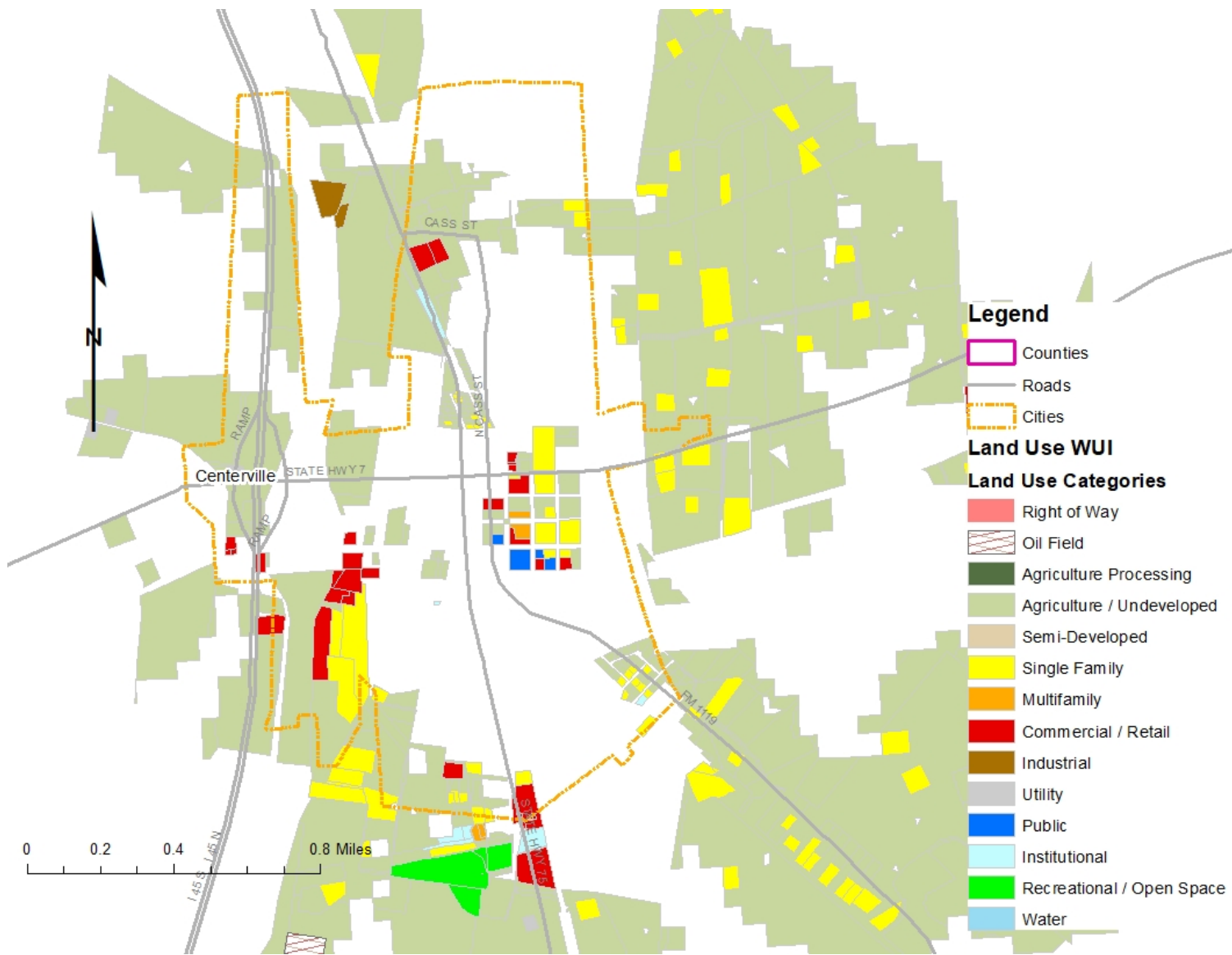


Figure 46: City of Centerville Wildland Urban Interface by Land Use Type

IV. City of Jewett Location

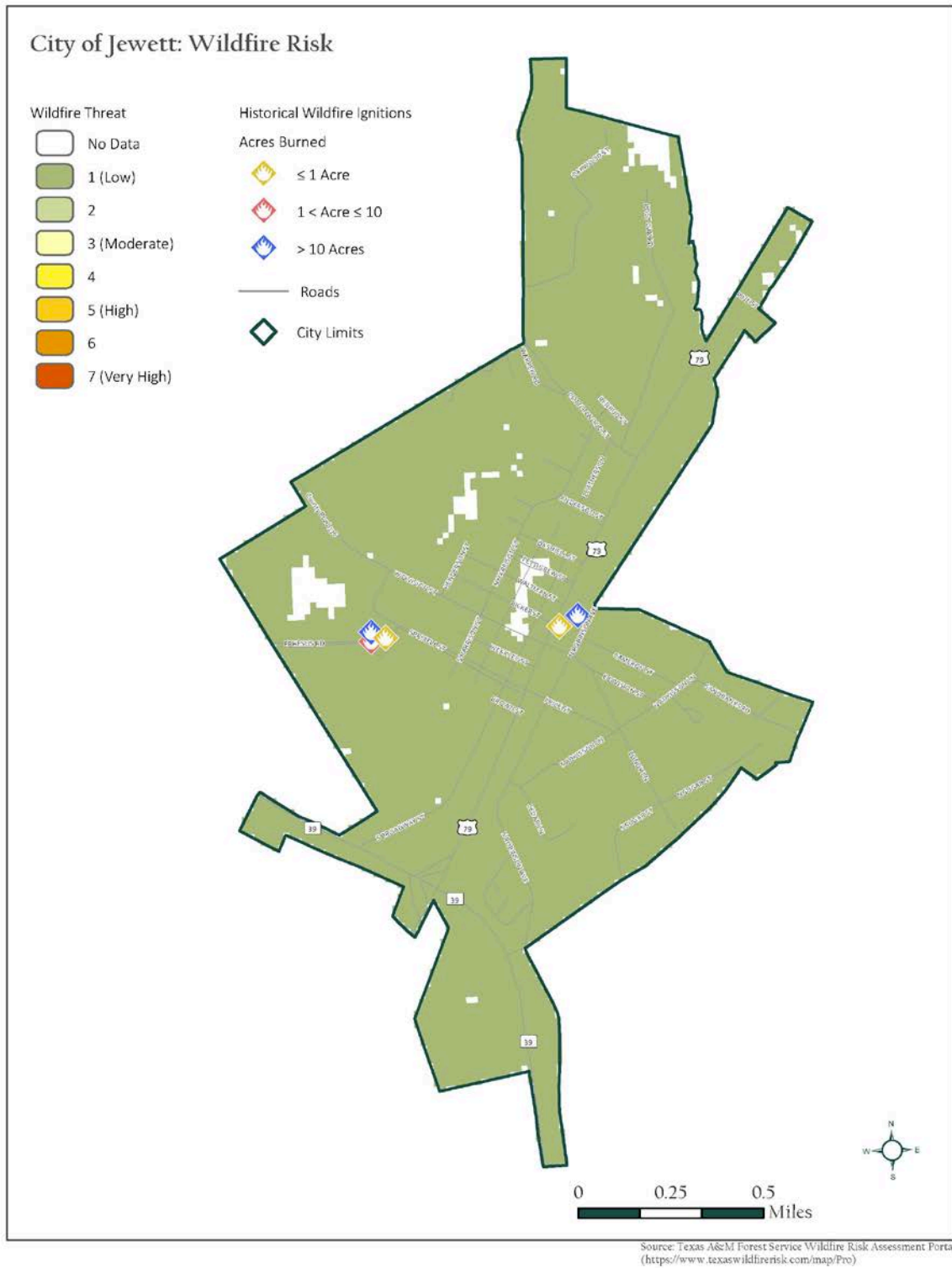


Figure 47: City of Jewett Wildfire Risk Location by Wildfire Threat

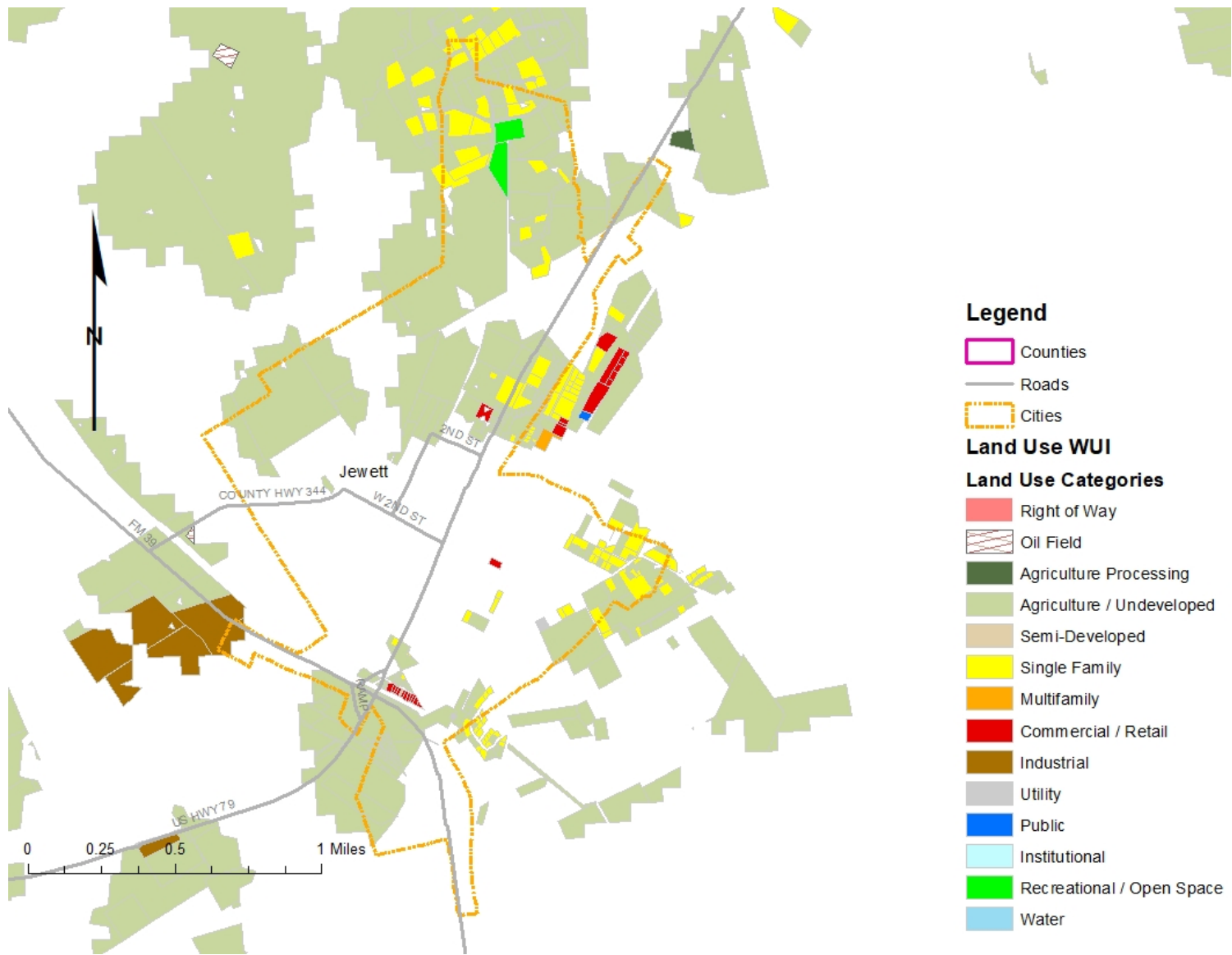


Figure 48: City of Jewett Wildland Urban Interface by Land Use Type

V. City of Leona Location

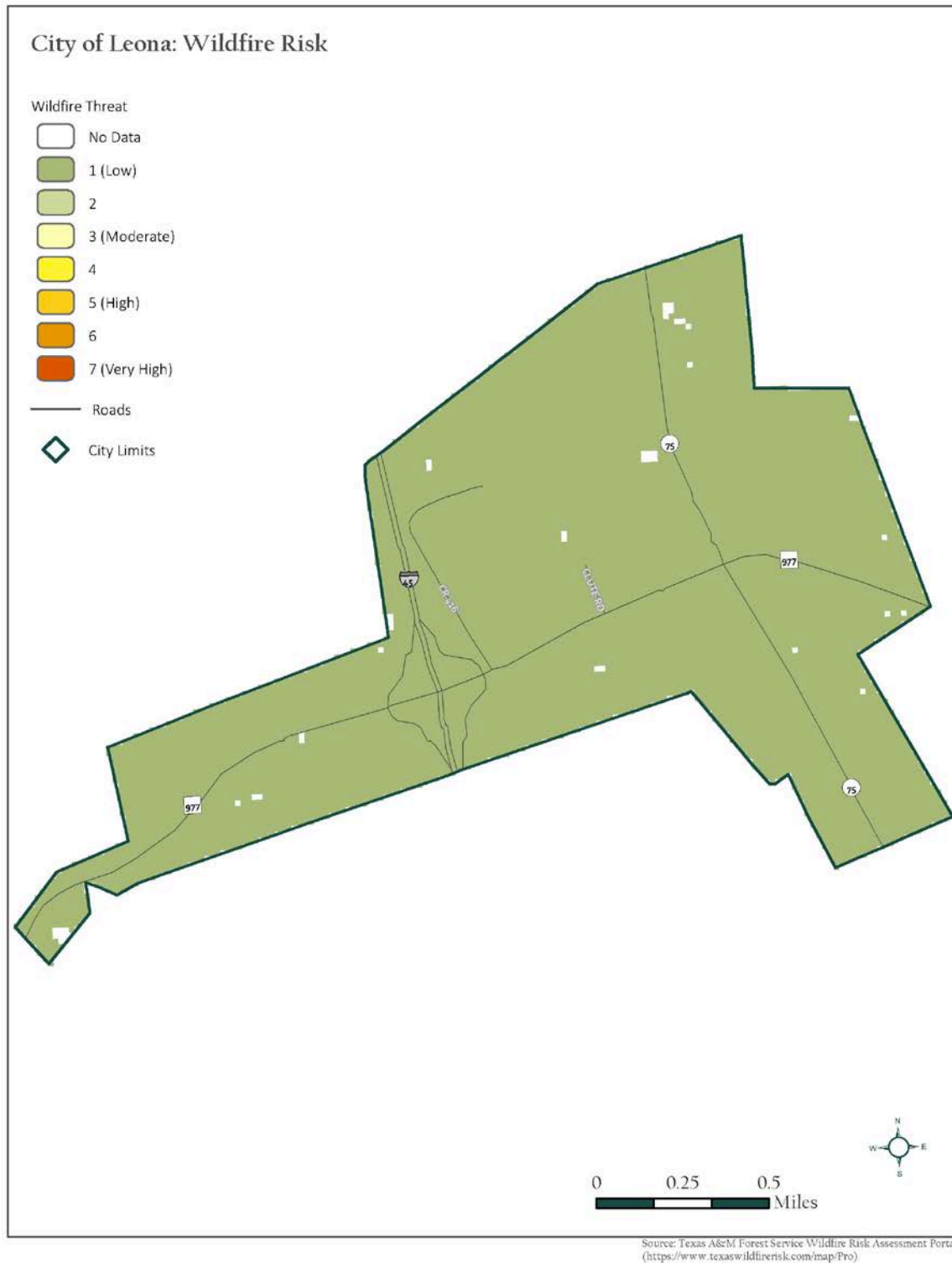


Figure 49: City of Leona Wildfire Risk Location by Wildfire Threat

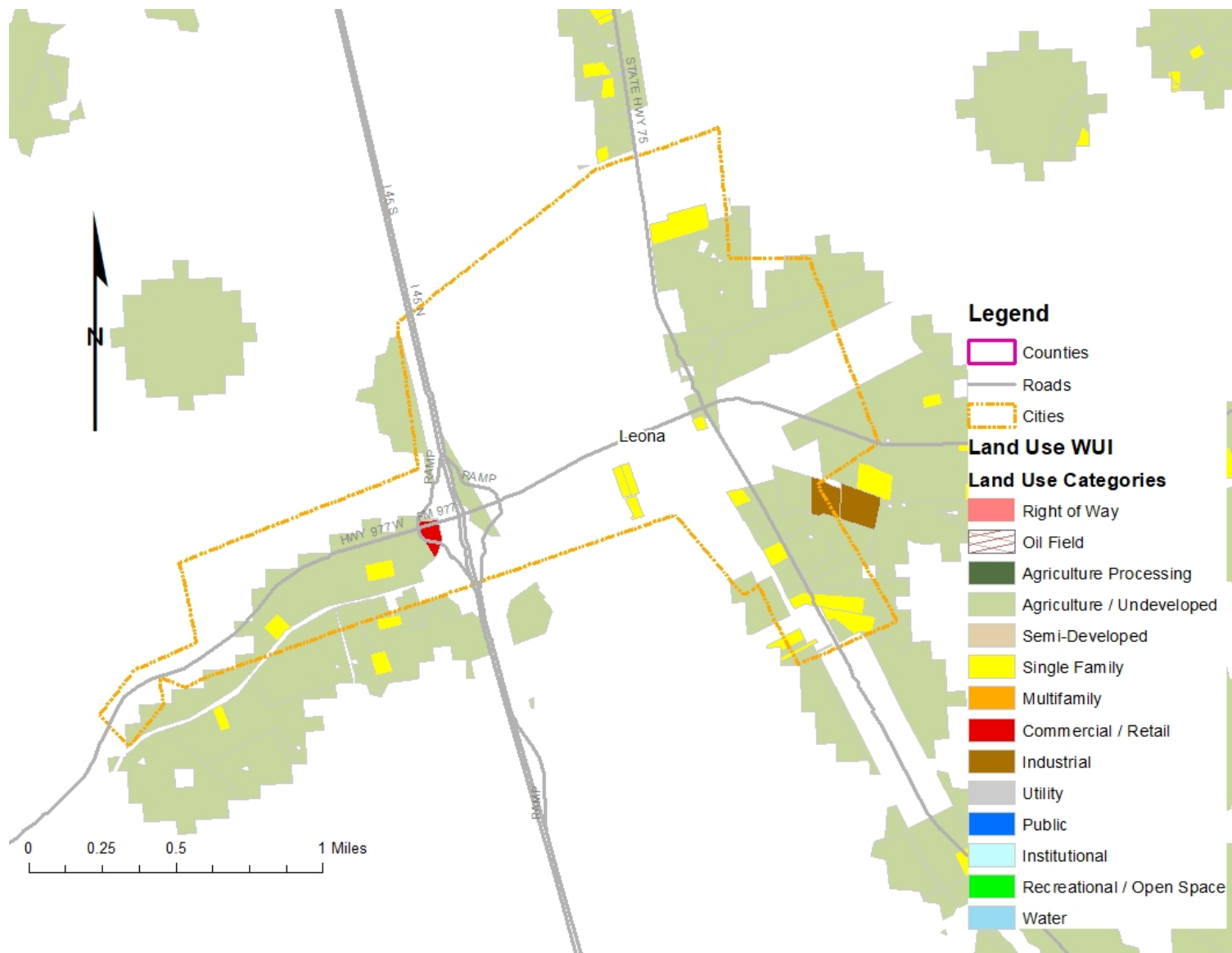


Figure 50: City of Leona Wildland Urban Interface by Land Use Type

VI. City of Marquez Location

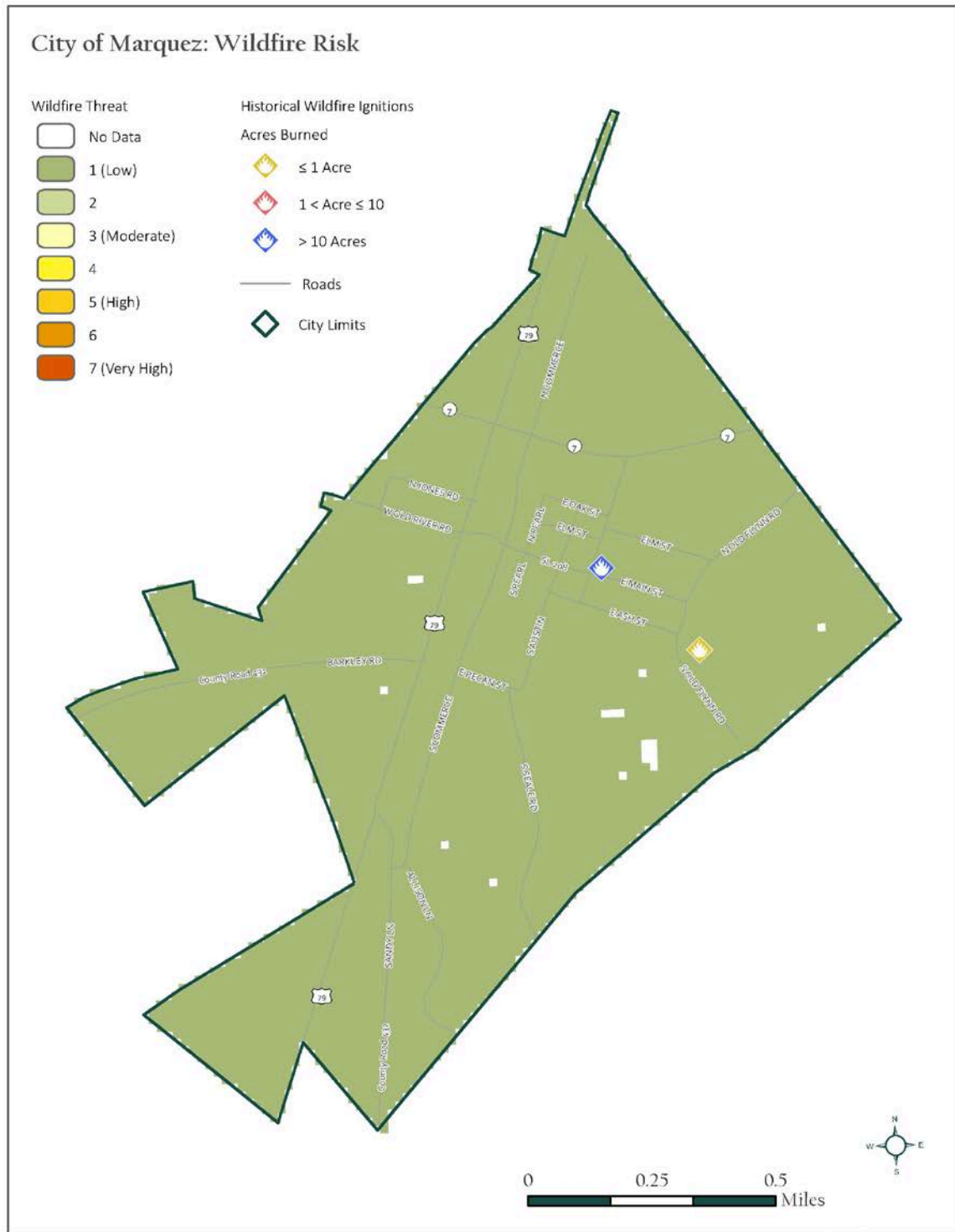


Figure 51: City of Marquez Wildfire Risk Location by Wildfire Threat

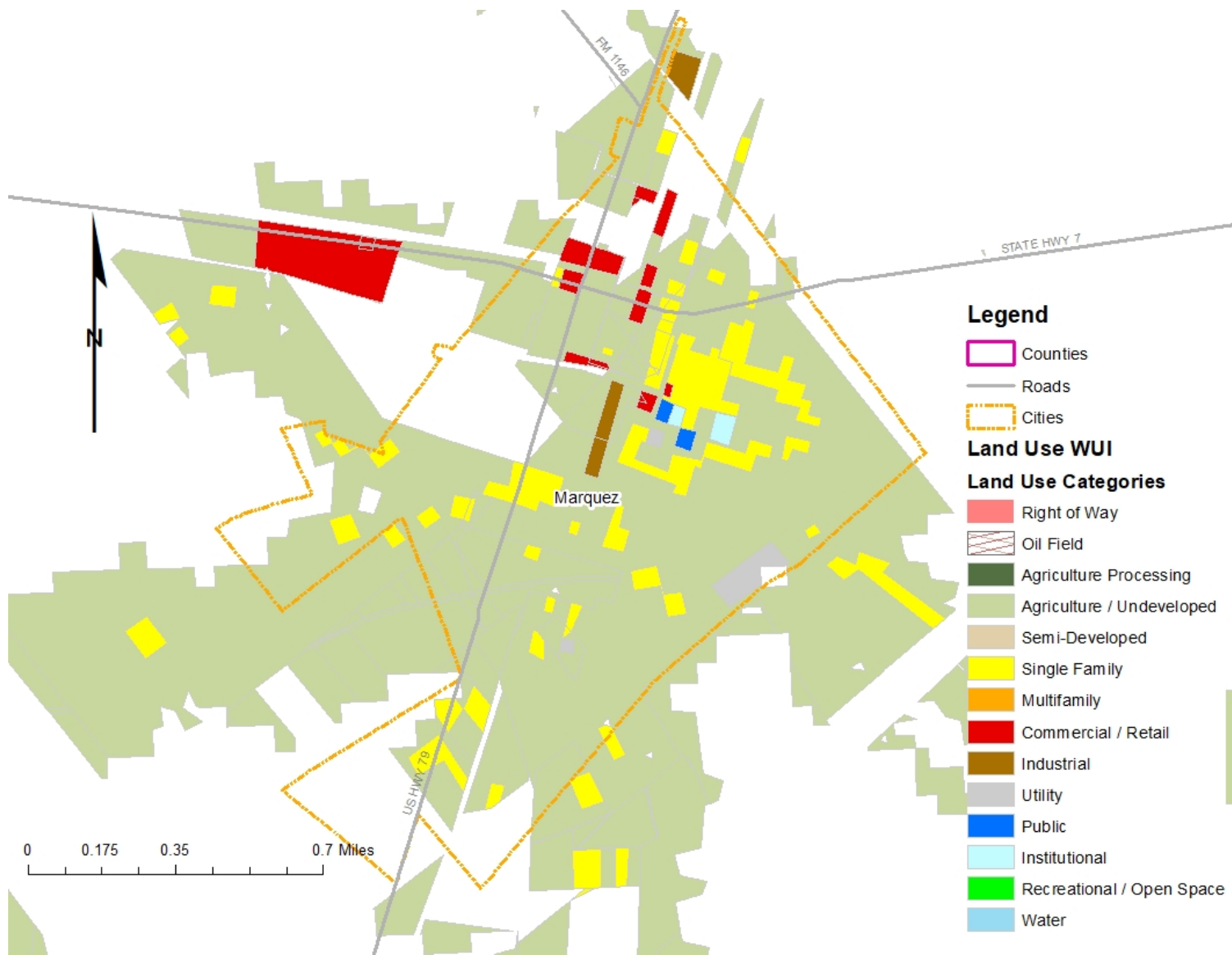


Figure 52: City of Marquez Wildland Urban Interface by Land Use Type

VII. City of Normangee Location

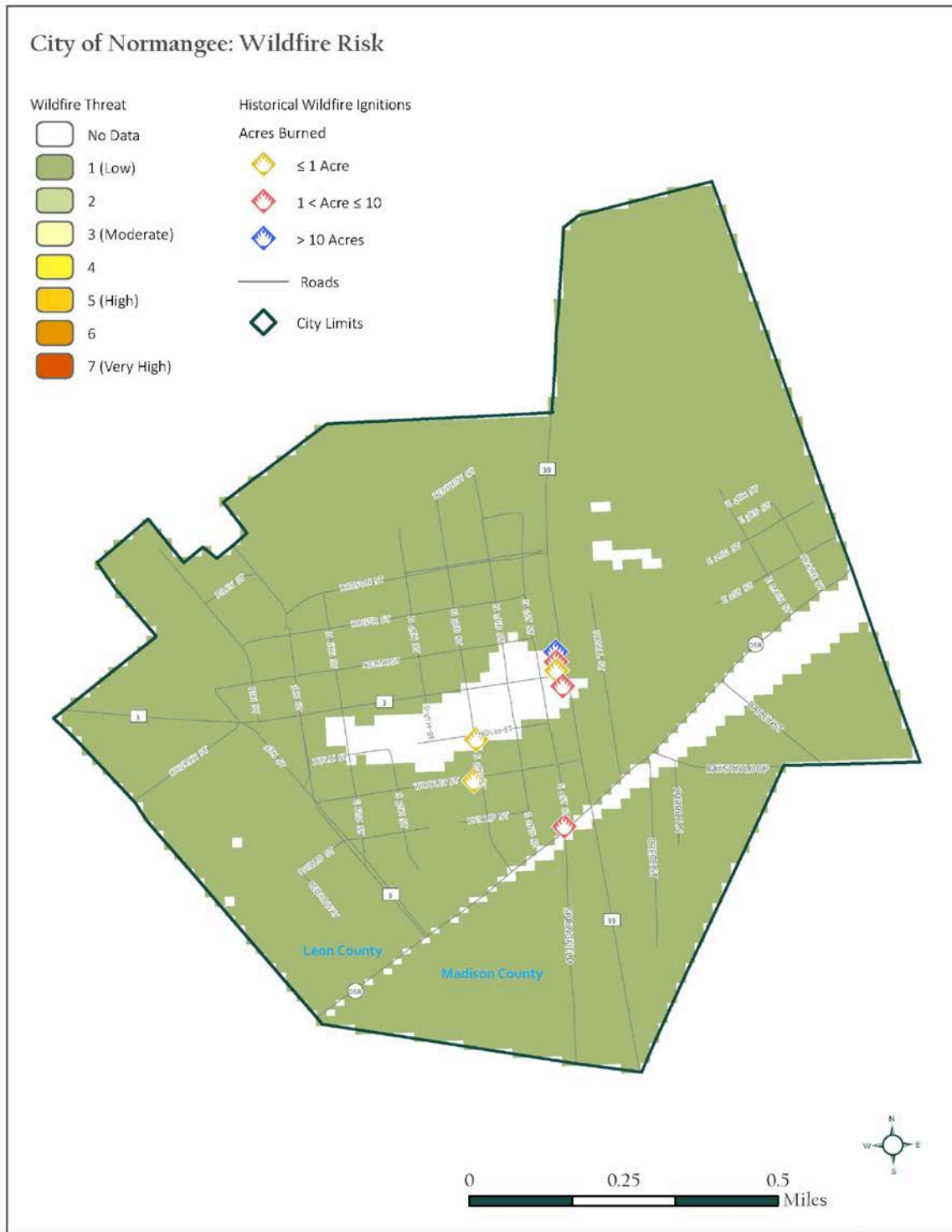


Figure 53: City of Normangee Wildfire Risk Location by Wildfire Threat

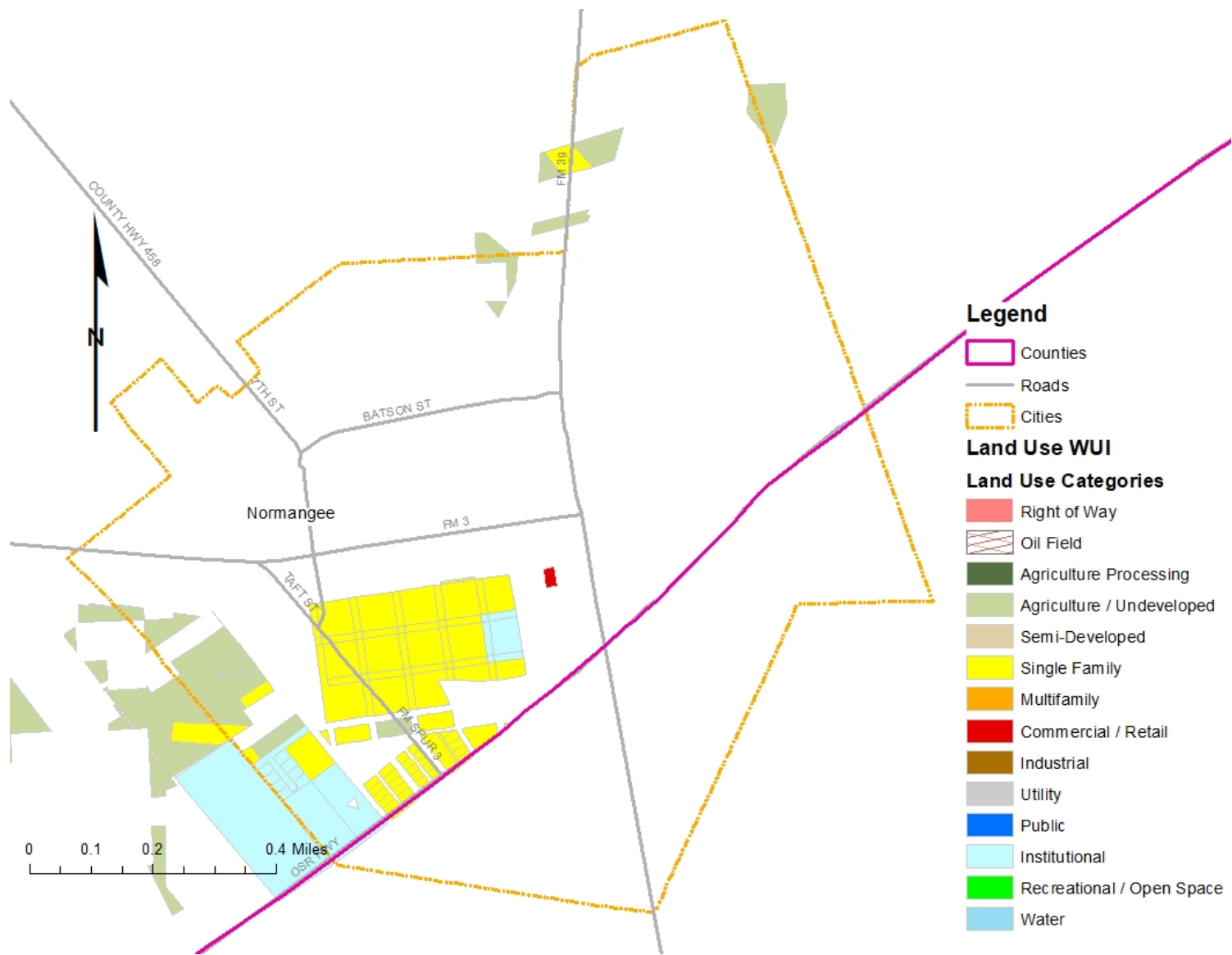


Figure 54: City of Normangee Wildland Urban Interface by Land Use Type

VIII. City of Oakwood Location

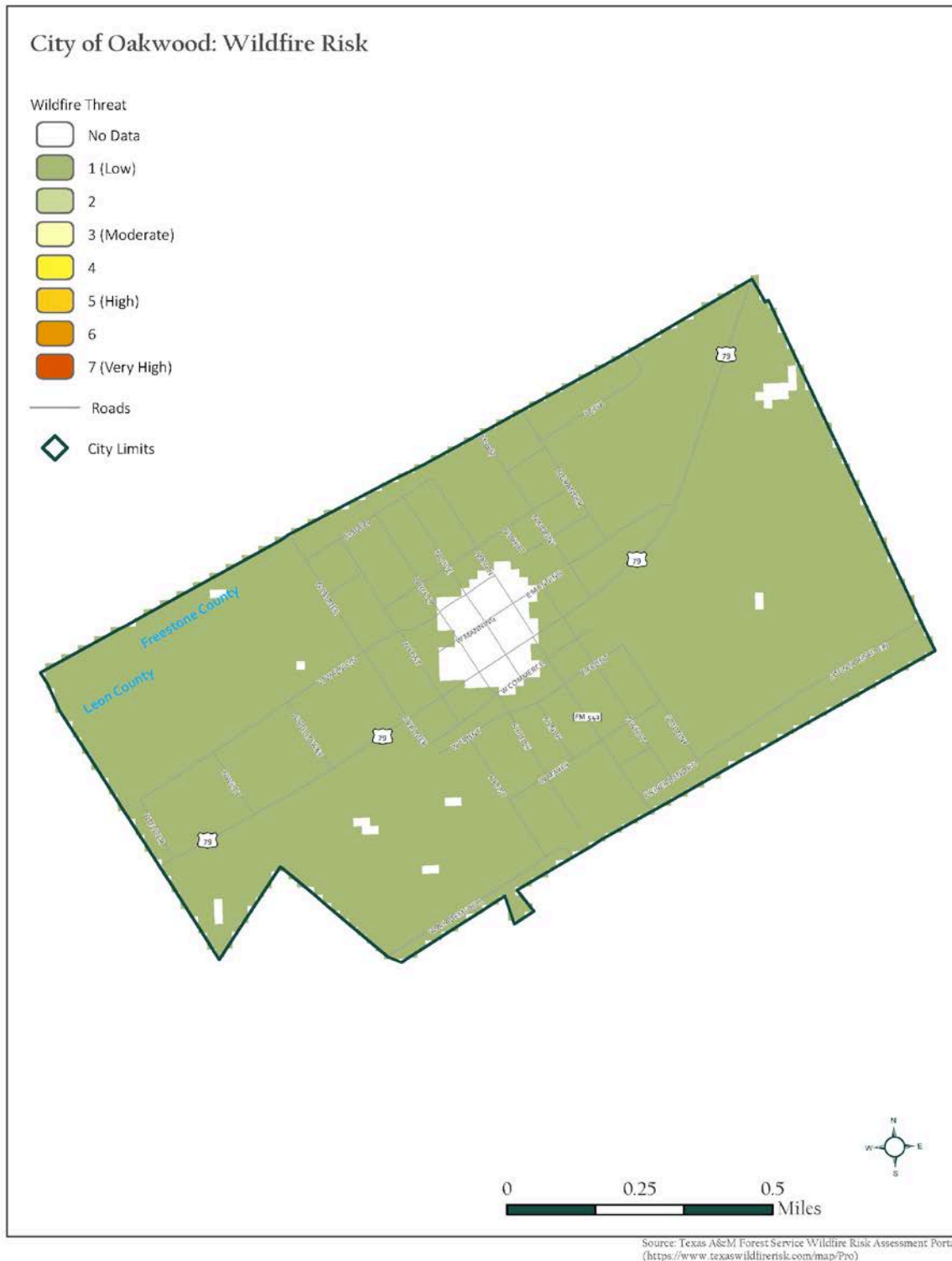


Figure 55: City of Oakwood Wildfire Risk Location by Wildfire Threat

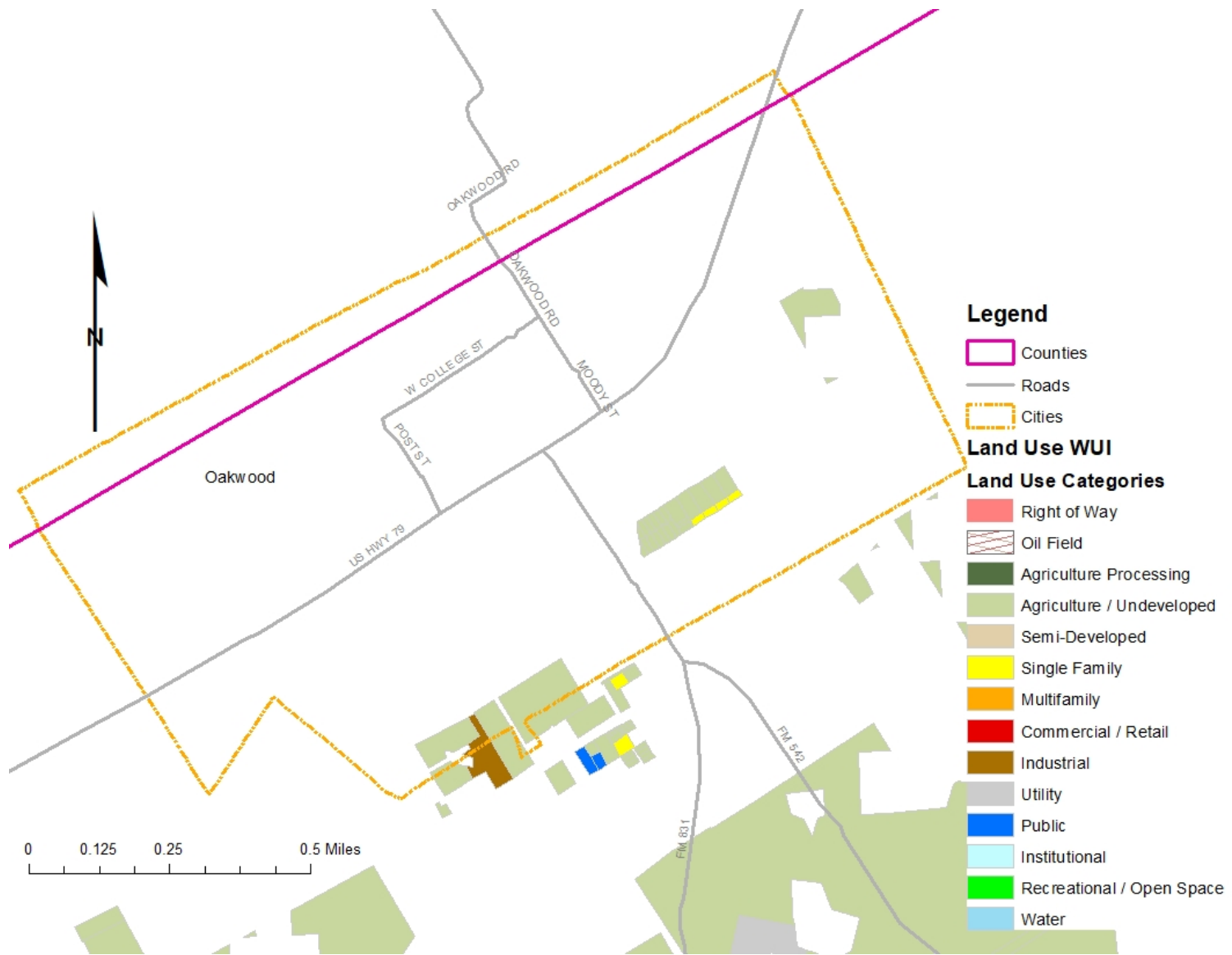


Figure 56: City of Oakwood Wildland Urban Interface by Land Use Type

B) Impact

Impacts from a wildfire in Leon 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, Leon 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 concern¹⁰. 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.

B) Critical Facilities

There are 55 critical facilities located throughout the County and participating jurisdictions. Eighteen 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.

¹⁰ <https://www.usfa.fema.gov/downloads/pdf/statistics/rural.pdf>

Table 23: Critical Facilities Vulnerable to Wildfire and Potential Impacts

Leon County and Participating Jurisdictions	Potential Wildfire Impacts				
	Destruction	Partial Destruction	Heat Damage	Smoke Damage	Water Damage
Dillard Ranch Airport	x	x	x	x	x
Buffalo Fire Department	x	x	x	x	x
Normangee Volunteer Fire Department	x	x	x	x	x
Marquez Volunteer Fire Department	x	x	x	x	x
Buffalo Police Station	x	x	x	x	x
Buffalo Elementary School	x	x	x	x	x
Buffalo High School	x	x	x	x	x
Buffalo Middle School	x	x	x	x	x
Centerville Elementary School	x	x	x	x	x
City of Jewett WWTP	x	x	x	x	x
Leona General Store	x	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x	x
Buffalo City Hall	x	x	x	x	x
Normangee City Hall	x	x	x	x	x
Morris Lazy K Ranch Airport	x	x	x	x	x
Hilltop Lakes Airport	x	x	x	x	x
Oakwood WWTP	x	x	x	x	x

C) Vulnerable Parcels

Central Appraisal District data was used to estimate potential damage values for each participating jurisdiction. The percentage of WUI land within each jurisdiction was used to calculate potential damage.

Table 24: Leon County and Participating Jurisdictions Parcels Vulnerable to Wildfire Valuation

Jurisdiction	Estimated Potential Damage Value
County	\$308,071,791
City of Buffalo	\$61,579,640
City of Centerville	\$14,814,239
City of Jewett	\$12,267,843
City of Leona	unavailable
City of Marquez	\$10,118,666
City of Normangee	\$2,755,302
City of Oakwood	\$427,709

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 total destruction of buildings.

1) Tornado History

According to data from the National Climatic Data Center, there were 21 tornados in Leon County between 1953 – 2011. All but one preceded the 2007 switch to the EF scale. The location of each tornado wasn't recorded for most events. The City of Jewett is not identified as the location of a previous tornado. No tornados have been recorded in any participating jurisdiction since 2011.

Leon County

Table 25: Leon County Tornado History

Location	Date	Time	F / EF Magnitude	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
-	5/11/1953	6:30 PM	F2	0	0	\$25,000	\$0	\$229,359	\$0
-	5/10/1954	2:30 PM	F1	0	0	\$0	\$0	\$0	\$0
-	9/28/1959	4:00 PM	F0	0	0	\$250	\$0	\$2,294	\$0
-	9/8/1961	-	-	0	4	\$493,295	\$493,295	\$4,041,307	\$4,041,307
-	11/19/1964	-	-	0	0	\$2,532	\$0	\$20,005	\$0
-	11/19/1964	4:45 PM	F1	0	0	\$25,000	\$0	\$197,544	\$0
-	4/13/1967	-	-	0	0	\$5,092	\$0	\$37,342	\$0
-	4/13/1967	5:00 PM	F2	0	0	\$25,000	\$0	\$183,350	\$0
-	2/23/1979	11:30 AM	F1	0	0	\$0	\$0	\$0	\$0
-	2/11/1984	-	-	0	2	\$247,482	\$0	\$583,464	\$0
-	2/11/1984	-	-	0	2	\$247,482	\$0	\$583,464	\$0
-	2/11/1984	-	-	0	0	\$2,475	\$0	\$5,835	\$0
-	2/11/1984	5:35 PM	F2	0	3	\$2,500,000	\$0	\$5,894,009	\$0
-	2/11/1984	6:00 PM	F2	0	0	\$25,000	\$0	\$58,940	\$0
-	7/22/1987	2:55 PM	F0	0	0	\$0	\$0	\$0	\$0
-	11/15/1987	-	-	0	1	\$249,772	\$0	\$538,582	\$0
-	11/15/1987	2:20 PM	F2	0	0	\$2,500,000	\$0	\$5,390,735	\$0
-	4/27/1990	5:05 PM	F1	0	0	\$0	\$0	\$0	\$0
-	5/2/1994	-	-	0	0	\$49,836	\$0	\$77,037	\$0
-	1/21/1998	-	-	0	1	\$49,696	\$0	\$74,683	\$0
-	2/10/1998	-	-	0	0	\$44,727	\$0	\$67,215	\$0
-	12/29/2006	-	-	0	0	\$35,076	\$0	\$42,619	\$0
-	12/29/2006	-	-	0	0	\$5,011	\$0	\$6,089	\$0
-	12/29/2006	-	-	0	0	\$5,011	\$0	\$6,089	\$0

NOAA Data
CHAMPS Data
Reported by Both

City of Buffalo

Table 26: City of Buffalo Tornado History

Location	Date	Time	F / EF Magnitude	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Buffalo	12/29/2006	4:12 PM	F0	0	0	\$5,000	\$0	\$6,075	\$0

NOAA Data
CHAMPS Data
Reported by Both

City of Centerville

Table 27: City of Centerville Tornado History

Location	Date	Time	F / EF Magnitude	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Centerville	12/29/2006	3:45 PM	F0	0	0	\$35,000	\$0	\$42,527	\$0

- NOAA Data
- CHAMPS Data
- Reported by Both

City of Leona

Table 28: City of Leona Tornado History

Location	Date	Time	F / EF Magnitude	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Leona	1/21/1998	5:28 PM	F1	0	1	\$50,000	\$0	\$75,140	\$0
Leona	2/10/1998	10:19 AM	F0	0	0	\$45,000	\$0	\$67,626	\$0

- NOAA Data
- CHAMPS Data
- Reported by Both

City of Marquez

Table 29: City of Marquez Tornado History

Location	Date	Time	F / EF Magnitude	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Marquez	5/2/1994	7:15 PM	F1	0	0	\$500,000	\$0	\$826,434	\$0

- NOAA Data
- CHAMPS Data
- Reported by Both

City of Normangee

Table 30: City of Normangee Tornado History

Location	Date	Time	F / EF Magnitude	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Normangee	1/21/1998	4:35 PM	F0	0	0	\$0	\$0	\$0	\$0
Normangee	12/29/2006	3:33 PM	F0	0	0	\$5,000	\$0	\$6,075	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Oakwood

Table 31: City of Oakwood Tornado History

Location	Date	Time	F / EF Magnitude	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Oakwood	4/25/2011	6:35 PM	EF0	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

Although the City of Jewett has not recorded any previous tornados, their proximity to the other participating jurisdictions and tornados' unpredictable nature means they're as vulnerable to tornados as every other participant.

2) Likelihood of Future Events

Based on the frequency of previous tornados in Leon County and the participating jurisdictions, a future event that may impact any or all of them is likely, meaning one is probable in the next three years.

3) Extent

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 takes into account how most structures are designed, and is thought to be an accurate representation of the surface wind speeds in the most violent tornados.

Table 32: Enhanced Fujita Scale¹¹

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; 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.

Previous tornados ranged in strength from F0 to F2 on the Fujita Scale. Since the switch to the updated scale, only one EF0 tornado has been recorded. In terms of property damages inflicted, the worst reported tornado in Leon County and the participating jurisdictions was rated an F2, which would correspond to a tornado rated from EF2 to EF3 on the Enhanced Fujita scale. That tornado caused the \$2017 equivalent of \$5,894,009¹² in property damages after adjusting for inflation. In terms of crop damages inflicted, the worst tornado didn't have an F-rating, but it caused the \$2017 equivalent of \$4,041,307¹³ in crop damages. Previous tornados have injured up to four people, but there are no recorded tornado fatalities in Leon County or any of the participating jurisdictions.

Future tornados may meet previous worst-case F2 tornados (EF2 to EF3 in the Enhanced Fujita scale) in terms of total damage dollars inflicted and the number residents injured or killed.

¹¹ Texas State Hazard Mitigation Plan, 2013 Update.

¹² Estimated property damages in 1984 were \$2,500,000.

¹³ Estimated crop damages in 1961 were \$493,295.

4) Location and Impact

A) Location

Tornados are not constrained by any distinct geographic boundary. Tornados can occur across all participating jurisdictions, and may freely cross from one jurisdiction into another.

B) Impact

Impacts from a tornado may include 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

Tornadoes 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, Leon 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

Central Appraisal District was used to estimate potential damage values for each participating jurisdiction. Given the broad nature of vulnerability, damage values were calculated on the jurisdictional level.

Table 33: Critical Facilities Vulnerable to Tornadoes and Potential Impacts

Leon County	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
Dillard Ranch Airport	x	x	x	x	x	x	x	x	x
Moore Ranch Airport	x	x	x	x	x	x	x	x	x
Morris Lazy K Ranch Airport	x	x	x	x	x	x	x	x	x
Hilltop Lakes Airport	x	x	x	x	x	x	x	x	x
Miles Field Airport	x	x	x	x	x	x	x	x	x
Hub Field Airport	x	x	x	x	x	x	x	x	x
Wood Crest Ranch Airport	x	x	x	x	x	x	x	x	x
Carter Ranch Airport	x	x	x	x	x	x	x	x	x
Communications Tower for KTCJ	x	x	x	x	x	x	x	x	x
Communications Tower for KBHT	x	x	x	x	x	x	x	x	x
Communications Tower for KMVL-FM	x	x	x	x	x	x	x	x	x
Reliant Energy Limestone Electric Generating Plant	x	x	x	x	x	x	x	x	x
Buffalo Fire Department	x	x	x	x	x	x	x	x	x
Normangee Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Oakwood Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Centerville Volunteer Fire Department	x	x	x	x	x	x	x	x	x

Hilltop Lakes Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Marquez Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Leona Fire Department	x	x	x	x	x	x	x	x	x
Jewett Police Station	x	x	x	x	x	x	x	x	x
Buffalo Police Station	x	x	x	x	x	x	x	x	x
Leon County Sheriff's Office	x	x	x	x	x	x	x	x	x
Buffalo Elementary School	x	x	x	x	x	x	x	x	x
Buffalo High School	x	x	x	x	x	x	x	x	x
Buffalo Middle School	x	x	x	x	x	x	x	x	x
Centerville Elementary School	x	x	x	x	x	x	x	x	x
Centerville Jr. and Sr. High School	x	x	x	x	x	x	x	x	x
Leon Elementary School	x	x	x	x	x	x	x	x	x
Leon High School	x	x	x	x	x	x	x	x	x
Leon Junior High School	x	x	x	x	x	x	x	x	x
Normangee Elementary School	x	x	x	x	x	x	x	x	x
Normangee Middle School	x	x	x	x	x	x	x	x	x
Normangee High School	x	x	x	x	x	x	x	x	x
Oakwood Elementary School	x	x	x	x	x	x	x	x	x
City of Buffalo WWTP	x	x	x	x	x	x	x	x	x

City of Centerville WWTP	x	x	x	x	x	x	x	x	x
City of Jewett WWTP	x	x	x	x	x	x	x	x	x
City of Leona WWTP	x	x	x	x	x	x	x	x	x
City of Normangee WWTP	x	x	x	x	x	x	x	x	x
City of Oakwood WWTP	x	x	x	x	x	x	x	x	x
Leona General Store	x	x	x	x	x	x	x	x	x
Guy's Lumber and Hardware in Centerville	x	x	x	x	x	x	x	x	x
Centerville Building Supplies	x	x	x	x	x	x	x	x	x
Lacey's Grocery in Centerville	x	x	x	x	x	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x	x	x	x	x	x
Buffalo Ace Hardware	x	x	x	x	x	x	x	x	x
Buffalo City Hall	x	x	x	x	x	x	x	x	x
Centerville City Hall	x	x	x	x	x	x	x	x	x
Jewett City Hall	x	x	x	x	x	x	x	x	x
Leona City Hall	x	x	x	x	x	x	x	x	x
Marquez City Hall	x	x	x	x	x	x	x	x	x
Normangee City Hall	x	x	x	x	x	x	x	x	x
Oakwood City Hall	x	x	x	x	x	x	x	x	x
Leon County Courthouse and Annex	x	x	x	x	x	x	x	x	x

C) Vulnerable Parcels

Table 34: Parcels Vulnerable to Tornados

Jurisdiction	Estimated Potential Damage Value
Leon County	\$1,656,299,949
City of Buffalo	\$88,731,470
City of Centerville	\$43,190,200
City of Jewett	\$29,209,150
City of Leona	unavailable
City of Marquez	\$12,890,020
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

8. 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 35: 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.

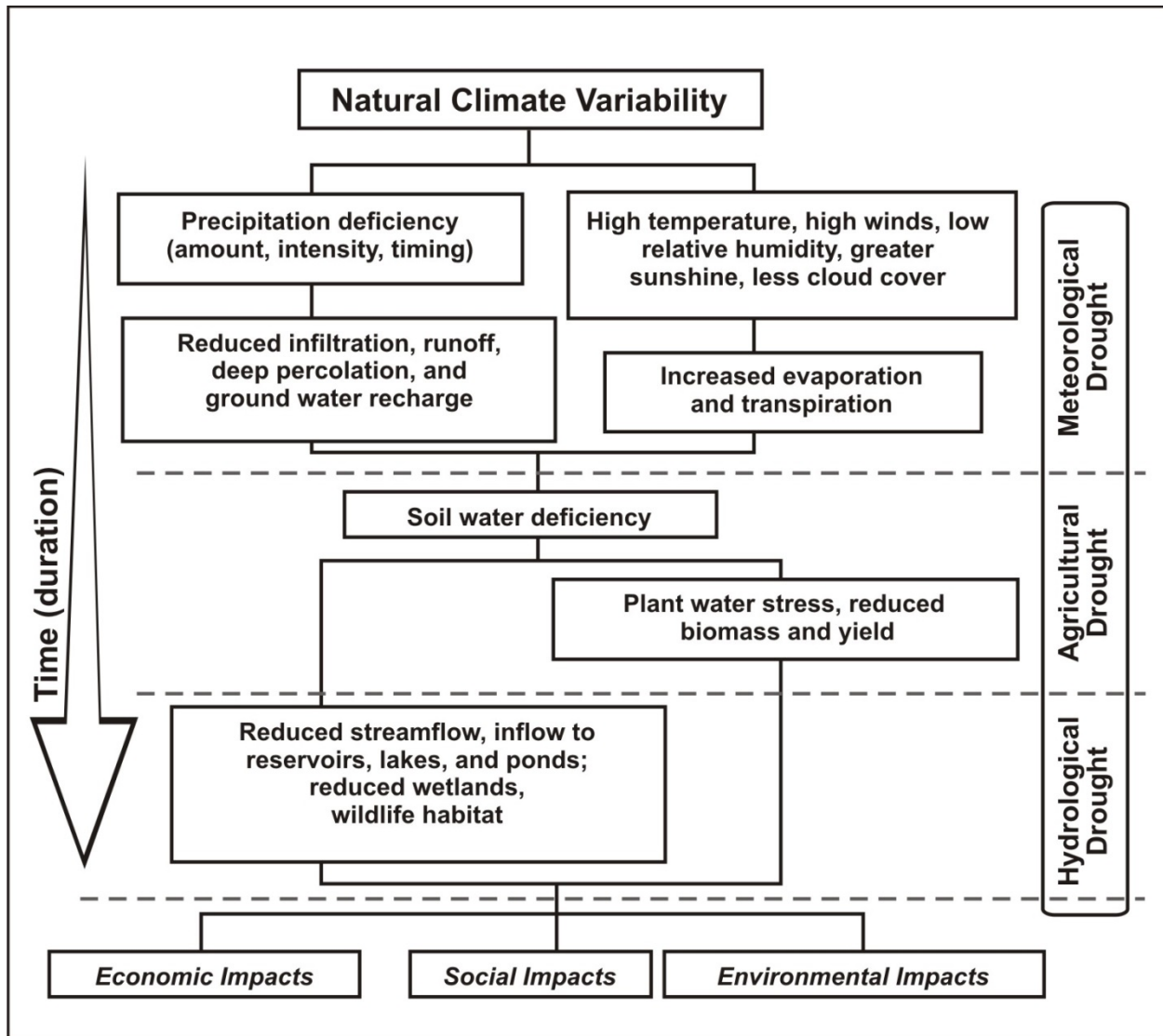


Figure 57: Sequence of Drought Occurrence and Impacts for Commonly Accepted Drought Types¹⁴

¹⁴ Source: National Drought Mitigation Center, University of Nebraska-Lincoln, <http://drought.unl.edu/DroughtBasics/TypesofDrought.aspx>

1) Drought History

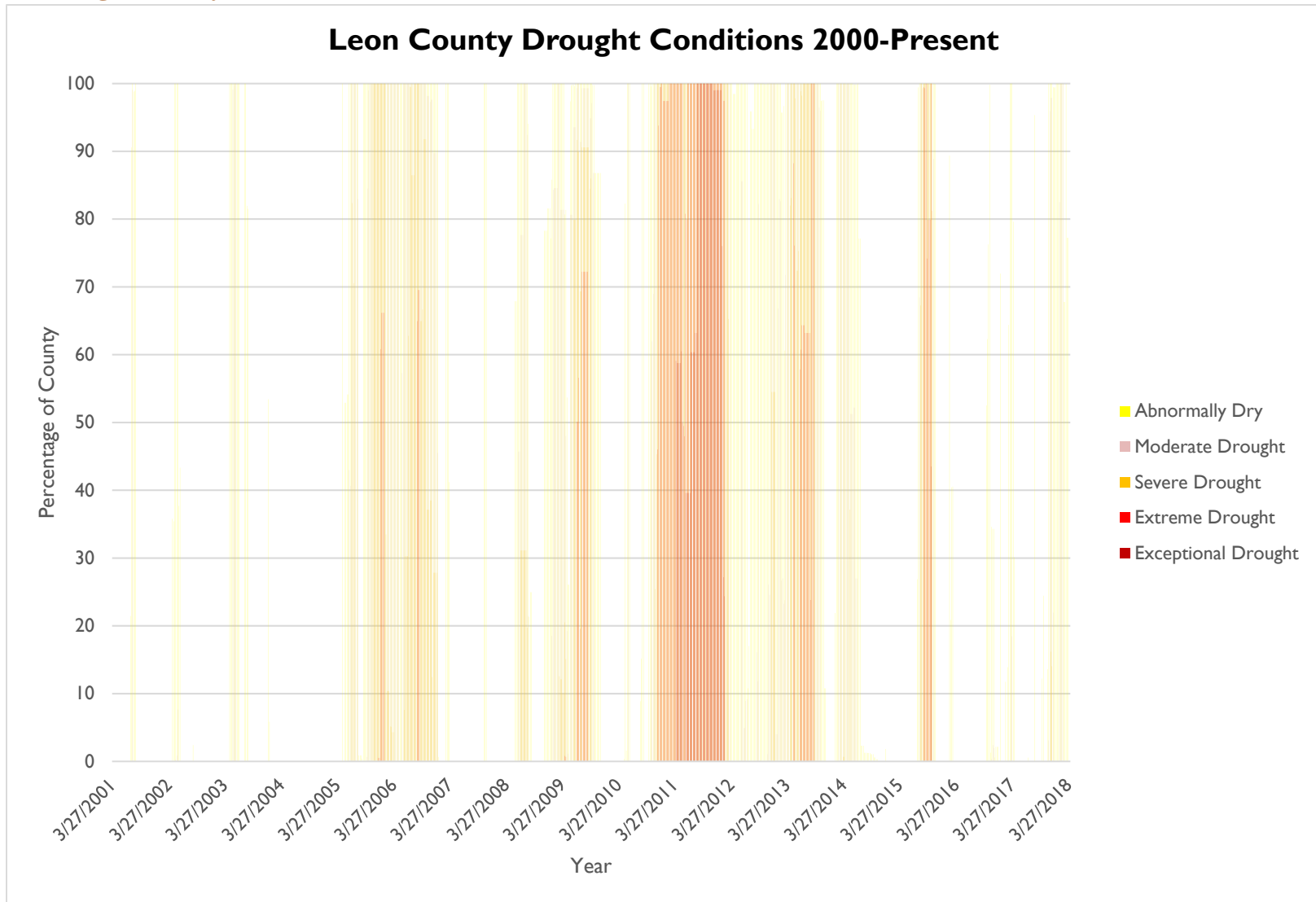


Figure 58: Leon County Drought History

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 58 to infer when the participating jurisdictions previously experienced drought conditions due to the fact that the conditions impacted 100% of the county. According to the data, Leon County and the participating jurisdictions have regularly experienced drought conditions since 2000, especially between 2005 – 2007, 2008 – 2010, and 2011 – 2016.

According to the NOAA data, drought conditions on August 1, 2006 caused \$121,505,456 in crop damages adjusted to \$2017. NOAA also identifies \$2017 adjusted crop damages of over \$67 million respectively between January and February of 2006.

There are no recorded injuries or deaths due to drought in Leon County or the participating jurisdictions.

2) Likelihood of Future Events

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

3) Extent

Since 2000, Leon County has regularly experienced county-wide droughts classified as periods ranging from abnormal dryness to exceptional drought. At multiple times, the entire County, including all participating jurisdictions, has been in exceptional drought, the most severe drought category.

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 36: 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
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Table 37: Palmer Drought Category Descriptions¹⁵

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, Leon County and all participating jurisdictions should anticipate experiencing droughts ranging from abnormally dry to exceptional drought or D0 to D4 based on the Palmer Drought Category. Given varying conditions, droughts may start on the low end of the Palmer Drought Category, but will intensify with duration and an ongoing lack of precipitation.

Leon County recorded its worst drought in recent history between August 2011 and January 2012, when between 99% and 100% of the County experienced an exceptional drought.

According to the NOAA data, since 1996, the worst drought in Leon County and the participating jurisdictions inflicted up to \$121,505,456 in crop damages adjusted to \$2017.

¹⁵ www.droughtmonitor.unl.edu

Future drought events may meet previous worst-case D4 droughts in terms of intensity, duration, and total damage dollars inflicted.

4) Location and Impact

A) Location

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

B) Impact

Infrastructural impacts may include damage to the foundations of agricultural, residential, commercial, and industrial buildings. Road networks that pass through the County and participating jurisdictions may be damaged to the point of failure as the ground shifts and shrinks. The participating jurisdictions' water and wastewater systems may fail due to cracks and breaks in underground tanks and pipe networks.

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

The City of Buffalo adopted its current Drought Contingency Plan in May 2014. The plan describes three stages of water restrictions ranging from voluntary conservation to pro rata water consumption. At each stage, the plan outlines a process to reduce total water usage from as little as 0% during a Stage 1 response to as much as 20% during a Stage 3 response, or to a greater percentage set by the City based on water availability. The percent of daily consumption of the City's production capacity is the trigger for all stages of drought contingency.

The City of Centerville adopted its current Drought Contingency Plan in August 2000. The plan describes five stages of water restrictions ranging from voluntary conservation to restricting all non-essential water uses described in the plan. The plan does not include the percentages of water consumption to be reduced at each stage. The percent of daily consumption of the City's production capacity is the trigger for all stages of drought contingency.

The City of Jewett adopted its current Drought Contingency Plan in February 2011. The plan describes five stages of water restrictions ranging from voluntary conservation to restricting all non-essential water uses described in the plan. At each stage, the plan outlines a process to reduce total water usage from 15% during a Stage 1 response to as much as 50% during a Stage 5 response. The triggers for all stages of drought contingency are when total water demand equals or exceeds amounts indicated in the plan for three consecutive days except Stage 5, which is triggered by a major water line break or contamination of the water supply.

The City of Marquez adopted its current Drought Contingency Plan in August 2012. The plan describes five stages of water restrictions ranging from voluntary conservation to restricting all non-essential water uses described in the plan. At each stage, the plan outlines a process to reduce total water usage from as little as 10% during a Stage 1 response to as much as 50% during a Stage 5 response, or to a greater percentage set by the City based on water availability. The percent of daily consumption of the City's production capacity is the trigger for all stages of drought contingency besides Stage 5, which is triggered by a major water line break or contamination of the water supply.

Drought Contingency Plans were not available for Leona, Normangee, or Oakwood.

5) Vulnerability

Because drought has the potential to impact the every jurisdiction equally, all improved property and the entire population is exposed to this hazard. Foundations of all buildings are vulnerable; however, older structures or those built under less stringent foundation code requirements are most vulnerable. Critical infrastructure like water and wastewater lines, roads, and railroads are also vulnerable. 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 above, Leon 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 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.

Residents of sub-standard structures are also of particular concern. Structures in sub-standard condition ahead of a drought may be more likely to suffer additional damages, including irreparable damage to building foundations as soils shift and shrink. Depending on their financial means, these residents may require additional assistance recovering from drought-caused damages.

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. Depending on factors like time of

year, temperature, and duration, increased electrical demand may cause brownouts that would impact critical facilities like area schools. Structural damage to all critical facilities, based on the rarity of previous instances of structural damage, is expected to be limited. However, in the worst cases such damage is possible, and may include cracked building foundations, damages to water and wastewater lines that serve the facilities, and in certain cases, these physical damages may create economic damages for the broader community.

Table 38: Critical Facilities Vulnerable to Drought and Potential Impacts

Leon County and Participating Jurisdictions	Potential Drought Impacts			
	Structural Damage	Water / Wastewater Line Damages	Increased Demand for Services	Economic Damages
Dillard Ranch Airport	x		x	x
Moore Ranch Airport	x		x	x
Morris Lazy K Ranch Airport	x		x	x
Hilltop Lakes Airport	x		x	x
Miles Field Airport	x		x	x
Hub Field Airport	x		x	x
Wood Crest Ranch Airport	x		x	x
Carter Ranch Airport	x		x	x
Communications Tower for KTCJ	x		x	
Communications Tower for KBHT	x		x	
Communications Tower for KMVL-FM	x		x	
Reliant Energy Limestone Electric Generating Plant	x		x	x
Buffalo Fire Department	x	x	x	x
Normangee Volunteer Fire Department	x	x	x	x
Oakwood Volunteer Fire Department	x	x	x	x
Centerville Volunteer Fire Department	x	x	x	x

Hilltop Lakes Volunteer Fire Department	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x
Marquez Volunteer Fire Department	x	x	x	x
Leona Fire Department	x	x	x	x
Jewett Police Station	x	x	x	x
Buffalo Police Station	x	x	x	x
Leon County Sheriff's Office	x	x	x	x
Buffalo Elementary School	x	x	x	x
Buffalo High School	x	x	x	x
Buffalo Middle School	x	x	x	x
Centerville Elementary School	x	x	x	x
Centerville Jr. and Sr. High School	x	x	x	x
Leon Elementary School	x	x	x	x
Leon High School	x	x	x	x
Leon Junior High School	x	x	x	x
Normangee Elementary School	x	x	x	x
Normangee Middle School	x	x	x	x
Normangee High School	x	x	x	x
Oakwood Elementary School	x	x	x	x
City of Buffalo WWTP	x	x	x	x

City of Centerville WWTP	x	x	x	x
City of Jewett WWTP	x	x	x	x
City of Leona WWTP	x	x	x	x
City of Normangee WWTP	x	x	x	x
City of Oakwood WWTP	x	x	x	x
Leona General Store	x	x	x	x
Guy's Lumber and Hardware in Centerville	x	x	x	x
Centerville Building Supplies	x	x	x	x
Lacey's Grocery in Centerville	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x
Buffalo Ace Hardware	x	x	x	x
Buffalo City Hall	x	x	x	x
Centerville City Hall	x	x	x	x
Jewett City Hall	x	x	x	x
Leona City Hall	x	x	x	x
Marquez City Hall	x	x	x	x
Normangee City Hall	x	x	x	x
Oakwood City Hall	x	x	x	x
Leon County Courthouse and Annex	x	x	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 39: Parcels Vulnerable to Drought

Jurisdiction	Estimated Potential Damage Value
County	\$1,656,299,949
City of Buffalo	\$88,731,470
City of Centerville	\$43,190,200
City of Jewett	\$29,209,150
City of Leona	unavailable
City of Marquez	\$12,890,020
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

I. Water and Wastewater Systems

Water and wastewater systems rely on underground pipe networks to function properly. During extreme droughts, as the ground shifts and shrinks, these pipes become vulnerable to cracks and breaks. Within greater Leon County, the water and wastewater systems in the City of Buffalo, the City of Centerville, the City of Jewett, and the City of Oakwood serve the largest numbers of residents.

Damage to water and wastewater systems, especially during a drought, may be severe enough to exceed a jurisdiction's ability to immediately fund repairs without outside assistance. Delays to returning these systems to normal functionality will require these jurisdictions to provide emergency alternatives.

II. Road and Railroad Networks

Drought conditions may damage road and railroad networks in various ways. Depending on usage and temperature, as soil shifts and shrinks, roadbeds and railroad beds may subside. In the case of railroads, subsidence may lead to failure. A combination of shifting ground, high temperatures, and heavy usage may cause asphalt roads to become rutted.

The Union Pacific railroad in Leon County primarily runs east to west, parallel to US 79. The east-west line passes through Marquez, Jewett, Buffalo, and Oakwood. The Burlington Northern Santa Fe railroad runs north to south through the county and crosses from Normangee to Jewett. Damages to any rail line, especially those in the Marquez, Normangee, Jewett, Buffalo, and Oakwood, could be catastrophic if they were to cause a derailment.

Although surface streets may be most vulnerable to drought's effects due to variations in street construction requirements throughout the county and participating jurisdictions, damages to I-45, US 79, and SH 7 would create the greatest impact in Leon County and the participating jurisdictions because these highways also function as disaster evacuation routes.

Interstate 45 passes north to south through the center of Leon County including the City of Centerville. United States Highway 79 passes east to west through northern Leon County, through the cities of Marquez, Jewett, Buffalo, and Oakwood. State Highway 7 passes east to west through Centerville and Marquez.

III. Agricultural Production

According to the USDA 2012 Census of Agriculture¹⁶, the total market value of agricultural products sold, including direct sales, in Leon County was \$148,739,000. Between 1995 and 2016¹⁷, \$3,809,948 in indemnities was paid to farmers in Leon County. That is roughly \$346,359 per year. Although the proportion of indemnities paid to cover losses due to drought

¹⁶https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Texas/st48_2_002_002.pdf

¹⁷ <https://farm.ewg.org/cropinsurance.php?fips=48047&summpage=SUMMARY>

isn't identifiable, given Leon 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.

9. Riverine Erosion

Riverine erosion is the removal of a volume of sediment from a stream reach. However, in riverine areas, a stream reach can be stable and still migrate back and forth. Channel instability occurs when natural or man-induced processes lead to excessive erosion or deposition. Therefore, when a stream migrates laterally but maintains its dimensions, pattern, and profile, stability is achieved even though the river is “active” and moves across the floodplain. A reach experiencing such lateral migration is considered to be “eroding,” and thus has a riverine erosion hazard area. Such stream migration due to erosion can threaten buildings and infrastructure.

Property damaged by flood inundation can sometimes be considered a total loss, but property damaged by riverine erosion is not only destroyed, the land itself may be completely washed away leaving no chance to rebuild, let alone recover any property contents.

1) Erosion History

According to the local planning team, Leon County experiences riverine erosion rates of between 0’ – 10’ per year. During flash flooding, erosion rates may be even higher. The other jurisdictions participating in this plan do not have rivers or streams within their boundaries unlike Leon County. For this reason, the other jurisdictions (besides Leon County) have been unaffected by riverine erosion and it does not pose a threat to them.

No documented history exists for riverine erosion in Leon County. However, the planning team has determined that at least one riverine erosion event occurs annually in Leon County. This plan considers the lack of data detailing the history of riverine erosion in the county a data deficiency and the county plans to address this deficiency within the next five years by carefully documenting occurrences of riverine erosion as they occur.

2) Likelihood of Future Events

Given the ongoing nature of riverine erosion, a future event in Leon County and the participating jurisdictions is highly likely, meaning ongoing riverine erosion is probable in the next year.

3) Extent

Unlike the flood inundation zones identified in FEMA FIRM maps, riverine erosion hazards are not necessarily proportional to the peak flood discharge. Catastrophic losses may result from larger flood events; smaller, more frequent events; or from the cumulative effects of a series of smaller storms.

In fluvial geomorphic terms, a stream or river is described as a system, consisting of the stream itself, and the water that flows in it, and the sediment that is eroded from it, deposited in it, or transported through it; along with the watershed around the stream, from which water and

sediment are conveyed to the stream. If climatic conditions and land use on the watershed stay about the same, a stream tends to reach a more or less stable state, known as dynamic equilibrium, when large and abrupt changes in the characteristics of the stream do not occur under normal conditions. If the material (sediment) and energy (from flowing water) inputs to the stream change, however, then the system has to adjust to the changed conditions, until a new state of dynamic equilibrium is reached.

In the worst cases, riverbanks have seen collapses as large as 60' x 60' with a depth of 20', the equivalent of 72,000 cubic feet of land. Damages associated with riverine erosion have primarily affected public infrastructure, like roads, and have been estimated as high as \$100,000. Damages to structures have been minimal, but may become significant in the future. In addition to structural damages, erosion can decrease property values simply by reducing the amount of property a person owns.

Future riverine erosion events may reach losses of 72,000 cubic feet of land, inflict over \$100,000 in damages, and may even cause injuries or fatalities.

4) Location and Impact

A) Location

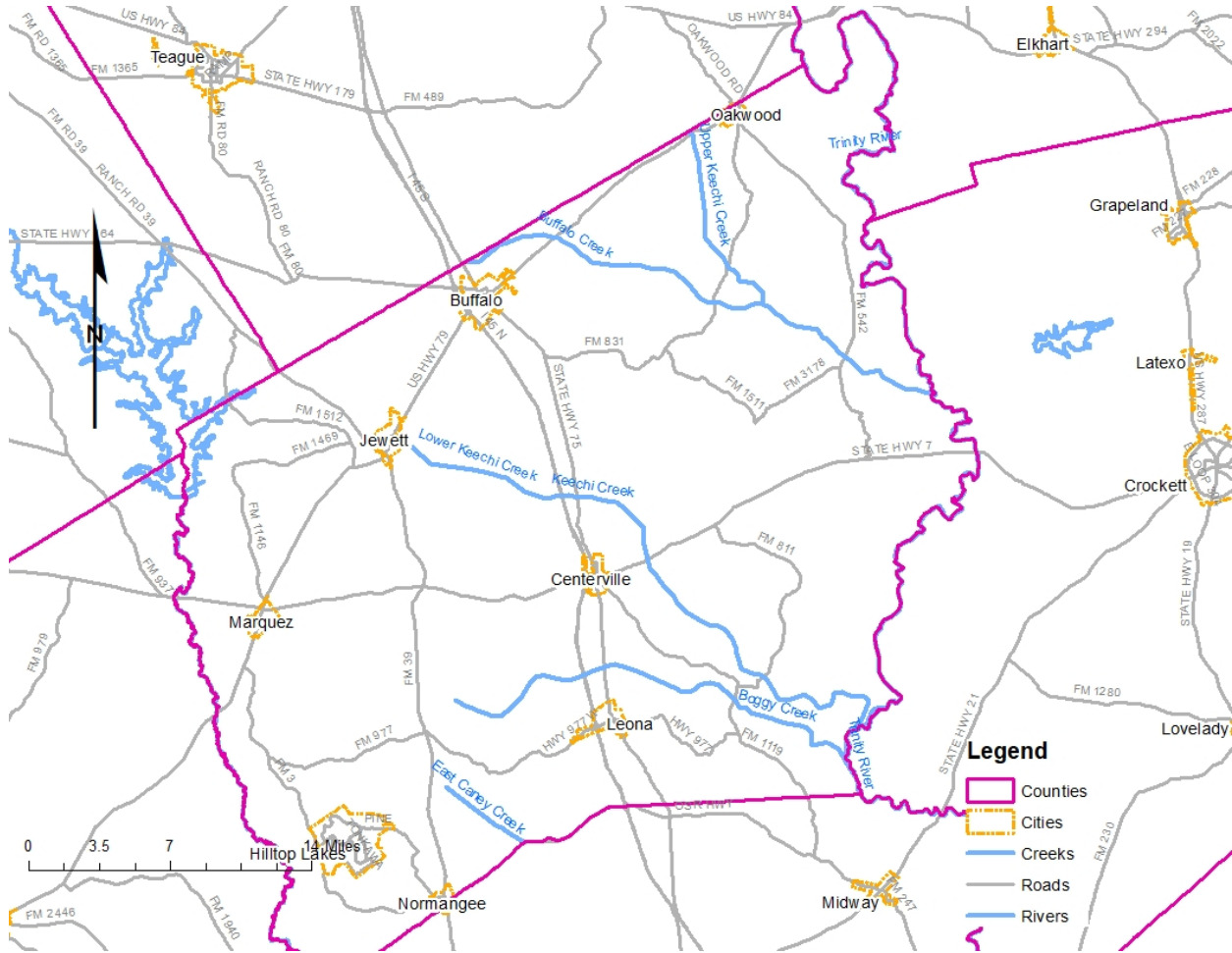


Figure 59: Leon County Major Streams

The location of riverine erosion is along the major streams that are mapped above. As can be seen in the above map, these major streams exist within Leon County, but the other participating jurisdictions do not have major streams within their boundaries.

B) Impact

The impacts of erosion may include but are not limited to decreasing property values, the partial or complete loss of structures, loss of land area and the ability to rebuild damaged or destroyed structures, economic losses to agricultural operations due to land and structure loss, damage to local infrastructure including, water and wastewater lines, roads and bridges.

5) Vulnerability

A) Critical Facilities

There are no critical facilities that are vulnerable to riverine erosion at this time. Other structures located near major streams in the County are vulnerable to riverine erosion however. In addition, valuable ranch and cropland adjacent to major streams in the County are also vulnerable to riverine erosion.

B) Vulnerable Structures

To determine vulnerability, the plan inventoried structures within 50 feet of the center of each jurisdiction's rivers and streams, including seasonal streams. Fifty feet was selected because the planning team determined it was the minimum useful distance to identify potential vulnerability to riverine erosion.

There is no setback requirement in Leon County or any of the participating jurisdictions, so at this time, the primary controls on development near river and stream banks are determined by their location within FEMA Special Flood Hazard Areas and applicable flood damage prevention rules.

Even if construction is limited to areas outside of the FEMA Special Flood Hazard Areas, without mitigation, riverine erosion is likely to continue to have a negative impact on the property and economic values of land that abuts local rivers and streams.

Table 40: Leon County and Participating Jurisdictions Parcels Vulnerable to Riverine Erosion

Jurisdiction	Estimated Potential Damage Value
County	\$243,476,092

10. Dam Failure

A dam is defined as any barrier, wall, or embankment, along with its abutments and appurtenant works, constructed for the purpose of storing water or other liquid material either temporarily or permanently. The term dam failure means that the dam is overtopped or fails to operate in the manner for which it was designed. A catastrophic failure would be a breach that would allow the dam's reservoir to suddenly drain. Dam failure can occur with little or no warning, or it can be an anticipated event.

The main causes of earthen dam failures are overtopping, internal erosion, and piping. These are most often caused in earthen dams by floods, animal burrows, and tree or woody shrub roots.

There are 76 dams in Leon County, and seven of these are owned by local governments. The other 69 are all privately owned.

1) Dam Failure History

Neither Leon County nor the City of Normangee have documented histories of damages caused by dam failure. However, the planning team has determined that the hazard has the ability to affect structures and infrastructure in these jurisdictions. The other jurisdictions have no history of damages caused by dam failure either. The planning team determined that these other jurisdictions, due to their being farther away from inundation areas that would occur due to dam failure, would not be affected by damages caused by dam failure.

The three dams of concern to Leon County are not actually in Leon County. They are known as the Houston County Lake Dam (in Houston County), the Sterling C. Robertson Dam (in Robertson County), and the Richland Chambers Dam (in Freestone County). The Houston County Lake Dam is owned by Houston County WCID I, has a maximum storage of 27,000 acre-feet, and is considered primarily a recreational dam. The dam was built originally in 1966 and was last inspected in 2013. The Sterling C. Robertson dam is owned by the Brazos River Authority and creates Lake Limestone with a maximum storage of 557,878 acre feet, and is considered primarily an irrigation dam. The dam was built in 1978 and last inspected in 2015. The Richland Chambers Dam is owned by the Tarrant Regional Water District and creates the Richland Chambers Reservoir with a maximum storage of 1,112,763 acre feet. The reservoir is primarily a municipal water supply for Fort Worth and Tarrant County and construction of the dam began in 1982 and it is inspected annually.

2) Probability

Given the lack of an officially recorded hazard history in the participating jurisdictions, it's imprudent to attempt to estimate the likelihood of future dam failure hazards events.

However, in light of the jurisdictions’ histories of heavy rainfalls, a condition that leads to dam overtopping and failure, it may be fair to say that a future dam failure event is unlikely, meaning 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

FEMA’s classification system for dam failures is a simple and straight-forward three tier system. It is based on whether there is any probability of a loss of human life, and whether there is a large economic, environmental, or lifeline loss. The low hazard potential classification is used for failures that will not result in any loss of human life, and the economic, environmental, and lifeline losses are low and generally limited to the dam owner. The significant hazard potential classification is used for failures that will not result in any loss of human life, but the economic, environmental, and lifeline losses would have a great impact on the community. The high hazard potential classification is used when the dam failure will cause the loss of at least one human life, regardless of what the economic, environmental, and lifeline losses are.

Table 41: Dam Failure Hazard Classification System

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

According to the Sterling C. Robertson Dam Emergency Action Plan (EAP), last updated by the Brazos River Authority in 2017, “a breach of the Dam has the potential to result in the loss of human life and property.” As such, the EAP classified the hazard potential classification of the dam as High.

According to the Houston County Lake Dam Emergency Action Plan (EAP) written by KSA Engineers in February 2018, currently in draft form and under review by TCEQ, “a significant number of structures...could be affected by a dam breach.” These structures include 20 residences, and so, the hazard potential classification of the dam is also High.

According to the Richland Chambers Dam Emergency Action Plan (EAP) written by the Tarrant Regional Water District, “a breach of the dam has the potential to result in the loss of human life and property” as well. As such, the EAP classified the hazard potential classification of this dam as High.

The plans provided maps of the Potential Maximum Flood (PMF) Inundation area. These areas are depicted in the maps below. These maps of Potential Maximum Flood Inundation areas depict the extent of the dam failure hazard for each of these three dams.

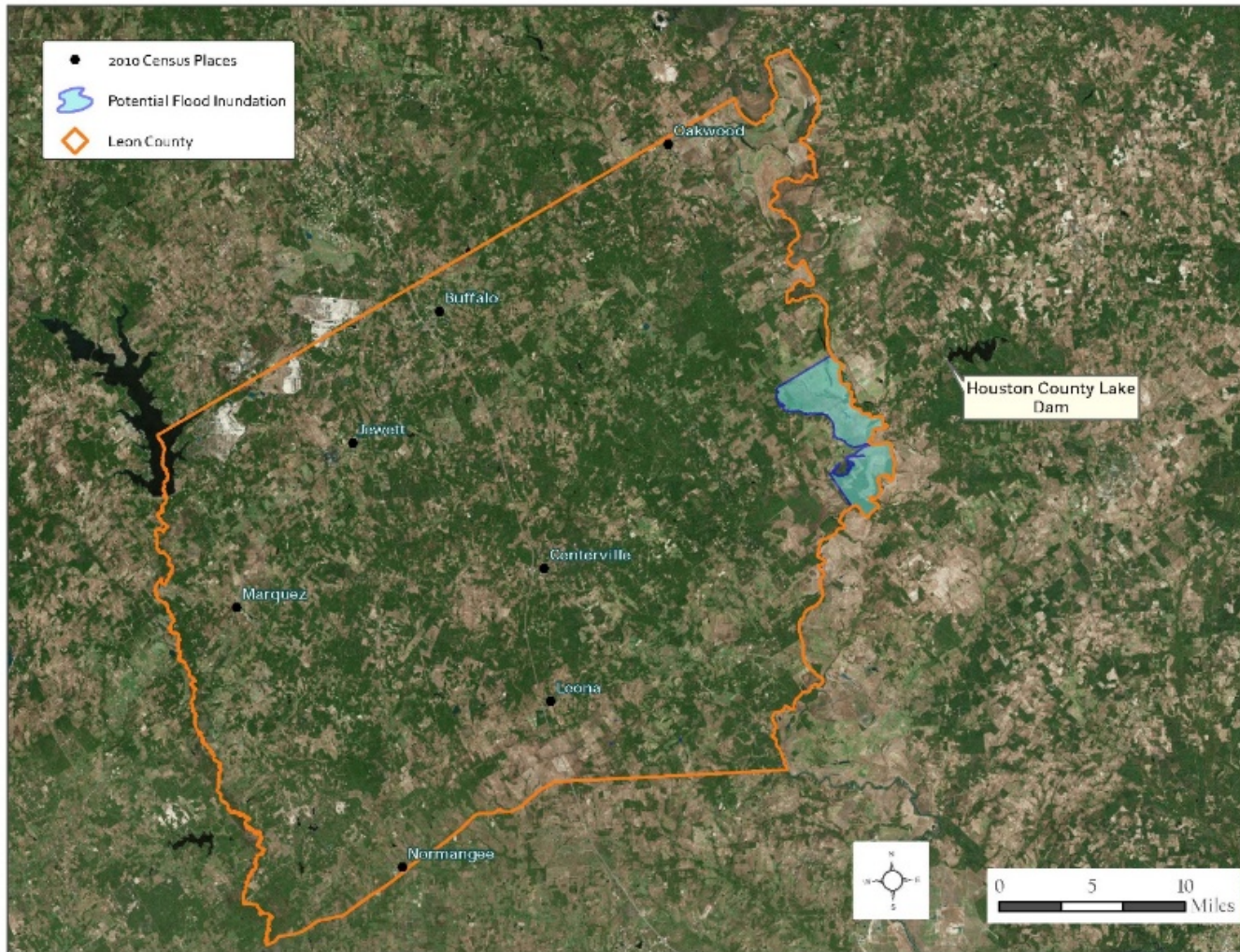


Figure 60: Potential Maximum Flood Inundation for Houston County Lake Dam - I

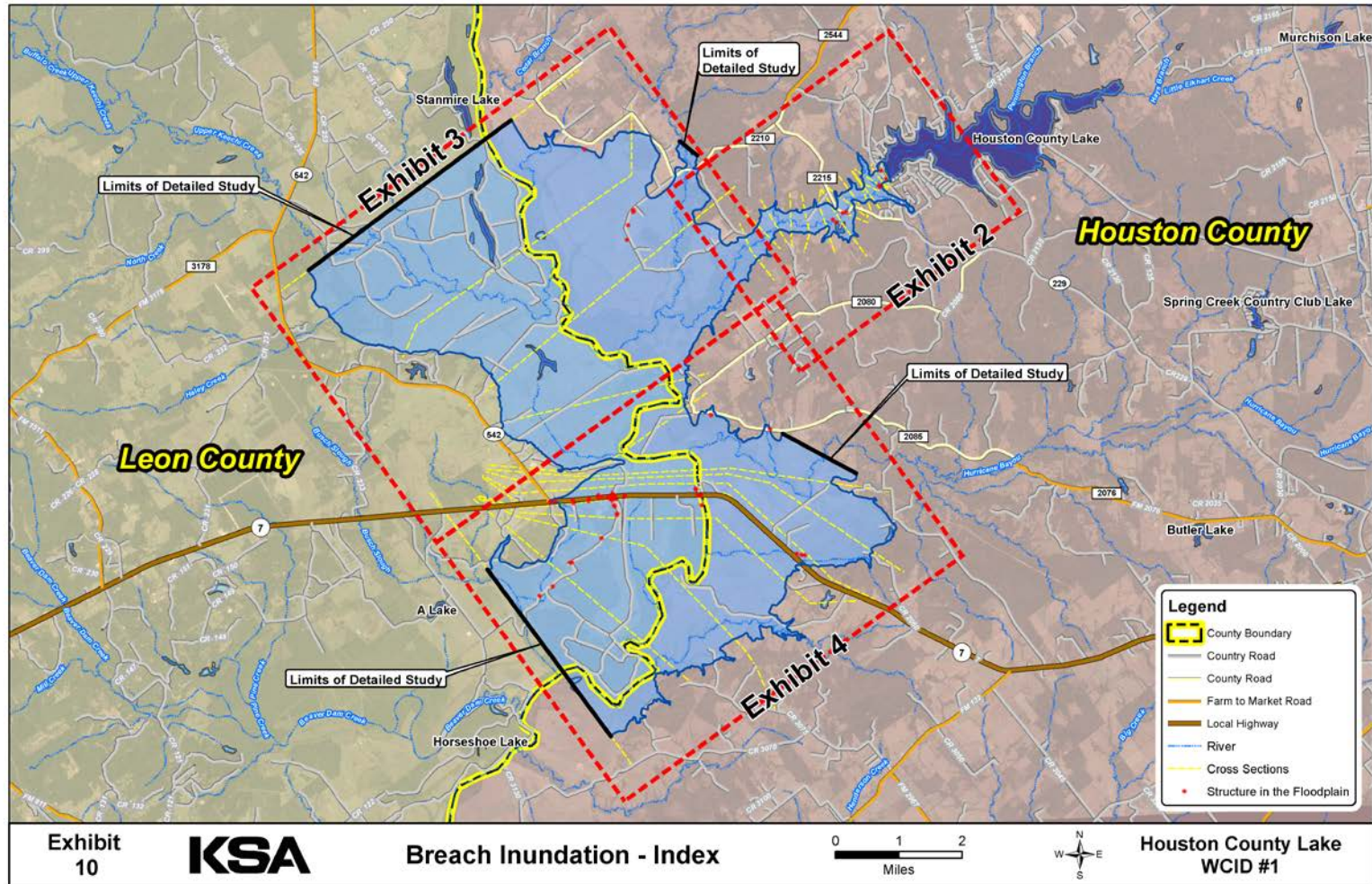


Figure 61: Potential Maximum Flood Inundation for Houston County Lake Dam - 2

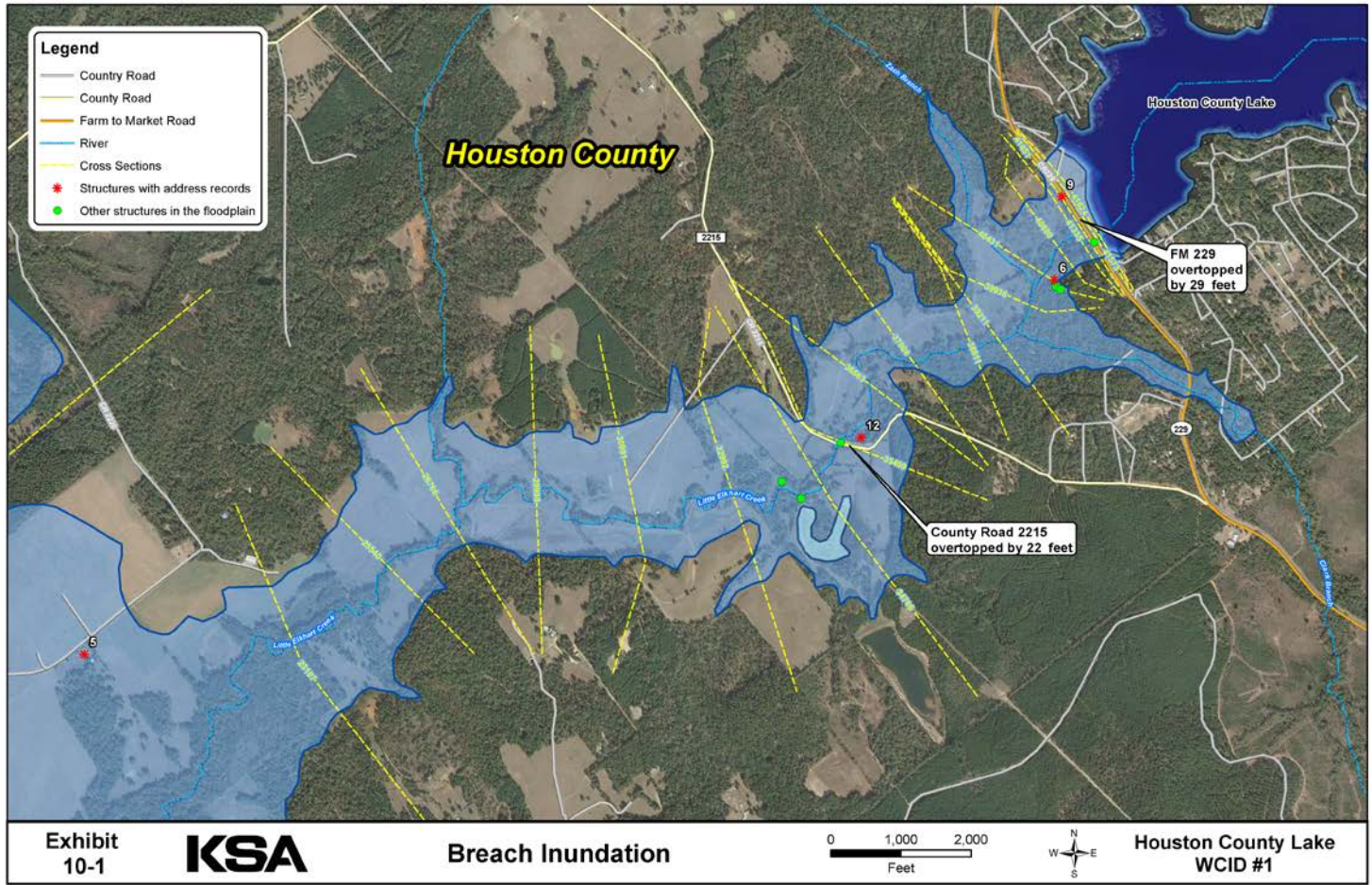


Figure 62: Potential Maximum Flood Inundation for Houston County Lake Dam - 3

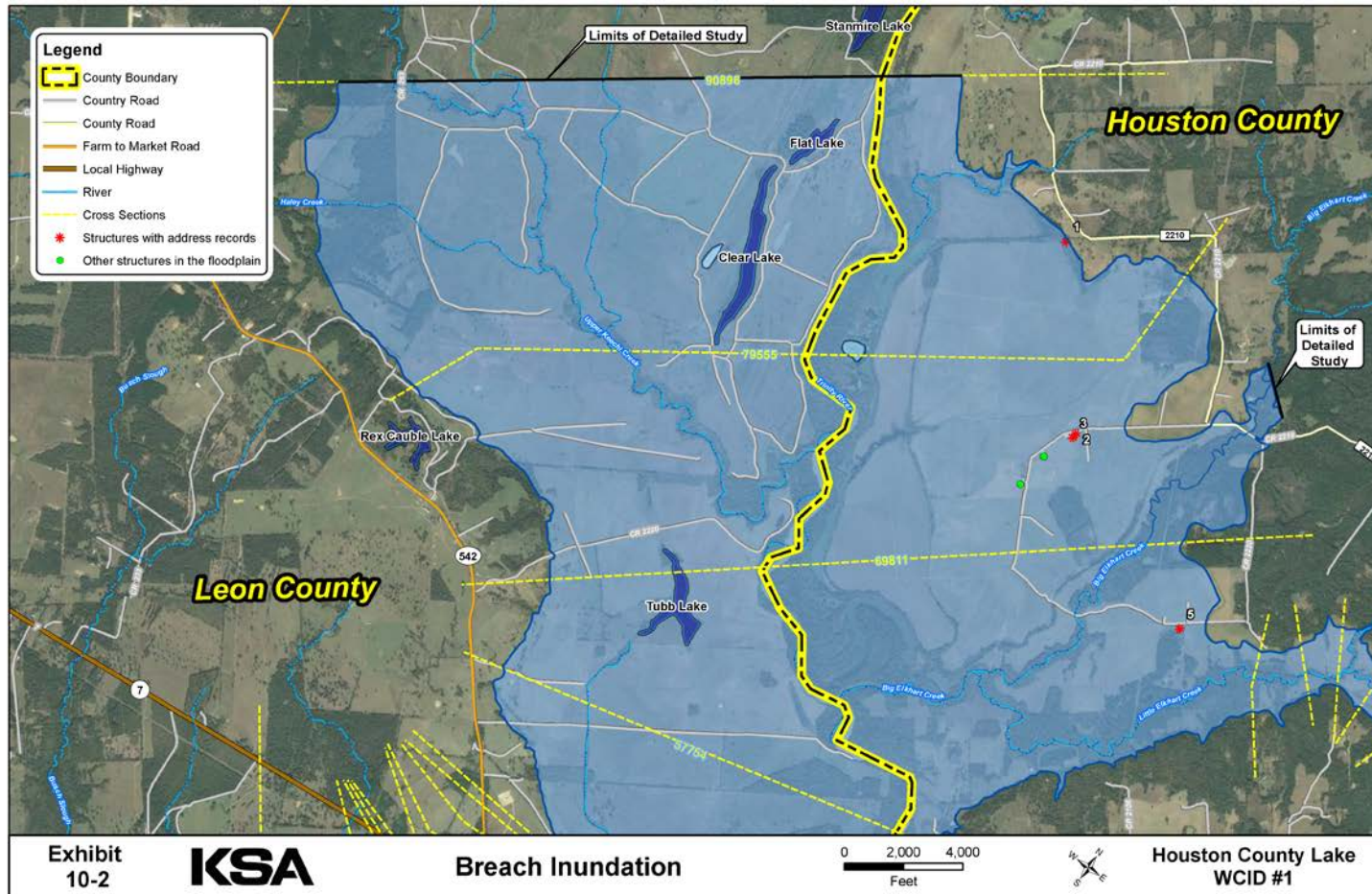


Figure 63: Potential Maximum Flood Inundation for Houston County Lake Dam - 4

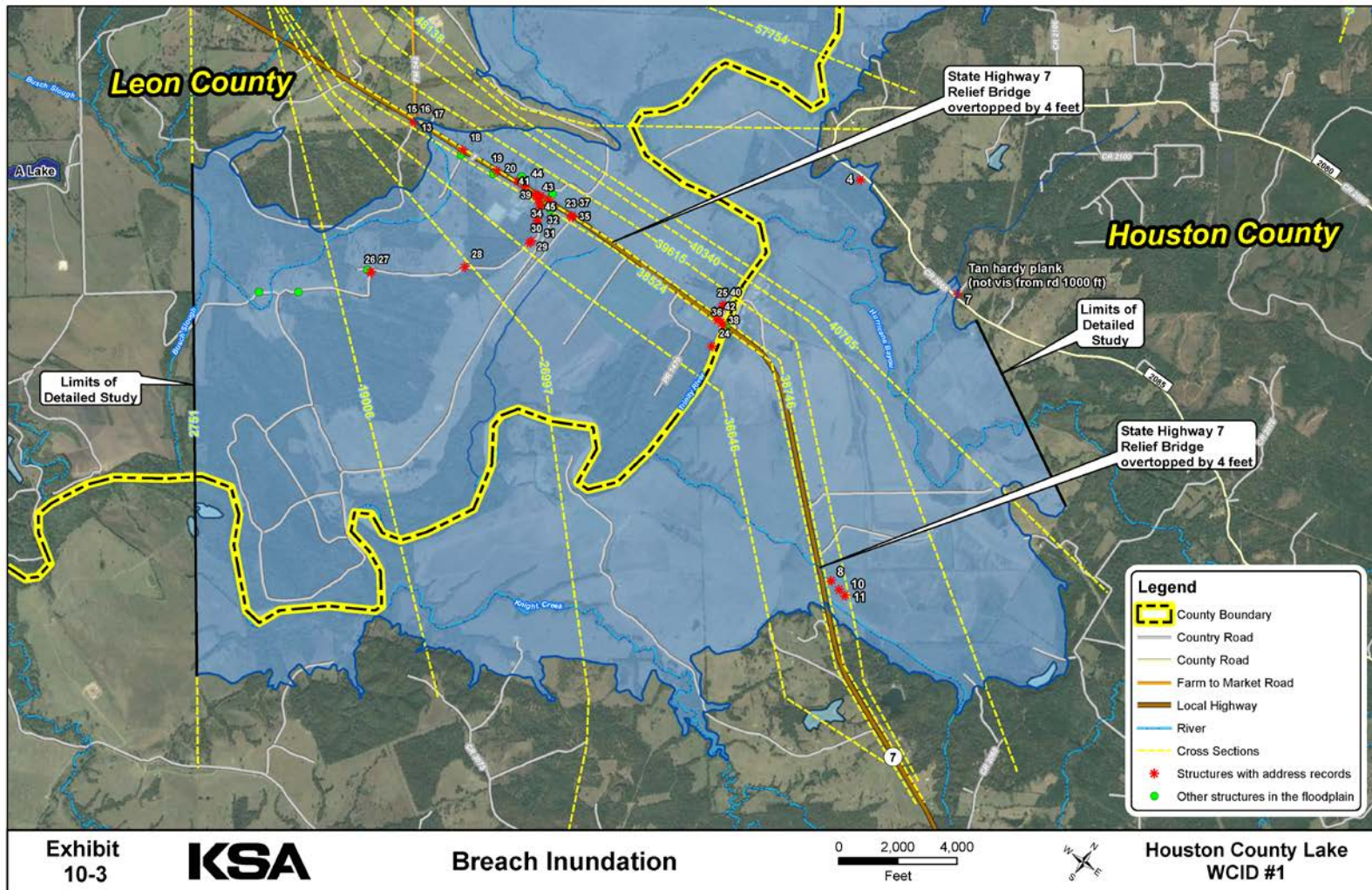


Figure 64: Potential Maximum Flood Inundation for Houston County Lake Dam - 5

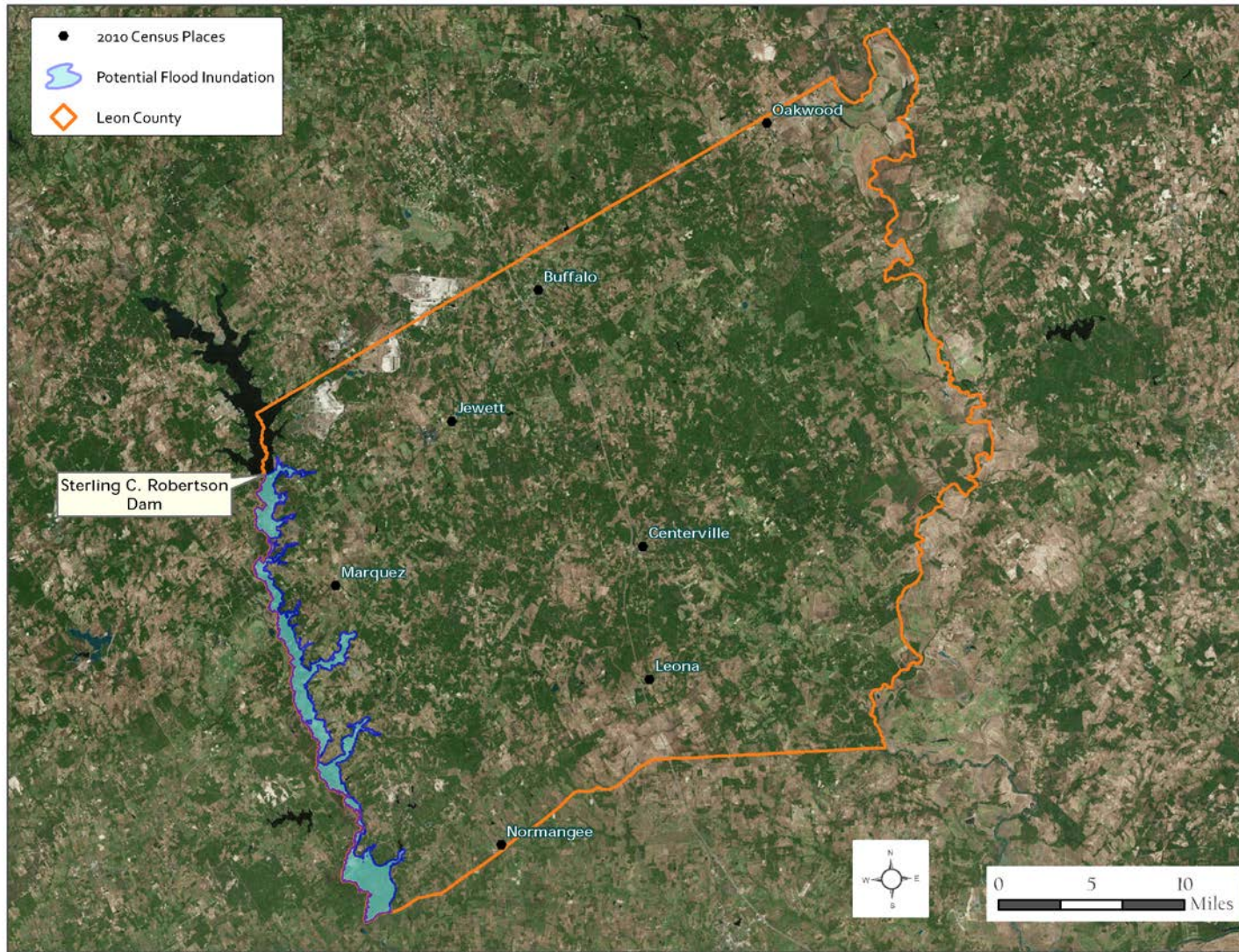


Figure 65: Potential Maximum Flood Inundation for Sterling C. Robertson Dam - I

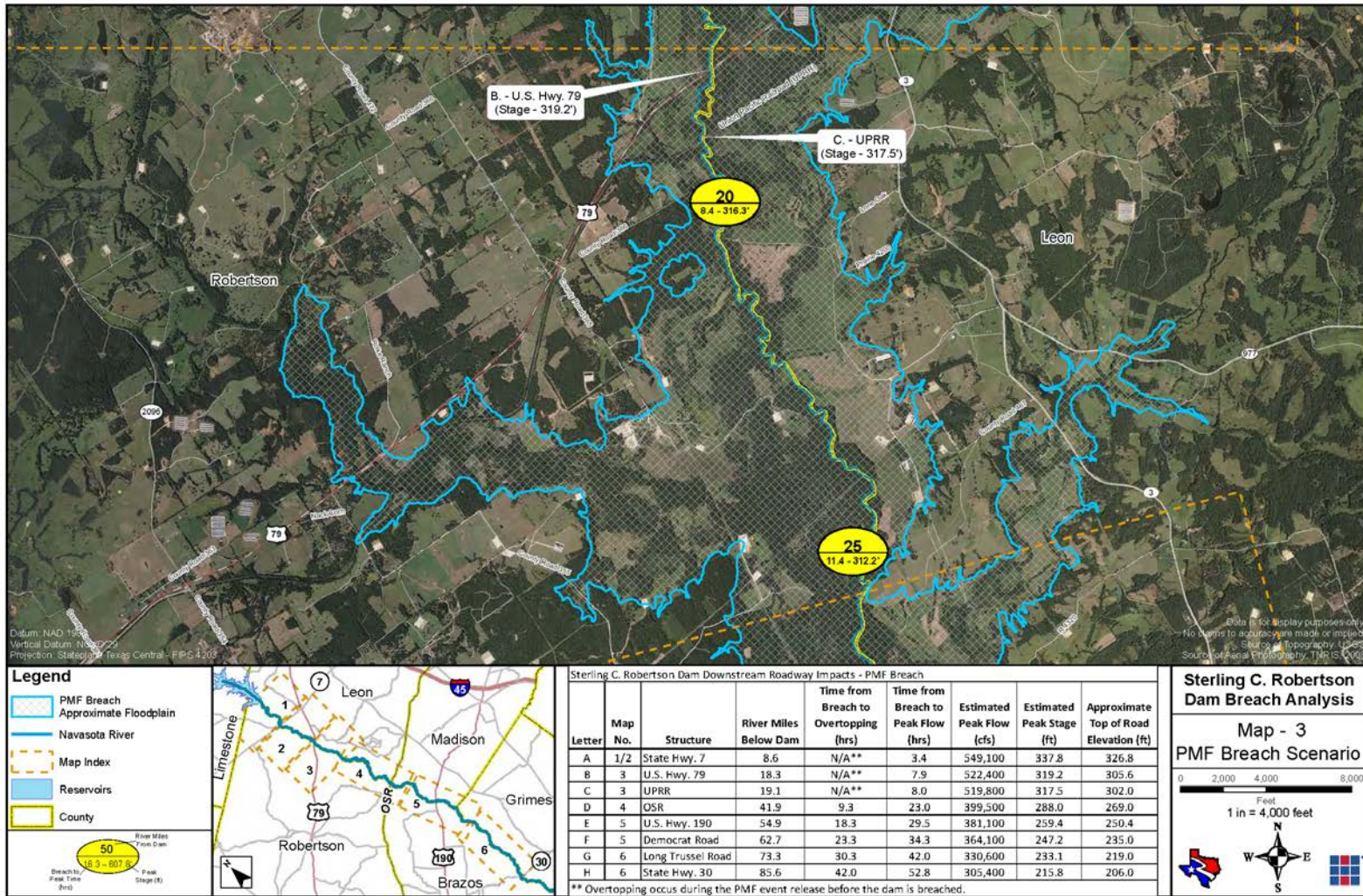


Figure 66: Potential Maximum Flood Inundation for Sterling C. Robertson Dam - 2

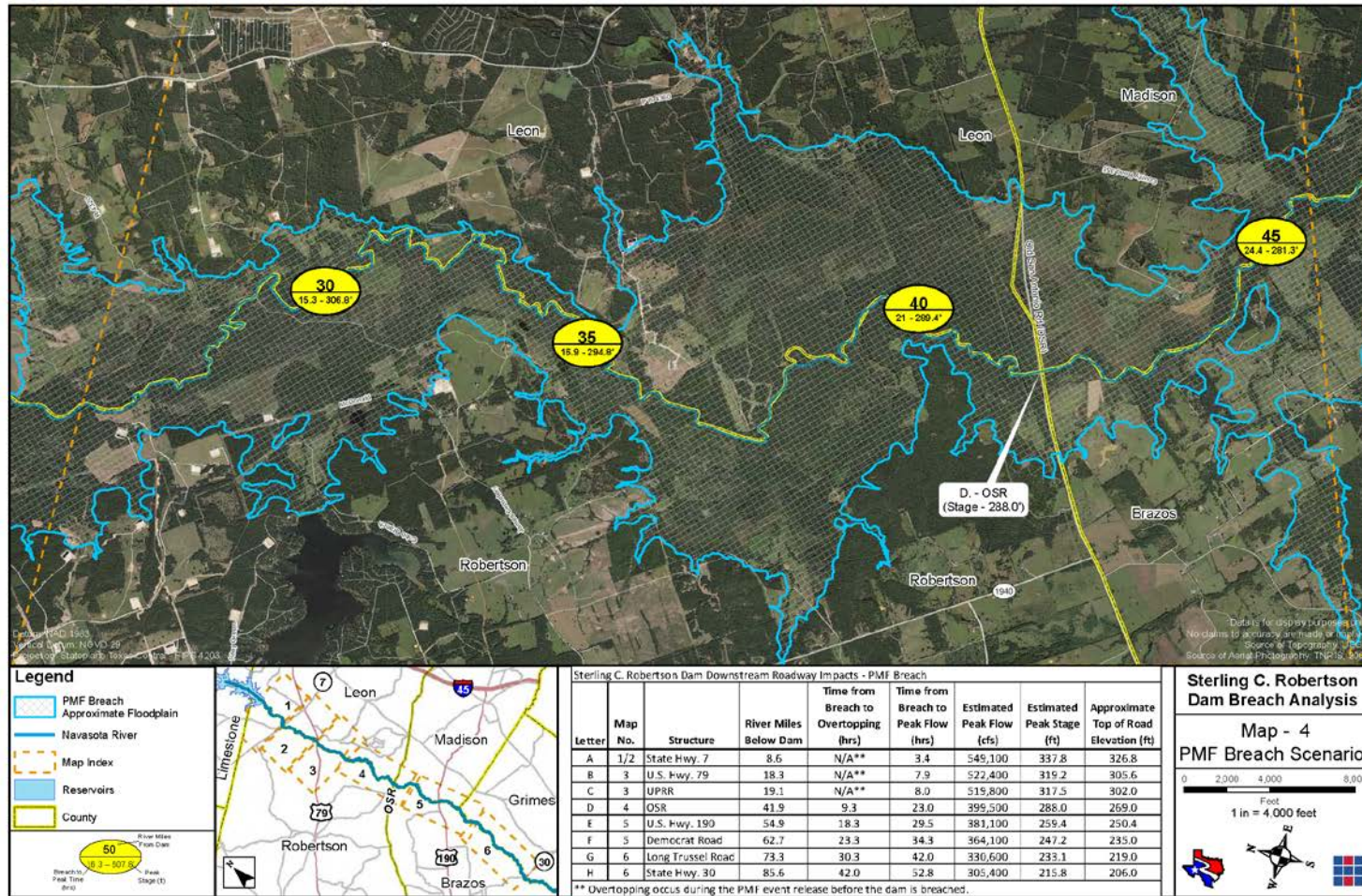


Figure 67: Potential Maximum Flood Inundation for Sterling C. Robertson Dam - 3

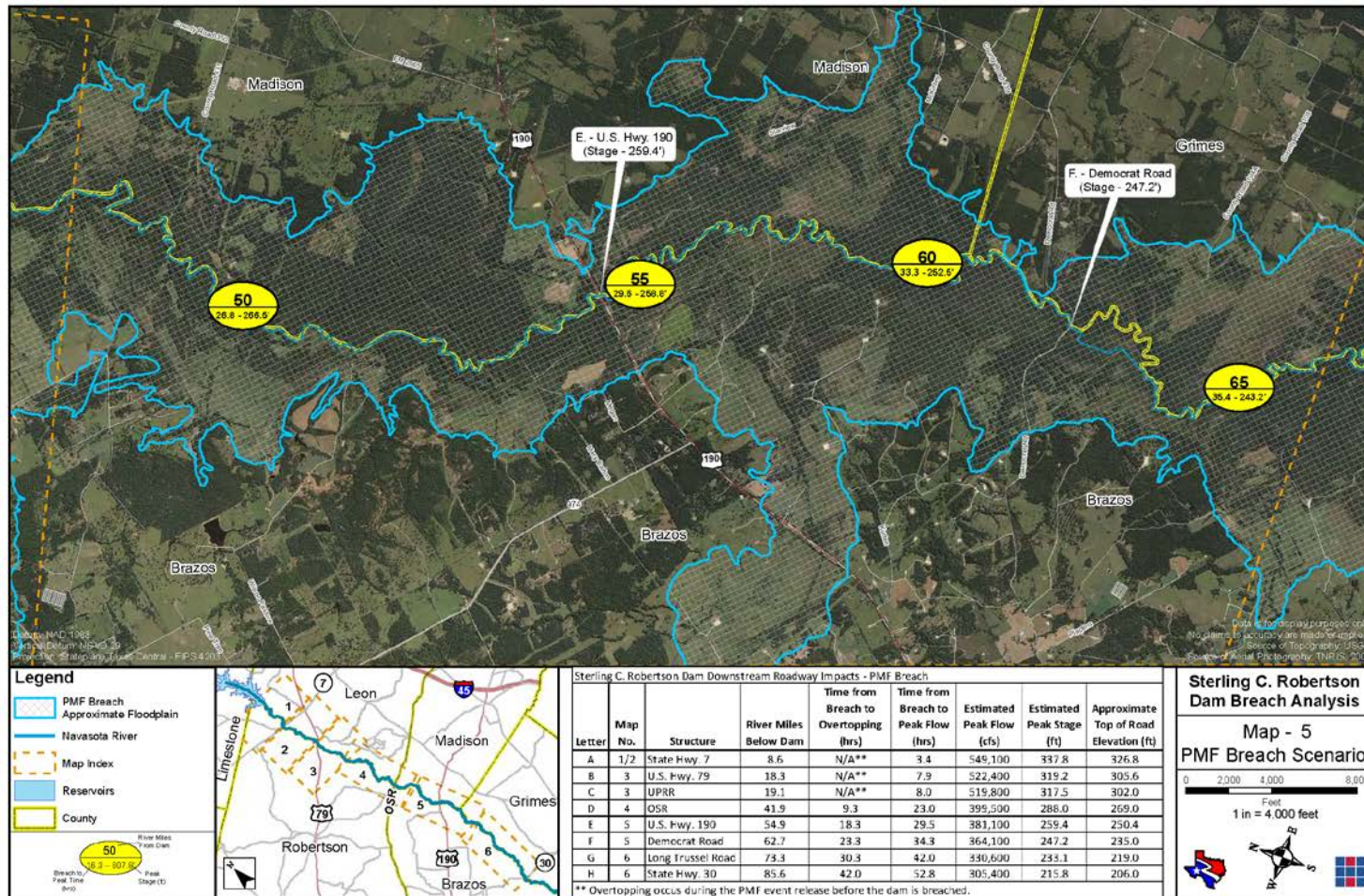


Figure 68: Potential Maximum Flood Inundation for Sterling C. Robertson Dam - 4

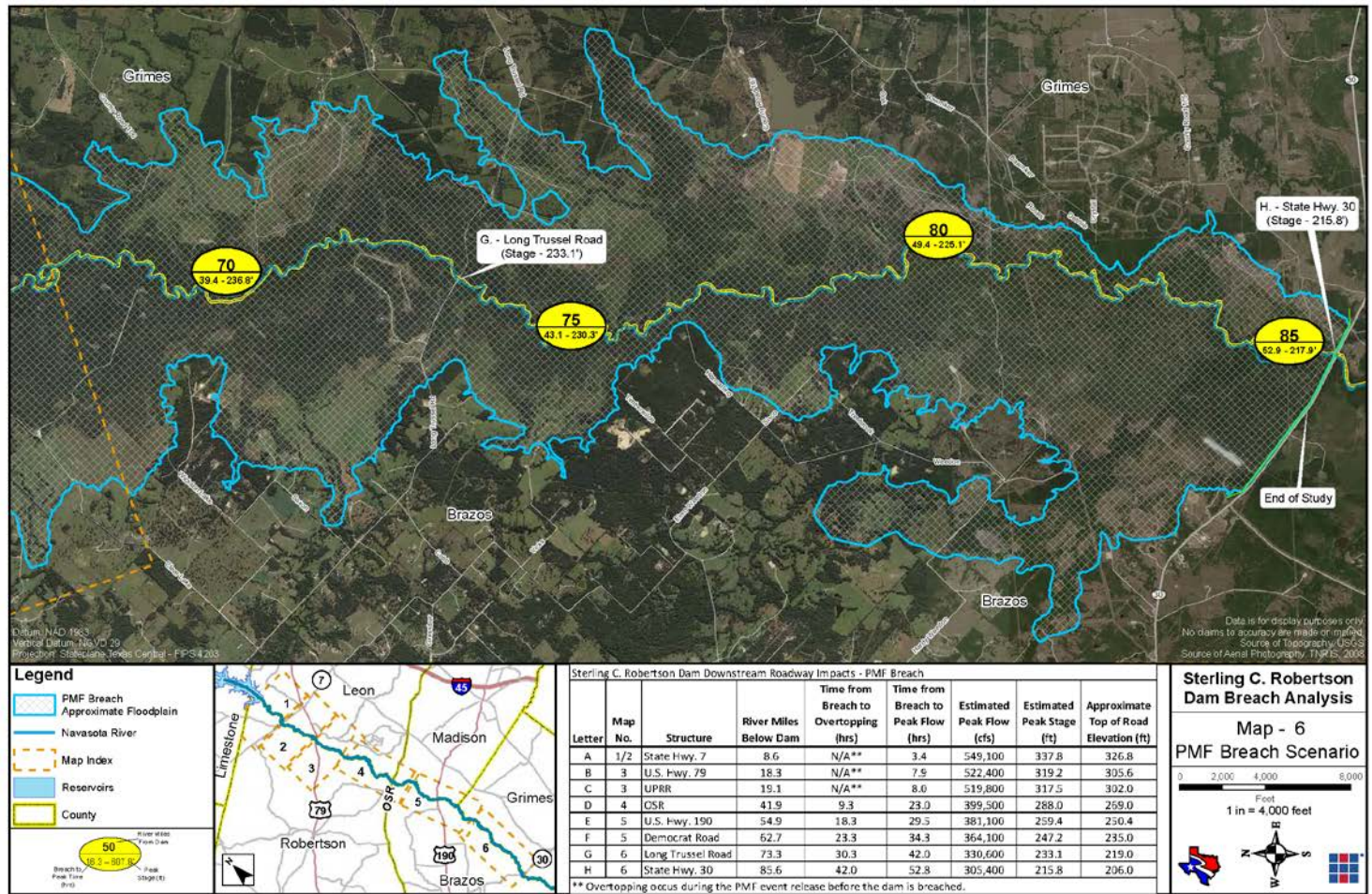


Figure 69: Potential Maximum Flood Inundation for Sterling C. Robertson Dam - 5

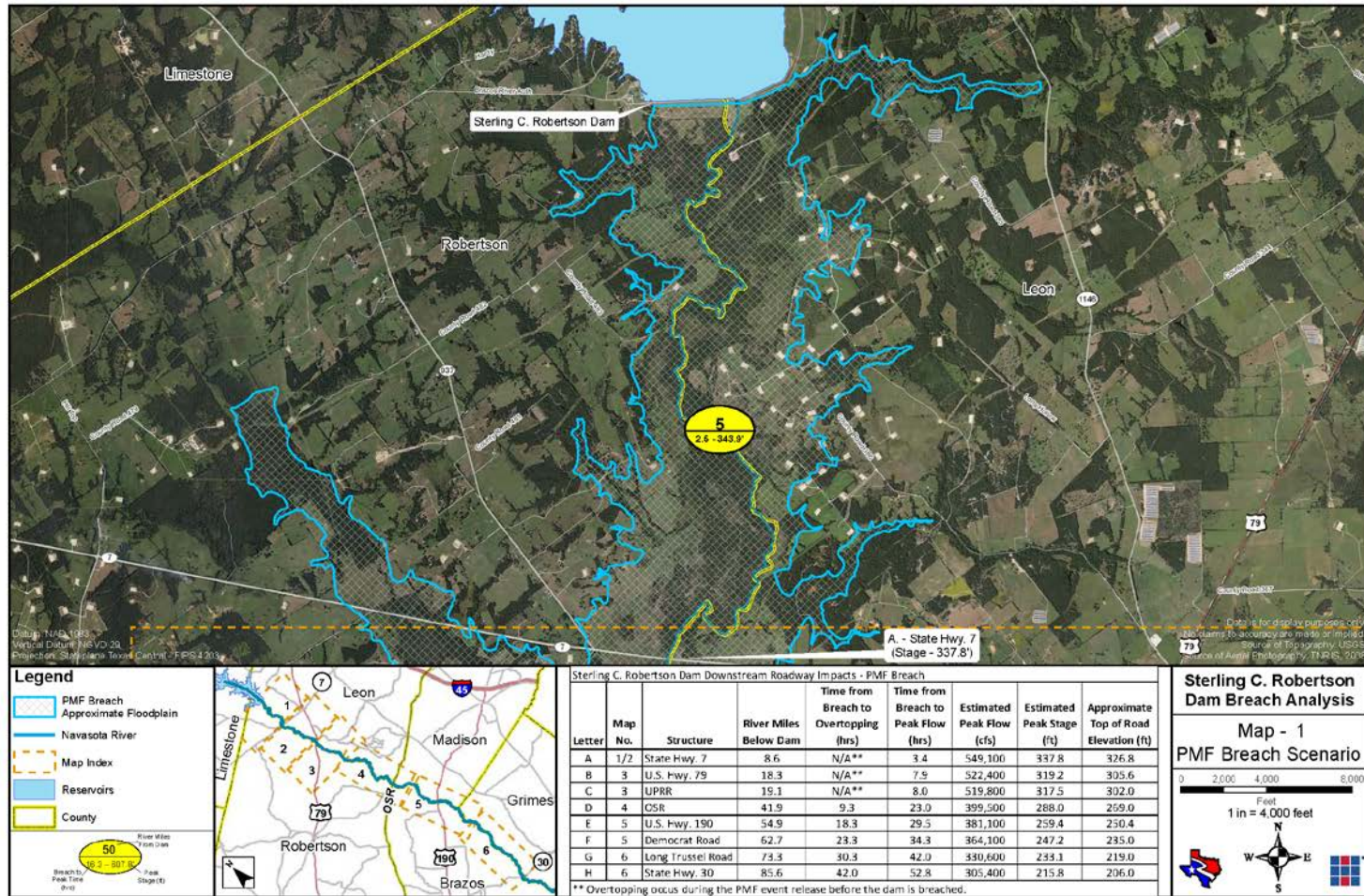


Figure 70: Potential Maximum Flood Inundation for Sterling C. Robertson Dam - 6

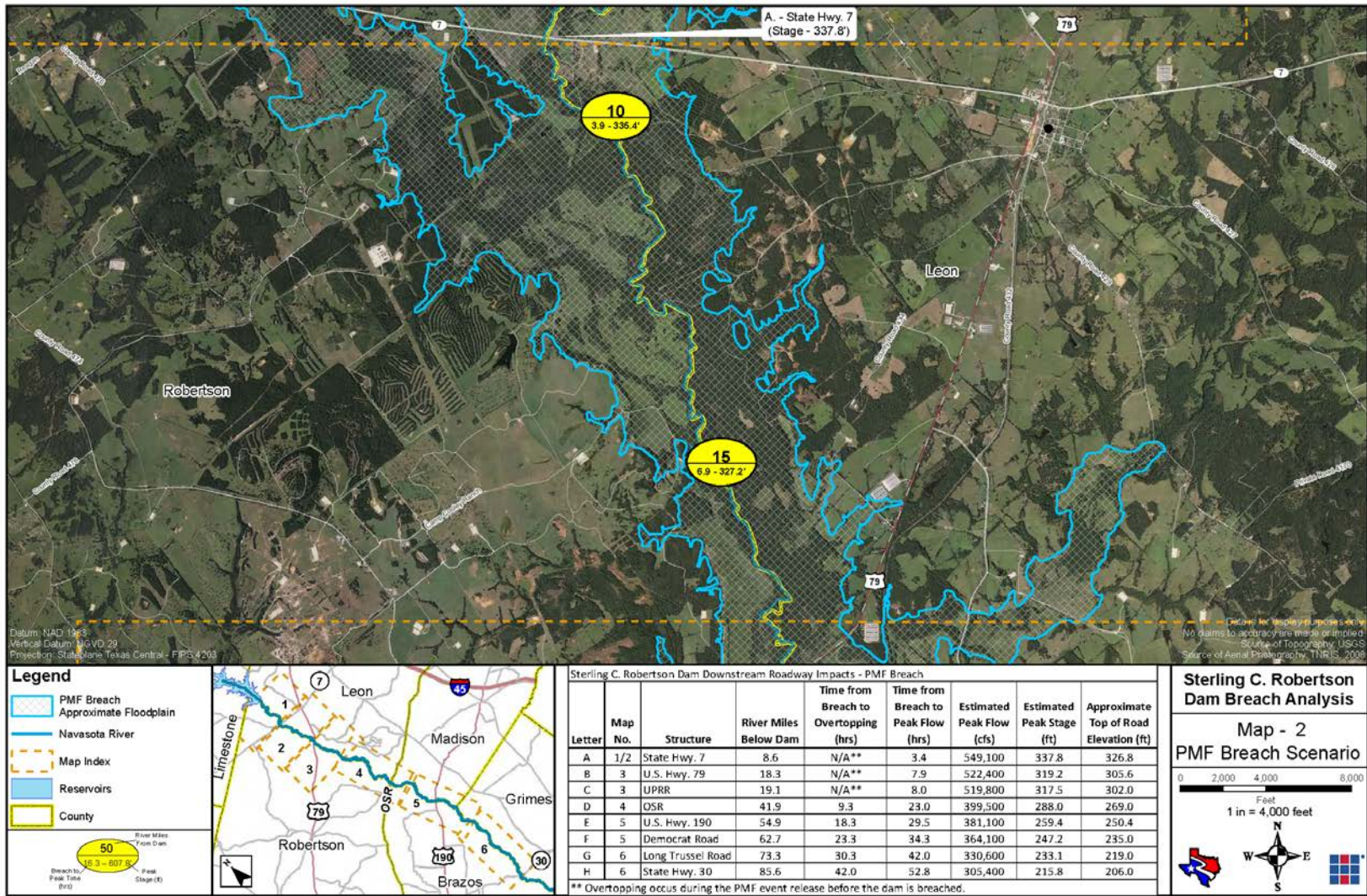


Figure 71: Potential Maximum Flood Inundation for Sterling C. Robertson Dam - 7

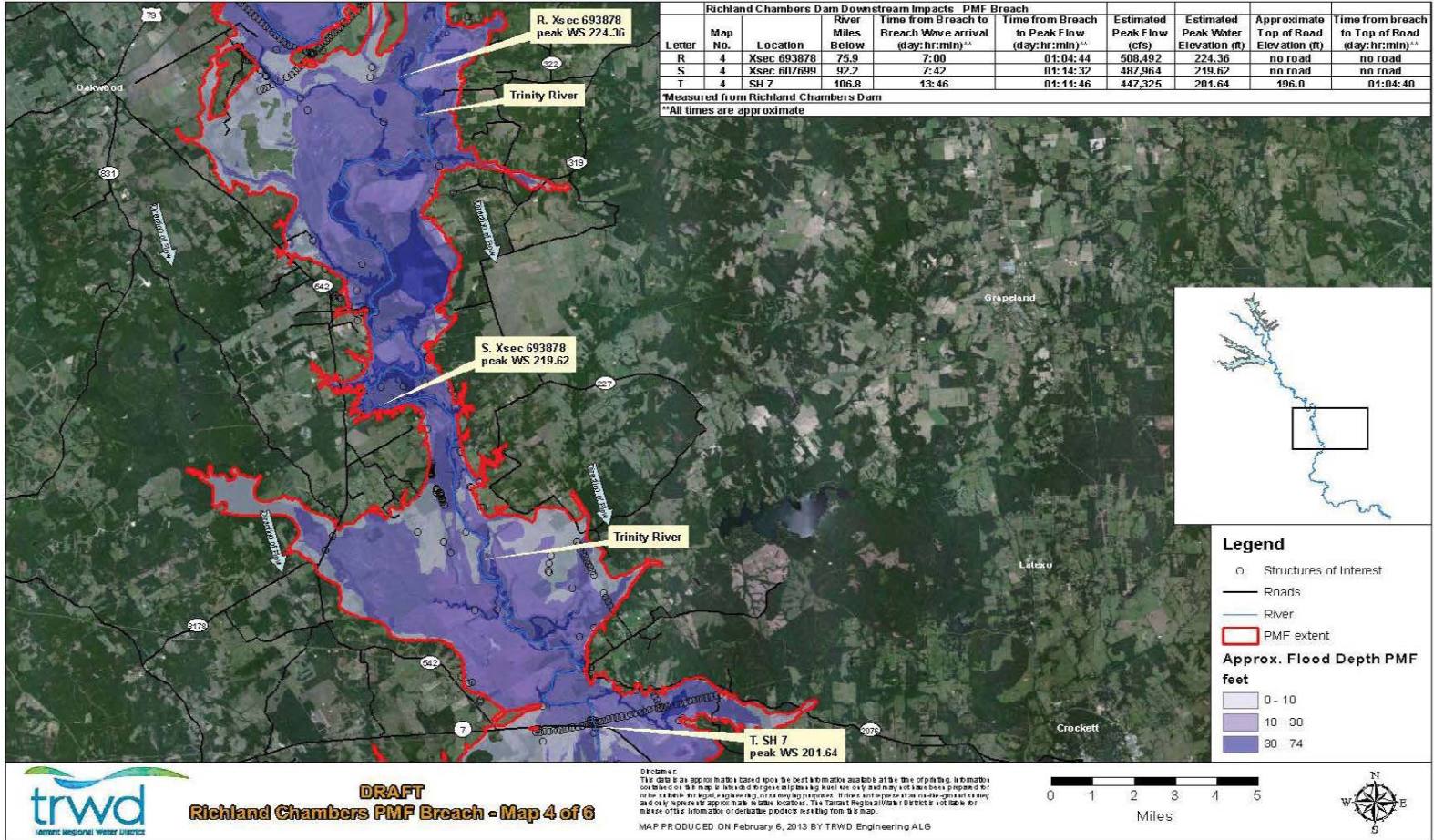


Figure 72: Potential Maximum Flood Inundation for Richland Chambers Dam in Leon County - I

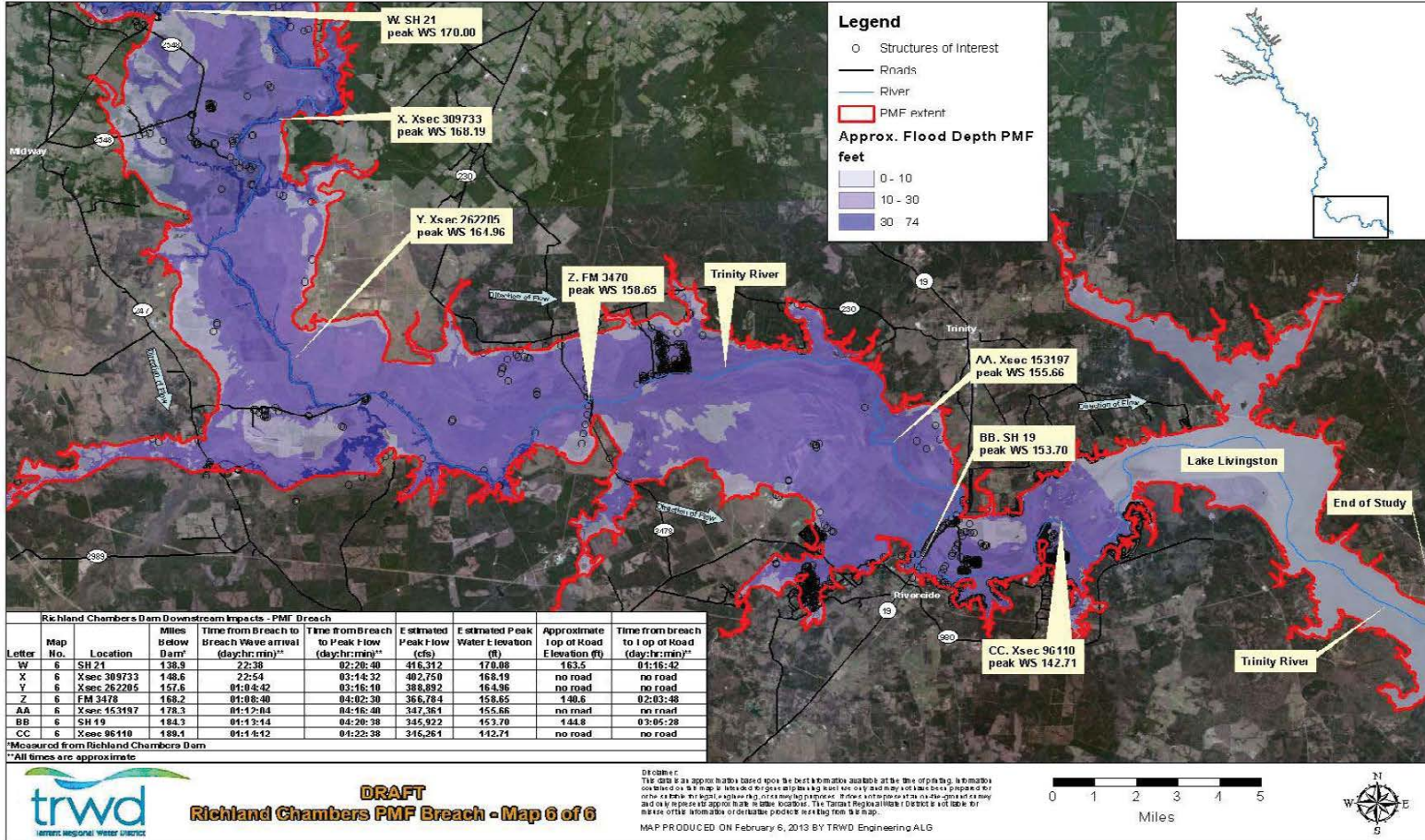


Figure 73: Potential Maximum Flood Inundation for Richland Chambers Dam in Leon County - 2

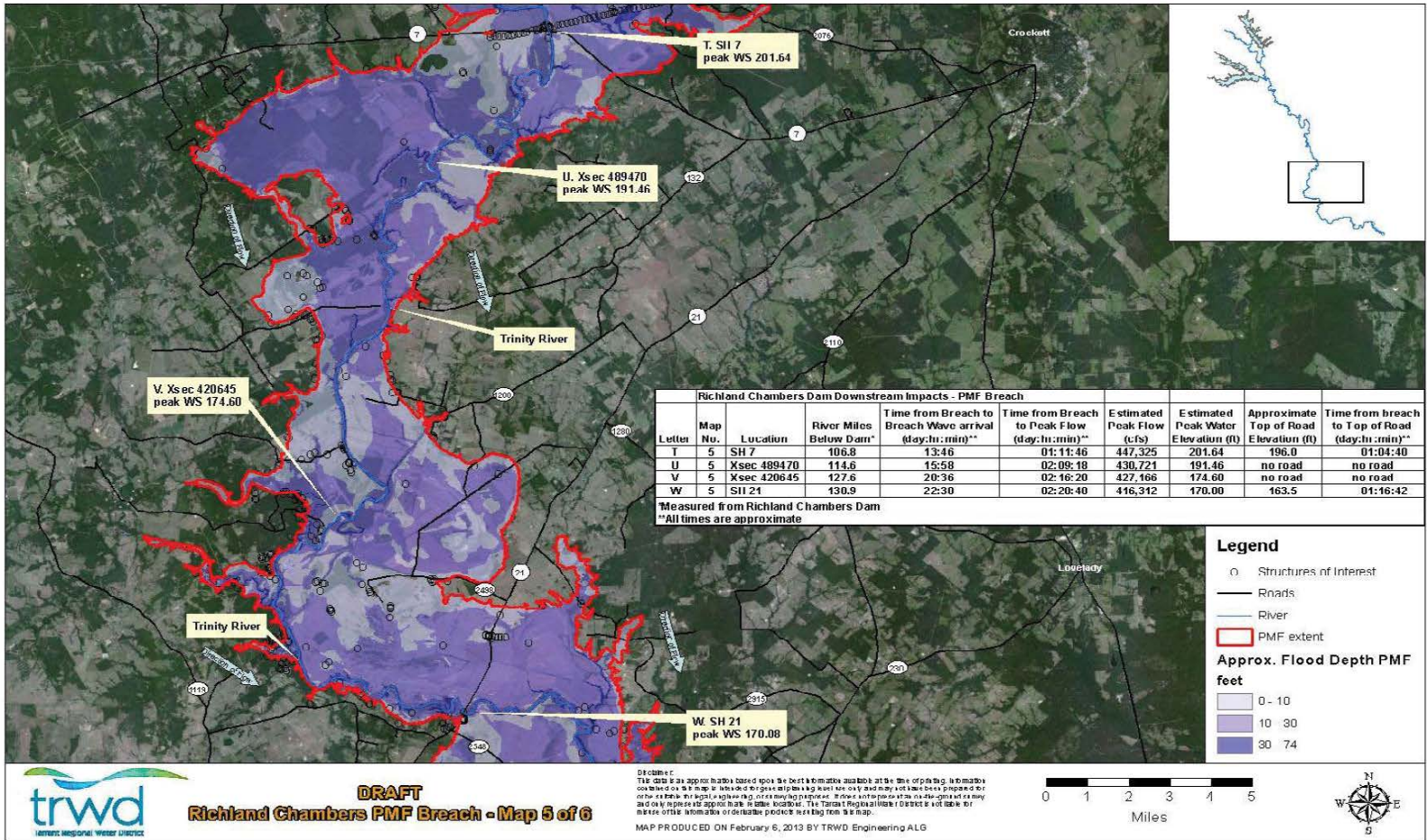


Figure 74: Potential Maximum Flood Inundation for Richland Chambers Dam in Leon County - 3

4) Vulnerability

A) Critical Facilities

As can be seen on the maps above and below, no critical facilities are found to be within the PMF Inundation areas.

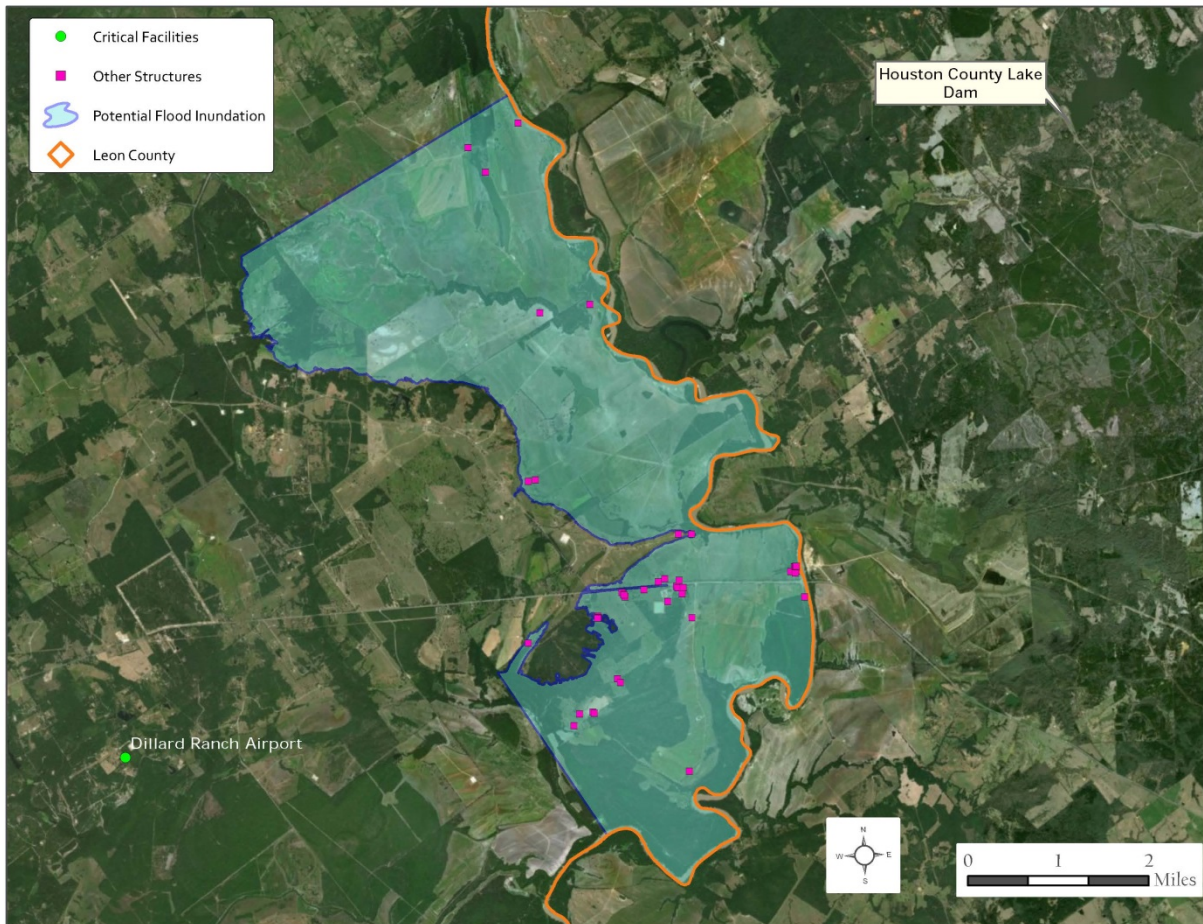


Figure 75: Critical Facilities and Potential Maximum Flood Inundation for Houston County Lake Dam

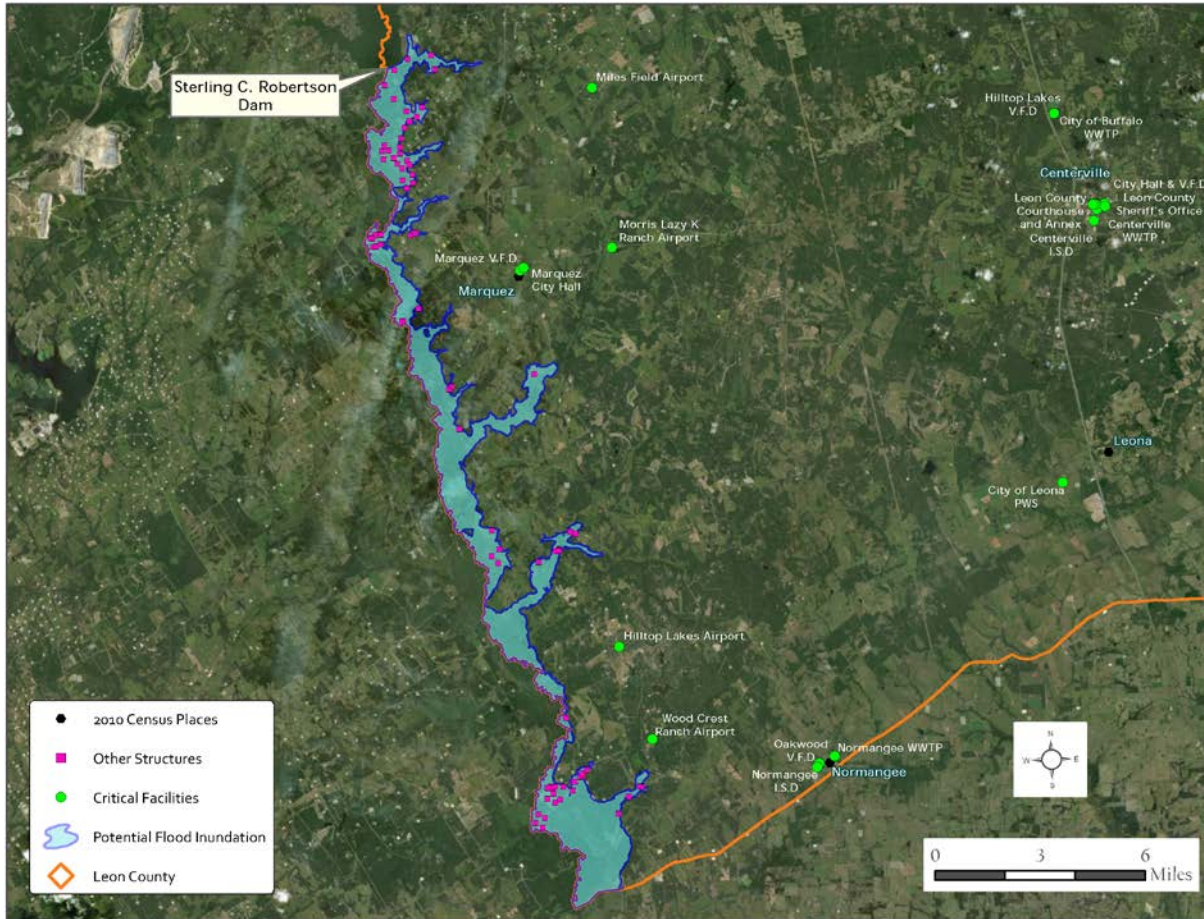


Figure 76: Critical Facilities and Potential Maximum Flood Inundation for Sterling C. Robertson Dam

B) Vulnerable Structures

Based on the inundation maps, it is estimated that around 250 structures could be affected by these dam failures. This data represents the most current available.

5) Location and Impact

A) Location

The location of the dam failure is limited to the areas depicted above that fall within Leon County.

B) Impact

As shown above under “Extent,” the Sterling C. Robertson, Houston County Lake, and the Richland Chambers Dams have hazard potential classifications of High. This is due to the fact

that residences fall within the PMF Inundation areas. A failure of any of these dams, therefore, may cause at least one loss of human life.

In addition to this, the property and improvement values for parcels that are in the PMF Inundation area total over \$100 million. Damaged or destroyed personal property could include vehicles, damaged or destroyed agricultural, residential, commercial, and other properties, damaged crops, and livestock.

11. Earthquake

Earthquakes are defined as a shaking or trembling of the earth that is volcanic or tectonic in origin.

A quake with magnitude 3 may do no more than startle people and rattle dishes within a one-square mile region. However, a magnitude 7 would be felt by people over the entire State of Texas, and could do significant damage to buildings, bridges, and dams over a considerable region.

1) Earthquake History

According to the best information available, there have not been any earthquakes in the City of Jewett.

Within the area surrounding Leon County, two earthquakes were found to have occurred. The first occurred in Limestone County in 1932 and the second occurred in Anderson County in 1981. The earthquakes have ranged in magnitude from 3.3 to 4.0.

The City of Jewett elected to address this hazard because of the possibility that earthquakes may become a more significant issue within the current planning period. The other jurisdictions do not have any history of earthquakes or damages resulting from earthquakes either, and they did not feel that earthquakes may become a more significant issue for them within the current planning period. For this reason, the jurisdictions participating in this plan (besides Jewett) did not choose to address this hazard.

Table 42: Leon County and surrounding area Earthquakes

Date	Location	Magnitude
4/9/1932	2.84 mi. east of Mexia, TX	4.0
11/6/1981	3.38 mi. east intersection of US 287 and FM 59	3.3

2) Likelihood of Future Occurrence

Given the proximity but infrequency of earthquakes in the surrounding area, an earthquake that could affect the City of Jewett is unlikely, meaning that one is possible in the next 10 years.

3) Extent

Earthquake strength is generally measured on the Richter Magnitude Scale. The Modified Mercalli Intensity Scale for Earthquakes provides an additional means of describing an earthquake's effects.

Table 43: Richter Magnitude Scale

Magnitude	Earthquake Effects	Estimated number each year
2.5 or less	Usually not felt, but can be recorded by seismograph.	900,000
2.5 to 5.4	Often felt, but only causes minor damage.	30,000
5.5 to 6.0	Slight damage to buildings and other structures.	500
6.1 to 6.9	May cause a lot of damage in very populated areas.	100
7.0 to 7.9	Major earthquake. Serious damage.	20
8.0 or greater	Great earthquake. Can totally destroy communities near the epicenter.	One every 5 to 10 years.

Table 44: Modified Mercalli Intensity Scale for Earthquakes

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only by seismographs	
II	Feeble	Some people feel it	<4.2
III	Slight	Felt by people resting, like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	<4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves	<5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls	<6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	<6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables destroyed; general triggering of other hazards	<8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	>8.1

Although the earthquakes in the surrounding vicinity inflicted minimal, if any, damages, earthquake frequency appears to be rising. A future earthquake affecting the City of Jewett is

expected to be similar in strength to those that have occurred in Anderson and Limestone Counties, up to 4.0 on the Richter Magnitude Scale or less than a II-feeble on the Modified Mercalli Intensity Scale.

4) Location and Impact

A) Location

Earthquakes have no distinct geographic boundary in Leon County and the participating jurisdictions. Earthquakes can occur across all eight jurisdictions.

B) Impact

Impacts may include structural damages to buildings of all types. Road networks that pass through the City of Jewett may be damaged to the point of failure as the ground shifts. Water and wastewater systems may fail due to cracks and breaks in underground tanks and pipe networks.

5) Vulnerability

A) Population

As described in the narrative, as well as in Section 3 of Chapter 3 above, the City of Jewett is 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 City of Jewett recognizes that vulnerable populations may need additional help preparing for and recovering from an earthquake.

Structures in substandard condition ahead of an earthquake may be more likely to suffer additional damages, including irreparable foundation or structural damages as the ground shifts. Depending on their means, these residents may require additional assistance recovering from earthquake-caused damages.

B) Critical Facilities

The planning team identified the following critical facilities that may be affected by earthquakes which could affect the City of Jewett. Because earthquakes don't recognize geographic boundaries, all critical facilities, no matter their jurisdictional location, are equally vulnerable to earthquakes.

Table 45: Leon County Critical Facilities Vulnerable to Earthquakes

Leon County and Participating Jurisdictions	Potential Earthquake Impacts			
	Structural Damage	Water / Wastewater Line Damages	Increased Demand for Services	Economic Damages
Communications Tower for KTCJ	x	x	x	x

Communications Tower for KBHT	x	x	x	x
Communications Tower for KMVL-FM	x	x	x	x
Reliant Energy Limestone Electric Generating Plant	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x
Jewett Police Station	x	x	x	x
City of Jewett WWTP	x	x		x
Jewett City Hall	x	x	x	x

C) Vulnerable Structures and Infrastructure

All structures within the City of Jewett are equally vulnerable to earthquakes. However, given the lack of structural damage inflicted by previous nearby events, future structural damages are expected to be similarly limited.

Table 46: Estimated Potential Damage Values¹⁸

Jurisdiction	Estimated Potential Damage Value
City of Jewett	\$29,209,150

Water, Wastewater, and Pipelines

Water, wastewater, and pipeline systems rely on underground storage tanks and pipe networks to function properly. During strong earthquakes these tanks and pipes may become vulnerable to cracks and breaks.

Damage to water and wastewater systems may be severe enough exceed participating jurisdictions’ ability to immediately fund repairs without outside assistance. Delays to returning these systems to normal functionality will require emergency alternatives.

Road Networks

Earthquakes may damage road networks in various ways. Depending on an earthquake’s strength, roadbeds may subside, crack, or become disjointed. Damages may be severe enough to exceed the participating jurisdictions’ ability to immediately fund repairs without outside assistance.

¹⁸ Property values based on Leon County Appraisal District information.

12. Expansive Soils

Expansive soils are defined as soils and soft rock that tend to swell or shrink due to changes in moisture content. Changes in soil volume present a hazard primarily to structures built on top of expansive soils.

Expansive soils (bentonite, smectite, or other reactive clays) expand when the soil particles attract water, and can shrink when the clay dries. Expansive soil can grow to as much as 15 times its original size, thus causing severe damage. Sidewalks, roads, and residential and commercial buildings may be lifted causing cracks and distortion.

It is differential expansion that causes damage. If the entire area under a foundation or road maintained the same moisture content, the entire structure would rise uniformly, and there would be no damage. Residential construction generally has more problems than commercial, but both experience significant losses. The foundation type most prevalent in Texas, slab on grade, is also the most susceptible to damage from expansive clays.

1) Expansive Soils History

Neither Leon County nor the participating jurisdictions have a documented history of damages caused by expansive soils.

The participating jurisdictions consider this to be a data deficiency.

To remedy the deficiency, the jurisdictions have proposed a mitigation action that will create a study to track instances of damages due to expansive soils and begin developing a comprehensive history of the hazard and its effects.

2) Likelihood of Future Events

Given the lack of an officially recorded hazard history in Leon County and the participating jurisdictions, it's difficult to attempt to estimate the likelihood of future expansive soils hazards events.

However, in light of the jurisdictions' histories of heavy rainfalls and periods of drought, conditions that lead clay-filled soils to expand and contract respectively, it may be fair to say that a future expansive soils event is unlikely, meaning 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

According to the State of Texas Mitigation Plan Update 2013, determining the extent of the expansive soils hazard requires measuring a soil's swelling potential or volumetric swell. To test the soil for these properties, the State outlined the following procedure:

Soil material is disaggregated and passed through the #4 sieve and then brought to approximately the optimum moisture content (as determined by American Society for Testing and Materials [ASTM-D-1557]). The optimum moisture content equates to approximately 80 to 85% of saturation. After setting for 6 to 30 hours, the moisture-conditioned soil is compacted into a 4-in diameter mold. The moisture content is then adjusted, if necessary, to bring the sample to 50% saturation. A 144 psf surcharge is applied and the sample is wetted and monitored for 24 hours, measuring the volumetric swell. The Expansion Index is calculated as follows:

$$EI = 100 \times \Delta h \times F$$

Where Δh = percent swell and F = fraction passing No. 4 sieve

The following "ratings" can be accepted examples expected for "extent" when a risk is identified as Expansive Soils:

Table 47: ASTM D4729-11 Expansive Soils Index (in %)

0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

The jurisdictions have instead decided to rely on the county-wide soil studies produced by the United States Department of Agriculture (USDA), Soil Conservation Service¹⁹ as well as the USDA's Web Soil Survey²⁰ data. The Web Soil Survey in particular offers both soil maps and USDA guidance on soil suitability for various types of development.

For the purposes of this plan, the jurisdictions have decided to consider the ratings of Leon County soils for the construction of both residential dwellings on concrete slab and small commercial buildings.

USDA rates soils based on the extent to which the soils are limited by all of the soil features that affect the specified use. Extent ratings are as follows: "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low

¹⁹https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/texas/TX289/0/leon.pdf

²⁰ <http://websoilsurvey.nrcs.usda.gov/app/>

maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

As shown in Figure 77 below, almost half (49.8%) of Leon County contains soils that are "Very Limited" for the construction of dwellings on concrete slab, the State's most prevalent dwelling foundation. Additionally, a significant portion (36.9%) of the County's soils are considered "Somewhat Limited" for the construction of dwellings on concrete slab. These areas that are "very limited" equate to areas with soils that are "very high" in Table 47 above. The areas that are "somewhat limited" equate to areas with soils that are medium to high in Table 47 above.

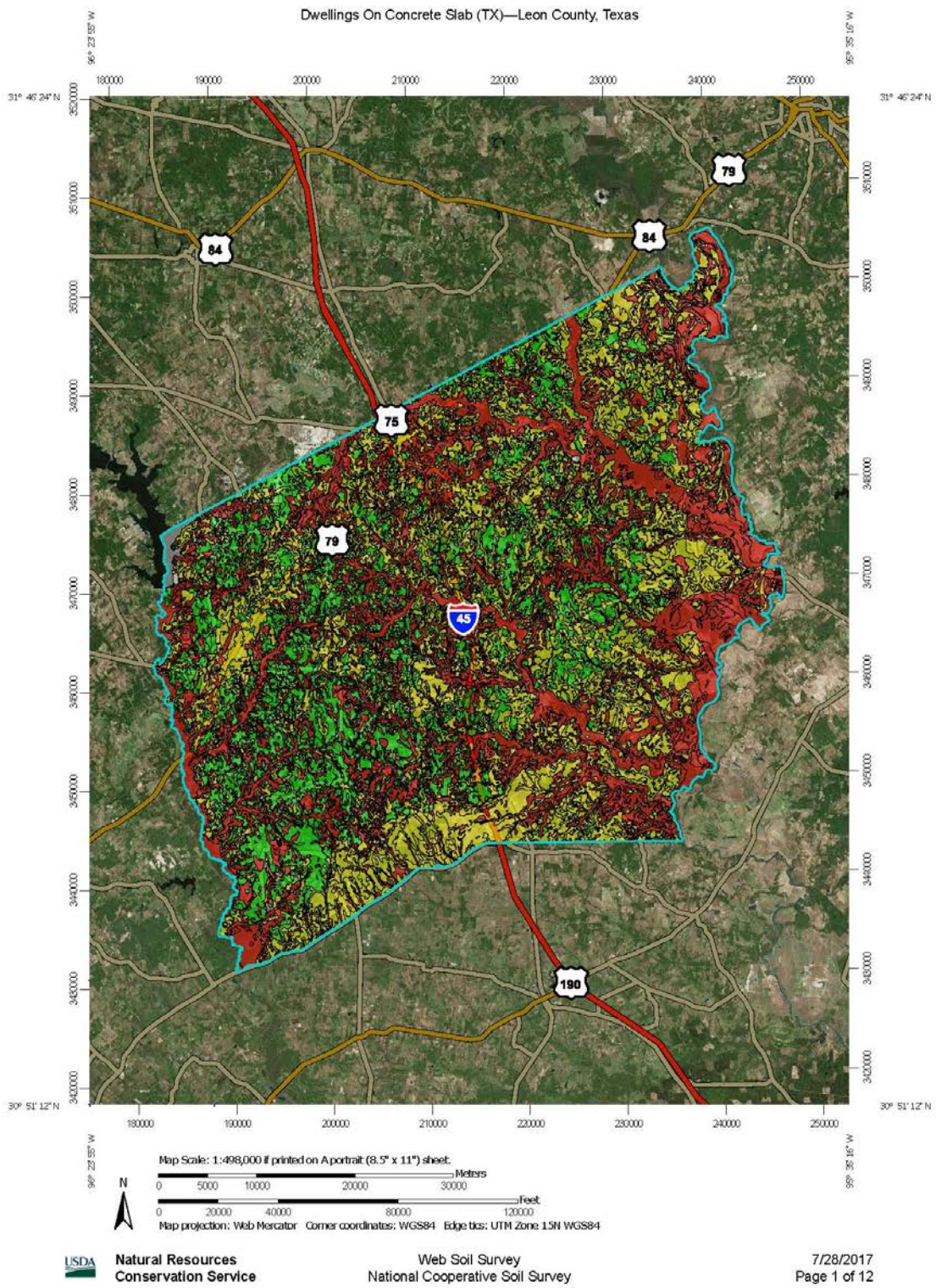






















Figure 77: Leon County Soil Ratings for the Construction of Dwellings on Concrete Slab

MAP LEGEND	MAP INFORMATION
<p>Area of Interest (AOI)</p> <p> Area of Interest (AOI)</p> <p>Background</p> <p> Aerial Photography</p> <p>Soils</p> <p>Soil Rating Polygons</p> <p> Very limited</p> <p> Somewhat limited</p> <p> Not limited</p> <p> Not rated or not available</p> <p>Soil Rating Lines</p> <p> Very limited</p> <p> Somewhat limited</p> <p> Not limited</p> <p> Not rated or not available</p> <p>Soil Rating Points</p> <p> Very limited</p> <p> Somewhat limited</p> <p> Not limited</p> <p> Not rated or not available</p> <p>Water Features</p> <p> Streams and Canals</p> <p>Transportation</p> <p> Rails</p> <p> Interstate Highways</p> <p> US Routes</p> <p> Major Roads</p> <p> Local Roads</p>	<p>The soil surveys that comprise your AOI were mapped at 1:24,000.</p> <p>Please rely on the bar scale on each map sheet for map measurements.</p> <p>Source of Map: Natural Resources Conservation Service Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)</p> <p>Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.</p> <p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p> <p>Soil Survey Area: Leon County, Texas Survey Area Data: Version 12, Sep 16, 2016</p> <p>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</p> <p>Date(s) aerial images were photographed: Jan 1, 1999—Dec 31, 2003</p> <p>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</p>

As shown in Figure 78 below, 42% of Leon County's soils are "Somewhat Limited" for the construction of small commercial buildings, defined as structures less than three stories high, without basements, and constructed on foundations consisting of spread footings or reinforced concrete built on undisturbed soil at a depth of 2' or at the depth of maximum frost penetration, whichever is deeper. In addition, another 37.3% of the county's soils are "Very Limited" for the construction of small commercial buildings. These areas that are "very limited" equate to areas with soils that are "very high" in Table 47 above. The areas that are "somewhat limited" equate to areas with soils that are medium to high in Table 47 above.

The areas considered very limited for the construction of small commercial buildings are spread throughout Leon County and the participating jurisdictions.

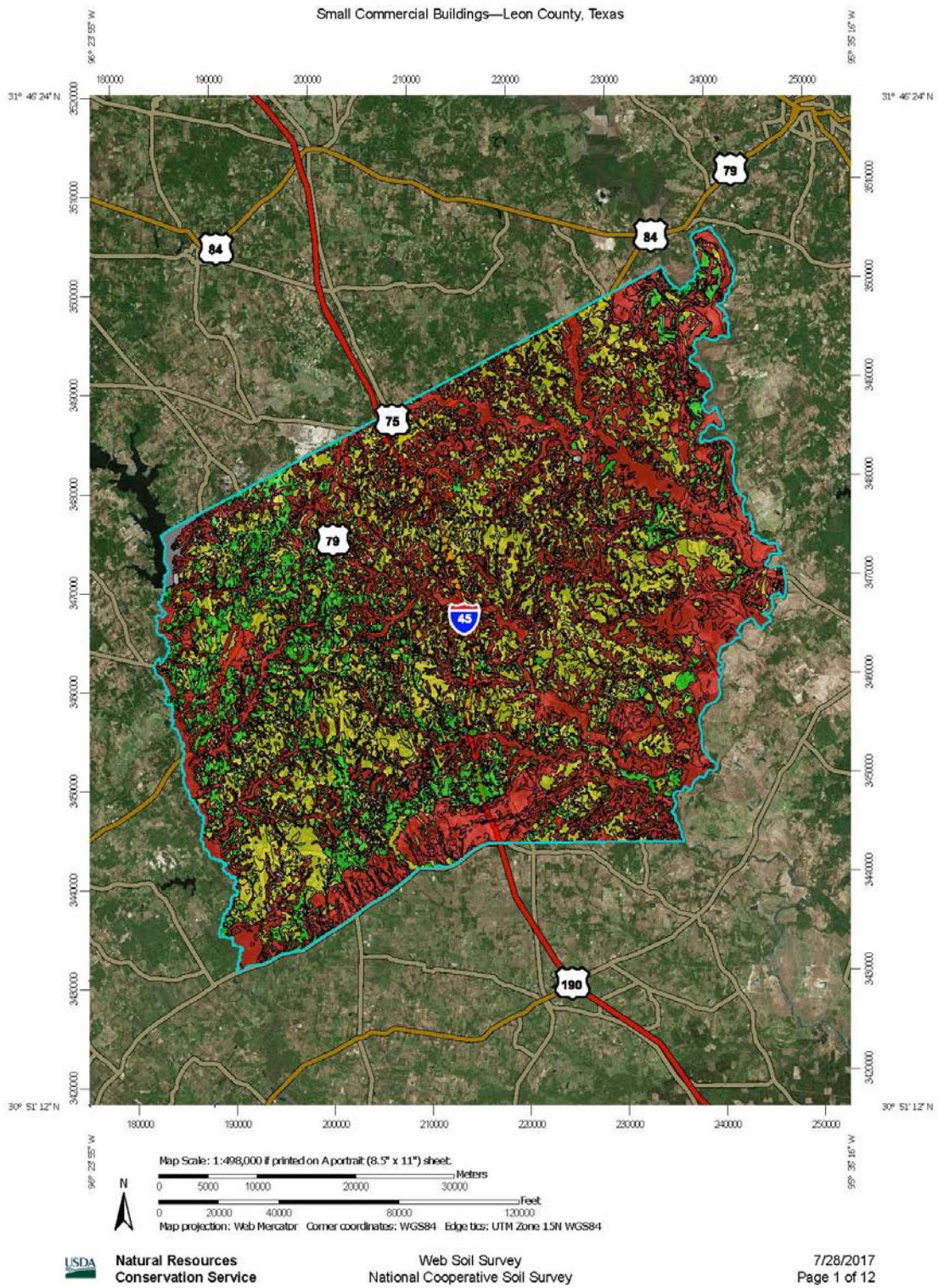
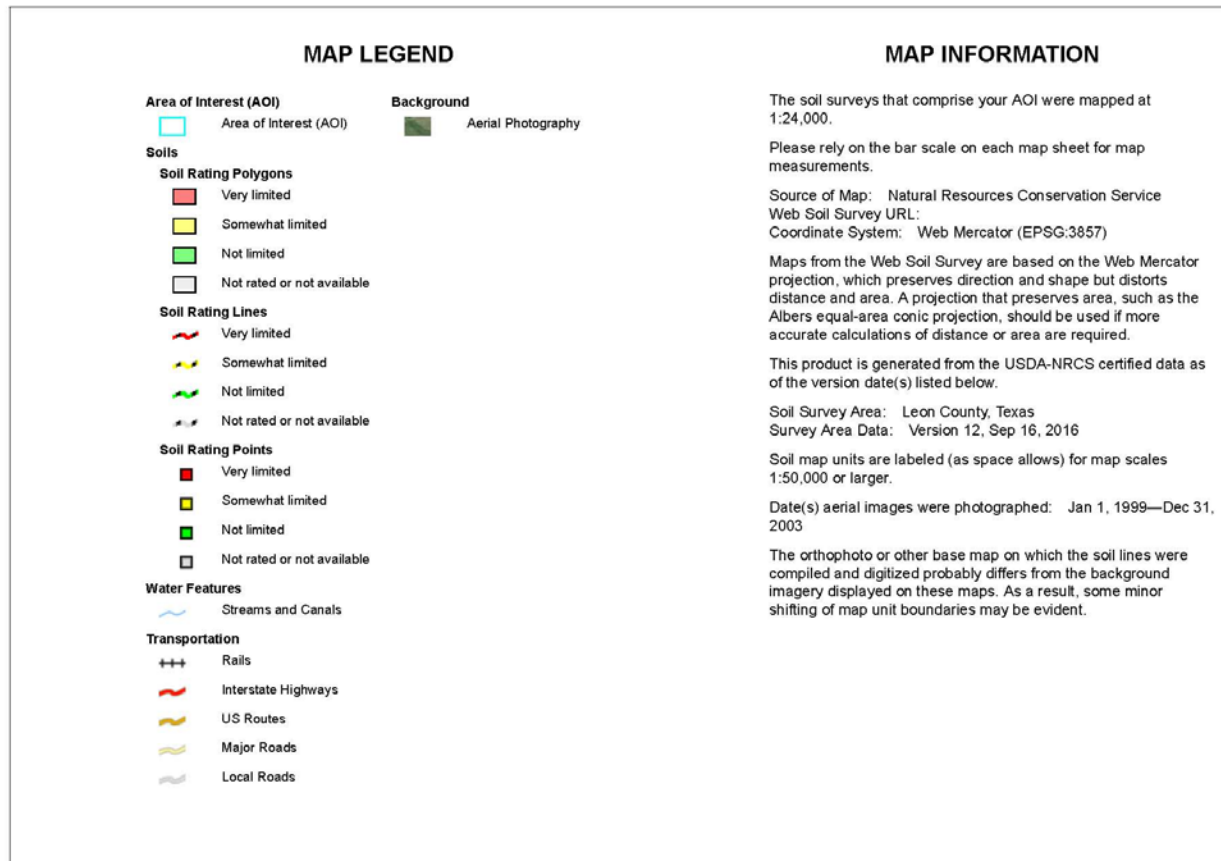


Figure 78: Leon County Soil Ratings for the Construction of Small Commercial Buildings



4) Location and Impact

A) Location – All Jurisdictions

As shown in the maps above, expansive soils exist across the County, and have the potential to affect all participating jurisdictions. Areas within each jurisdiction may be more affected by expansive soils depending on both building location and building type.

B) Impact – All Jurisdictions

The potential impact of expansive soils in the jurisdictions is unknown at this time. Future hazard events are expected to result in few, if any, injuries.

However, as outlined in the State of Texas Mitigation Plan Update 2013, the combination of expansive soils and Texas homebuilders' propensity for installing concrete slab foundations, often results in cracked foundations that can literally halve a home's value. In such cases, economic losses are not limited to those borne by the homeowner. Instead, halved property values result in lower property values, and therefore, lower property tax revenues.

Potential ripple effects make it difficult to estimate how wide-reaching expansive soils' impact could be. Under the right circumstances, expansive soils may wreak havoc on local economies by depleting homeowners' bank accounts and decimating municipal budgets. In the worst cases, building owners may choose to walk away, rather than make costly repairs, thus saddling local governments with abandoned properties and the incumbent challenges they pose.

5) Vulnerability

Leon County and the participating jurisdictions are exposed to expansive soils to varying degrees based on both soil type and building type, as shown in Figures 77-78 above. At this time, given the combination of the hazard's ability to inflict unpredictable damages, the lack of officially reported data, and the diversity of building ages, types, and foundations in each participating jurisdiction, it's unfeasible to identify which buildings, infrastructure, and critical facilities are vulnerable to damages significant enough to interrupt or stop normal operations. Therefore, all are considered equally vulnerable to the hazard.

A) Critical Facilities

Table 48: Leon County Critical Facilities Vulnerable to Expansive Soils

Leon County and Participating Jurisdictions
Dillard Ranch Airport
Moore Ranch Airport
Morris Lazy K Ranch Airport
Hilltop Lakes Airport
Miles Field Airport

Hub Field Airport
Wood Crest Ranch Airport
Carter Ranch Airport
Communications Tower for KTCJ
Communications Tower for KBHT
Communications Tower for KMVL-FM
Reliant Energy Limestone Electric Generating Plant
Buffalo Fire Department
Normangee Volunteer Fire Department
Oakwood Volunteer Fire Department
Hilltop Lakes Volunteer Fire Department
Jewett Volunteer Fire Department
Marquez Volunteer Fire Department
Jewett Police Station
Buffalo Police Station
Leon County Sheriff's Office
Buffalo Elementary School
Buffalo High School
Buffalo Middle School
Leon Elementary School
Leon High School
Leon Junior High School
Normangee Elementary School
Normangee Middle School
Normangee High School
Oakwood Elementary School
City of Buffalo WWTP
City of Jewett WWTP

City of Normangee WWTP
City of Oakwood WWTP
Brookshire Brothers in Normangee
Buffalo Ace Hardware
Buffalo City Hall
Jewett City Hall
Marquez City Hall
Normangee City Hall
Oakwood City Hall
Leon County Courthouse and Annex

B) Vulnerable Structures

Table 49: Expansive Soils Vulnerability

Jurisdiction	Estimated Potential Damage Value
County	\$1,656,299,949
City of Buffalo	\$88,731,470
City of Jewett	\$29,209,150
City of Marquez	\$12,890,020
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

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 2010²¹. 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.

1) Extreme Heat History

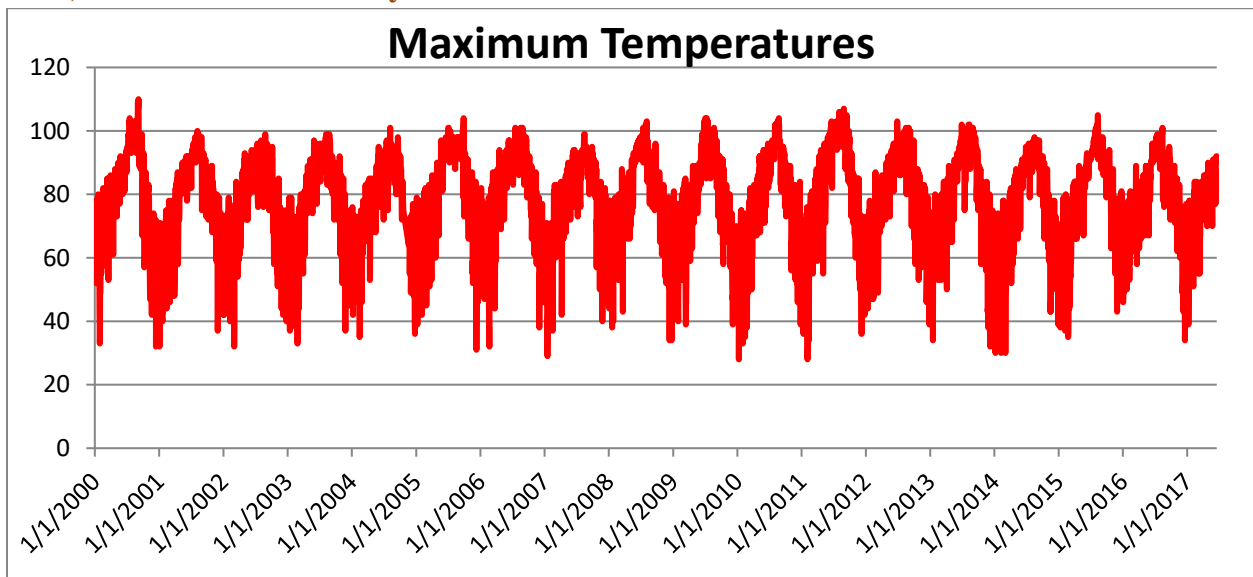


Figure 79: Maximum Recorded Daily Temperature 2000-2017²²

²¹ http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp

²² Source: National Climatic Data Center, <https://www.ncdc.noaa.gov/cdo-web/datasets>

Between January, 2000 and January, 2017, Leon County and the participating jurisdictions experienced 202 days with a maximum temperature of 100°F or hotter and nearly 700 days with a maximum temperature of 96°F or hotter.

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. No damage dollars for any extreme heat event have been recorded in any participating jurisdiction in over 15 years.

2) Likelihood of Future Events

Based on historic weather data, extreme heat in Leon 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 80. This index measures how hot it feels outside when humidity is combined with high temperatures.

NOAA's National Weather Service

Heat Index

Temperature (°F)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution
 Extreme Caution
 Danger
 Extreme Danger

Figure 80: NOAA's NWS Heat Index Chart²³

²³ <http://www.nws.noaa.gov/om/heat/ht-images/heatindexchart.png>

The extent scale in Figure 80 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 Table 50.

Table 50: 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 67%²⁴, highs as low as 90°F can produce a heat index temperature of 103°F. The combination of high humidity and moderate temperatures creates an environment that reaches the Danger Zone on NOAA’s Heat Index Chart, and may trigger a NWS Heat Advisory.

Between 2000 and 2017, Leon County and the participating jurisdictions experienced 252 days with highs of 89°F or hotter and overnight lows of 75°F or hotter. Based on the NWS descriptions in Table 50 above, and the average daily humidity level, these days likely warranted a heat advisory.

The hottest temperature recorded in Leon County in the recent past, 111°F, was reached on September 5, 2000. Based on the NWS descriptions in Table 50 above, at least 4 of the 252 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.

According to the Leon County 2013 CHAMPS Report, the worst extreme heat events occurred from July to September of 2000. However, the events resulted in no injuries and no crop or property damages.

²⁴ Used Waco Average, closest to County - <https://www.currentresults.com/Weather/Texas/humidity-annual.php>

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 50 above. The hottest temperatures in Leon County and the participating jurisdictions may meet the current record temperature of 110°F.

4) Location and Impact

A) 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.

B) 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 in over 15 years. 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

A) Population

As described in Section 3 of Chapter 3 above, Leon 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.

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.

14. 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 size²⁵ 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

The following hailstorm histories for each jurisdiction reflect the most current hailstorm data available. No hailstorms are known to have occurred in any participating jurisdiction more recently than those listed below.

Leon County

Location	Date	Time	Hail Diameter in inches	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
-	10/6/1984	7:40 PM	1	0	0	\$0	\$0	\$0	\$0
-	4/19/1986	6:15 PM	0.75	0	0	\$0	\$0	\$0	\$0
-	5/15/1987	12:10 PM	0.88	0	0	\$0	\$0	\$0	\$0
-	12/7/1988	6:52 PM	0.75	0	0	\$0	\$0	\$0	\$0
-	3/20/1989	7:15 PM	0.75	0	0	\$0	\$0	\$0	\$0
-	4/28/1989	3:00 PM	1	0	0	\$0	\$0	\$0	\$0
-	6/7/1989	10:45 AM	1	0	0	\$0	\$0	\$0	\$0
-	4/27/1990	5:20 PM	0.75	0	0	\$0	\$0	\$0	\$0
-	4/27/1990	5:43 PM	1.75	0	0	\$0	\$0	\$0	\$0
-	4/28/1990	5:20 PM	0.75	0	0	\$0	\$0	\$0	\$0
-	4/13/1991	2:24 PM	1.25	0	0	\$0	\$0	\$0	\$0
-	5/3/1991	3:40 PM	1.75	0	0	\$0	\$0	\$0	\$0
-	5/3/1991	4:25 PM	1.75	0	0	\$0	\$0	\$0	\$0
-	5/3/1991	5:25 PM	1.75	0	0	\$0	\$0	\$0	\$0
-	4/29/1992	2:10 AM	1	0	0	\$0	\$0	\$0	\$0
Henderson	5/2/1994	6:45 PM	1	0	0	\$0	\$0	\$0	\$0
Henderson	5/2/1994	6:55 PM	1.75	0	0	\$0	\$0	\$0	\$0
Tatum	5/2/1994	7:25 PM	1	0	0	\$0	\$0	\$0	\$0
-	2/5/2008	-	-	0	0	\$4,973	\$0	\$5,658	\$0
-	2/1/2009	-	-	0	0	\$5,006	\$0	\$5,715	\$0
-	7/19/2009	-	-	0	0	\$1,001	\$0	\$1,143	\$0
Flo	6/2/2010	8:00 PM	0.88	0	0	\$0	\$0	\$0	\$0

²⁵ As of January 5, 2010, the national minimum size for severe hail increased from ¾" to 1".

Wealthy	3/26/2011	8:47 PM	0.75	0	0	\$0	\$0	\$0	\$0
-	4/25/2011	-	-	0	0	\$4,994	\$0	\$5,438	\$0
-	4/26/2011	-	-	0	0	\$998	\$0	\$1,087	\$0
-	4/26/2011	-	-	0	0	\$998	\$0	\$1,087	\$0
Robbins	4/26/2011	4:10 PM	1.75	0	0	\$1,000	\$0	\$1,089	\$0
Wealthy	3/28/2014	4:14 PM	1	0	0	\$0	\$0	\$0	\$0
Wealthy	3/28/2014	4:27 PM	1.75	0	0	\$30,000	\$0	\$31,042	\$0
Keechi	4/9/2015	5:49 PM	0.75	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by
Both

City of Buffalo

Location	Date	Time	Hail Diameter in inches	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Buffalo	10/21/1996	8:40 PM	0.75	0	0	\$0	\$0	\$0	\$0
Buffalo	1/23/1997	4:50 PM	1	0	0	\$0	\$0	\$0	\$0
Buffalo	4/2/2000	7:50 PM	1	0	0	\$0	\$0	\$0	\$0
Buffalo	2/5/2008	4:15 PM	1.75	0	0	\$5,000	\$0	\$5,689	\$0
Buffalo	7/19/2009	3:00 PM	1.75	0	0	\$1,000	\$0	\$1,142	\$0
Buffalo	4/4/2011	7:35 AM	1	0	0	\$0	\$0	\$0	\$0
Buffalo	5/17/2013	8:25 AM	0.75	0	0	\$0	\$0	\$0	\$0
Buffalo	4/9/2015	5:40 PM	1	0	0	\$0	\$0	\$0	\$0
Buffalo	4/2/2017	7:04 AM	1.75	0	0	\$2,000	\$0	\$2,000	\$0

NOAA Data

CHAMPS Data

Reported by
Both

City of Centerville

Location	Date	Time	Hail Diameter in inches	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Centerville	3/18/1996	3:40 AM	0.75	0	0	\$0	\$0	\$0	\$0
Centerville	1/5/1998	5:31 PM	0.75	0	0	\$0	\$0	\$0	\$0
Centerville	1/22/1999	2:00 AM	1.75	0	0	\$0	\$0	\$0	\$0
Centerville	4/4/1999	3:00 PM	0.75	0	0	\$0	\$0	\$0	\$0
Centerville	5/31/2001	3:55 PM	1.75	0	0	\$0	\$0	\$0	\$0
Centerville	12/23/2002	8:30 PM	0.75	0	0	\$0	\$0	\$0	\$0
Centerville	12/23/2002	8:35 PM	1	0	0	\$0	\$0	\$0	\$0
Centerville	5/16/2003	8:00 PM	1.75	0	0	\$0	\$0	\$0	\$0
Centerville	2/1/2009	11:04 PM	0.75	0	0	\$0	\$0	\$0	\$0
Centerville	4/26/2011	10:40 PM	1.75	0	0	\$1,000	\$0	\$1,089	\$0
Centerville	4/26/2011	10:44 PM	1.25	0	0	\$0	\$0	\$0	\$0
Centerville	6/6/2012	9:10 PM	0.75	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Jewett

Location	Date	Time	Hail Diameter in inches	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Jewett	4/20/1995	2:45 PM	1	0	0	\$0	\$0	\$0	\$0
Jewett	12/23/1997	11:42 AM	0.75	0	0	\$0	\$0	\$0	\$0
Jewett	1/21/1999	11:30 PM	1.75	0	0	\$0	\$0	\$0	\$0
Jewett	1/22/1999	12:00 AM	1	0	0	\$0	\$0	\$0	\$0
Jewett	3/26/2000	4:15 AM	1	0	0	\$0	\$0	\$0	\$0
Jewett	5/28/2005	3:20 PM	1.75	0	0	\$0	\$0	\$0	\$0
Jewett	4/26/2011	3:35 PM	1	0	0	\$0	\$0	\$0	\$0
Jewett	5/20/2011	7:40 PM	1	0	0	\$0	\$0	\$0	\$0
Jewett	4/29/2016	2:00 PM	1	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Leona

Location	Date	Time	Hail Diameter in inches	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Leona	5/3/1998	1:30 AM	0.75	0	0	\$0	\$0	\$0	\$0
Leona	12/23/2002	8:20 PM	0.75	0	0	\$0	\$0	\$0	\$0
Leona	4/7/2004	4:55 PM	0.88	0	0	\$0	\$0	\$0	\$0
Leona	4/23/2010	6:30 PM	1.5	0	0	\$0	\$0	\$0	\$0
Leona	5/20/2011	5:05 PM	1	0	0	\$0	\$0	\$0	\$0
Leona	5/21/2013	6:50 PM	0.88	0	0	\$0	\$0	\$0	\$0
Leona	4/2/2017	6:40 AM	1	0	0	\$2,000	\$0	\$2,000	\$0
Loavor Leona	4/16/2009	6:06 PM	1	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Marquez

Location	Date	Time	Hail Diameter in inches	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Marquez	5/2/1999	2:58 PM	0.75	0	0	\$0	\$0	\$0	\$0
Marquez	3/28/2014	4:15 PM	1	0	0	\$0	\$0	\$0	\$0
Marquez	4/18/2015	8:17 PM	0.88	0	0	\$0	\$0	\$0	\$0
Marquez	4/27/2015	2:09 AM	0.75	0	0	\$0	\$0	\$0	\$0
Marquez	4/29/2016	1:57 PM	1.75	0	0	\$20,000	\$0	\$20,412	\$0
Marquez	5/2/2016	12:46 AM	0.88	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Normangee

Location	Date	Time	Hail Diameter in inches	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Normangee	1/21/1998	4:35 PM	1.75	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Oakwood

Location	Date	Time	Hail Diameter in inches	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Oakwood	2/1/2009	10:25 PM	1.75	0	0	\$5,000	\$0	\$5,709	\$0
Oakwood	4/25/2011	6:38 PM	1.75	0	0	\$5,000	\$0	\$5,445	\$0

NOAA Data
CHAMPS Data
Reported by Both

2) Likelihood of Future Events

Based on their history of hailstorms, hailstorms in Leon County, Buffalo, Centerville, and Jewett are highly likely, meaning that an event is probable within the next year.

The hailstorm histories in the Cities of Leona and Marquez suggests that a hailstorm in those Cities is likely, meaning that an event is probable within the next three years.

The limited histories of hailstorm history in the cities of Normangee and Oakwood suggest that a hailstorm in any of those jurisdictions is occasional, meaning one is possible in the next five years.

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 hail storm. 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 5I was developed by combining data from National Climatic Data Center (NCDC) and the Tornado and Storm Research Organization (TORRO).

Table 5I: Hailstorm Intensity^{26, 27}

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

²⁶ <http://www1.ncdc.noaa.gov/pub/data/cmb/extremes/scec/reports/SCEC-Hail-Guide.pdf>

²⁷ <http://www.torro.org.uk/hscale.php>

				vegetation
H3	Severe ²⁸	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 NCDC data, the worst hailstorms in Leon County and the participating jurisdictions have produced hail up to 1.75” in diameter, H5 on the Hailstorm Intensity Scale, and have inflicted \$95,745 in reported property damages in \$2017. No participating jurisdiction has ever reported any injuries or deaths caused by hail.

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.

B) Impact

The severity of a hailstorm’s impact is considered to be 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 in the participating jurisdictions are considered to be exposed to this hazard and could potentially be impacted.

²⁸ Hail must be 1” or larger to be classified as severe

5) Vulnerability

A) Population

As described in Section 3 of Chapter 3 above, Leon 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 facilities were determined to be especially vulnerable to hailstorms:

Table 52: Critical Facilities Vulnerable to Hailstorms and Potential Impacts

Leon County and Participating Jurisdictions	Potential Hailstorm Impacts			
	Damaged Roof	Destroyed Roof	Damaged Windows	Water damage due to Physical Damages
Reliant Energy Limestone Electric Generating Plant	x	x	x	x
Buffalo Fire Department	x	x	x	x
Normangee Volunteer Fire Department	x	x	x	x
Oakwood Volunteer Fire Department	x	x	x	x
Centerville Volunteer Fire Department	x	x	x	x
Hilltop Lakes Volunteer Fire Department	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x
Marquez Volunteer Fire Department	x	x	x	x

Leona Fire Department	x	x	x	x
Jewett Police Station	x	x	x	x
Buffalo Police Station	x	x	x	x
Leon County Sheriff's Office	x	x	x	x
Buffalo Elementary School	x	x	x	x
Buffalo High School	x	x	x	x
Buffalo Middle School	x	x	x	x
Centerville Elementary School	x	x	x	x
Centerville Jr. and Sr. High School	x	x	x	x
Leon Elementary School	x	x	x	x
Leon High School	x	x	x	x
Leon Junior High School	x	x	x	x
Normangee Elementary School	x	x	x	x
Normangee Middle School	x	x	x	x
Normangee High School	x	x	x	x
Oakwood Elementary School	x	x	x	x
Leona General Store	x	x	x	x
Guy's Lumber and Hardware in Centerville	x	x	x	x
Centerville Building Supplies	x	x	x	x
Lacey's Grocery in Centerville	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x
Buffalo Ace Hardware	x	x	x	x
Buffalo City Hall	x	x	x	x
Jewett City Hall	x	x	x	x
Marquez City Hall	x	x	x	x

C) Vulnerable Structures

Every structure is vulnerable to damage from hail. However, commercial structures with flat roofs are especially vulnerable due to the increased exposure that flat roofs create. Commercial buildings and their values detailed in the Leon County CHAMPS report were used for the commercial building value seen below.

Table 53: All Parcels Vulnerable to Hailstorms

Jurisdiction	Estimated Potential Damage Value
County	\$1,656,299,949
City of Buffalo	\$88,731,470
City of Centerville	\$43,190,200
City of Jewett	\$29,209,150
City of Leona	unavailable
City of Marquez	\$12,890,020
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

Table 54: Commercial Parcels Vulnerable to Hailstorms

Building	Building Count	Estimated Potential Damage Value
Commercial	296	\$83,422,000

15. Land Subsidence

Land subsidence is defined as the loss of surface elevation due to the removal of subsurface support. It can range from broad, regional lowering of the land surface to localized, full-blown collapses. Land subsidence occurs in different areas with different soil types for different reasons.

1) Land Subsidence History

Leon County doesn't have a documented history of damages caused by land subsidence. However, the planning team has determined that the hazard is known to affect structures and infrastructure in the jurisdiction, primarily in the form of sinkholes. Moving forward, the County will make an effort to track instances of damages due to land subsidence to begin developing a comprehensive history of the hazard and its effects.

2) Likelihood of Future Occurrence

Given the lack of an officially recorded hazard history in Leon County, it's difficult to attempt to estimate the likelihood of future land subsidence events.

However, based on the planning team's assessment, it may be fair to say that a future land subsidence event is unlikely, meaning 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

The magnitude or intensity of a land subsidence event is measured by the depth of land loss. Land subsidence can range from as little as 1' to well over 100'. In the case of sinkholes, width is also a consideration. The sinkholes in Wink, Texas, two of the worst in the State, have diameters of 300' and 900'.

According to information the planning team put together, land subsidence events near Leon County and the participating jurisdictions have been as deep as 20' and as wide as 8'. These are known to have occurred in Waco, Temple, and around Lake Palestine.

In addition to considering their depth and width, sinkholes may expand over time. The sinkholes in Wink expand ²⁹at the rate of nearly 2" per year.

Generally, land subsidence will likely cause only minor property damage and minimal disruption to the quality of life in the participating jurisdictions.

²⁹ <http://blog.smu.edu/research/2016/06/13/geohazard-giant-sinkholes-near-west-texas-oil-patch-towns-are-growing-as-new-ones-lurk/>

However, future worst-case sinkhole depths may reach 20', widths may reach 8', and if a future sinkhole can't be filled in, its expansion rates could reach 2" per year. Regardless of future sinkhole depth, width, and expansion rates, land loss, total destruction, injuries, and death may result from future sinkhole and land subsidence events.

4) Location and Impact

A) Location

Land subsidence has no distinct geographic boundary. Land subsidence may occur across the entire planning area.

B) Impact – All Jurisdictions

The impact of land subsidence is normally minor, resulting in few, if any, injuries. Although no deaths related to land subsidence have been reported in Leon County, in the worst cases, the hazard has the potential to be deadly.

Land subsidence may occur slowly over long periods of time, or it can occur rapidly in the form of a sinkhole. Therefore, estimated property losses associated with the hazard are generally anticipated to be minimal, but they have the potential to be total.

Land subsidence may result in damaged building foundations as well as damaged infrastructure including: pipelines, roadways, and sidewalks. These damages may require extensive repair work. In the case of local infrastructure, damages may impede normal business operations and incur repair costs beyond any participating jurisdiction's immediate ability to fund them quickly.

If a sinkhole opens, the damage can be immediate and devastating. Sinkholes may lead to the collapse and complete destruction of nearby structures and infrastructure. Sinkholes can be deadly, especially if they occur along roadways or in commercial centers. In the case of sinkholes, repairing damaged structures and infrastructure may be cost prohibitive. Associated demolition and reconstruction costs may exceed any property owner's or participating jurisdiction's financial capacity and may result in the structure or infrastructure being abandoned, saddling the County with any associated costs and challenges.

5) Vulnerability

Given the lack of officially reported historical damage data, it's not possible to specifically identify which buildings, infrastructure, and critical facilities are vulnerable to damages significant enough to interrupt or stop normal operations. The unpredictable nature of the hazard adds an additional layer of complication, and it makes identifying differences in vulnerability impossible at this time. Therefore, all are considered equally vulnerable to land subsidence.

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

A) Critical Facilities

Table 55: Leon County and Participating Jurisdictions Critical Facilities Vulnerable to Land Subsidence

Leon County and Participating Jurisdictions	Potential Land Subsidence Impacts			
	Destruction	Structural Damage	Water / Wastewater Line Damages	Economic Damages
Dillard Ranch Airport	x	x		
Moore Ranch Airport	x	x		
Morris Lazy K Ranch Airport	x	x		
Hilltop Lakes Airport	x	x		
Miles Field Airport	x	x		
Hub Field Airport	x	x		
Wood Crest Ranch Airport	x	x		
Carter Ranch Airport	x	x		
Communications Tower for KTCJ	x	x		
Communications Tower for KBHT	x	x		
Communications Tower for KMVL-FM	x	x		
Reliant Energy Limestone Electric Generating Plant	x	x		x
Normangee Volunteer Fire Department	x	x	x	x
Oakwood Volunteer Fire Department	x	x	x	x
Centerville Volunteer Fire Department	x	x	x	x
Hilltop Lakes Volunteer Fire Department	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x
Jewett Police Station	x	x	x	x
Leon County Sheriff's Office	x	x	x	x
Centerville Elementary School	x	x	x	x
Centerville Jr. and Sr. High School	x	x	x	x
Leon Elementary School	x	x	x	x
Leon High School	x	x	x	x
Leon Junior High School	x	x	x	x

Normangee Elementary School	x	x	x	x
Normangee Middle School	x	x	x	x
Normangee High School	x	x	x	x
Oakwood Elementary School	x	x	x	x
City of Centerville WWTP	x	x	x	x
City of Jewett WWTP	x	x	x	x
City of Normangee WWTP	x	x	x	x
City of Oakwood WWTP	x	x	x	x
Guy's Lumber and Hardware in Centerville	x	x	x	x
Centerville Building Supplies	x	x	x	x
Lacey's Grocery in Centerville	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x
Centerville City Hall	x	x	x	x
Jewett City Hall	x	x	x	x
Normangee City Hall	x	x	x	x
Oakwood City Hall	x	x	x	x
Leon County Courthouse and Annex	x	x	x	x

B) Vulnerable Structures

Table 56: Land Subsidence Vulnerability

Jurisdiction	Estimated Potential Damage Value
Leon County	\$1,656,299,949
City of Centerville	\$43,190,200
City of Jewett	\$29,209,150
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

16. Severe Winter Storm

A severe winter storm is defined by extreme cold and heavy concentrations of snowfall or ice. Texas is disrupted more severely by severe winter storms than are regions that experience severe winter weather more frequently.

The types of severe winter storms 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 Storm History

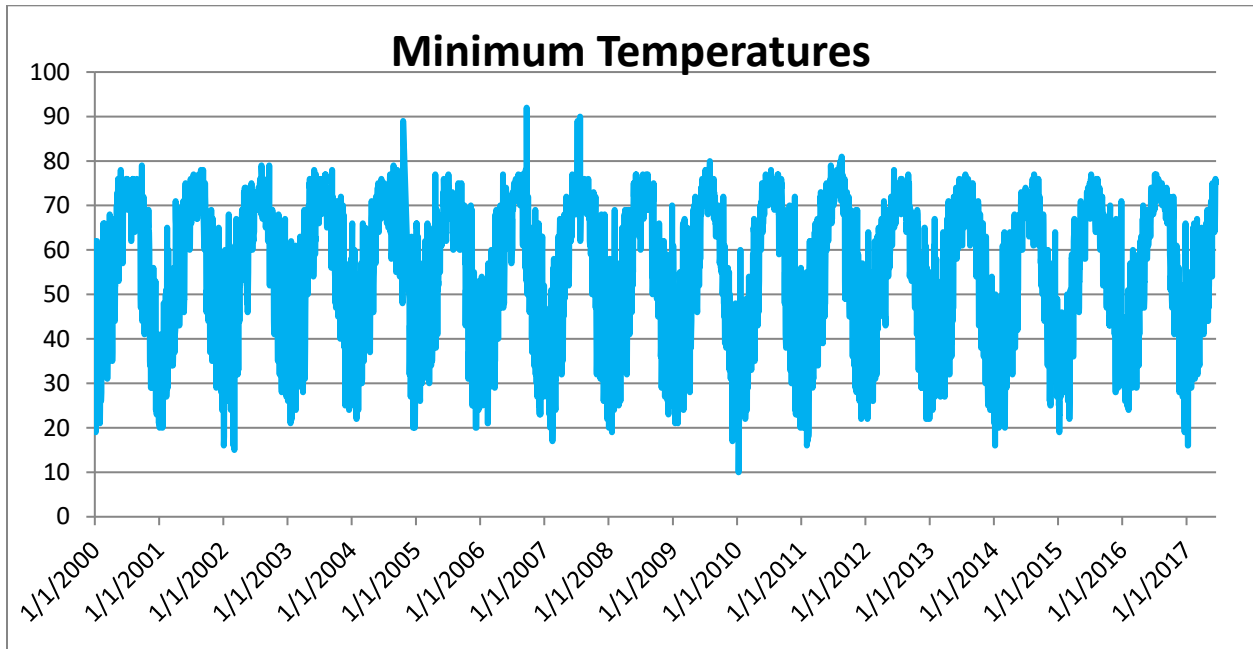


Figure 81: Minimum Recorded Daily Temperature, 2000-2017³⁰

Between 2000 and 2017, Leon County experienced 806 days with a minimum temperature of 32°F or colder. At least 16 of those days had a maximum temperature of 32°F or below.

During the same timeframe, the coldest temperature recorded was 10°F on January 9 and 10, 2010.

Table 57: Leon County and Participating Jurisdictions Severe Winter Weather Hazard History

Date	Time	Hazard	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
1/9/1962	-	-	0	0	\$19,420	\$19,420	\$157,520	\$157,520
12/10/1972	-	-	0	0	\$198	\$0	\$1,161	\$0
1/8/1973	-	-	0	0	\$1,999	\$199,857	\$11,027	\$1,102,609
3/29/1987	-	-	0	0	\$0	\$35,938	\$0	\$77,494
2/9/1994	-	-	0	0	\$64,721	\$0	\$106,975	\$0
11/24/1996	2:00 PM	Winter Storm	0	0	\$0	\$0	\$0	\$0
1/12/1997	8:00 PM	Winter Weather	0	0	\$0	\$0	\$0	\$0
12/22/1998	12:00 AM	Ice Storm	0	0	\$0	\$0	\$0	\$0
1/25/2000	12:00 AM	Winter Storm	0	0	\$0	\$0	\$0	\$0
1/25/2000	-	-	0	0	\$0	\$0	\$0	\$0
12/12/2000	6:00 PM	Winter Storm	0	0	\$0	\$0	\$0	\$0
12/25/2000	12:00 AM	Winter Storm	0	0	\$0	\$0	\$0	\$0
12/31/2000	12:00 AM	Winter Storm	0	0	\$0	\$0	\$0	\$0
1/1/2001	12:00 AM	Heavy Snow	0	0	\$0	\$0	\$0	\$0

³⁰ Source: National Climatic Data Center, <https://www.ncdc.noaa.gov/cdo-web/datasets>

2/24/2003	11:20 AM	Winter Storm	0	0	\$0	\$0	\$0	\$0
2/24/2003	-	-	0	0	\$326,664	\$0	\$434,880	\$0
12/22/2004	12:01 AM	Winter Weather	0	0	\$0	\$0	\$0	\$0
2/11/2010	7:00 PM	Winter Weather	0	0	\$15,000	\$0	\$16,850	\$0
2/11/2010	-	-	0	0	\$14,959	\$0	\$16,804	\$0
3/5/2015	8:34 AM	Winter Weather	0	0	\$0	\$0	\$0	\$0

NOAA Data
CHAMPS Data
Reported by Both

Severe winter weather data is recorded at the county level. However, given the nature of severe winter weather and the proximity of all jurisdictions to each other, every jurisdiction experienced the same severe winter weather events. No severe winter weather has been recorded in any jurisdiction since 2015.

2) Likelihood of Future Events

Because it is likely that more winter storms have occurred than have been officially reported, the likelihood of winter storms occurring in Leon County and the participating jurisdictions is occasional, meaning an event affecting any or all of the participating jurisdictions is possible in the next five years.

3) Extent

Table 58 below displays the magnitude of severe winter storms. The wind-chill factor is further described in Figure 82. The wind chill index was developed by the National Weather Service. It neither addresses temperatures above 40°F nor wind speeds below 5 mph.

Table 58: Winter Weather Extent Scale³¹

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. <i>A Freeze Watch is issued when these conditions may be met 12 to 48 hours in the future.</i>
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	Issued when winds of 25 to 34 mph are expected to be accompanied

³¹ Source: National Weather Service Weather Forecast Office; Norman, Oklahoma. <http://www.srh.noaa.gov/oun/?n=spotter-wwa-definitions>

Snow Advisory	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.
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 ³²	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 ³³	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. <i>A Winter Storm Watch is issued when these conditions may be met 12 to 48 hours in the future.</i>
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. <i>A Blizzard Watch is issued when these conditions may be met 12 to 48 hours in the future.</i>

* - Non-precipitation watch / warning / advisory

³² https://www.osha.gov/dts/weather/winter_weather/windchill.html

³³ https://www.osha.gov/dts/weather/winter_weather/windchill.html



Wind Chill Chart

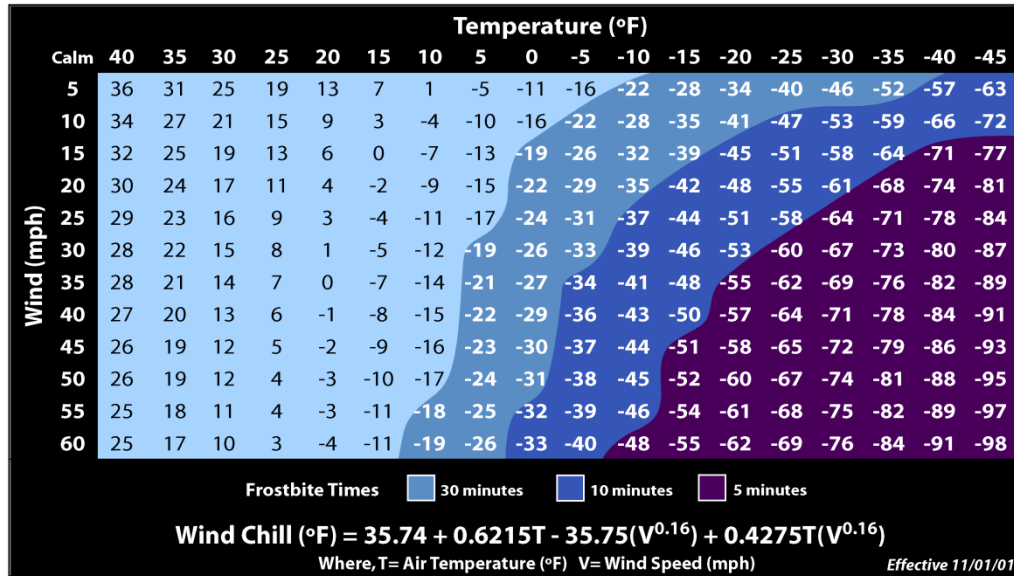


Figure 82: NWS Wind Chill Index

According to the Leon County 2013 CHAMPS Report, the most damaging winter storm has inflicted over \$1 million in crop damages and over \$150,000 in property damages in \$2017 on January 8, 1973. The most recent winter storm to inflict damages in the County occurred in 2010. Property damages for that storm totaled \$16,804 in \$2017. Severe winter weather isn't known to have caused any injuries or deaths in any jurisdiction in Leon County.

Future winter storm events in Leon County and the participating jurisdictions may see temperatures drop to the lowest recently recorded temperature, 10°F, see snow accumulation of 1", or see ice accumulation of 1/2".

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 Leon 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.

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 severe winter storms 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

While all of the participating jurisdictions are exposed to extreme temperatures, existing buildings, infrastructure, and critical facilities are not considered vulnerable to significant damage caused by severe winter storm events. This determination was made based on the expectation that most roofs can support 20 lbs. / square foot of snow³⁴. The worst snow storm in any participating jurisdiction dropped 1". Although it's not impossible³⁵ 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 ½", it's unlikely, but not impossible, that an ice storm causing structural ice accumulations of less than 4" will cause significant structural damages.

Therefore, estimated property losses associated are anticipated to be minimal across the area. Areas with concentrations of young, elderly, and low-income residents identified in Section 3 of Chapter 3 above, may feel greater impacts from severe winter weather due to those populations' limited ability to properly address the hazard.

Any shutdown of critical facilities due to severe winter weather is expected to be temporary. However, based on the risk of losing power during severe winter storms, the following critical facilities were deemed more vulnerable than others in the County and participating jurisdictions since their operation is critical to the population getting through the storm safely.

³⁴ <https://disastersafety.org/freezing-weather/prevent-roof-collapse-homes/>

³⁵ 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.

Table 59: Critical Facilities Vulnerable to Winter Storms

Leon County and Participating Jurisdictions Critical Facilities
Reliant Energy Limestone Electric Generating Plant
Jewett Police Station
Buffalo Police Station
Leon County Sheriff's Office
Leona General Store
Guy's Lumber and Hardware in Centerville
Centerville Building Supplies
Lacey's Grocery in Centerville
Brookshire Brothers in Normangee
Buffalo Ace Hardware
Buffalo City Hall
Centerville City Hall
Jewett City Hall
Leona City Hall
Marquez City Hall
Normangee City Hall
Oakwood City Hall
Leon County Courthouse and Annex

17. Windstorm

A windstorm³⁶ 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) Windstorm History

Between 1981 – 2017, the most recently recorded windstorm in any jurisdiction, Leon County and the participating jurisdictions experienced damaging high winds with gusts up to 61 knots on 106 separate occasions not related to a Hurricane or Tropical Storm event.

³⁶ <https://www.britannica.com/science/windstorm>

Leon County

Location	Date	Time	Hazard	Windspeed Knots	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
-	2/10/1981	2:00 AM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	2/10/1981	2:15 AM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	2/10/1981	3:00 AM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	5/17/1982	3:30 AM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	6/28/1982	3:00 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	12/13/1984	9:30 AM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	6/17/1987	6:35 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	6/23/1988	6:23 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	5/4/1989	11:30 PM	Thunderstorm Wind	61	0	0	\$0	\$0	\$0	\$0
-	5/4/1989	11:37 PM	Thunderstorm Wind	56	0	0	\$0	\$0	\$0	\$0
-	6/7/1989	6:00 PM	Thunderstorm Wind	56	0	0	\$0	\$0	\$0	\$0
-	6/25/1990	10:05 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	4/13/1991	2:24 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	4/28/1991	3:08 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
-	4/29/1992	2:00 AM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
-	5/2/1994	-	-	-	0	0	\$49,836	\$0	\$82,372	\$0
-	4/20/1996	-	-	-	0	0	\$1,993	\$0	\$3,112	\$0
-	2/25/1998	-	-	-	0	0	\$3,763	\$0	\$5,975	\$0
-	2/26/1998	-	-	-	0	0	\$149,089	\$0	\$224,050	\$0
-	5/17/1999	-	-	-	0	0	\$602	\$0	\$885	\$0
-	9/2/2000	-	-	-	0	0	\$9,969	\$0	\$14,180	\$0
-	3/19/2002	-	-	-	0	0	\$991	\$0	\$1,350	\$0
-	3/30/2002	-	-	-	0	0	\$496	\$0	\$675	\$0
Flo	3/30/2002	3:45 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
-	5/1/2003	-	-	-	0	0	\$5,009	\$0	\$6,668	\$0
-	6/1/2004	-	-	-	0	0	\$9,930	\$0	\$12,877	\$0
-	5/8/2005	-	-	-	0	0	\$14,886	\$0	\$18,671	\$0
-	5/8/2005	-	-	-	0	0	\$2,977	\$0	\$3,734	\$0
-	5/8/2005	-	-	-	0	0	\$2,977	\$0	\$3,734	\$0
-	7/2/2005	-	-	-	0	0	\$4,962	\$0	\$6,223	\$0
Flynn	7/2/2005	10:25 PM	Thunderstorm Wind	50	0	0	\$5,000	\$0	\$6,271	\$0
-	5/14/2008	-	-	-	0	0	\$995	\$0	\$1,132	\$0
Redland	5/14/2008	11:25 PM	Thunderstorm Wind	50	0	0	\$1,000	\$0	\$1,138	\$0
-	10/1/2009	-	-	-	0	0	\$501	\$0	\$572	\$0

-	10/1/2009	-	-	-	0	0	\$250	\$0	\$286	\$0
-	10/23/2010	-	-	-	0	0	\$499	\$0	\$560	\$0
-	4/4/2011	-	-	-	0	0	\$2,996	\$0	\$3,263	\$0
-	4/25/2011	-	-	-	0	0	\$4,994	\$0	\$5,438	\$0
Keechi	4/25/2011	7:04 PM	Thunderstorm Wind	61	0	0	\$5,000	\$0	\$5,445	\$0
New Salem	2/21/2013	10:07 AM	Thunderstorm Wind	43	0	0	\$6,000	\$0	\$6,309	\$0
New Salem	10/12/2013	3:12 PM	Thunderstorm Wind	52	0	0	\$5,000	\$0	\$5,258	\$0
Wealthy	10/12/2013	3:30 PM	Thunderstorm Wind	52	0	0	\$5,000	\$0	\$5,258	\$0
-	11/17/2015	5:45 AM	Strong Wind	43	0	0	\$2,000	\$0	\$2,067	\$0
New Salem	1/2/2017	5:58 AM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Buffalo

Location	Date	Time	Hazard	Windspeed Knots	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Buffalo	6/14/1997	3:00 AM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
Buffalo	2/26/1998	12:10 AM	Thunderstorm Wind	-	0	0	\$50,000	\$0	\$75,140	\$0
Buffalo	5/17/1999	7:45 PM	Thunderstorm Wind	-	0	0	\$200	\$0	\$294	\$0
Buffalo	9/2/2000	3:13 PM	Thunderstorm Wind	-	0	0	\$10,000	\$0	\$14,225	\$0
Buffalo	9/4/2003	7:20 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Buffalo	6/1/2004	10:44 PM	Thunderstorm Wind	61	0	0	\$10,000	\$0	\$12,967	\$0
Buffalo	5/8/2005	7:38 AM	Thunderstorm Wind	52	0	0	\$3,000	\$0	\$3,763	\$0
Buffalo	5/7/2008	5:56 PM	Thunderstorm Wind	50	0	0	\$0	\$0	\$0	\$0
Buffalo	10/6/2008	8:10 PM	Thunderstorm Wind	50	0	0	\$0	\$0	\$0	\$0
Buffalo	2/10/2009	11:00 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Buffalo	5/26/2014	12:50 PM	Thunderstorm Wind	50	0	0	\$3,000	\$0	\$3,104	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Centerville

Location	Date	Time	Hazard	Windspeed Knots	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Centerville	6/18/1994	5:40 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Centerville	6/18/1994	5:52 PM	Thunderstorm Wind	57	0	0	\$0	\$0	\$0	\$0
Centerville	10/31/1995	6:10 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
Centerville	4/20/1996	1:40 PM	Thunderstorm Wind	-	0	0	\$2,000	\$0	\$3,122	\$0
Centerville	5/30/1997	9:10 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
Centerville	6/22/1997	5:45 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Centerville	8/4/1998	5:11 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
Centerville	5/11/1999	9:20 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Centerville	4/7/2000	8:45 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Centerville	3/30/2002	3:04 PM	Thunderstorm Wind	-	0	0	\$500	\$0	\$681	\$0
Centerville	5/8/2005	7:30 AM	Thunderstorm Wind	52	0	0	\$15,000	\$0	\$18,814	\$0
Centerville	2/10/2009	11:12 PM	Thunderstorm Wind	56	0	0	\$0	\$0	\$0	\$0
Centerville	3/28/2014	4:35 PM	Thunderstorm Wind	56	0	0	\$20,000	\$0	\$20,694	\$0
Centerville	3/28/2014	4:35 PM	Thunderstorm Wind	56	0	0	\$7,000	\$0	\$7,243	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Jewett

Location	Date	Time	Hazard	Windspeed Knots	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Jewett	2/26/1998	12:04 AM	Thunderstorm Wind	-	0	0	\$60,000	\$0	\$90,168	\$0
Jewett	5/17/1999	7:50 PM	Thunderstorm Wind	-	0	0	\$200	\$0	\$294	\$0
Jewett	9/2/2000	3:00 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Jewett	5/6/2001	6:00 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Jewett	5/28/2001	3:20 AM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Jewett	3/30/2002	3:48 PM	Thunderstorm Wind	50	0	0	\$0	\$0	\$0	\$0
Jewett	5/8/2005	7:32 AM	Thunderstorm Wind	52	0	0	\$3,000	\$0	\$3,763	\$0
Jewett	2/10/2009	10:52 PM	Thunderstorm Wind	64	0	0	\$0	\$0	\$0	\$0

Jewett	10/23/2010	4:50 PM	Thunderstorm Wind	52	0	0	\$500	\$0	\$562	\$0
Jewett	4/4/2011	7:27 AM	Thunderstorm Wind	52	0	0	\$3,000	\$0	\$3,267	\$0
Jewett	10/12/2013	3:04 PM	Thunderstorm Wind	52	0	0	\$5,000	\$0	\$5,258	\$0
Jewett	2/20/2017	1:55 AM	Thunderstorm Wind	61	0	0	\$10,000	\$0	\$10,000	\$0

- NOAA Data
- CHAMPS Data
- Reported by Both

City of Leona

None of the windstorms reported to have struck Leon County were recorded as specifically affecting the City of Leona. However, windstorms have affected the City, and as future storms occur, the jurisdiction will work to build an accurate windstorm history.

City of Marquez

Location	Date	Time	Hazard	Windspeed Knots	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Marquez	5/2/1994	6:57 PM	Thunderstorm Wind	-	0	0	\$500,000	\$0	\$826,434	\$0
Marquez	5/9/1994	2:30 PM	Thunderstorm Wind	-	0	0	\$500	\$0	\$826	\$0
Marquez	5/30/1997	9:30 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
Marquez	2/25/1998	11:45 PM	Thunderstorm Wind	-	0	0	\$4,000	\$0	\$6,011	\$0
Marquez	3/30/2002	3:30 PM	Thunderstorm Wind	50	0	0	\$0	\$0	\$0	\$0
Marquez	5/1/2003	9:30 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Marquez	11/23/2004	1:00 PM	Thunderstorm Wind	50	0	0	\$0	\$0	\$0	\$0
Marquez	5/14/2006	11:15 AM	Thunderstorm Wind	50	0	0	\$0	\$0	\$0	\$0
Marquez	10/1/2009	9:50 PM	Thunderstorm Wind	56	0	0	\$250	\$0	\$286	\$0
Marquez	1/2/2017	6:04 AM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Marquez	2/20/2017	1:41 AM	Thunderstorm Wind	56	0	0	\$10,000	\$0	\$10,000	\$0
Marquez	2/20/2017	1:43 AM	Thunderstorm Wind	56	0	0	\$0	\$0	\$0	\$0
Marquez	2/20/2017	1:45 AM	Thunderstorm Wind	70	0	0	\$5,000	\$0	\$5,000	\$0
Marquez	2/20/2017	1:45 AM	Thunderstorm Wind	56	0	0	\$0	\$0	\$0	\$0
Marquez	2/20/2017	1:45 AM	Thunderstorm Wind	56	0	0	\$10,000	\$0	\$10,000	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Normangee

Location	Date	Time	Hazard	Windspeed Knots	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Normangee	3/19/2002	11:05 PM	Thunderstorm Wind	-	0	0	\$1,000	\$0	\$1,362	\$0
Normangee	7/6/2002	11:42 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Normangee	5/1/2003	9:33 PM	Thunderstorm Wind	52	0	0	\$5,000	\$0	\$6,656	\$0
Normangee	6/12/2003	6:30 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Normangee	10/1/2009	10:05 PM	Thunderstorm Wind	56	0	0	\$500	\$0	\$571	\$0
Nomangee	2/20/2017	2:11 AM	Thunderstorm Wind	56	0	0	\$5,000	\$0	\$5,000	\$0

NOAA Data

CHAMPS Data

Reported by Both

City of Oakwood

Location	Date	Time	Hazard	Windspeed Knots	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Oakwood	11/10/1995	11:00 PM	Thunderstorm Wind	-	0	0	\$0	\$0	\$0	\$0
Oakwood	2/26/1998	12:10 AM	Thunderstorm Wind	-	0	0	\$40,000	\$0	\$60,112	\$0
Oakwood	5/11/1999	9:20 PM	Thunderstorm Wind	52	0	0	\$0	\$0	\$0	\$0
Oakwood	5/17/1999	7:50 PM	Thunderstorm Wind	-	0	0	\$200	\$0	\$294	\$0

NOAA Data

CHAMPS Data

Reported by Both

2) Likelihood of Future Events

Leon County and the participating jurisdictions have experienced a damaging windstorm roughly once every two or three years. Given the frequency of past events in both jurisdictions, a damaging windstorm in the future is likely, meaning that an event is probable in the next three years.

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 60: Beaufort Wind Scale³⁷

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	Slight structural damage occurs, slate blows off roofs

³⁷ Source: www.spc.noaa.gov/faq/tornado/beaufort.html

			of foam, spray may reduce visibility	
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	

The worst windstorms in Leon County and the participating jurisdictions have ranged up to an 11 on the Beaufort Wind Scale.

Adjusted for inflation to \$2017, the most devastating windstorms have inflicted up to \$826,434 in property damages but no agricultural damages.

No windstorm in any of the participating jurisdictions has caused any injuries or deaths.

Future windstorms may meet previous worst-case Force 11 events in terms of wind speed, damage dollars inflicted, and residents injured or killed.

4) Location and Impact

A) Location

Windstorms are not constrained by any distinct geographic boundary. Windstorms can occur across all participating jurisdictions.

B) Impact

Impacts from a windstorm may include but are not limited to damaged or destroyed personal property including vehicles, and 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, windstorms may cause injuries and/or be deadly.

5) Vulnerability

Windstorms 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 windstorms.

Based on windstorm data collected for the participating jurisdictions, windstorms primarily damage physical structures. However, there is no uniformity with respect to the type of structures that have been damaged by windstorms in any of the participating jurisdictions. Windstorm 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, Leon 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 windstorm.

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

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

Certain critical facilities and infrastructure in each jurisdiction may be particularly vulnerable to windstorms. 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 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 windstorm if that damage affects the facility's ability to reopen and resume normal business right away.

Table 6 I: Critical Facilities Vulnerable to Windstorms and Potential Impacts

Leon County	Potential Windstorm 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
Communications Tower for KTCJ	x	x	x	x	x	x	x	x	x
Communications Tower for KBHT	x	x	x	x	x	x	x	x	x
Communications Tower for KMVL-FM	x	x	x	x	x	x	x	x	x
Reliant Energy Limestone Electric Generating Plant	x	x	x	x	x	x	x	x	x
Buffalo Fire Department	x	x	x	x	x	x	x	x	x
Normangee Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Oakwood Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Centerville Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Hilltop Lakes Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Marquez Volunteer Fire Department	x	x	x	x	x	x	x	x	x
Leona Fire Department	x	x	x	x	x	x	x	x	x
Jewett Police Station	x	x	x	x	x	x	x	x	x
Buffalo Police Station	x	x	x	x	x	x	x	x	x
Leon County Sheriff's Office	x	x	x	x	x	x	x	x	x
Buffalo Elementary School	x	x	x	x	x	x	x	x	x

Buffalo High School	x	x	x	x	x	x	x	x	x
Buffalo Middle School	x	x	x	x	x	x	x	x	x
Centerville Elementary School	x	x	x	x	x	x	x	x	x
Centerville Jr. and Sr. High School	x	x	x	x	x	x	x	x	x
Leon Elementary School	x	x	x	x	x	x	x	x	x
Leon High School	x	x	x	x	x	x	x	x	x
Leon Junior High School	x	x	x	x	x	x	x	x	x
Normangee Elementary School	x	x	x	x	x	x	x	x	x
Normangee Middle School	x	x	x	x	x	x	x	x	x
Normangee High School	x	x	x	x	x	x	x	x	x
Oakwood Elementary School	x	x	x	x	x	x	x	x	x
City of Buffalo WWTP	x	x	x	x	x	x	x	x	x
City of Centerville WWTP	x	x	x	x	x	x	x	x	x
City of Jewett WWTP	x	x	x	x	x	x	x	x	x
City of Leona WWTP	x	x	x	x	x	x	x	x	x
City of Normangee WWTP	x	x	x	x	x	x	x	x	x
City of Oakwood WWTP	x	x	x	x	x	x	x	x	x
Leona General Store	x	x	x	x	x	x	x	x	x
Guy's Lumber and Hardware in Centerville	x	x	x	x	x	x	x	x	x
Centerville Building Supplies	x	x	x	x	x	x	x	x	x

Lacey's Grocery in Centerville	x	x	x	x	x	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x	x	x	x	x	x
Buffalo Ace Hardware	x	x	x	x	x	x	x	x	x
Buffalo City Hall	x	x	x	x	x	x	x	x	x
Centerville City Hall	x	x	x	x	x	x	x	x	x
Jewett City Hall	x	x	x	x	x	x	x	x	x
Leona City Hall	x	x	x	x	x	x	x	x	x
Marquez City Hall	x	x	x	x	x	x	x	x	x
Normangee City Hall	x	x	x	x	x	x	x	x	x
Oakwood City Hall	x	x	x	x	x	x	x	x	x
Leon County Courthouse and Annex	x	x	x	x	x	x	x	x	x

C) Vulnerable Parcels

Table 62: Parcels Vulnerable to Windstorms

Jurisdiction	Estimated Potential Damage Value
County	\$1,656,299,949
City of Buffalo	\$88,731,470
City of Centerville	\$43,190,200
City of Jewett	\$29,209,150
City of Leona	unavailable
City of Marquez	\$12,890,020
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

18. 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 50 people ³⁸each year in the United States.

1) Lightning History

The last time Leon County or any of the participating jurisdictions recorded a lightning event was in 2014 in Normangee. That event resulted in \$20,694 in property damage in \$2017.

Table 63: Leon County Lightning History

Location	Date	Time	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
-	5/19/1963	-	0	0	\$499,795	\$0	\$4,000,894	\$0
-	5/13/1985	-	1	2	\$0	\$0	\$0	\$0
Guys Store	6/10/2010	9:15 AM	0	0	\$25,000	\$0	\$28,084	\$0
-	6/10/2010	-	0	0	\$24,931	\$0	\$28,006	\$0
-	3/14/2011	-	0	0	\$49,938	\$0	\$54,381	\$0
Nineveh	3/14/2011	6:15 AM	0	0	\$50,000	\$0	\$54,449	\$0

NOAA Data
CHAMPS Data
Reported by Both

Table 64: City of Normangee Lightning History

Location	Date	Time	Fatalities	Injuries	Property Damage	Crop Damage	Property Damage \$2017	Crop Damage \$2017
Nomangee	8/19/2014	4:49 PM	0	0	\$20,000	\$0	\$20,694	\$0

NOAA Data
CHAMPS Data
Reported by Both

No lightning-inflicted property or crop damage dollars have been recorded in the Cities of Buffalo, Centerville, Jewett, Leona, Marquez, or Oakwood.

³⁸ <http://www.lightningsafety.noaa.gov/victims.shtml>

2) Likelihood of Future Events

Lightning is especially associated with thunderstorms. A lightning event is highly likely, meaning an event affecting any or all of the participating jurisdictions is probable in the next year.

According to information from VAISALA³⁹, most of Leon County, including the participating jurisdictions, can expect between 12 and 20 lightning flashes per square mile per year. Small portions of the County can expect to see 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 Leon County and all participating jurisdictions may experience lightning events between LAL 1 and LAL 5. Dry thunderstorms, LAL 6, are not expected.

Table 65: Lightning Activity Levels⁴⁰

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.	

³⁹ http://www.vaisala.com/VaisalaImages/Lightning/avg_fd_2005-2014_CONUS_2mi_grid.png

⁴⁰ Source: <http://www.prh.noaa.gov/hnl/pages/LAL.php>

The worst lightning events to affect Leon County and the participating jurisdictions have inflicted over \$4 million in property damages in 2017. In addition, one death and two injuries have been reported due to lightning in Leon County.

Future events may meet previous intensity level of up to LAL 4, damage dollars inflicted, and the number of residents injured or killed.

4) Location and Impact

A) Location

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

B) Impact

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 myth⁴¹ that lightning always strikes the tallest objects. Given lightning's indiscriminate nature, it is impossible to identify buildings that 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 66: Critical Facilities Vulnerable to Lightning and Potential Impacts

Leon County	Potential Lightning Impacts			
	Physical Damage	Electrical Damage	Data Damage or Loss	Fire
Dillard Ranch Airport	x	x		x
Moore Ranch Airport	x	x		x
Morris Lazy K Ranch Airport	x	x		x
Hilltop Lakes Airport	x	x		x
Miles Field Airport	x	x		x

⁴¹ http://lightning.org/wp-content/uploads/2015/06/LPI_lightning_infographic_2015.jpg

Hub Field Airport	x	x		x
Wood Crest Ranch Airport	x	x		x
Carter Ranch Airport	x	x		x
Communications Tower for KTCJ	x	x		x
Communications Tower for KBHT	x	x		x
Communications Tower for KMVL-FM	x	x		x
Reliant Energy Limestone Electric Generating Plant	x	x	x	x
Buffalo Fire Department	x	x	x	x
Normangee Volunteer Fire Department	x	x	x	x
Oakwood Volunteer Fire Department	x	x	x	x
Centerville Volunteer Fire Department	x	x	x	x
Hilltop Lakes Volunteer Fire Department	x	x	x	x
Jewett Volunteer Fire Department	x	x	x	x
Marquez Volunteer Fire Department	x	x	x	x
Leona Fire Department	x	x	x	x
Jewett Police Station	x	x	x	x
Buffalo Police Station	x	x	x	x
Leon County Sheriff's Office	x	x	x	x
Buffalo Elementary School	x	x	x	x
Buffalo High School	x	x	x	x
Buffalo Middle School	x	x	x	x
Centerville Elementary School	x	x	x	x
Centerville Jr. and Sr. High School	x	x	x	x
Leon Elementary School	x	x	x	x
Leon High School	x	x	x	x
Leon Junior High School	x	x	x	x
Normangee Elementary School	x	x	x	x
Normangee Middle School	x	x	x	x

Normangee High School	x	x	x	x
Oakwood Elementary School	x	x	x	x
City of Buffalo WWTP	x	x		x
City of Centerville WWTP	x	x		x
City of Jewett WWTP	x	x		x
City of Leona WWTP	x	x		x
City of Normangee WWTP	x	x		x
City of Oakwood WWTP	x	x		x
Leona General Store	x	x	x	x
Guy's Lumber and Hardware in Centerville	x	x	x	x
Centerville Building Supplies	x	x	x	x
Lacey's Grocery in Centerville	x	x	x	x
Brookshire Brothers in Normangee	x	x	x	x
Buffalo Ace Hardware	x	x	x	x
Buffalo City Hall	x	x	x	x
Centerville City Hall	x	x	x	x
Jewett City Hall	x	x	x	x
Leona City Hall	x	x	x	x
Marquez City Hall	x	x	x	x
Normangee City Hall	x	x	x	x
Oakwood City Hall	x	x	x	x
Leon County Courthouse and Annex	x	x	x	x

B) Vulnerable Parcels

Table 67: Parcels Vulnerable to Lightning

Jurisdiction	Estimated Potential Damage Value
County	\$1,656,299,949
City of Buffalo	\$88,731,470

City of Centerville	\$43,190,200
City of Jewett	\$29,209,150
City of Leona	unavailable
City of Marquez	\$12,890,020
City of Normangee	\$23,959,150
City of Oakwood	\$12,579,690

19. Mitigation Strategy

1) Capability Assessment

Leon County and the participating jurisdictions have shown themselves to be highly capable, especially in terms of implementing hazard mitigation actions. Of the five participating jurisdictions, four participated in the previous GBRA plan. Each of these jurisdictions completed, or is in the process of completing, many of the actions recommended in the GBRA 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: creating and adopting regularly updated comprehensive plans, 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.

Table 68: Capability Assessment by Jurisdiction

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

City of Buffalo Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Building Code Enforcement

Nuisance Abatement
Substandard Structures Abatement
Water Conservation Planning
Drought Contingency Planning
Comprehensive Planning
Economic Development
Tax Collection
Grant Writing
General Budgeting
CIP Funding
CDBG Funding
State and Federal Grant Funding

City of Centerville Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Subdivision
Substandard Structures Abatement
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 Jewett Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Subdivision

Zoning
Building Code Enforcement
Substandard Structures Abatement
Drought Contingency Planning
Tax Collection
Grant Writing
General Budgeting
CDBG Funding
State and Federal Grant Funding

City of Leona Administrative, Financial, Regulatory, and Technical Abilities
No information was available regarding Leona's Abilities

City of Marquez Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Building Code Enforcement
Nuisance Abatement
Drought Contingency Planning
Tax Collection
Grant Writing
General Budgeting
CDBG Funding
State and Federal Grant Funding

City of Normangee Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Building Code Enforcement
Comprehensive Planning
Economic Development

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

City of Oakwood Administrative, Financial, Regulatory, and Technical Abilities
Floodplain management
Emergency Management
Substandard Structures Abatement
Tax Collection
Grant Writing
General Budgeting
CDBG Funding
State and Federal Grant Funding

2) Goals and Objectives Overview

The hazard analysis has shown that Leon 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.

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. Although some goals and objectives are similar to those of the previous plan from 2013, this update includes new goals and objectives that the participating jurisdictions feel more closely reflect their intentions.

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.

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) Previous Mitigation Actions

The previous Mitigation Action Plan for Leon County and the participating jurisdictions outlined 87 mitigation actions to be taken by the County or jurisdictions.

These are all listed below:

Leon County

ACTION: Two new towers to be erected to provide emergency notification to communities where no current coverage exists.

Hazard: Flood, tornado, hurricane, winter storm, thunderstorm, hailstorm

Background: Leon County has rural areas where no radio coverage is received

Benefits: Protection of life by notifying the public to impending natural hazards.

Priority: Very high

Estimated Cost: 100k+

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue, grants, and private entities

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Build a dual-use community safe room at a recreation center located between the Cities of Buffalo and Centerville.

Hazard: Tornadoes, hailstorms, winter storms, thunderstorms, hurricanes, excessive heat

Background: Leon County has proposed to build a safe room recreational center between Buffalo and Centerville. The safe room would provide protection for the citizens at the recreational center should severe storms arise, and also act as a cooling center with air conditioning during periods of excessive heat.

Benefits: Save lives by providing safe shelter from tornadoes and other severe weather events.

Priority: High

Estimated Cost: \$400,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Install lightning rods on critical utilities and communications facilities to prevent fires resulting from lightning strikes.

Hazard: Thunderstorms

Background: We have had many severe storms over the years (primarily March-August) that result in numerous lightning strikes throughout the county.

Benefits: Continue to operate and maintain emergency facilities and communications and utilities.

Priority: Medium

Estimated Cost: \$2,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2016

Funding Sources: General revenue

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Strengthen existing critical facilities and utilities with braces, stronger bolts and protective coverings to protect them from severe storms.

Hazard: Hail, hurricanes, tornadoes

Background: Powerful hail storms can knock out power to critical facilities.

Benefits: Continue to operate and maintain emergency facilities and communications and utilities.

Priority: Medium

Estimated Cost: \$14,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Educate the public to use natural conservation methods around their homes, i.e., tree plantings and watering at appropriate times to minimize damage and loss due to excessive heat and drought.

Hazard: Excessive heat, drought

Background: Leon County has been in a period of drought conditions for a period of five years and has had significant extended periods of 100+ degree weather. This is causing a significant strain on water resources.

Benefits: Conserve water resources and promote public health.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2016

Funding Sources: Individuals and homeowners

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Create educational program to inform the public and teach them how to prevent potential fires and implement fire ban ordinance during prolonged periods of drought.

Hazard: Wildfires, drought, excessive heat

Background: Every year Leon County experiences wildfire occurrences caused by various sources. This action will provide the public with critical information needed to reduce the damage to property and loss of life from fires.

Benefits: Prevent the destruction of property or loss of life of humans and animals.

Priority: High

Estimated Cost: \$3,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue

This project is complete.

ACTION: Create and implement a drought contingency plan.

Hazard: Drought, excessive heat, wildfires

Background: Create a drought contingency plan to outline steps to be taken to prevent the county from experiencing loss of water pressure.

Benefits: Save lives and prevents property loss during periods of drought, excessive heat or wildfires.

Priority: High

Estimated Cost: \$1,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2015

Funding Sources: General revenue

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Create temporary sheltering capabilities to manage a sudden influx of people into and through Leon County by expanding the amount of shelters offered.

Hazard: Hurricanes

Background: In the past, Leon County has housed and fed many people in the process of hurricane related evacuations that have made landfall on the Texas coast.

Benefits: Provision of shelter, food, and people movement control whenever an event happens

Priority: High

Estimated Cost: Minimal – some police, EMS, Leon County personnel time spent (less than \$10,000)

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2016

Funding Sources: General revenues and grants

This project is complete.

ACTION: Bury power lines to minimize damages to all individuals and private and public utilities resulting from severe winter storms.

Hazard: Winter storms

Background: Leon County has had outages resulting from ice storms that affected the public welfare.

Benefits: Prevent loss of utility

Priority: Medium

Estimated Cost: \$15,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Per NFIP participation, acquire any repetitive loss structures located below the high hazard dams.

Hazard: Dam failure, flooding

Background: There are a few structures located in the county that are downstream of a dam.

Benefits: Protection of life and property by removing people and structures from the identified dam failure inundation zone.

Priority: Medium to low

Estimated Cost: \$70,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General fund

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Per NFIP compliance, implement program to enlarge culverts and drains beneath county bridges to allow for more flood capacity.

Hazard: Floods

Background: Leon County has been flooded in several areas of the county. Enlarging culverts and drains beneath bridges will prevent a back flow of floodwaters onto people's property.

Benefits: Reduce the financial impact and loss of life from floods.

Priority: Medium

Estimated Cost: \$33,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2016

Funding Sources: General revenue

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Coordinate with the Brazos River Authority to determine structural integrity of existing dams in the county and map potential inundation areas. Elevate structures in the inundation areas above Base Flood Elevation if they cannot be acquired outright.

Hazard: Dam failure

Background: There is a potential for any dam to fail without proper maintenance, thus resulting in possible loss of life and property.

Benefits: Prevention of a dam failure and resulting loss of life and property; and preservation of the water supply.

Priority: Low

Estimated Cost: \$5,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue

This project is complete.

ACTION: Acquisition of homes below high hazard dams.

Hazard: Dam Failure

Background: Although a dam failure event is unlikely in Leon County, there are some structures that may be located in the dam failure inundation area.

Benefits: Protection of lives and structures from the affects of dam failure.

Priority: Medium

Estimated Cost: \$100,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue or a mitigation grant from the Texas Water Development Board

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Organizing outreach to vulnerable populations, including establishing and promoting accessible cooling centers in the community.

Hazard: Excessive heat

Background: Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

City of Buffalo

ACTION: Establish and implement burning standards. Develop ways to educate and inform public about fire bans and ways to control possibilities of fires.

Hazard: Wildfires, drought, excessive heat

Background: The City of Buffalo may experience wildfires cause by various sources, including drought and excessive heat. This action will provide the public with critical information needed to reduce the damage to property and loss of life from fires.

Benefits: Prevent the destruction of property or loss of life of humans and animals.

Priority: High

Estimated Cost: \$1,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues

This project is complete.

ACTION: Per NFIP participation, install or replace culverts to increase capacity wherever needed in city.

Hazard: Flooding, hurricane, thunderstorms

Background: Larger culverts are needed at several sites in the city to help enhance flood and rainwater drainage.

Benefits: The action will help improve the city infrastructure and thereby reduce flood damage.

Priority: Medium

Estimated Cost: \$45,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues

This project is complete.

ACTION: Per NFIP participation, acquire homes located in the floodplain.

Hazard: Flood, hurricane, thunderstorms

Background: Some homes become flooded after heavy rain events, such as from hurricanes and thunderstorms. Acquiring these homes with FEMA mitigation grants will remove them from the identified flood hazard area.

Benefits: Help protect people and property and reduce health risks.

Priority: Medium

Estimated Cost: \$20,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Complete the flood study to update city flood plain maps.

Hazard: Floods, thunderstorms, hurricanes

Background: The City of Buffalo can be vulnerable to flooding. Portions of the flood plain have not been mapped.

Benefits: New buildings will be built outside of the identified flood hazard area, thus preventing future damages due to floods.

Priority: Medium

Estimated Cost: \$15,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: Local funds and FEMA Flood Mitigation Assistance grants

This project is complete.

ACTION: Educate the public to use natural conservation methods around their homes, i.e., tree plantings and watering at appropriate times to minimize damage and loss due to excessive heat and drought.

Hazard: Excessive heat, drought

Background: The City of Buffalo has experienced drought conditions in recent summers and has had significant extended periods of 100+ degree weather. This is causing a significant strain on water resources.

Benefits: Conserve water resources and promote public health.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: Local funds

This project is complete.

ACTION: Build a new dual-use community safe room for protection from severe storms.

Hazard: Tornadoes, hail, winter storms, thunderstorms, hurricanes, excessive heat

Background: The City of Buffalo currently has no reinforced structures. The safe room would provide protection for the citizens at the recreational center should severe storms arise, and also act as a cooling center with air conditioning during periods of excessive heat.

Benefits: Prevent the destruction of property or loss of life of humans.

Priority: High

Estimated Cost: \$100,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Bury power lines to minimize damages to all individuals and private and public utilities resulting from severe winter storms.

Hazard: Winter storms, hail, tornado

Background: The City of Buffalo is vulnerable to outages resulting from ice storms, hail storms, and tornadoes due to above-ground power lines being knocked down.

Benefits: Prevents loss of utility and protects the public welfare.

Priority: Medium

Estimated Cost: \$21,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Identifying new available water supplies.

Hazard: Drought

Background: Locating new water supplies to supplement current water availability will help to lessen the local vulnerability to drought.

Benefits: Having additional water supplies can assist the city during periods of drought by keeping a reserve on hand for fire-fighting capabilities and for use by the general public.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2018

Funding Sources: Grant from the Texas Water Development Board

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Develop and maintain a database to track community vulnerability to wildfire and then remove the dry brush from those areas.

Hazard: Wildfire

Background: To identify wildfire hazard areas to assess overall community vulnerability, and then remove the dry brush from those areas to lessen the vulnerability.

Benefits: Can save lives and prevent property damage by having the community lessen their vulnerability to wildfires.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Improving roof sheathing to prevent hail penetration.

Hazard: Hail

Background: For new construction as well as retrofitting existing buildings, require roof sheathing techniques to minimize hail damage.

Benefits: Can prevent property damage to new and existing structures.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Organizing outreach to vulnerable populations, including establishing and promoting accessible cooling centers in the community.

Hazard: Excessive Heat

Background: Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

ACTION: Removal of hazardous storm debris.

Hazard: Flood, hurricane, tornado, hail, excessive heat, drought, thunderstorm, winter storm

Background: Disasters generate a variety of debris, including vegetative matter, building/construction material, appliances, personal property, mud, and sediment. The quantity and type of debris is a function of the location and type of event. This action will foster a unified and coordinated approach to respond to any debris-generated disaster. It will develop a plan for the most efficient and effective methods to resolve disaster debris removal and disposal issues; expedite debris response and recovery efforts that will mitigate secondary impacts to health, safety, and welfare.

Benefits: Help protect people and property and reduce health risks.

Priority: High

Estimated Cost: \$3,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues and grants

This project is complete.

ACTION: Brush removal to prevent accumulation of fuels for wildfires.

Hazard: Wildfires

Background: Removal of dead trees and other brush that may act as fuel for a wildfire.

Benefits: Protect people and property.

Priority: High

Estimated Cost: \$2,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2016

Funding Sources: General revenues

This project is complete.

ACTION: Replace or clean culverts and enlarge and clean drainage ditches to protect new and existing buildings.

Hazard: Floods, hurricanes, thunderstorms

Background: The City of Centerville has experienced loss of property due to flooding. Replacing and enlarging culverts and cleaning drainage ditches will help reduce damage.

Benefits: Reduce damage and loss to property, including damage to streets.

Priority: Medium

Estimated Cost: \$12,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues

This project is complete.

ACTION: Build a dual-use community safe room for the citizens of Centerville.

Hazard: Hurricane, tornadoes, thunderstorms, winter storms, floods, wildfires, excessive heat

Background: In the past, the city and its residents have been vulnerable to severe storms. Currently, the city has no structures built strong enough to withstand tornadoes and other severe storms.

Benefits: Protection of lives by providing safe shelter from severe storms. The safe room may be used as a cooling center during periods of excessive heat.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2016

Funding Sources: General revenues and from churches and private citizens

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Educate the public about the severity of thunderstorms, tornadoes, droughts, and hailstorms through local media and city websites.

Hazard: Thunderstorms, tornadoes, hail, drought

Background: Educating the public about the severity of storms and droughts leads to better understanding of the associated risks with each event.

Benefits: Protection of lives and property.

Priority: Medium

Estimated Cost: \$2,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues, grants, bonds

This project is complete.

ACTION: Increase culvert sizes to allow for more flood water to flow beneath major roads.

Hazard: Flooding

Background: Some older culverts are not large enough to allow flood waters to flow safely beneath the road.

Benefits: Prevents major road closures due to flood waters crossing the roads and allows emergency response vehicles to reach their destination.

Priority: Medium

Estimated Cost: \$10,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Funds

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Implement their Drought Contingency Plan response stages.

Hazard: Drought

Background: The local Drought Contingency Plan contains specific, quantified targets for water use restrictions. This includes drought response stages with triggers to begin and end at each stage.

Benefits: Each drought response stage will reduce the availability of water for certain events. Examples include not allowing the watering of lawns during the day or encouraging the use of xeriscape landscapes.

Priority: Medium

Estimated Cost: No cost

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: No cost

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Develop and maintain a database to track community vulnerability to wildfire and then remove the dry brush from those areas.

Hazard: Wildfire

Background: To identify wildfire hazard areas to assess overall community vulnerability, and then remove the dry brush from those areas to lessen the vulnerability.

Benefits: Can save lives and prevent property damage by having the community lessen their vulnerability to wildfires.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

ACTION: Establishing a tree limb removal program for areas around utility power lines.

Hazard: Winter Storm

Background: Power lines can be protected from the impacts of winter storms by removing nearby tree limbs that can knock down power lines.

Benefits: Allows facilities to still function with power during severe winter storms.

Priority: Medium

Estimated Cost: \$300

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

ACTION: Improving roof sheathing to prevent hail penetration.

Hazard: Hail

Background: For new construction as well as retrofitting existing buildings, require roof sheathing techniques to minimize hail damage.

Benefits: Can prevent property damage to new and existing structures.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Organizing outreach to vulnerable populations, including establishing and promoting accessible cooling centers in the community.

Hazard: Excessive Heat

Background: Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

ACTION: Provide free fans to vulnerable populations, including the elderly and those without adequate air conditioning in their homes.

Hazard: Excessive Heat

Background: Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat, such as providing them with free fans to help cool down their homes.

Benefits: Can save lives by reducing the excessive high temperatures inside homes

Priority: Medium

Estimated Cost: \$300

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

City of Jewett

ACTION: Improve water supply and pressure to provide better fire fighting capabilities.

Hazard: Wildfires, drought, excessive heat

Background: Improve water supply and available fire hydrants in the city to enable firefighters to obtain water in a timely quantity and manner.

Benefits: Saving people and property.

Priority: High

Estimated Cost: \$100,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues, grants

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Build a community safe room for protecting vulnerable people during severe storms.

Hazard: Tornadoes, hail, winter storms, excessive heat, thunderstorms

Background: A community safe room is needed to protect citizens from the affects of severe storms.

Benefits: Protection of lives.

Priority: Medium

Estimated Cost: \$150,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues, grants

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Purchase permanent and portable power generators for the wastewater treatment facility.

Hazard: Flood, hurricane, tornado, hail, thunderstorm, winter storm

Background: City of Jewett lost power to the main lift station in town during previous storms. A permanent power generator is needed to keep the wastewater treatment facility operational.

Benefits: Reduced contamination and health risk.

Priority: Very high

Estimated Cost: \$10,000 - \$15,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2016

Funding Sources: General revenues, grants

This project is complete.

ACTION: Install a warning system to alert residents to coming hazardous weather.

Hazard: Tornadoes, hurricanes, wildfires

Background: The city of Jewett has no way of warning its people of weather conditions and must rely on radio and television stations that are 50-60 miles away.

Benefits: Early warning to residents to evacuate or move to a safe location.

Priority: High

Estimated Cost: \$1,500

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: Grants

This project is complete.

ACTION: Provide a third well for Jewett and surrounding residents in the extra territorial jurisdiction (ETJ). Initiate water conservation measures during drought times.

Hazard: Drought, excessive heat

Background: In the past 6 years, Jewett has suffered drought conditions depleting the water supply with two wells. A third well would help assure water during drought times.

Benefits: Assure water use during drought conditions.

Priority: Medium

Estimated Cost: Approximately \$1,000,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: TCDP Rural Development and other grant programs

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Retrofit larger ditches and bigger culverts to alleviate the problem of flooding due to storm water runoff.

Hazard: Floods, thunderstorms

Background: Water runs down streets causing potholes and erosion and increasing the flood risk.

Benefits: Reduce environmental problems due to erosion and stormwater runoff and reduce flood risks.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues and grants

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Incorporating drought tolerant or xeriscape practices into landscape ordinances to reduce dependence on irrigation.

Hazard: Drought

Background: Yards and landscapes with grass often require more irrigation in times of drought, thus draining local resources of available water.

Benefits: Xeriscaping landscapes and yards can reduce or eliminate the need for supplemental water from irrigation.

Priority: Medium

Estimated Cost: No cost

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2018

Funding Sources: No cost

This project is complete.

ACTION: Develop and maintain a database to track community vulnerability to wildfire and then remove the dry brush from those areas.

Hazard: Wildfire

Background: To identify wildfire hazard areas to assess overall community vulnerability, and then remove the dry brush from those areas to lessen the vulnerability.

Benefits: Can save lives and prevent property damage by having the community lessen their vulnerability to wildfires.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Organizing outreach to vulnerable populations, including establishing and promoting accessible cooling centers in the community.

Hazard: Excessive Heat

Background: Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program and Flood Mitigations Assistance grants

This project is complete.

City of Leona

ACTION: Install a warning system to alert residents to coming hazardous weather.

Hazard: Tornadoes, hurricanes, winter storm, hail, thunderstorm, wildfire

Background: The city of Leona has no way of warning residents of weather conditions and must rely on radio and television stations that are 50-60 miles away.

Benefits: Early warning to residents to evacuate or move to a safe location.

Priority: High

Estimated Cost: \$2,500

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: Grants

This project is complete.

ACTION: Enlarge road culverts to handle higher water capacity.

Hazard: Floods, hurricanes, thunderstorms

Background: Urban growth increases runoff in immediate vicinity. Debris and sediment needs to be cleared from drains and culverts enlarged to reduce flood risks.

Benefits: Prevent backwater flooding.

Priority: Medium

Estimated Cost: \$30,000

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues and grants

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Upgrade the capability for managing the temporary, sudden influx of evacuees, from tropical storms or hurricanes, that seek shelter in the City of Leona by developing signs to direct evacuees to services.

Hazard: Hurricanes

Background: The city of Leon has fed and housed hurricane evacuees from coastal areas of Texas on a number of occasions. The city needs to upgrade its capabilities for managing this large influx of people.

Benefits: Helping people find food and shelter in any emergency situation.

Priority: Medium

Estimated Cost: Some police, EMS, and Leon County personnel time (\$10,000)

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues and grant funds

This project is complete.

ACTION: Create educational program to inform the public and teach them how to prevent potential fires and implement fire ban ordinance during prolonged periods of drought.

Hazard: Wildfires, drought, excessive heat

Background: The City of Leona may experience wildfires caused by various sources, including droughts and excessive heat. This action will provide the public with critical information needed to reduce the damage to property and loss of life from fires.

Benefits: Prevent the destruction of property or loss of life of humans and animals.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: Local funds

This project is complete.

ACTION: Educate the public to use natural conservation methods around their homes, i.e., tree plantings and watering at appropriate times to minimize damage and loss due to excessive heat and drought.

Hazard: Excessive heat, drought

Background: The City of Leona has experienced drought conditions in recent summers and has had significant extended periods of excessive heat. This is causing a significant strain on water resources.

Benefits: Conserve water resources and promote public health.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: Local funds

This project is complete.

ACTION: Strengthen existing critical facilities and utilities with braces, stronger bolts and protective coverings to protect them from severe storms.

Hazard: Hail, thunderstorms, hurricanes, tornadoes, winter storm

Background: Powerful storms can knock out power to critical facilities.

Benefits: Continue to operate and maintain emergency facilities, communications and utilities.

Priority: Medium

Estimated Cost: \$21,000

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Acquire existing structures located in the identified flood hazard area.

Hazard: Floods, hurricanes, thunderstorms

Background: The City of Leona may experience minor flooding that causes homes to flood. Purchase and removal of the structure will prevent future property damage.

Benefits: Can save lives and prevent future property damage.

Priority: Medium

Estimated Cost: \$60,000

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Flood Mitigation Assistance grants or Hazard Mitigation Grant Program

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Implement their Drought Contingency Plan response stages.

Hazard: Drought

Background: The local Drought Contingency Plan contains specific, quantified targets for water use restrictions. This includes drought response stages with triggers to begin and end at each stage.

Benefits: Each drought response stage will reduce the availability of water for certain events. Examples include not allowing the washing of cars during the day or for restaurants to serve water only when requested by the customer.

Priority: Medium

Estimated Cost: No cost

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2018

Funding Sources: No cost

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Organizing outreach to vulnerable populations, including establishing and promoting accessible cooling centers in the community.

Hazard: Excessive Heat

Background: Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

ACTION: Provide free fans to vulnerable populations, including the elderly and those without adequate air conditioning in their homes.

Hazard: Excessive Heat

Background: Measures will be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat, such as providing them with free fans to help cool down their homes.

Benefits: Can save lives by reducing the excessive high temperatures inside homes.

Priority: Medium

Estimated Cost: \$300

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

City of Marquez

ACTION: Establish and implement burning standards. Develop ways to educate and inform the public about fire bans and ways to diminish the possibility of fire.

Hazard: Wildfire

Background: Local volunteer fire departments respond to wildfires in the City of Marquez. The public needs to be educated about steps they can take to reduce the risk of loss of life and property from wildfires.

Benefits: Prevent the destruction of property or loss of life of humans and animals.

Priority: Medium

Estimated Cost: Undetermined

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2017

Funding Sources: Grants

This project is complete.

ACTION: Build a community safe room

Hazard: Hurricane, winter storm, tornadoes, hail, excessive heat, thunderstorms

Background: Local citizens have no strengthened safe rooms to protect themselves from severe storms.

Benefits: Prevent the loss of life by providing a strengthened shelter during storm events.

Priority: High

Estimated Cost: \$50,000

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Complete the flood study to update city flood plain maps.

Hazard: Floods, thunderstorms, hurricanes

Background: The City of Marquez can be vulnerable to flooding. Portions of the flood plain have not been mapped.

Benefits: New buildings will be built outside of the identified flood hazard area, thus preventing future damages due to floods.

Priority: Medium

Estimated Cost: \$15,000

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Flood Mitigation Assistance grants

This project is complete.

ACTION: Create educational program to inform the public and teach them how to prevent potential fires and implement fire ban ordinance during prolonged periods of drought.

Hazard: Wildfires, drought, excessive heat

Background: The City of Marquez may experience wildfires caused by various sources, including droughts and excessive heat. This action will provide the public with critical information needed to reduce the damage to property and loss of life from fires.

Benefits: Prevent the destruction of property or loss of life of humans and animals.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2017

Funding Sources: Local funds

This project is complete.

ACTION: Educate the public to use natural conservation methods around their homes, i.e., tree plantings and watering at appropriate times to minimize damage and loss due to excessive heat and drought.

Hazard: Excessive heat, drought

Background: The City of Marquez has experienced drought conditions in recent summers and has had significant extended periods of excessive heat. This is causing a significant strain on water resources.

Benefits: Conserve water resources and promote public health.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2017

Funding Sources: Local funds

This project is complete.

ACTION: Bury power lines to minimize damages to all individuals and private and public utilities resulting from severe storms.

Hazard: Winter storms, hail, tornado, thunderstorms, hurricanes

Background: The City of Marquez is vulnerable to outages resulting from severe storms due to above-ground lines being knocked down.

Benefits: Prevent loss of utility and protects the public welfare.

Priority: Medium

Estimated Cost: \$25,000

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Strengthen flood plain ordinance by increasing free board on all new development in the identified flood hazard area.

Hazard: Floods, thunderstorms, hurricanes

Background: The City of Marquez can protect future development in the floodplain by requiring an additional two (2) feet of freeboard added to the first floor height above Base Flood Elevation.

Benefits: Can save lives and prevent future property damage by keeping floodwaters out of structures.

Priority: Medium

Estimated Cost: \$100

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2015

Funding Sources: No funds required.

This project is complete.

ACTION: Increase culvert sizes to allow for more flood water to flow beneath major roads.

Hazard: Flooding

Background: Some older culverts are not large enough to allow flood waters to flow safely beneath the road.

Benefits: Prevents major road closures due to flood waters crossing the roads. Allow emergency response vehicles to reach their destination.

Priority: Medium

Estimated Cost: \$5,000

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Funds

This project is complete.

ACTION: Incorporating language to provide incentives for using drought tolerant or xeriscape practices into landscape ordinances to reduce dependence on irrigation.

Hazard: Drought

Background: Yards and landscapes with grass often require more irrigation in times of drought, thus draining local resources of available water.

Benefits: Xeriscaping landscapes and yards can reduce or eliminate the need for supplemental water from irrigation.

Priority: Medium

Estimated Cost: No cost

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2018

Funding Sources: No cost

This project is complete.

ACTION: Improving roof sheathing to prevent hail penetration.

Hazard: Hail

Background: For new construction as well as retrofitting existing buildings, require roof sheathing techniques to minimize hail damage.

Benefits: Can prevent property damage to new and existing structures.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

ACTION: Organizing outreach to vulnerable populations, including establishing and promoting accessible cooling centers in the community.

Hazard: Excessive Heat

Background: Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

City of Normangee

ACTION: Per NFIP participation, install larger road culverts to protect existing buildings from floods.

Hazard: Floods, hurricanes, thunderstorms

Background: The City of Normangee is vulnerable to floods due to road culverts that cannot carry flood capacity. Installing new, larger road culverts would help reduce the potential for flooding.

Benefits: Reduce the financial impact and loss of life.

Priority: Medium to low

Estimated Cost: \$2,000

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenue

This project is complete.

ACTION: Create educational program to inform the public and teach them how to prevent potential fires and implement fire ban ordinance during prolonged periods of drought.

Hazard: Wildfires, drought, excessive heat

Background: The City of Normangee may experience wildfires caused by various sources, including droughts and excessive heat. This action will provide the public with critical information needed to reduce the damage to property and loss of life from fires.

Benefits: Prevent the destruction of property or loss of life of humans and animals.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2017

Funding Sources: Local funds

This project is complete.

ACTION: Educate the public to use natural conservation methods around their homes, i.e., tree plantings and watering at appropriate times to minimize damage and loss due to excessive heat and drought.

Hazard: Excessive heat, drought

Background: The City of Normangee has experienced drought conditions in recent summers and has had significant extended periods of 100+ degree weather. This is causing a significant strain on water resources.

Benefits: Conserve water resources and promote public health.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2017

Funding Sources: Local funds

This project is complete.

ACTION: Clear away dry brush from beneath trees and bushes to prevent accumulation of wildfire fuels.

Hazard: Wildfires

Background: The City of Normangee will clear away excess brush that may accumulate and increase the chance of wildfires in the wildland-urban interface around the city.

Benefits: Decreases the chances of wildfires, thus protecting structures and saving lives.

Priority: High

Estimated Cost: \$1,000

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2017

Funding Sources: Texas Forest Service grants and local funds

This project is complete.

ACTION: Build a new dual-use community safe room.

Hazard: Hail, winter storm, tornado, hurricane, excessive heat

Background: The City of Normangee currently has no reinforced structures. The safe room would provide protection for the citizens at the recreational center should severe storms arise, and also act as a cooling center with air conditioning during periods of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$100,000

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Strengthen existing critical facilities and utilities with braces, stronger bolts and protective coverings to protect them from severe storms.

Hazard: Hail, thunderstorms, hurricanes, tornadoes, winter storm

Background: Powerful storms can knock out power to critical facilities.

Benefits: Continue to operate and maintain emergency facilities, communications and utilities.

Priority: Medium

Estimated Cost: \$20,000

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

This project is ongoing and so is included in the current plan's mitigation actions below.

ACTION: Implement their Drought Contingency Plan response stages.

Hazard: Drought

Background: The local Drought Contingency Plan contains specific, quantified targets for water use restrictions. This includes drought response stages with triggers to begin and end at each stage.

Benefits: Each drought response stage will reduce the availability of water for certain events. Examples include not allowing the washing of cars during the day or for restaurants to serve water only when requested by the customer.

Priority: Medium

Estimated Cost: No cost

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2018

Funding Sources: No cost

This project is complete.

ACTION: Individual Safe Room Program.

Hazard: Hail, thunderstorm, tornado

Background: For new construction as well as retrofitting existing buildings, provide rebates for installing individual safe rooms into their homes for protection against hailstorms.

Benefits: To prevent hail-induced injuries when taking shelter from a thunderstorm.

Priority: Medium

Estimated Cost: \$2,500 for each safe room

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Installing hail resistant roofing and siding to critical facilities, including the local police department headquarters and main fire station.

Hazard: Hail

Background: In order to provide protection to existing critical facilities, install hail resistant roofing and siding to minimize or prevent future hail damage.

Benefits: Can protect critical facilities, such as police and fire stations, during severe hail storms.

Priority: Medium

Estimated Cost: \$15,000

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

This project is complete.

City of Oakwood

ACTION: Establish a plan with the Dunbar Community Center to allow evacuees to stay there during emergencies. Establish a reserve of blankets, cots, and food resources to be used in emergency.

Hazard: Hurricanes

Background: In case of a major hurricane evacuation, the Dunbar Community Center (having kitchen and people maintaining space) could hold up to 100 people.

Benefits: Maintain livable standards of living for non-resident evacuees for a short time.

Priority: Medium

Estimated Cost: \$5,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues

This project is complete.

ACTION: Establish a plan for sharing water between the city and local residents; for ensuring access to water sources for emergency use; and conserving water during emergency times by implementing "no water" rules and other conservation measures.

Hazard: Drought and excessive heat

Background: Leon County has experienced a series of droughts for each year of the last 5 years, with resulting economic damages and loss of crops and livestock.

Benefits: Reduction in loss of life and/or damage to humans, livestock, and wildlife.

Priority: Medium

Estimated Cost: \$2,500

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues and grants

This project is complete.

ACTION: Acquire homes located in the identified flood hazard area.

Hazard: Floods, hurricanes, thunderstorms

Background: Acquire homes in the flood plain located on College Street and Whitt Street.

Benefits: Removal of structures from the flood plain can save lives and reduce property damage from floods, hurricanes, and thunderstorms.

Priority: Medium

Estimated Cost: \$25,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Improve culverts and expand drainage ditches to prevent flooding.

Hazard: Floods, hurricanes, thunderstorms

Background: Previous flooding on Highways 542 and 831 has closed both highways necessitating all routes planning to maintain movement of traffic.

Benefits: Maintaining culverts and drainage ditches will reduce flood risks and resulting damage to people and property.

Priority: Medium

Estimated Cost: \$25,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenue

This project is complete.

ACTION: Educate the public to use natural conservation methods around their homes, i.e., tree plantings and watering at appropriate times to minimize damage and loss due to excessive heat and drought.

Hazard: Excessive heat, drought

Background: The City of Oakwood has experienced drought conditions in recent summers and has had significant extended periods of excessive heat. This is causing a significant strain on water resources.

Benefits: Conserve water resources and promote public health.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2015

Funding Sources: Local funds

This project is complete.

ACTION: Build a new dual-use community safe room.

Hazard: Hail, winter storm, tornado, hurricane, excessive heat

Background: The City of Oakwood currently has no reinforced structures. The safe room would provide protection for the citizens at the recreational center should severe storms arise, and also act as a cooling center with air conditioning during periods of excessive heat.

Benefits: Prevent the loss of life of humans.

Priority: Medium

Estimated Cost: \$100,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

This project has not been started and so is included in the current plan's mitigation actions below.

ACTION: Strengthen existing critical facilities and utilities with braces, stronger bolts and protective coverings to protect them from severe storms.

Hazard: Hail, thunderstorms, hurricanes, tornadoes, winter storm

Background: Powerful storms can knock out power to critical facilities.

Benefits: Continue to operate and maintain emergency facilities, communications and utilities.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

This project is complete.

ACTION: Create educational program to inform the public and teach them how to prevent potential fires and implement fire ban ordinance during prolonged periods of drought.

Hazard: Wildfires, drought, excessive heat

Background: The City of Oakwood may experience wildfires caused by various sources, including droughts and excessive heat. This action will provide the public with critical information needed to reduce the damage to property and loss of life from fires.

Benefits: Prevent the destruction of property or loss of life of humans and animals.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2016

Funding Sources: Local funds

This project is complete.

ACTION: Clear away dry brush from beneath trees and bushes to prevent accumulation of wildfire fuels.

Hazard: Wildfires

Background: The City of Oakwood will clear away excess brush that may accumulate and increase the chance of wildfires in the wildland-urban interface around the city.

Benefits: Decreases the chances of wildfires, thus protecting structures and saving lives.

Priority: Medium

Estimated Cost: \$5,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2018

Funding Sources: Texas Forest Service grants and local funds

This project is complete.

ACTION: Improving roof sheathing to prevent hail penetration.

Hazard: Hail

Background: For new construction as well as retrofitting existing buildings, require roof sheathing techniques to minimize hail damage.

Benefits: Can prevent property damage to new and existing structures.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

ACTION: Installing hail resistant roofing and siding to critical facilities.

Hazard: Hail

Background: For new construction as well as retrofitting existing critical facilities, install hail resistant roofing and siding to minimize hail damage.

Benefits: Can protect critical facilities during severe hail storms.

Priority: Medium

Estimated Cost: \$5,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

This project is complete.

ACTION: Organizing outreach to vulnerable populations, including establishing and promoting accessible cooling centers in the community.

Hazard: Excessive Heat

Background: Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

This project is complete.

B) Mitigation Action Prioritization

The planning team members have identified at least two mitigation actions per natural hazard. 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

Criteria for prioritizing mitigation actions are not available in the participating jurisdictions’ previous Hazard Mitigation Action Plan from 2013, and so it is not known how the previous mitigation actions were prioritized. The planning team selected the above priorities for selecting mitigation actions in this update. 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.

C) 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. As part of its effort, the planning team examined how each jurisdiction implemented the mitigation actions outlined in the previous plan.

Each jurisdiction has its own established process for integrating new actions, codes, ordinances, plans, and studies into its existing capabilities. The planning team will ensure that each jurisdiction’s various departments continue to integrate hazard mitigation actions into their day-to-day processes.

Table 69: Plan Integration

Department	All Departments	Commissioners' Court, Road and Bridge, Mayor's Office, Council, Public Works, Economic Development, Zoning, Schoolboard	Planning, Zoning, Economic Development, Public Works, Mayor's Office, Floodplain Manager	Office of Emergency Management, Mayor's Office, Chief of Fire Department, Superintendent's Office	Office of Emergency Management, Mayor's Office, Chief of Fire Department, Superintendent's Office	Office of Emergency Management, Mayor's Office, Superintendent'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, Council, or Schoolboard (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 insure 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 PDM, 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							
Leon County	x	x		x	x	x	x
City of Buffalo	x	x	x	x	x	x	x
City of Centerville	x	x	x	x	x	x	x
City of Jewett	x	x	x	x	x	x	x
City of Leona	x	x	x	x	x	x	x
City of Marquez	x	x	x	x	x	x	x
City of Normangee	x	x	x	x	x	x	x
City of Oakwood	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 70 below.

Table 70: Integration Process

Jurisdiction	Integration Process
Leon County	<p>After considering integrating mitigation actions with the activities outlined in Table 69 above, mitigation actions will be presented, considered, and formally adopted by the County Commissioners’ Court and County Judge.</p> <p>Leon County will also use the Leon County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.</p>
City of Buffalo	<p>After considering integrating mitigation actions with the activities outlined in Table 69 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor.</p> <p>The City of Buffalo will also use the Leon County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.</p>
City of Centerville	<p>After considering integrating mitigation actions with the activities outlined in Table 69 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor.</p> <p>The City of Centerville will also use the Leon County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.</p>
City of Jewett	<p>After considering integrating mitigation actions with the activities outlined in Table 69 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor.</p> <p>The City of Jewett will also use the Leon County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.</p>
City of Leona	<p>After considering integrating mitigation actions with the activities outlined in Table 69 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor.</p> <p>The City of Leona will also use the Leon County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.</p>
City of Marquez	<p>After considering integrating mitigation actions with the activities outlined in Table 69 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor.</p> <p>The City of Marquez will also use the Leon County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.</p>
City of Normangee	<p>After considering integrating mitigation actions with the activities outlined in Table 69 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor.</p> <p>The City of Normangee will also use the Leon County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.</p>
City of Oakwood	<p>After considering integrating mitigation actions with the activities outlined in Table 69 above, mitigation actions will be presented, considered, and formally adopted by the council and mayor.</p> <p>The City of Oakwood will also use the Leon County Hazard Mitigation Plan as a technical reference and data source for identified and future mitigation actions, as well as future planning processes.</p>

D) 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. Leon 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.

E) Mitigation Actions for Participating Jurisdictions

Leon County

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	Flood, Hurricane / Tropical Storm, Wildfire, Tornado, Drought, Riverine Erosion, Dam / Levee Failure, Expansive Soil, Extreme Heat, Hailstorm, Land Subsidence, Severe Winter Storm, Windstorm, Lightning
Priority	High
Estimated Cost	Less than \$10,000 per hazard
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure and / or improving existing infrastructure to reduce the potential impacts of future flood events.
Hazard	Flood, Hurricane / Tropical Storm
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source (s)	County, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	Leon County Office of Emergency Management
Implementation Schedule	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	Flood
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	County, FEMA PDM, FEMA HMGP
Responsible Department	Leon County Office of Emergency Management
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Automated Flood Warning System
Objective	This action proposes a local flood warning system to reduce the potential impacts of future flood events.
Hazard	Flood
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1 - 2 Years
Target	Existing and future infrastructure

Mitigation Action	Harden Facilities
Objective	This action proposes hardening facilities. Hardening will include but is not limited to 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	Hurricane / Tropical Storm, Tornado, Hailstorm, Severe Winter Storm, Windstorm, Lightning
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	County, FEMA PDM, FEMA HMGP
Responsible Department	Leon County Office of Emergency Management
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Construct Safe Rooms
Objective	The action's goal is to minimize vulnerability to tornados by constructing strategically located safe rooms.
Hazard	Tornado
Priority	Medium
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	County, FEMA PDM, FEMA HMGP
Responsible Department	Leon County Office of Emergency Management
Implementation Schedule	1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Purchase Back Up Power Generators
Objective	Installing generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages.
Hazard	Hurricane / Tropical Storm, Extreme Heat, Hailstorm, Lightning
Priority	Highest
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 PDM, FEMA HMGP
Responsible Department	Leon County Office of Emergency Management
Implementation Schedule	1-5 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.
Hazard	Hurricane / Tropical Storm, Wildfire, Tornado, Hailstorm, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	\$10,000 - \$100,0000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1-5 Years
Target	Existing and future infrastructure

Mitigation Action	Wildfire Fuels Reduction
Objective	This action will develop and implement a program to reduce wildfire fuels.
Hazard	Hurricane / Tropical Storm, Wildfire, Tornado, Hailstorm, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	Greater than \$100,0000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1-5 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	Less than \$10,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Create and Adopt a Riverine Erosion Control Master Plan
Objective	This action will develop and implement master plan to limit riverine erosion.
Hazard	Riverine Erosion
Priority	Medium
Estimated Cost	\$10,000 - \$100,000
Potential Funding Source (s)	County, FEMA PDM, FEMA HMGP
Responsible Department	Leon County Office of Emergency Management
Implementation Schedule	Short Term - 1-5 Years
Target	Existing and future infrastructure

Mitigation Action	Document Hazard Occurrences
Objective	This action will document occurrences of hazards within the next five years to address deficiencies in the data.
Hazard	Riverine Erosion, Expansive Soils, Land Subsidence
Priority	High
Estimated Cost	More than \$100,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Mandate Freeboard on Structures to Reduce Flooding Damage
Objective	This action proposes a re-evaluation of all existing floodplain construction restrictions to identify strengths and weaknesses in order to reduce future damages during flood events. Changes will include the addition of a freeboard requirement.
Hazard	Dam/Levee Failure
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ

Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1 - 2 Years
Target	Existing and future infrastructure

Mitigation Action	Restrict development in high hazard areas.
Objective	Re-evaluate all existing floodplain construction restrictions to identify strengths and weaknesses in order to produce a standalone floodplain development restriction ordinance, update its existing flood damage prevention ordinance, and / or update its subdivision ordinance.
Hazard	Dam / Levee Failure
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Develop and Implement a New Road Construction Manual
Objective	Develop and enforce a new road construction manual to reduce vulnerability to expansive soils.
Hazard	Expansive Soils
Priority	High
Estimated Cost	\$10,000 - \$100,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	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.

Hazard	Extreme Heat
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1-5 Years
Target	Existing and future population

Mitigation Action	Develop and Implement an Ordinance to Limit Groundwater Consumption
Objective	Re-evaluate all existing groundwater-use control measures to identify strengths and weaknesses in order to develop and enforce a new or updated groundwater consumption ordinance.
Hazard	Land Subsidence
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	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	Severe Winter Storm
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	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	Windstorm
Priority	Medium
Estimated Cost	Less than \$10,000
Potential Funding Source (s)	County, FEMA PDM, FEMA HMGP
Responsible Department	Leon County Office of Emergency Management
Implementation Schedule	Short Term - 1-5 Years
Target	Existing and future population and 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	High
Estimated Cost	Greater than \$10,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

Mitigation Action	Install Grounding System to Protect Electronic Assets
Objective	This action will install grounding systems including but not limited to: lightning arresters, grounding rods, and grounding electrodes 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	Greater than \$10,000
Potential Funding	County, FEMA PDM, FEMA HMGP

Source(s)	
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

City of Buffalo

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	Flood, Hurricane / Tropical Storm, Wildfire, Tornado, Drought, Expansive Soil, Extreme Heat, Hailstorm, Severe Winter Storm, Windstorm, Lightning
Priority	High
Estimated Cost	Less than \$10,000 per hazard
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Buffalo Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure and / or improving existing infrastructure to reduce the potential impacts of future flood events.
Hazard	Flood, Hurricane / Tropical Storm
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source (s)	City, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	City of Buffalo Mayor's Office
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 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	Hailstorm
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source	City, FEMA FMA, FEMA PDM, FEMA HMGP

(s)	
Responsible Department	City of Buffalo Mayor's Office
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Purchase Back Up Power Generators
Objective	Installing generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages.
Hazard	Hurricane / Tropical Storm, Extreme Heat, Hailstorm, Lightning
Priority	Highest
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 PDM, FEMA HMGP
Responsible Department	City of Buffalo Mayor's Office
Implementation Schedule	1-5 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.
Hazard	Wildfire, Tornado, Hailstorm, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	\$10,000 - \$100,0000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Buffalo Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement a New Drought Contingency Plan
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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	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Buffalo Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Develop and Implement a New Road Construction Manual
Objective	Develop and enforce a new road construction manual to reduce vulnerability to expansive soils.
Hazard	Expansive Soils
Priority	High
Estimated Cost	\$10,000 - \$100,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Buffalo Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Document Hazard Occurrences
Objective	This action will document occurrences of hazards within the next five years to address deficiencies in the data.
Hazard	Expansive Soils
Priority	High
Estimated Cost	More than \$100,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	5 Years
Target	Existing and future population and infrastructure

City of Centerville

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	Flood, Hurricane / Tropical Storm, Wildfire, Tornado, Drought, Extreme Heat, Hailstorm, Land Subsidence, Severe Winter Storm, Windstorm, Lightning
Priority	High
Estimated Cost	Less than \$10,000 per hazard
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Centerville Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure and / or improving existing infrastructure to reduce the potential impacts of future flood events.
Hazard	Flood, Hurricane / Tropical Storm
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source (s)	City, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	City of Centerville Mayor's Office
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Construct Safe Rooms
Objective	The action's goal is to minimize vulnerability to tornados by constructing strategically located safe rooms.
Hazard	Hurricane / Tropical Storm, Tornado
Priority	Medium
Estimated Cost	Greater than \$100,000
Potential Funding	City, FEMA PDM, FEMA HMGP

Source (s)	
Responsible Department	City of Centerville Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Purchase Back Up Power Generators
Objective	Installing generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages.
Hazard	Hurricane / Tropical Storm, Extreme Heat, Hailstorm, Lightning
Priority	Highest
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 PDM, FEMA HMGP
Responsible Department	City of Centerville Mayor's Office
Implementation Schedule	1-5 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.
Hazard	Wildfire, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	\$10,000 - \$100,0000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Centerville Mayor's Office
Implementation	1-5 Years

Schedule	
Target	Existing and future infrastructure

Mitigation Action	Develop an Alternative Water Source
Objective	This action proposes developing secondary water sources to minimize wildfire and drought impacts on the local water supply.
Hazard	Wildfire, Drought
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Centerville Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Develop and Implement an Ordinance to Limit Groundwater Consumption
Objective	Re-evaluate all existing groundwater-use control measures to identify strengths and weaknesses in order to develop and enforce a new or updated groundwater consumption ordinance.
Hazard	Land Subsidence
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Centerville Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Document Hazard Occurrences
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Objective	This action will document occurrences of hazards within the next five years to address deficiencies in the data.
Hazard	Land Subsidence
Priority	High
Estimated Cost	More than \$100,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	5 Years
Target	Existing and future population and infrastructure

City of Jewett

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	Flood, Hurricane / Tropical Storm, Wildfire, Tornado, Drought, Earthquake, Expansive Soil, Extreme Heat, Hailstorm, Land Subsidence, Severe Winter Storm, Windstorm, Lightning
Priority	High
Estimated Cost	Less than \$10,000 per hazard
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Jewett Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure and / or improving existing infrastructure to reduce the potential impacts of future flood events.
Hazard	Flood, Hurricane / Tropical Storm
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source (s)	City, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	City of Jewett Mayor's Office
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Upgrade Drainage Pump Stations
Objective	This action proposes upgrading pump stations to reduce the potential impacts of future flood events.
Hazard	Flood
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source (s)	City, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	City of Jewett Mayor's Office
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 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	Hailstorm, Land Subsidence, Windstorm
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	City, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	City of Jewett Mayor's Office
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Purchase Back Up Power Generators
Objective	Installing generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages.
Hazard	Hurricane / Tropical Storm, Extreme Heat, Hailstorm
Priority	Highest
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 PDM, FEMA HMGP
Responsible Department	City of Jewett Mayor's Office
Implementation Schedule	1-5 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.
Hazard	Hurricane / Tropical Storm, Wildfire, Tornado, Hailstorm, Severe Winter Storm
Priority	High
Estimated Cost	\$10,000 - \$100,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Jewett Mayor's Office
Implementation Schedule	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	High
Estimated Cost	\$10,000 - \$100,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Jewett Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future infrastructure

Mitigation Action	Update Building Code Requirements
Objective	Re-evaluate all existing building code requirements to identify strengths and weaknesses in order to develop and enforce a new or updated code that reduces structural vulnerability.
Hazard	Earthquake, Expansive Soils, Land Subsidence
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Jewett Mayor's Office

Implementation Schedule	I-5 Years
Target	Existing and future population and 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	Windstorm
Priority	Medium
Estimated Cost	Less than \$10,000
Potential Funding Source (s)	City, FEMA PDM, FEMA HMGP
Responsible Department	City of Jewett Mayor's Office
Implementation Schedule	Short Term - I-5 Years
Target	Existing and future population and 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	High
Estimated Cost	Greater than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Jewett Mayor's Office
Implementation Schedule	I - 5 Years
Target	Existing infrastructure

Mitigation Action	Document Hazard Occurrences
Objective	This action will document occurrences of hazards within the next five years to address deficiencies in the data.
Hazard	Expansive Soils, Land Subsidence
Priority	High
Estimated Cost	More than \$100,000

Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Install Grounding System to Protect Electronic Assets
Objective	This action will install grounding systems including but not limited to: lightning arresters, grounding rods, and grounding electrodes 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	Greater than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Jewett Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

City of Leona

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	Flood, Hurricane / Tropical Storm, Wildfire, Tornado, Drought, Extreme Heat, Hailstorm, Severe Winter Storm, Windstorm, Lightning
Priority	High
Estimated Cost	Less than \$10,000 per hazard
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Leona Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure and / or improving existing infrastructure to reduce the potential impacts of future flood events.
Hazard	Flood, Hurricane / Tropical Storm
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source (s)	City, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	City of Leona Mayor's Office
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 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	Hailstorm, Severe Winter Storm
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source	City, FEMA FMA, FEMA PDM, FEMA HMGP

(s)	
Responsible Department	City of Leona Mayor's Office
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Purchase Back Up Power Generators
Objective	Installing generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages.
Hazard	Extreme Heat, Hailstorm, Lightning
Priority	Highest
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 PDM, FEMA HMGP
Responsible Department	City of Leona Mayor's Office
Implementation Schedule	1-5 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.
Hazard	Hurricane / Tropical Storm, Wildfire, Tornado, Hailstorm, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	\$10,000 - \$100,0000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Leona Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement a New Drought Contingency Plan
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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	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Leona Mayor's Office
Implementation Schedule	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.
Hazard	Extreme Heat
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Leona Mayor's Office
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	Severe Winter Storm
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Leona Mayor's Office
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	High
Estimated Cost	Greater than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Leona Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

Mitigation Action	Install Grounding System to Protect Electronic Assets
Objective	This action will install grounding systems including but not limited to: lightning arresters, grounding rods, and grounding electrodes 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	Greater than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Leona Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

City of Marquez

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	Flood, Hurricane / Tropical Storm, Wildfire, Tornado, Drought, Expansive Soil, Extreme Heat, Hailstorm, Severe Winter Storm, Windstorm, Lightning
Priority	High
Estimated Cost	Less than \$10,000 per hazard
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Marquez Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure and / or improving existing infrastructure to reduce the potential impacts of future flood events.
Hazard	Flood, Hurricane / Tropical Storm
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source (s)	City, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	City of Marquez Mayor's Office
Implementation Schedule	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	Flood
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	City FEMA PDM, FEMA FMA, FEMA HMGP

Responsible Department	City of Marquez Mayor's Office
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 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	Hailstorm, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	City FEMA PDM, FEMA FMA, FEMA HMGP
Responsible Department	City of Marquez Mayor's Office
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Purchase Back Up Power Generators
Objective	Installing generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages.
Hazard	Hurricane / Tropical Storm, Extreme Heat, Hailstorm, Lightning
Priority	Highest
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 PDM, FEMA HMGP
Responsible Department	City of Marquez Mayor's Office
Implementation Schedule	1-5 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.
Hazard	Hurricane / Tropical Storm, Wildfire, Tornado, Hailstorm, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	\$10,000 - \$100,0000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Marquez Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement a New Water Conservation Ordinance
Objective	Re-evaluate all existing water conservation measures to identify strengths and weaknesses in order to develop and enforce a new water conservation ordinance.
Hazard	Drought
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Marquez Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Update Building Code Requirements
Objective	Re-evaluate all existing building code requirements to identify strengths and weaknesses in order to develop and enforce a new or updated code that reduces structural vulnerability.
Hazard	Expansive Soils
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Marquez Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Document Hazard Occurrences
Objective	This action will document occurrences of hazards within the next five years to address deficiencies in the data.
Hazard	Expansive Soils
Priority	High
Estimated Cost	More than \$100,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	5 Years
Target	Existing and future population and infrastructure

City of Normangee

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	Flood, Hurricane / Tropical Storm, Wildfire, Tornado, Drought, Expansive Soil, Extreme Heat, Hailstorm, Land Subsidence, Severe Winter Storm, Windstorm, Lightning, Dam/Levee Failure
Priority	High
Estimated Cost	Less than \$10,000 per hazard
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Normangee Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population

Mitigation Action	Construct Storm Drainage Infrastructure
Objective	This action proposes constructing new storm drainage infrastructure and / or improving existing infrastructure to reduce the potential impacts of future flood events.
Hazard	Flood, Hurricane / Tropical Storm
Priority	High
Estimated Cost	Greater than \$1,000,000
Potential Funding Source (s)	City, FEMA FMA, FEMA PDM, FEMA HMGP
Responsible Department	City of Normangee Mayor's Office
Implementation Schedule	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	Flood
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	City FEMA PDM, FEMA FMA, FEMA HMGP

Responsible Department	City of Normangee Mayor's Office
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 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	Hailstorm
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	City FEMA PDM, FEMA FMA, FEMA HMGP
Responsible Department	City of Normangee Mayor's Office
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Construct Safe Rooms
Objective	The action's goal is to minimize vulnerability to tornados by constructing strategically located safe rooms.
Hazard	Tornado
Priority	Medium
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	City, FEMA PDM, FEMA HMGP
Responsible Department	City of Normangee Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Purchase Back Up Power Generators
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Objective	Installing generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages.
Hazard	Hurricane / Tropical Storm, Hailstorm, Lightning
Priority	Highest
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 PDM, FEMA HMGP
Responsible Department	City of Normangee Mayor's Office
Implementation Schedule	1-5 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.
Hazard	Hurricane / Tropical Storm, Wildfire, Tornado, Hailstorm, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	\$10,000 - \$100,0000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Normangee Mayor's Office
Implementation Schedule	1-5 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	Less than \$10,000

Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Normangee Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Mandate Freeboard on Structures to Reduce Flooding Damage
Objective	This action proposes a re-evaluation of all existing floodplain construction restrictions to identify strengths and weaknesses in order to reduce future damages during flood events. Changes will include the addition of a freeboard requirement.
Hazard	Dam/Levee Failure
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	1 - 2 Years
Target	Existing and future infrastructure

Mitigation Action	Update Building Code Requirements
Objective	Re-evaluate all existing building code requirements to identify strengths and weaknesses in order to develop and enforce a new or updated code that reduces structural vulnerability.
Hazard	Expansive Soils, Land Subsidence
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Normangee Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Develop and Implement a New Road Construction Manual
Objective	Develop and enforce a new road construction manual to reduce vulnerability to expansive soils.
Hazard	Expansive Soils
Priority	High
Estimated Cost	\$10,000 - \$100,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Normangee Mayor's Office
Implementation Schedule	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.
Hazard	Extreme Heat
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Normangee Mayor's Office
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	Severe Winter Storm
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Normangee Mayor's Office
Implementation Schedule	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
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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	Windstorm
Priority	Medium
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department	City of Normangee Mayor's Office
Implementation Schedule	Short Term - 1-5 Years
Target	Existing and future population and 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	High
Estimated Cost	Greater than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Normangee Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

Mitigation Action	Document Hazard Occurrences
Objective	This action will document occurrences of hazards within the next five years to address deficiencies in the data.
Hazard	Expansive Soils, Land Subsidence
Priority	High
Estimated Cost	More than \$100,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	5 Years
Target	Existing and future population and infrastructure

City of Oakwood

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	Flood, Hurricane / Tropical Storm, Wildfire, Tornado, Drought, Extreme Heat, Hailstorm, Land Subsidence, Severe Winter Storm, Windstorm, Lightning
Priority	High
Estimated Cost	Less than \$10,000 per hazard
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Oakwood Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing and future population

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	Flood
Priority	High
Estimated Cost	Greater than \$100,000
Potential Funding Source (s)	City FEMA PDM, FEMA FMA, FEMA HMGP
Responsible Department	City of Oakwood Mayor's Office
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 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	Hailstorm, Severe Winter Storm
Priority	High
Estimated Cost	Greater than \$100,000

Potential Funding Source (s)	City FEMA PDM, FEMA FMA, FEMA HMGP
Responsible Department	City of Oakwood Mayor's Office
Implementation Schedule	5 Years
Target	Existing infrastructure

Mitigation Action	Purchase Back Up Power Generators
Objective	Installing generators at critical facilities will help ensure physical safety for facility occupants and maintain electronic systems functionality during power outages.
Hazard	Hurricane / Tropical Storm, Extreme Heat, Hailstorm, Lightning
Priority	Highest
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 PDM, FEMA HMGP
Responsible Department	City of Oakwood Mayor's Office
Implementation Schedule	1-5 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.
Hazard	Hurricane / Tropical Storm, Wildfire, Tornado, Severe Winter Storm, Windstorm
Priority	High
Estimated Cost	\$10,000 - \$100,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Oakwood Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future infrastructure

Mitigation Action	Develop and Implement a New Water Conservation Ordinance
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Objective	Re-evaluate all existing water conservation measures to identify strengths and weaknesses in order to develop and enforce a new water conservation ordinance.
Hazard	Drought
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Oakwood Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Update Building Code Requirements
Objective	Re-evaluate all existing building code requirements to identify strengths and weaknesses in order to develop and enforce a new or updated code that reduces structural vulnerability.
Hazard	Expansive Soils, Land Subsidence
Priority	High
Estimated Cost	Less than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Oakwood Mayor's Office
Implementation Schedule	1-5 Years
Target	Existing and future population and infrastructure

Mitigation Action	Document Hazard Occurrences
Objective	This action will document occurrences of hazards within the next five years to address deficiencies in the data.
Hazard	Expansive Soils, Land Subsidence
Priority	High
Estimated Cost	More than \$100,000
Potential Funding Source(s)	County, FEMA PDM, FEMA HMGP, FEMA FMA, TWDB, TCEQ
Responsible Department(s)	Leon County Office of Emergency Management
Implementation Schedule	5 Years

Target

Existing and future population and 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	High
Estimated Cost	Greater than \$10,000
Potential Funding Source(s)	City, FEMA PDM, FEMA HMGP
Responsible Department(s)	City of Oakwood Mayor's Office
Implementation Schedule	1 - 5 Years
Target	Existing infrastructure

E) Unfinished Previous Mitigation Actions for Participating Jurisdictions

Leon County

ACTION: Two new towers to be erected to provide emergency notification to communities where no current coverage exists.

Hazard: Flood, tornado, hurricane, winter storm, thunderstorm, hailstorm

Background: Leon County has rural areas where no radio coverage is received

Benefits: Protection of life by notifying the public to impending natural hazards.

Priority: Very high

Estimated Cost: 100k+

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue, grants, and private entities

ACTION: Build a dual-use community safe room at a recreation center located between the Cities of Buffalo and Centerville.

Hazard: Tornadoes, hailstorms, winter storms, thunderstorms, hurricanes, excessive heat

Background: Leon County has proposed to build a safe room recreational center between Buffalo and Centerville. The safe room would provide protection for the citizens at the recreational center should severe storms arise, and also act as a cooling center with air conditioning during periods of excessive heat.

Benefits: Save lives by providing safe shelter from tornadoes and other severe weather events.

Priority: High

Estimated Cost: \$400,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Install lightning rods on critical utilities and communications facilities to prevent fires resulting from lightning strikes.

Hazard: Thunderstorms

Background: We have had many severe storms over the years (primarily March-August) that result in numerous lightning strikes throughout the county.

Benefits: Continue to operate and maintain emergency facilities and communications and utilities.

Priority: Medium

Estimated Cost: \$2,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2016

Funding Sources: General revenue

ACTION: Strengthen existing critical facilities and utilities with braces, stronger bolts and protective coverings to protect them from severe storms.

Hazard: Hail, hurricanes, tornadoes

Background: Powerful hail storms can knock out power to critical facilities.

Benefits: Continue to operate and maintain emergency facilities and communications and utilities.

Priority: Medium

Estimated Cost: \$14,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue

ACTION: Educate the public to use natural conservation methods around their homes, i.e., tree plantings and watering at appropriate times to minimize damage and loss due to excessive heat and drought.

Hazard: Excessive heat, drought

Background: Leon County has been in a period of drought conditions for a period of five years and has had significant extended periods of 100+ degree weather. This is causing a significant strain on water resources.

Benefits: Conserve water resources and promote public health.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2016

Funding Sources: Individuals and homeowners

ACTION: Create and implement a drought contingency plan.

Hazard: Drought, excessive heat, wildfires

Background: Create a drought contingency plan to outline steps to be taken to prevent the county from experiencing loss of water pressure.

Benefits: Save lives and prevents property loss during periods of drought, excessive heat or wildfires.

Priority: High

Estimated Cost: \$1,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2015

Funding Sources: General revenue

ACTION: Bury power lines to minimize damages to all individuals and private and public utilities resulting from severe winter storms.

Hazard: Winter storms

Background: Leon County has had outages resulting from ice storms that affected the public welfare.

Benefits: Prevent loss of utility

Priority: Medium

Estimated Cost: \$15,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue

ACTION: Per NFIP participation, acquire any repetitive loss structures located below the high hazard dams.

Hazard: Dam failure, flooding

Background: There are a few structures located in the county that are downstream of a dam.

Benefits: Protection of life and property by removing people and structures from the identified dam failure inundation zone.

Priority: Medium to low

Estimated Cost: \$70,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General fund

ACTION: Per NFIP compliance, implement program to enlarge culverts and drains beneath county bridges to allow for more flood capacity.

Hazard: Floods

Background: Leon County has been flooded in several areas of the county. Enlarging culverts and drains beneath bridges will prevent a back flow of floodwaters onto people's property.

Benefits: Reduce the financial impact and loss of life from floods.

Priority: Medium

Estimated Cost: \$33,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2016

Funding Sources: General revenue

ACTION: Acquisition of homes below high hazard dams.

Hazard: Dam Failure

Background: Although a dam failure event is unlikely in Leon County, there are some structures that may be located in the dam failure inundation area.

Benefits: Protection of lives and structures from the affects of dam failure.

Priority: Medium

Estimated Cost: \$100,000

Responsible Organization: Leon County Office of Emergency Management, Emergency Management Coordinator

Target Completion Date: 2017

Funding Sources: General revenue or a mitigation grant from the Texas Water Development Board

City of Buffalo

ACTION: Per NFIP participation, acquire homes located in the floodplain.

Hazard: Flood, hurricane, thunderstorms

Background: Some homes become flooded after heavy rain events, such as from hurricanes and thunderstorms. Acquiring these homes with FEMA mitigation grants will remove them from the identified flood hazard area.

Benefits: Help protect people and property and reduce health risks.

Priority: Medium

Estimated Cost: \$20,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Build a new dual-use community safe room for protection from severe storms.

Hazard: Tornadoes, hail, winter storms, thunderstorms, hurricanes, excessive heat

Background: The City of Buffalo currently has no reinforced structures. The safe room would provide protection for the citizens at the recreational center should severe storms arise, and also act as a cooling center with air conditioning during periods of excessive heat.

Benefits: Prevent the destruction of property or loss of life of humans.

Priority: High

Estimated Cost: \$100,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Bury power lines to minimize damages to all individuals and private and public utilities resulting from severe winter storms.

Hazard: Winter storms, hail, tornado

Background: The City of Buffalo is vulnerable to outages resulting from ice storms, hail storms, and tornadoes due to above-ground power lines being knocked down.

Benefits: Prevents loss of utility and protects the public welfare.

Priority: Medium

Estimated Cost: \$21,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Identifying new available water supplies.

Hazard: Drought

Background: Locating new water supplies to supplement current water availability will help to lessen the local vulnerability to drought.

Benefits: Having additional water supplies can assist the city during periods of drought by keeping a reserve on hand for fire-fighting capabilities and for use by the general public.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2018

Funding Sources: Grant from the Texas Water Development Board

ACTION: Develop and maintain a database to track community vulnerability to wildfire and then remove the dry brush from those areas.

Hazard: Wildfire

Background: To identify wildfire hazard areas to assess overall community vulnerability, and then remove the dry brush from those areas to lessen the vulnerability.

Benefits: Can save lives and prevent property damage by having the community lessen their vulnerability to wildfires.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

ACTION: Improving roof sheathing to prevent hail penetration.

Hazard: Hail

Background: For new construction as well as retrofitting existing buildings, require roof sheathing techniques to minimize hail damage.

Benefits: Can prevent property damage to new and existing structures.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Buffalo, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

City of Centerville

ACTION: Build a dual-use community safe room for the citizens of Centerville.

Hazard: Hurricane, tornadoes, thunderstorms, winter storms, floods, wildfires, excessive heat

Background: In the past, the city and its residents have been vulnerable to severe storms. Currently, the city has no structures built strong enough to withstand tornadoes and other severe storms.

Benefits: Protection of lives by providing safe shelter from severe storms. The safe room may be used as a cooling center during periods of excessive heat.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2016

Funding Sources: General revenues and from churches and private citizens

ACTION: Increase culvert sizes to allow for more flood water to flow beneath major roads.

Hazard: Flooding

Background: Some older culverts are not large enough to allow flood waters to flow safely beneath the road.

Benefits: Prevents major road closures due to flood waters crossing the roads and allows emergency response vehicles to reach their destination.

Priority: Medium

Estimated Cost: \$10,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Funds

ACTION: Implement their Drought Contingency Plan response stages.

Hazard: Drought

Background: The local Drought Contingency Plan contains specific, quantified targets for water use restrictions. This includes drought response stages with triggers to begin and end at each stage.

Benefits: Each drought response stage will reduce the availability of water for certain events. Examples include not allowing the watering of lawns during the day or encouraging the use of xeriscape landscapes.

Priority: Medium

Estimated Cost: No cost

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: No cost

ACTION: Increase culvert sizes to allow for more flood water to flow beneath major roads.

Hazard: Flooding

Background: Some older culverts are not large enough to allow flood waters to flow safely beneath the road.

Benefits: Prevents major road closures due to flood waters crossing the roads and allows emergency response vehicles to reach their destination.

Priority: Medium

Estimated Cost: \$10,000

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Funds

ACTION: Improving roof sheathing to prevent hail penetration.

Hazard: Hail

Background: For new construction as well as retrofitting existing buildings, require roof sheathing techniques to minimize hail damage.

Benefits: Can prevent property damage to new and existing structures.

Priority: Medium

Estimated Cost: \$500

Responsible Organization: City of Centerville, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

City of Jewett

ACTION: Improve water supply and pressure to provide better fire fighting capabilities.

Hazard: Wildfires, drought, excessive heat

Background: Improve water supply and available fire hydrants in the city to enable firefighters to obtain water in a timely quantity and manner.

Benefits: Saving people and property.

Priority: High

Estimated Cost: \$100,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues, grants

ACTION: Build a community safe room for protecting vulnerable people during severe storms.

Hazard: Tornadoes, hail, winter storms, excessive heat, thunderstorms

Background: A community safe room is needed to protect citizens from the affects of severe storms.

Benefits: Protection of lives.

Priority: Medium

Estimated Cost: \$150,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues, grants

ACTION: Provide a third well for Jewett and surrounding residents in the extra territorial jurisdiction (ETJ). Initiate water conservation measures during drought times.

Hazard: Drought, excessive heat

Background: In the past 6 years, Jewett has suffered drought conditions depleting the water supply with two wells. A third well would help assure water during drought times.

Benefits: Assure water use during drought conditions.

Priority: Medium

Estimated Cost: Approximately \$1,000,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: TCDP Rural Development and other grant programs

ACTION: Retrofit larger ditches and bigger culverts to alleviate the problem of flooding due to storm water runoff.

Hazard: Floods, thunderstorms

Background: Water runs down streets causing potholes and erosion and increasing the flood risk.

Benefits: Reduce environmental problems due to erosion and stormwater runoff and reduce flood risks.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues and grants

ACTION: Develop and maintain a database to track community vulnerability to wildfire and then remove the dry brush from those areas.

Hazard: Wildfire

Background: To identify wildfire hazard areas to assess overall community vulnerability, and then remove the dry brush from those areas to lessen the vulnerability.

Benefits: Can save lives and prevent property damage by having the community lessen their vulnerability to wildfires.

Priority: Medium

Estimated Cost: \$1,000

Responsible Organization: City of Jewett, Mayor's Office

Target Completion Date: 2018

Funding Sources: Local funds

City of Leona

ACTION: Enlarge road culverts to handle higher water capacity.

Hazard: Floods, hurricanes, thunderstorms

Background: Urban growth increases runoff in immediate vicinity. Debris and sediment needs to be cleared from drains and culverts enlarged to reduce flood risks.

Benefits: Prevent backwater flooding.

Priority: Medium

Estimated Cost: \$30,000

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: General revenues and grants

ACTION: Strengthen existing critical facilities and utilities with braces, stronger bolts and protective coverings to protect them from severe storms.

Hazard: Hail, thunderstorms, hurricanes, tornadoes, winter storm

Background: Powerful storms can knock out power to critical facilities.

Benefits: Continue to operate and maintain emergency facilities, communications and utilities.

Priority: Medium

Estimated Cost: \$21,000

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Acquire existing structures located in the identified flood hazard area.

Hazard: Floods, hurricanes, thunderstorms

Background: The City of Leona may experience minor flooding that causes homes to flood. Purchase and removal of the structure will prevent future property damage.

Benefits: Can save lives and prevent future property damage.

Priority: Medium

Estimated Cost: \$60,000

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Flood Mitigation Assistance grants or Hazard Mitigation Grant Program

ACTION: Implement their Drought Contingency Plan response stages.

Hazard: Drought

Background: The local Drought Contingency Plan contains specific, quantified targets for water use restrictions. This includes drought response stages with triggers to begin and end at each stage.

Benefits: Each drought response stage will reduce the availability of water for certain events. Examples include not allowing the washing of cars during the day or for restaurants to serve water only when requested by the customer.

Priority: Medium

Estimated Cost: No cost

Responsible Organization: City of Leona, Mayor's Office

Target Completion Date: 2018

Funding Sources: No cost

City of Marquez

ACTION: Build a community safe room

Hazard: Hurricane, winter storm, tornadoes, hail, excessive heat, thunderstorms

Background: Local citizens have no strengthened safe rooms to protect themselves from severe storms.

Benefits: Prevent the loss of life by providing a strengthened shelter during storm events.

Priority: High

Estimated Cost: \$50,000

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Bury power lines to minimize damages to all individuals and private and public utilities resulting from severe storms.

Hazard: Winter storms, hail, tornado, thunderstorms, hurricanes

Background: The City of Marquez is vulnerable to outages resulting from severe storms due to above-ground lines being knocked down.

Benefits: Prevent loss of utility and protects the public welfare.

Priority: Medium

Estimated Cost: \$25,000

Responsible Organization: City of Marquez, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

City of Normangee

ACTION: Build a new dual-use community safe room.

Hazard: Hail, winter storm, tornado, hurricane, excessive heat

Background: The City of Normangee currently has no reinforced structures. The safe room would provide protection for the citizens at the recreational center should severe storms arise, and also act as a cooling center with air conditioning during periods of excessive heat.

Benefits: Can save lives.

Priority: Medium

Estimated Cost: \$100,000

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Strengthen existing critical facilities and utilities with braces, stronger bolts and protective coverings to protect them from severe storms.

Hazard: Hail, thunderstorms, hurricanes, tornadoes, winter storm

Background: Powerful storms can knock out power to critical facilities.

Benefits: Continue to operate and maintain emergency facilities, communications and utilities.

Priority: Medium

Estimated Cost: \$20,000

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Individual Safe Room Program.

Hazard: Hail, thunderstorm, tornado

Background: For new construction as well as retrofitting existing buildings, provide rebates for installing individual safe rooms into their homes for protection against hailstorms.

Benefits: To prevent hail-induced injuries when taking shelter from a thunderstorm.

Priority: Medium

Estimated Cost: \$2,500 for each safe room

Responsible Organization: City of Normangee, Mayor's Office

Target Completion Date: 2018

Funding Sources: FEMA Hazard Mitigation Grant Program

City of Oakwood

ACTION: Acquire homes located in the identified flood hazard area.

Hazard: Floods, hurricanes, thunderstorms

Background: Acquire homes in the flood plain located on College Street and Whitt Street.

Benefits: Removal of structures from the flood plain can save lives and reduce property damage from floods, hurricanes, and thunderstorms.

Priority: Medium

Estimated Cost: \$25,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program

ACTION: Build a new dual-use community safe room.

Hazard: Hail, winter storm, tornado, hurricane, excessive heat

Background: The City of Oakwood currently has no reinforced structures. The safe room would provide protection for the citizens at the recreational center should severe storms arise, and also act as a cooling center with air conditioning during periods of excessive heat.

Benefits: Prevent the loss of life of humans.

Priority: Medium

Estimated Cost: \$100,000

Responsible Organization: City of Oakwood, Mayor's Office

Target Completion Date: 2017

Funding Sources: FEMA Hazard Mitigation Grant Program