Union County
Multi-Jurisdictional
Hazard Mitigation Plan
2022

Union County

Prepared by Union County with professional planning assistance provided by CDR Maguire

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1. Introduction

1.1 Purpose

Union County, including the participating jurisdictions of the Town of Clayton and the Villages of Des Moines, Folsom, and Grenville, has prepared this local hazard mitigation plan to guide hazard mitigation planning to better protect the people and property of the county from the effects of hazard events. While all municipalities participated to some extent in the plan development, only Union County and the Town of Clayton are seeking FEMA approval for this plan. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision-makers direct mitigation activities and resources. The plan is intended to be a living document through ongoing implementation, maintenance, and regular updates every five years. This is the county's first hazard mitigation plan that was developed beginning in 2019 through 2022.

This plan was also developed to enable Union County and participating jurisdictions to become eligible for certain federal disaster assistance. Specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) grant programs, as well as to make the county more disaster resilient.

1.2 Background and Scope

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents Union County's: hazard mitigation planning process; identifies relevant hazards and risks; and identifies the strategy the County and participating jurisdictions will use to decrease vulnerability while increasing resiliency and sustainability.

The Union County Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers everything within the county's jurisdictional boundaries. Unincorporated Union County and the following municipalities participated in the planning process (those seeking FEMA approval shown in **bold**):

- **Union County**
- **Town of Clayton**
- Village of Des Moines (not formally adopting)
- Village of Folsom (not formally adopting)
- Village of Grenville (not formally adopting)

This plan was prepared under the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements, and regulations will be referred to collectively as the Disaster Mitigation Act - DMA.) The 2007 amendments also incorporate mitigation planning requirements of the Flood Mitigation Assistance (FMA) program authorized by the National Flood Insurance Act of 1968. While the DMA emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Access to these programs is vital because the Union County planning area is subject to many types of hazards.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost for the community and its property owners associated with disaster response and recovery to the by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. Union County has been affected by hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for federal funding.

1.3 Plan Organization

The Union County Multi-Jurisdictional Hazard Mitigation Plan (Plan) is organized in several sections as follows.

- Chapter 1: Introduction
- Chapter 2: Community Profile
- Chapter 3: Mitigation Strategy
- Chapter 4: Planning Process
- Chapter 5: Plan Maintenance, Revision, and Integration
- Chapter 6: Hazard Identification and Risk Assessment (HIRA)
- Appendixes: Adoptions, Meeting Details

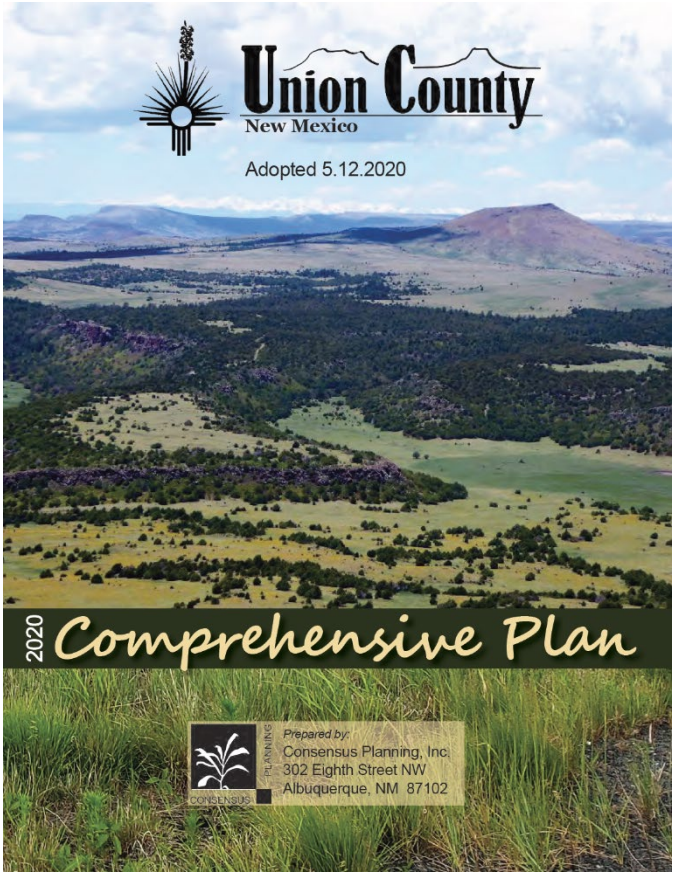
2. Community Profile

Union County recently (2020) completed its comprehensive plan. Readers are directed to this document for an in-depth review of the county's current profile. Topics focused on include demographics, land use, economic development, housing, water resources, transportation, and public services.

The following content is borrowed from the comprehensive plan, to help inform readers of this hazard mitigation plan:

Union County is located in northeastern New Mexico and is bordered by Colfax County to the west, Harding County to the southwest, Quay County to the south, the state of Texas to the east, and the state of Colorado to the north. Union County is a rural county that primarily relies on farming and ranching to help sustain the rural lifestyle that resident's value and want to maintain in the future.

The winter months in Union County are cold and the summer months are milder than the rest of New Mexico. The annual high temperature of Union County is approximately 67.8 degrees Fahrenheit with an annual low temperature of 40.3 degrees Fahrenheit. Precipitation is higher between May and August with an average rainfall of approximately 15.77 inches. The annual snowfall is approximately 28 inches.



Union County is rural with a majority of its population concentrated in the Town of Clayton. Approximately 70.8% of the County's population resides in Clayton; others live in homesteads or ranches in unincorporated Union County or in communities such as Capulin, Grenville, Des Moines, Folsom, Sedan, Amistad, Gladstone, Hayden, Mount Dora, Sedan, Seneca, Sofia, or Stead.

The following figures present current population trends across Union County. Currently the county is experiencing a decline in population which is delaying future growth and development into potentially hazardous areas.

Figure 2-1 Jurisdictional Population

TABLE 2.1: UNION COUNTY POPULATION BY PLACE			
	2010	2017	% Change
UNION COUNTY	4,549	4,216	-7.3%
Clayton	2,980	2,987	0.2%
Capulin	66	60	-9.1%
Grenville	38	16	-57.9%
Des Moines	143	56	-60.8%
Folsom	56	41	-26.8%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates, 2013-2017.

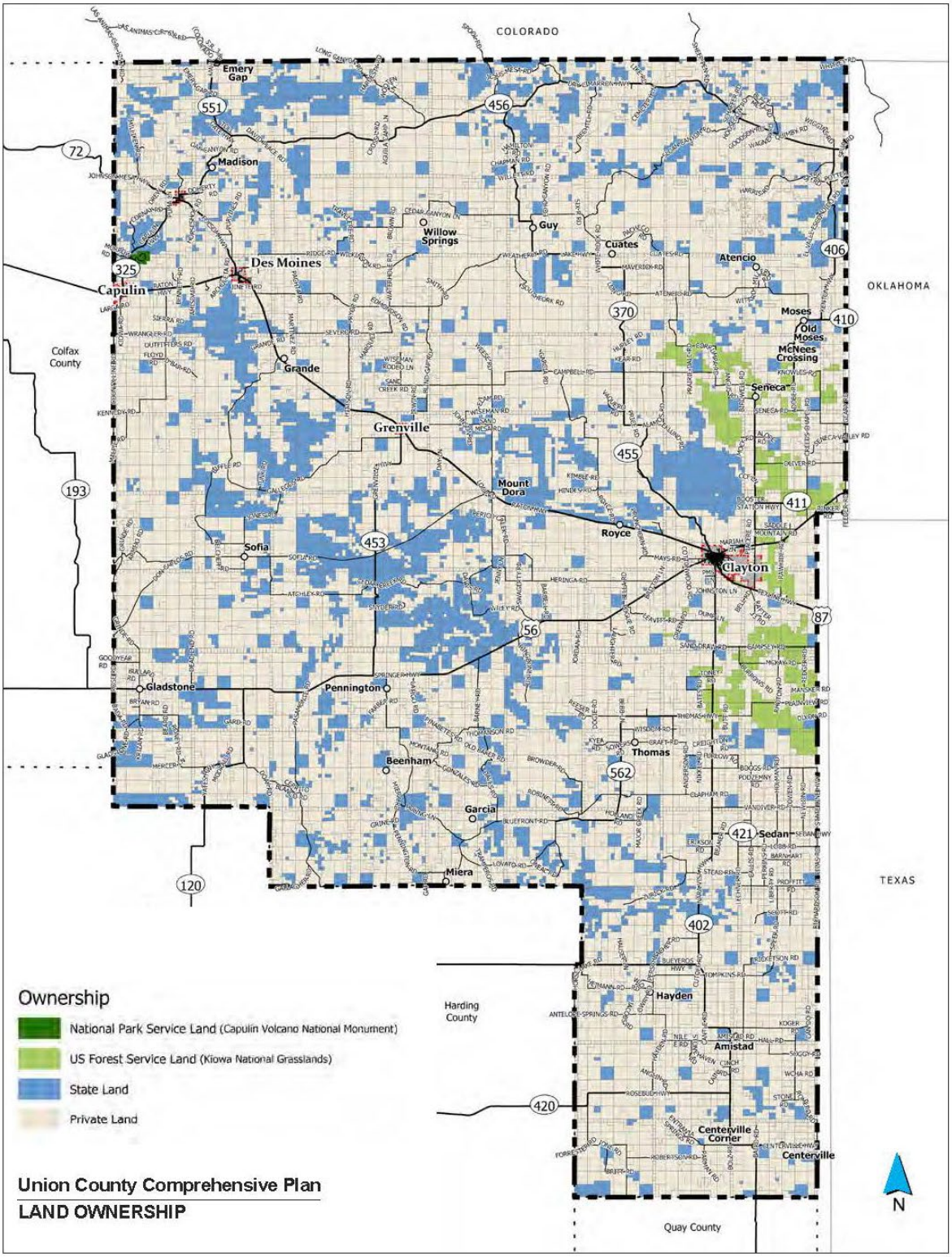
Figure 2-2 Historic Population and Projections

FIGURE 2.1: UNION COUNTY HISTORIC POPULATION and PROJECTIONS

Source: U.S. Census Bureau.

The next figure presents land ownership patterns across Union County. There are a number of state and federal lands scattered across the county. Implementing hazard mitigation activities in these areas will require close coordination with various landowner entities.

Figure 2-3 Land Ownership



3. Mitigation Strategy

3.1 Hazard Mitigation Strategy Overview

The mitigation strategy provides a blueprint for Union County to follow to become less vulnerable to its identified hazards. It is based on the general consensus of the county's local planning committee (LPC), the findings and conclusions of the risk assessment, and input from the public and stakeholders. The Mitigation Strategy includes hazard mitigation plan goals, objectives, and actions. The Plan's goals and objectives serve as the guiding principles for future mitigation policy and project administration. Mitigation actions serve as implemental items that support these goals. The mitigation strategy includes a process for evaluating mitigation actions to ensure activities are feasible based on community capabilities, tied to plan goals, and are effective in reducing hazard losses for current and future structures and populations.

This section outlines the goals, objectives, capabilities, mitigation action evaluation, and prioritization process undertaken in Union County.

3.2 Mitigation Goals & Objectives

The Plan's mitigation goals and objectives were developed as part of the planning process and relied heavily on input from the 2020 Union County Comprehensive Plan. Those relevant goals and objectives from the comprehensive plan were evaluated by the LPC. After some minor edits, it was agreed that they would serve as this Plan's goals and objectives, to ensure strategic agreement across these important county plans.

These new Plan goals and objectives reflect the current needs and priorities of the County and are intended to reduce long-term vulnerability and risk to all hazards identified in this Plan. The new 2022 mitigation goals and objectives are as follows:

1) **Increase Union County's capacity to handle major storm events.**
   a) To protect the residents in unincorporated Union County from flooding and preserve property values.
   b) To minimize damage to public facilities, including roads, dams, and dry utilities.
   c) To allow for more on-site drainage to reduce the impact of flooding.
2) **Reduce Union County's vulnerability to natural hazards.**
   a) To provide residents with adequate warning for major hazards.
   b) To develop greater capability and capacity to mitigate hazards and experience a shorter recovery time after hazards have occurred.
   c) To increase emergency preparedness and response during natural hazard events.
   d) To coordinate with the Federal Emergency Management Agency (FEMA) on mitigating natural hazards.
3) **Reduce Union County's vulnerability to wildfires.**
   a) To coordinate with the Town of Clayton, Village of Des Moines, Village of Folsom, Village of Grenville, and other communities within Union County on fuel reduction activities in the Wildland-Urban Interface (WUI) areas.
   b) To educate residents on best practices in wildfire prevention.
   c) To participate in organizations dedicated to preventing urban wildfires.

4) **Minimize Union County's vulnerability to and impact from flooding.**
   a) To develop greater capability and capacity to mitigate flooding and flash floods.
   b) To strive for a shorter recovery time after flooding has occurred.
5) **Improve Union County's capacity to respond to hazardous spills and accidents on US 87 (Ports to Plains Corridor).**
   a) To develop a rapid and coordinated response to hazardous spills and accidents.
   b) To ensure adequate equipment and staffing levels trained in specialized emergency response.

3.2.1 Mitigation Capabilities Assessment

Prior to forming new mitigation actions, a capabilities assessment was conducted for jurisdictions to understand what planning and regulatory; administrative and technical; financial; and educational and outreach capabilities each has for implementing hazard mitigation projects. To assess capabilities, an online survey was distributed to each jurisdiction. Additionally, capabilities were discussed during LPC meetings and identified gaps were evaluated as potential mitigation actions, including stormwater management, public outreach for multiple hazards, and development of warning systems. A summary of the current capabilities is described in the tables below.

Table 3-1 Union County Capability Summary

Mitigation Capabilities	Unincorporated Union County
Planning & Regulatory	Capital Improvements Program (CIP) or Plan; Community Wildfire Protection Plan (CWPP); Comprehensive, Master, or General Plan
Administrative & Technical	Emergency Manager; Transportation Planner; GIS Capability; Grant Manager, Writer, or Specialist; General Warning Systems/Services; Tornado Warning Systems/Services
Financial	Special Tax Bonds to Incur Debt; Capital Improvement Project Funding; Community Development Block Grants
Education & Outreach	Local Citizen Groups that Communicate Hazard Risks; Firewise; StormReady

Table 3-2 Town of Clayton Capability Summary

Mitigation Capabilities	Town of Clayton
Planning & Regulatory	Building Codes; Capital Improvements Program (CIP) or Plan; Comprehensive, Master, or General Plan; Zoning Ordinance
Administrative & Technical	Emergency Manager; Tornado Warning Systems/Services
Financial	Utilities Fees; Capital Improvement Project Funding
Education & Outreach	n/a

Table 3-3 Village of Des Moines Capability Summary

Mitigation Capabilities	Village of Des Moines
Planning & Regulatory	Building Codes; Comprehensive, Master, or General Plan; Economic Development Plan
Administrative & Technical	Emergency Manager; Transportation Planner; Grant Manager, Writer, or Specialist; General Warning Systems/Services; Tornado Warning Systems/Services
Financial	Utilities Fees; Special Tax Bonds to Incur Debt; Capital Improvement Project Funding; Community Development Block Grants
Education & Outreach	Local Citizen Groups that Communicate Hazard Risks; Firewise; StormReady

Table 3-4 Village of Folsom Capability Summary

Mitigation Capabilities	Village of Folsom
Planning & Regulatory	n/a
Administrative & Technical	n/a
Financial	n/a
Education & Outreach	Firewise

Table 3-5 Village of Grenville Capability Summary

Mitigation Capabilities	Village of Grenville
Planning & Regulatory	Community Wildfire Protection Plan (CWPP)
Administrative & Technical	Emergency Manager; GIS Capability; Wildfire Warning Systems/Services
Financial	n/a
Education & Outreach	Local Citizen Groups that Communicate Hazard Risks; Firewise

3.3 Mitigation Actions

Selected actions are included in the Mitigation Action Plan (MAP), which is presented at the end of this chapter. The MAP is a functional plan for action and is the most essential outcome of the mitigation planning process. The MAP includes a prioritized listing of proposed hazard mitigation actions for the county and participating jurisdictions to implement. Mitigation actions were derived from the hazard identification and risk assessment (HIRA), LPC meetings, the public surveys, and other community plans. Each action includes accompanying information such as the department responsible for completing the action, timeline, and funding source. The MAP provides those departments or individuals accountable for implementing mitigation actions with a clear path to reduce risk and vulnerability over time. Further, the MAP provides a mechanism to monitor progress.

3.3.1 Prioritization of Mitigation Actions

Each action considers the benefits and costs of an action, to ensure it is cost effective and beneficial to the entirety of the community. During the third LPC meeting, methods to prioritize mitigation actions were discussed and a subjective measure was decided upon due to the difficulty of quantifying many of the criteria. It was determined that a "high, medium, low" prioritization scheme would work best for the LPC. Actions were ranked high, medium, or low based on the following criteria:

- Positive cost-benefit ratio
- Overall hazard risk
- Social considerations (life safety)
- Administrative considerations (admin / technical assistance)
- Protecting critical facilities / infrastructure
- Economic impacts
- Environmental impacts
- Alignment with other local objectives
- Availability of local funding (but this did not preclude any actions)

"High" priority was primarily designated to those actions with a: moderate to high risk ranking; potential high risk to life safety, property, and the environment; and importantly a critical need for information to move forward with any mitigation measures. These data deficiencies are mitigation actions in themselves, since without proper assessment and studies by engineers and subject matter experts, it cannot be determined if cost-benefit ratio is positive, an action is feasible, and what impact it may have on other areas or hazards.

"Medium" priority was in general designated to actions for hazards that were either slow onset, localized impact events, or larger impact hazards with a sporadic occurrence. In these cases, the factors that played heavily were: cost-benefit ratio; considerations for level of risk to life safety and critical facilities; and overall hazard risk.

"Low" priority was assigned to low probability hazards in most cases and therefore actions may not be prioritized above or competing with other more practical actions. Also, considering the typically small staff in many communities in Union County, utilizing the administrative time would likely not be practical or efficient.

3.3.2 Implementation of Mitigation Actions

The MAP includes several measures to support implementation. Each action is tied to an organization which will be responsible for leading the completion of that project. By assigning responsibility, it increases accountability and the likelihood of action. In addition to the assignment of a local lead, an implementation time-period or a specific implementation date has been assigned to assess whether actions are being implemented in a timely fashion. Further, the county will seek outside funding sources to execute mitigation projects in both the pre-disaster and post-disaster environments. When known, potential funding sources have been identified for proposed actions listed in the MAP. Further detail on implementation can be found in the Maintenance and Implementation section of this Plan.

3.3.3 2022 Union County Mitigation Action Plan

This section includes the MAP and details the 2022 Union County mitigation actions. Each action includes a number of items, as shown below. As mentioned in Chapter 6, while volcanoes were profiled in this plan the LPC determined volcano-specific actions would not be created due to the lack of ability to mitigate against the impacts of an eruption.

- Action ID
- Jurisdiction
- Action (project description)
- Lead / Partner Organizations
- Priority
- Goal(s) Addressed
- Hazard(s) [mitigated]
- Completion date
- Cost
- Potential Funding Sources

Table 3-6 Union County Mitigation Action Plan (MAP)

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
2022-1	Union County	Conduct an engineering study to determine the potential risk from dam failure at Clayton Lake and implement the study's proposed solutions.	Union County	H	1,2,4	Dam Failure	2026	Unknown	US Army Corps of Engineers, FPF, local, FEMA
2022-2	Union County	To address a data deficiency identified as part of the HIRA, resolve dam inundation mapping needs across the county and neighboring counties where the risk may originate.	Union County	H	1,2,4	Dam Failure	2026	Unknown	US Army Corps of Engineers, FPF, local, FEMA
2022-3	Town of Clayton	Evaluate and map community lifelines that may be at risk due to dam failure events and implement mitigation measures to reduce the risk.	Town of Clayton	H	1,2,4	Dam Failure	2026	Staff Time	FEMA, Local
2022-4	Town of Clayton	In collaboration with the county and to address a data deficiency identified as part of the HIRA, resolve dam inundation mapping needs across the	Town of Clayton	H	1,2,4	Dam Failure	2026	Staff Time	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
		county and neighboring counties where the risk may originate.							
2022-5	Union County	Develop drought mitigation materials to conduct public education on the hazard.	TOC Public Works	M	2	Drought	2025	$5,000,000	FEMA, NMED
2022-6	Union County	Installation of earthen and fabricated storage tanks to help retain water.	Union County	M	2	Drought	2026	Unknown	FEMA, NMED
2022-7	Town of Clayton	Determine the feasibility of developing a water reuse system that provides irrigation to town parks and golf course, if feasible implement necessary engineering studies, permits, and procurement process to begin installation of water saving system.	TOC Public Works	M	2	Drought	2025	$5,000,000	FEMA, NMED
2022-8	Town of Clayton	Develop drought mitigation materials to conduct public education on the hazard.	Town of Clayton	H	2	Drought	2026	Staff Time	FEMA, NMED
2022-9	Union County	Conduct engineering review of government	Union County	L	2	Earthquake	2026	Unknown	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
		buildings to determine potential structural hardening mitigation measures, if review finds measures to be possible and cost effective implement recommended retrofits.							
2022-10	Union County	Develop earthquake preparedness and mitigation materials to conduct public education on the hazard.	Union County	L	2	Earthquake	2026	Staff Time	FEMA, Local
2022-11	Town of Clayton	Conduct engineering review of government buildings to determine potential structural hardening mitigation measures, if review finds measures to be possible and cost effective implement recommended retrofits.	Town of Clayton	L	2	Earthquake	2026	Unknown	FEMA, Local
2022-12	Town of Clayton	Develop earthquake preparedness and mitigation materials to conduct public education on the hazard.	Town of Clayton	L	2	Earthquake	2026	Staff Time	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
2022-13	Union County	Conduct flash flood assessments to identify roads that may be impacted by future events and based on assessment implement sustainable, cost effective mitigation measures.	Union County	H	1,2,4	Flood / Flash Flood	2026	Unknown	NMDOT, FEMA, Local
2022-14	Union County	Use public outreach to create awareness of roads that are identified as prone to flash flood and educate community members on safety precautions and actions if flooding occurs	Union County	H	1,2,4	Flood / Flash Flood	2026	Unknown	NMDOT, FEMA, Local
2022-15	Town of Clayton	Perform stormwater design evaluation and utilize results to create a Stormwater Plan, which will inform long-term capital improvements on existing channels and sustainable updates or new construction where needed.	TOC Streets	H	1,2	Flood / Flash Flood	2025	$3,000,000	NMDOT, FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
2022-16	Town of Clayton	Use public outreach to create awareness of roads that are identified as prone to flash flood and educate community members on safety precautions and actions if flooding occurs	Town of Clayton	H	1,2,4	Flood / Flash Flood	2026	Unknown	FEMA, Local
2022-17	Union County	Coordinate with partners (NM Tech, USDA) to perform geotechnical sampling and testing to more accurately identify the properties at risk in potentially hazard soil areas, using the results to identify targeted, cost-effective, and practical mitigation measures (e.g., structural reinforcement), as well as providing property owners support to implement them.	Union County	M	2	Hazard Soils	2026	Staff Time	FEMA, NMED, Local, NM Tech, USDA
2022-18	Union County	Conduct a public education campaign informing residents of the known (and unknown) risks to hazardous soils,	Union County	M	2	Hazard Soils	2026	Staff Time	FEMA, NMED, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
		with an emphasis on areas with verified hazard soil.							
2022-19	Town of Clayton	Coordinate with partners (NM Tech, USDA) to perform geotechnical sampling and testing to more accurately identify the properties at risk in potentially hazard soil areas, using the results to identify targeted, cost-effective, and practical mitigation measures (e.g., structural reinforcement), as well as providing property owners support to implement them.	Town of Clayton	M	2	Hazard Soils	2026	Staff Time	FEMA, NMED, Local, NM Tech, USDA
2022-20	Town of Clayton	Conduct a public education campaign informing residents of the known (and unknown) risks to hazardous soils, with an emphasis on areas with verified hazard soil.	Town of Clayton	M	2	Hazard Soils	2026	Unknown	FEMA, NMED, Local
2022-21	Union County	Evaluate the community's unmet tornado sheltering needs and identify	Union County	H	2	High Wind / Tornado	2026	Staff Time	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
		potential sheltering locations, selecting the most cost effective and logical choice for implementing retrofit measures and begin process (procurement, permitting, etc).							
2022-22	Union County	Construct public tornado safe room(s) along major roadways for use by those traveling through the county.	Union County	M	2	High Wind / Tornado	2026	Unknown	FEMA, Local
2022-23	Town of Clayton	Evaluate the community's unmet tornado sheltering needs and identify potential sheltering locations, selecting the most cost effective and logical choice for implementing retrofit measures and begin process (procurement, permitting, etc).	Town of Clayton	H	2	High Wind / Tornado	2026	Staff Time	FEMA, Local
2022-24	Town of Clayton	Install tornado warning sirens across town.	Town of Clayton	M	2	High Wind / Tornado	2026	Unknown	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
2022-25	Union County	Conduct landslide / rockfall assessments to identify roads that may be impacted by future events and implement recommended, cost effective mitigation measures.	Union County	M	2	Landslide / Rockfall	2026	Unknown	FEMA, Local
2022-26	Union County	Due to the statewide scale of the data used for this analysis, site specific exposure assessments are a suggested next step to determine if an actual risk is present. Individually evaluate those structures and critical facilities located in the 'likely susceptible' landslide and rockfall areas. Determine and implement recommended mitigation measures on those structures and critical facilities where the greatest risk is present.	Union County	M	2	Landslide / Rockfall	2026	Unknown	FEMA, NMDOT, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
2022-27	Town of Clayton	Conduct landslide / rockfall assessments to identify roads that may be impacted by future events and implement recommended, cost effective mitigation measures.	Town of Clayton	M	2	Landslide / Rockfall	2026	Unknown	FEMA, NMDOT, Local
2022-28	Town of Clayton	Develop public information content and flyers relating to helping the public identify potential landslide / rockfall vulnerabilities to their properties and ways to mitigate this risk.	Town of Clayton	M	2	Landslide / Rockfall	2026	Unknown	FEMA, NMDOT, Local
2022-29	Union County	Upgrade Transmission lines to allow for expedited emergency restoration.	Union County	H	2	Severe Winter Storm	2025	Unknown	TSG&T, Golden Spread
2022-30	Union County	Construct a redundant transmission line to serve as a backup main power supply to the entire county, ensuring critical lifeline redundancy.	Union County	H	2	Severe Winter Storm	2025	Unknown	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
2022-31	Town of Clayton	Develop winter storm preparedness and mitigation materials to conduct public education on the hazard.	Town of Clayton	H	1,2	Severe Winter Storm	2025	Unknown	TSG&T, Golden Spread
2022-32	Town of Clayton	Identify and assess public sheltering facility options and upon selection of logical, inclusive, and feasible site, create an agreement with building owners/operators, begin storing supplies, and filling needs, such as a generator.	Town of Clayton	H	2	Severe Winter Storm	2025	Staff Time	FEMA, Red Cross, Local
2022-33	Union County	In coordination with the Village of Des Moines, install a snow gate on NM 551 at the Colorado border to restrict traffic during severe winter storm highway closures.	UC, Capulin, Des Moines, Folsom, and Grenville EMS; NMDOT	H	1,2	Severe Winter Storm	2025	$10,000	NMDOT, FEMA
2022-34	Union County	In coordination with the Village of Des Moines, install generator and transfer switch at	UC, Des Moines Village, Des	L	1,2	Severe Winter Storm	2025	$50,000	FEMA, Red Cross, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
		emergency shelter location.	Moines Municipal School						
2022-35	Union County	Train volunteer residents and community leaders of the county through the free National Weather Service SKYWARN Weather Spotter program to assist in thunderstorm and other hazard data tracking in their communities, also using this information to alert the community of potential storms.	Union County	M	1,2	Thunderstorm (including Lightning & Hail)	2026	Unknown	FEMA, Local, NWS
2022-36	Union County	Develop and distribute public information focused on educating the public of the dangers of hail and how to protect themselves and possibly property.	Union County	M	1,2	Thunderstorm (including Lightning & Hail)	2026	Staff Time	FEMA, Local
2022-37	Union County	Develop a public information campaign focused on educating the public of the dangers of lightning strikes.	Union County	M	1,2	Thunderstorm (including Lightning & Hail)	2026	Staff Time	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
2022-38	Union County	Work with a grounding engineer and licensed lightning protection company to determine which critical facilities to install lightning protection and install according to NFPA (National Fire Protection Association) standards	Union County	M	1,2	Thunderstorm (including Lightning & Hail)	2026	Unknown	FEMA, Local
2022-39	Town of Clayton	Train volunteer residents and community leaders of the county through the free National Weather Service SKYWARN Weather Spotter program to assist in thunderstorm and other hazard data tracking in their communities, also using this information to alert the community of potential storms.	Town of Clayton	M	1,2	Thunderstorm (including Lightning & Hail)	2026	Unknown	FEMA, Local
2022-40	Town of Clayton	Develop and distribute public information focused on educating the public of the dangers of hail and how to protect	Town of Clayton	M	1,2	Thunderstorm (including Lightning & Hail)	2026	Staff Time	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
		themselves and possibly property.							
2022-41	Town of Clayton	Develop a public information campaign focused on educating the public of the dangers of lightning strikes.	Town of Clayton	M	1,2	Thunderstorm (including Lightning & Hail)	2026	Staff Time	FEMA, Local
2022-42	Town of Clayton	Work with a grounding engineer and licensed lightning protection company to determine which critical facilities to install lightning protection and install according to NFPA (National Fire Protection Association) standards	Town of Clayton	M	1,2	Thunderstorm (including Lightning & Hail)	2026	Unknown	FEMA, Local
2022-43	Union County	Develop wildfire preparedness and mitigation materials to conduct public education on the hazard.	Union County	H	2,3	Wildland Fire	2026	Staff Time	FPF, Local, FEMA
2022-44	Union County	Perform wildfire mitigation to reduce the risk to highest risk communities across the county, including fuel	Union County	H	2	Wildland Fire	2026	Unknown	FEMA, Local

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
		reduction and defensible space management where appropriate.							
2022-45	Town of Clayton	Develop wildfire preparedness and mitigation materials to conduct public education on the hazard.	Town of Clayton	H	2,3	Wildland Fire	2026	Staff Time	FPF, Local, FEMA
2022-46	Town of Clayton	Perform wildfire mitigation to reduce the risk to public facilities, including fuel reduction and defensible space management where appropriate.	Town of Clayton	M	2,3	Wildland Fire	2026	Unknown	FPF, Local, FEMA
2022-47	Union County	In coordination with the Village of Des Moines, upgrade and repair village water wells and sites.	Des Moines Village, Des Moines Fire	M	2,3	Wildland Fire	2023	$30,000	US Army Corps of Engineers, FPF, Local, FEMA
2022-48	Union County	In coordination with the Village of Des Moines, locate and repair water leak in between village wells (preventing use of back-up well).	Des Moines Village, Des Moines Fire	M	2,3	Wildland Fire	2022	$30,000	US Army Corps of Engineers, FPF, Local, FEMA

Action ID	Jurisdiction	Action	Lead / Partner Organizations	Priority	Goal(s) Addressed	Hazard(s)	Completion Date	Cost	Potential Funding Sources
2022-49	Town of Clayton	Provide Clayton Fire and Rescue with adequate resources and training to respond to hazardous spills and accidents	Clayton Fire and Rescue	M	2,5	Hazardous Material Release (HazMat)	2023	$100,000	Local, FEMA
2022-50	Union County	In coordination with the Village of Des Moines, purchase Haz-Mat response equipment/materials and HazMat Ops training	Des Moines Fire, Des Moines EMS	L	5	Hazardous Material Release (HazMat)	2022	$40,000	FPF, FEMA
2022-51	Union County	Develop public education campaign concerning the identification and reporting of agricultural disease.	Union County	M	2	Agricultural Disease	2026	Staff Time	FEMA, NASDA, NMED
2022-52	Union County	Conduct terrorism training classes across all entities to help recognize and mitigate potential threats.	Union County	L	2	Terrorism	2026	Staff Time	FEMA, Local

4. Planning Process

4.1 Introduction

This section provides an overview of the planning process followed to create the 2022 Union County Multi-Jurisdictional Hazard Mitigation Plan (Plan). This section includes how the Plan was prepared, who was involved in preparing the Plan, how the public and stakeholders were involved, and the review and incorporation of existing plans and studies.

The planning process was organized into five phases, including:

- Phase I: Organize resources
- Phase II: Assess risks
- Phase III: Develop the mitigation strategy
- Phase IV: Implement the plan and monitor progress
- Phase V: Plan adoption

The following sections detail each phase of the planning process.

4.2 Phase I: Organize Resources

Union County recognized the need for and importance of this Plan. The County was responsible for initiating the planning process and in securing grant funding to hire a consultant, CDR Maguire, to assist with plan development.

This phase started with a commitment to developing the Plan from the county and participating municipalities. Efforts such as: refining the scope of the Plan and the schedule; discussing coordination with participating departments and individuals who should be invited to serve on the LPC; establishing clear participation standards for all Plan participants; gathering and review of initial data and documents relative to the planning process; clearly defining roles and responsibilities of the consultant and all adopting jurisdictions and entities; discussion of an initial public involvement strategy; and setting dates for the kick-off meeting with the local planning committee (LPC) all identified as important initial planning steps.

4.2.1 Pre-kickoff Meeting

Obtaining this information was accomplished by coordination between the consultant and the Union County Emergency Manager and County Manager. A pre-kickoff webinar was held on August 21, 2019, with county leadership.

Major outcomes of the pre-kickoff meeting were a: discussion of how to conduct outreach to the LPC, stakeholders, and the public; communication preferences for the LPC; initial conversation about hazards and major events since the previous plans; and participation standards. Agreement was made that there would be three meetings during the planning process to include an LPC kickoff, review of the Hazard Identification and Risk Assessment Results, and a Mitigation Strategy workshop.

The LPC kickoff meeting was scheduled for November and email invitations were sent out to the suggested roster. This initial roster did grow as more stakeholders became involved through secondary invitation, by word of mouth or forwarded emails.

In between these meetings, the consultant and Union County's Emergency Manager would communicate weekly, or on an as-needed basis. The agreed-upon participation standards were as follows:

Consultant:

- Facilitate the planning process to ensure tasks are being completed in agreement with the project timeline.
- Provide overall planning guidance and plan organization in close coordination with participating jurisdictions.
- Guide the public participation process.
- Overall plan writing and data analysis with input from participating jurisdictions and LPC.
- Ensure the plan meets all FEMA requirements.

Local Planning Committee (LPC)

- Meeting attendance and participation.
- Providing requested information and data.
- Broad participation across jurisdictional staff.
- Community and stakeholder involvement and education.
- Review draft plan sections.
- Adopt plan as participating jurisdictions.

4.2.2 Local Planning Committee (LPC) Kickoff Meeting

The LPC kickoff webinar was held on November 20, 2019. In preparation for the kickoff, the consultant coordinated with Union County to develop LPC representation from: the County; the Town of Clayton; the Villages of Des Moines, Folsom, and Grenville; local stakeholders; and neighboring entities. The LPC roster was built off the current Local Emergency Planning Committee (LEPC), and additional participants were added based on input from county and municipal leadership. LPC members were encouraged to invite community members that would provide a unique perspective to the planning process. All participants were invited through in person discussions and email. The LPC is presented in Table 4-1.

Everyone invited to participate on the LPC has the ability to implement mitigation activities, however only specific members have the authority to regulate development and those people are listed in **bold** in the following table. Additionally, those members who represent a more regional perspective, separate from county representation, have an asterisk (*) next to the organization.

Records of attendance, as well as meeting agendas are included in Appendix 7.2.

Table 4-1 Union County Local Planning Committee (LPC)

Name	Title / Position
Bradley, Stacey	Union County General Hospital - Chief Nursing Officer

Name	Title / Position
Bramblett, Phillip	Village of Grenville Fire/Rescue
Briesh, Paul	*Baca Valley Telephone - VP and GM
Burmeister, Scotty	*Baca Valley Telephone - Radio Tech
Cardenas, Narce	*NM Gas – Title unavailable
Chancy, Darrell	*NM Gas - Operations Supervisor
Christy, Kristen	Union County Health Network - Executive Director
Cooper, Judith	Union County Collaborative Health Council - Coordinator
Dale, Chris	Clayton PD - SGT/Investigator
Dempsey, Lori	Clayton Nursing & Rehabilitation Center - Center Nursing Executive
Diller, Stacy	Clayton Superintendent
Drumm, Justin	Clayton Fire/Rescue - Fire Chief
Drumm, Cassie	Union County General Hospital - Medical Staff Coordinator
Earp, Patty	GEO Group - Fire/Safety
Fickling, Tanner	*Pinnacle Propane - Manager
Fluhman, Jay	Clayton Family Practice - Family Nurse Practitioner
Gallegos, April	Clayton/UC Chamber - Executive Director
Garcia, Ferdinand	Golden Spread Coalition - Supervisor
Garcia, Quirina	Pharmacist
Garcia, Josh	Town of Clayton Water Supervisor
Garcia, Albert	Town of Clayton Streets Supervisor
Gerlitz, Sara	*DHSEM Mitigation Specialist
Gonzales, Angie	**Union County Manager**
Grine, Art	Rabbit Ear Fire Dept.
Hass, Michael	Hass Funeral Director - NM OMI
Jones, Michael	GEO - EPMV - Corrections Lt.
Julian, Scott	Clayton PD - Chief of Police
Kear, Carolyn	Clayton Nursing & Rehabilitation Center - Center Executive Director
Kear, Russell	County Road Dept. - Superintendent

Name	Title / Position
Kiesling, Clay	**Union County Commissioner**
King, Garland	Village of Capulin - Capulin Fire Dept.
Haisten, Anna	*KLMX Radio- Media/Radio
Kohler, Rusty	*Red Cross
Lawrence, Eva	Golden Spread Coalition- Supervisor
Lobb, James	Union County Sheriff
Lucero, Phil	NMSHD Clayton - Patrol Supervisor
Lucero, Ferron	**Clayton City Manager**
Mann, Michael	Clayton PD - Patrolman
Mayfield, Jim	C&C Communications - Owner
Nightingale, Briceson	Sedan Fire Dept. - Asst. Chief
O'Bryant, Jim	Wildland Fire Coordinator/County Fire Marshall
Orthman, Ken	Motor Transportation Division - Sgt
Osborn, Zach	Des Moines EMS Director
Palmer, Sandra	Clayton PD Dispatch - Communication Specialist Supervisor
Pryor, Jan	NM Disaster Medical Assistance Team (DMAT) - Paramedic
Reeser, Joe	Sedan Fire Dept. - Chief
Reif, Dr. Donald	Veterinarian
Rose, Marianne	Union County Leader newspaper Reporter
Sanchez, Earnest	**Clayton Mayor**
Sink, Levon	County GIS Coordinator/Rural Addressing
Sisneros, Edward	Clayton Airport Manager
Sullivan, Travis	*Southwestern Electric Co-Op - General Manager
Sumpter, Kodi	Des Moines School Superintendent
Union County Leader	Media/Newspaper
Valdez, Talisha	NMSU Extension Office - County Program Director
Vigil, Lawrence	NMHD Supervisor - Des Moines Station
Windle, Gina	First National Bank - CFO

Name	Title / Position
Wingo, Robert	Union County Emergency Manager

Major goals of the kickoff meeting were for the LPC to: understand the process and importance of hazard mitigation planning; help to expand the LPC roster; understand their roles and responsibilities as members of the LPC; review the stage of the planning process the county was presently at; review data requests; and contribute to the development of the public involvement strategy.

Major outcomes of the LPC meeting included a finalized hazard list to profile in the HIRA and discussion of recent community planning efforts, hazard events, and particular problem areas/hazard concerns across the county. Another important discussion pertained to the public involvement strategy and how the LPC could best utilize existing tools and resources to maximize public involvement.

The timeline for public involvement was another component discussed, and this information was used to further refine the public involvement plan. Data requests, such as critical facilities, were reviewed and the LPC provided input on other relevant plans. The following post-meeting action items were discussed for the LPC:

- Provide Best Available Data / Recent Community Plans
- Provide LPC Roster Additions
- Provide Public Involvement Input

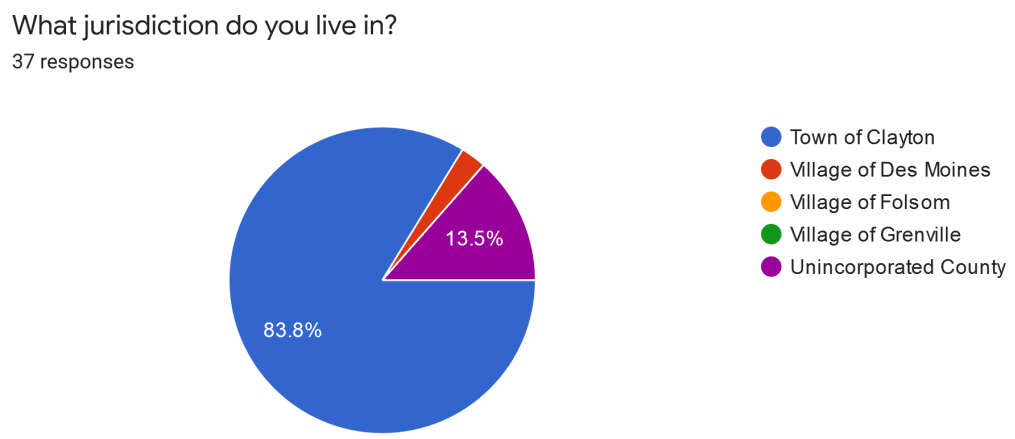
4.2.3 Public Engagement

Based on feedback from the pre-kickoff and kickoff meetings, a Public Involvement Plan (PIP) was developed for the planning project. A draft PIP was disseminated to the LPC for their input on public involvement tools and timelines associated to the utilization of each tool for outreach to the public. Examples of public outreach tools for the county included: local radio (KLMX), local print media (Union County Leader), and individual/organizational social media accounts of the LPC.

With input from the LPC, public outreach materials and content were developed and disseminate in accordance with the PIP timeline. The timeline also ensured public engagement would be spread across the entire planning process, so the public remained involved and informed.

As part of the PIP, two surveys were distributed to the public during the planning process. The first was the Hazard Risk Perception Survey, distributed in January 2020. This survey was sent out to gain an understanding of public knowledge of hazards in their communities, and their perception of what poses the most risk. Overall, the survey gathered 37 responses. Figure 4-1 shows the distribution of the location of participants, a large majority were from the Town of Clayton.

Figure 4-1 Public Survey 1 Responses (1)



The results are portrayed in the figures below. Key takeaways from this survey are:

- Only 35% of the respondents have been majorly impacted by at least one natural hazard in the past five years.
- Almost 81% of respondents consider themselves “very informed” or “somewhat informed” on how various hazards can impact their community.
- Respondents ranked high winds as their highest risk hazard, followed by severe winter storms, drought, wildland fire, and thunderstorms. Dam failure, earthquake, landslide, and volcanoes were rated as presenting the lowest hazard risk.
- Not receiving emergency alerts and lack of access to medications/doctor were the top concerns following a disaster.
- Over half of the respondents have an emergency kit, and almost half have taken mitigation action to make their home or neighborhood more resistant to hazards.
- Respondents said that social media is the most effective way to receive information about hazard mitigation (76%), followed by website postings (46%) and hardcopy media (43%).

Figure 4-2 Public Survey 1 Responses (2)

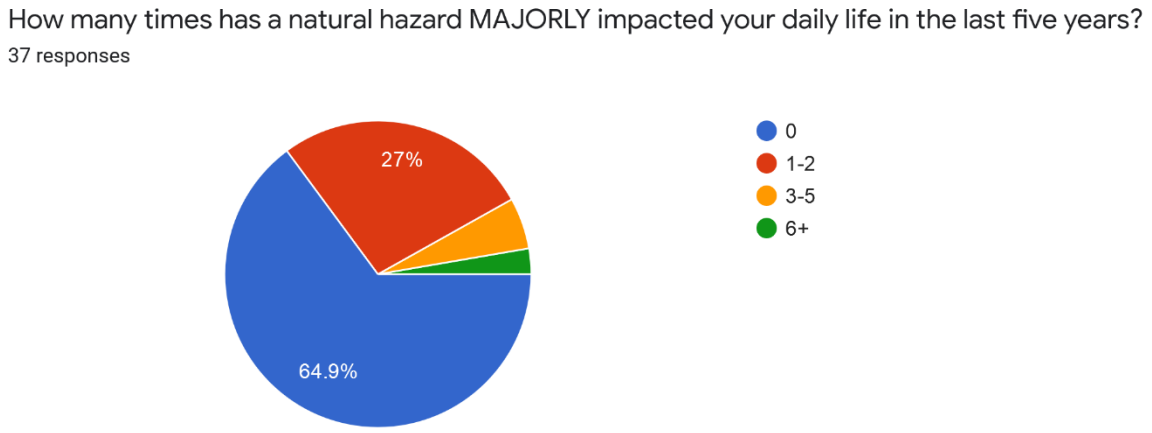


Figure 4-3 Public Survey 1 Responses (3)

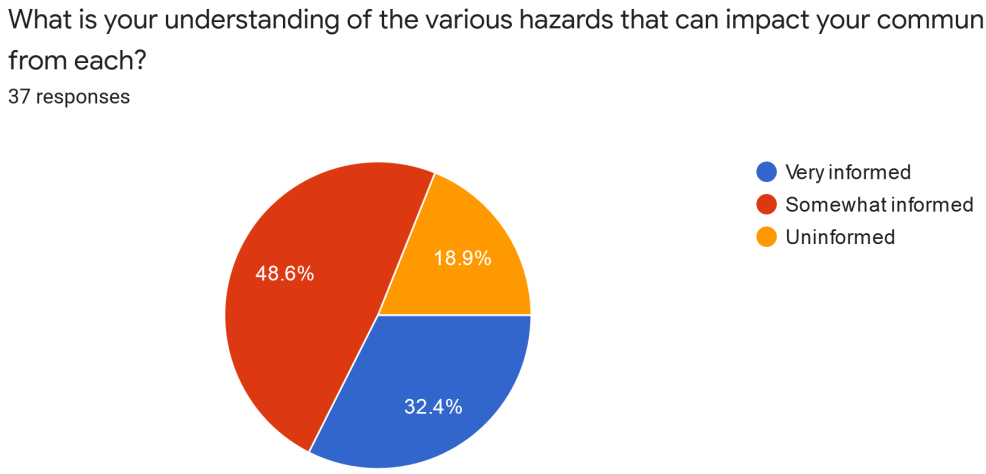


Figure 4-4 Public Survey 1 Responses (4)

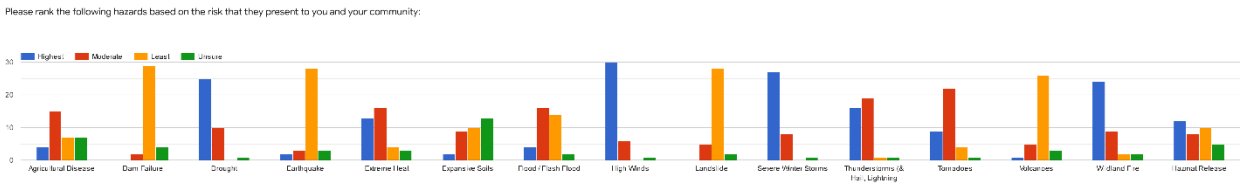


Figure 4-5 Public Survey 1 Responses (5)

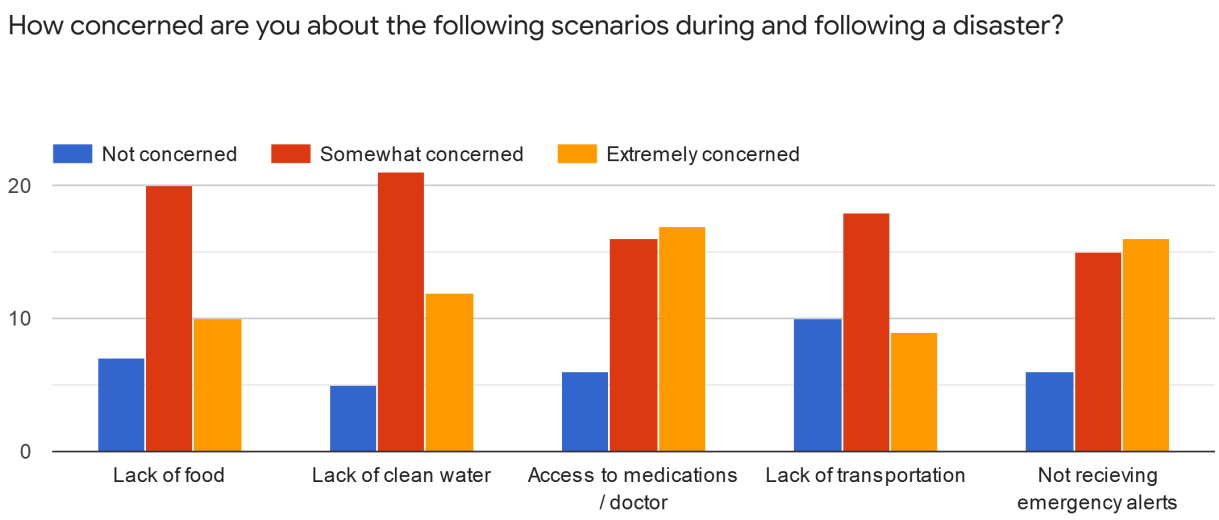


Figure 4-6 Public Survey 1 Responses (6)

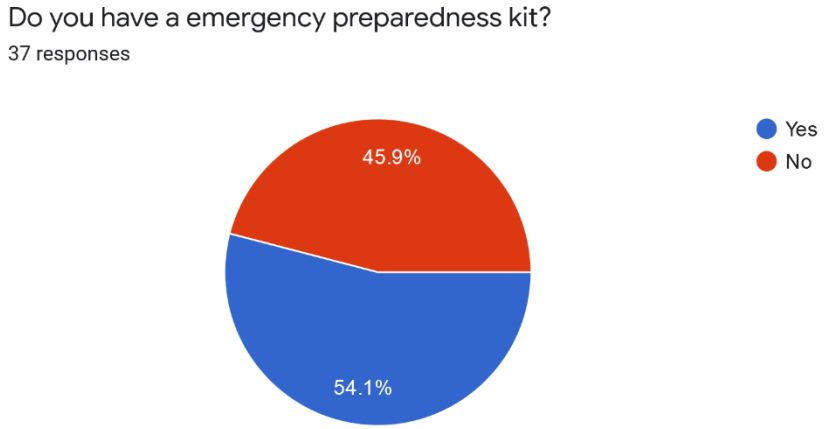


Figure 4-7 Public Survey 1 Responses (7)

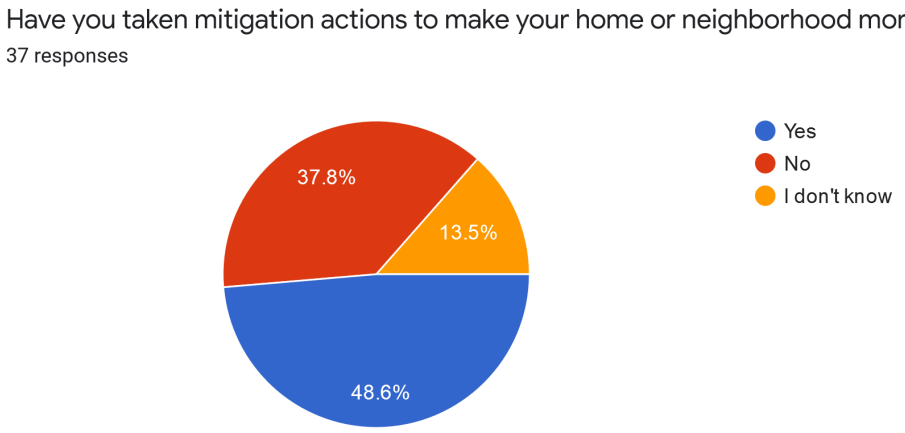
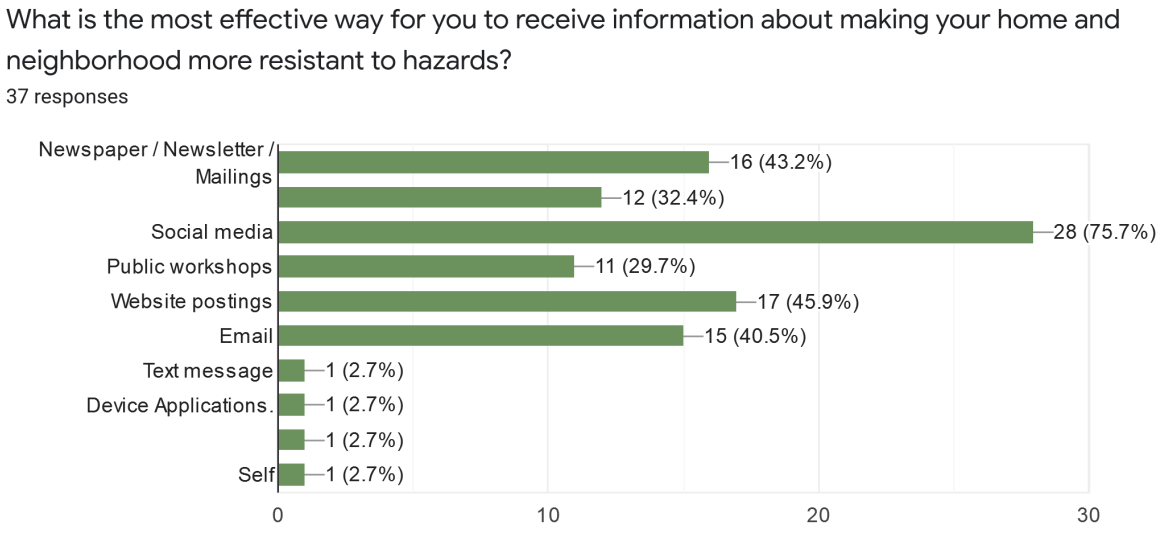


Figure 4-8 Public Survey 1 Responses (8)



The second survey distributed to the public was the Public Hazard Mitigation Survey, distributed in April 2020. This survey was disseminated to educate the public on mitigation actions, gain an understanding concerning what types of mitigation strategies the public supports, and allow the public an opportunity to contribute potential mitigation actions. Overall, the survey gathered 9 responses, with 33% of the responses from the Town of Clayton and the other two-thirds from the unincorporated areas.

The results are portrayed in the figures below. Key takeaways from this survey are:

- Overall, a large majority of respondents are in favor of all types of mitigation actions.
- There was mostly even support across the various types of mitigation categories, with structure and infrastructure projects being preferred.

- Natural systems protection was the least supported mitigation category, though this may be due to a lack of education on this mitigation type.

Figure 4-9 Public Survey 2 Responses (1)

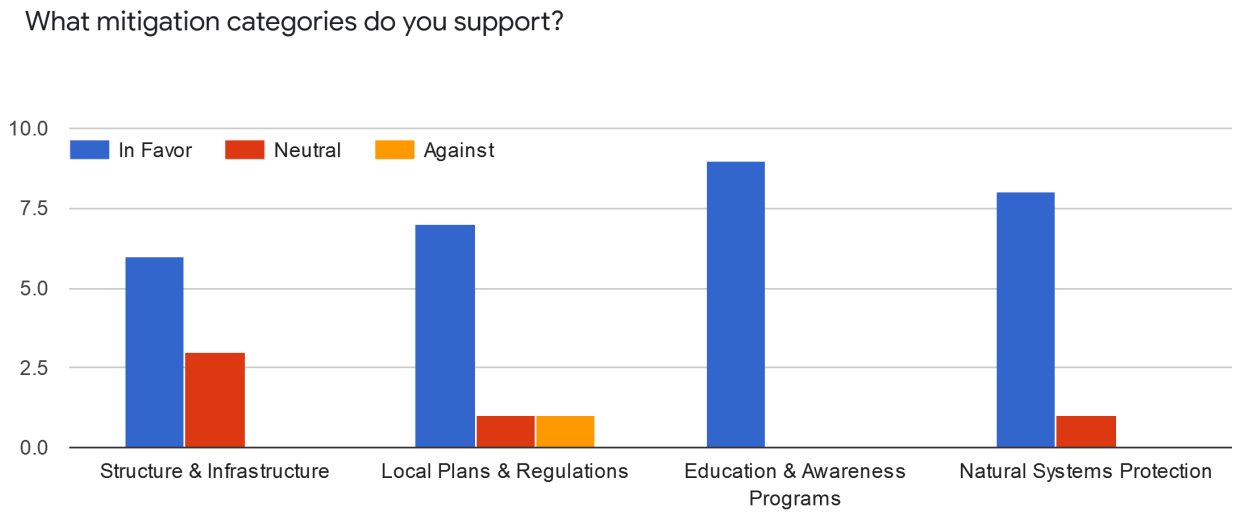


Figure 4-10 Public Survey 2 Responses (2)

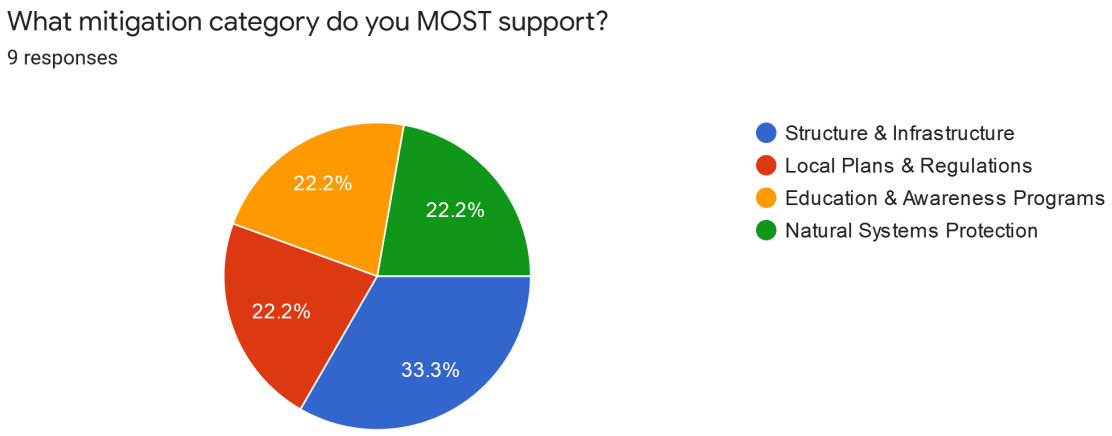
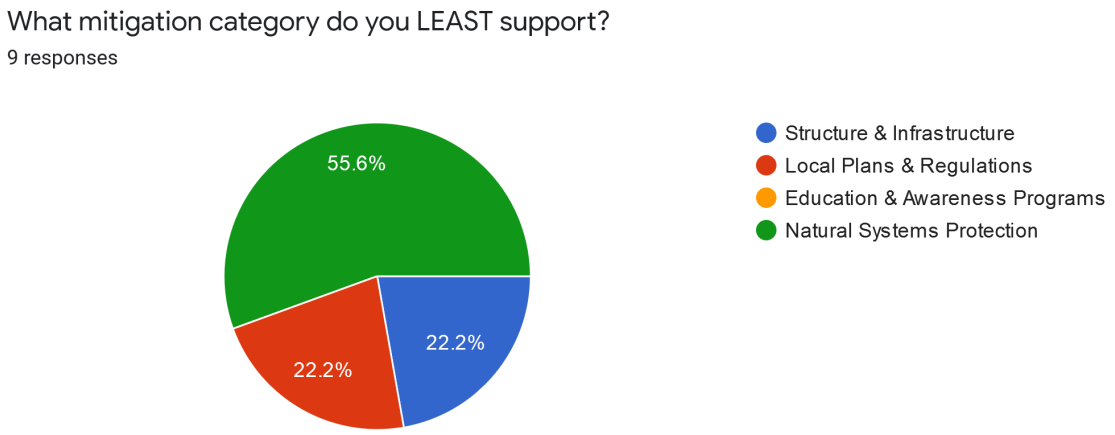


Figure 4-11 Public Survey 2 Responses (3)



There was also an opportunity for free responses from the public pertaining to specific mitigation activities. Comments were broad and ranged from wanting efforts focused on: grass fires, tree removal along highways, increased regional collaboration, improving Radar coverage, and the need for mitigation champions to ensure implementation results from project identification.

A final public touchpoint involved a review and comment period of the draft Plan. The public was given the opportunity to review and comment on the draft plan between March and July of 2021. Notifications were posted to the Union County website. Individual LPC members also assisted in disseminating the message through various social media posts. Digital copies of the final draft plan were distributed in accordance with the public involvement plan. There were no comments received from the public through the online survey tool that was utilized, nor any provided to the county through other means.

4.2.4 Review and Incorporation of Existing Planning Mechanisms

Throughout the planning process, numerous other plans, studies, reports, and technical information were obtained and reviewed for incorporation or reference purposes. The majority of sources referenced and researched pertain to the risk assessment, where they are cited across this Plan as footnotes. To a lesser extent, the mitigation strategy also includes some technical information research.

The following list shows the primary community plans reviewed and used for incorporation into this Plan.

- Union County / Town of Clayton Comprehensive Plan (2020)
- New Mexico Communities at Risk Assessment Plan [wildland fire] 2019
- Colorado-New Mexico Regional Extreme Precipitation Study (2018)
- Union County / Town of Clayton Severe Weather Plan (2017)
- Northeast New Mexico Regional Water Plan (2016)
- Union County Agricultural Prevention, Preparedness, Response, & Recovery Plan [APPRR] (2009)
- Union County Community Wildfire Protection Plan (2008)

4.3 Phase II: Assess Risks

The Hazard Identification and Risk Assessment (HIRA) process began almost immediately. Data was gathered from other planning resources (see above), the LPC, the State of New Mexico, and other publicly available data sources. Sources of data are discussed in the text and as footnotes throughout the HIRA section. The LPC was instrumental in supplying jurisdictional-specific data to the consultant, who performed the analysis and writing of the HIRA. Data were collected and incorporated into the HIRA through May 2020, and the draft results of the HIRA were presented to the LPC during the risk and vulnerability assessment workshop, which was the second LPC meeting. Additionally, the results of the public Hazard Risk Perception Survey were incorporated into the HIRA. The draft HIRA was sent for LPC review in May 2020 and finalized in June 2020 after all comments were integrated.

4.3.1 LPC Risk and Vulnerability Assessment Workshop

The LPC risk and vulnerability assessment workshop was held on March 31, 2020, via webinar. The current COVID-19 pandemic forced this to be a virtual event.

The major goals of this workshop were for the results of the HIRA to be presented to the LPC and to receive any feedback on the results and hazard rankings, including a review of the critical facility analysis results. Additional goals include: a review of remaining data requests and the mitigation capability assessment, continued implementation of the PIP, and finalizing the mitigation goals and objectives.

Outcomes of the workshop included final input on the HIRA results and rankings. The capability assessment results were also confirmed as accurate and the new Plan's mitigation goals were finalized. Additionally, the PIP was discussed and the second public survey was sent shortly after the workshop. The remaining data requests were provided to finalize the HIRA following the workshop.

The following post-meeting action items were discussed for the LPC:

- Continue local discussions relating to this project.
- Begin identifying new mitigation actions.
- Continued implementation of the PIP.
- Review of the Risk Assessment section.

4.4 Phase III: Develop the Mitigation Strategy

Mitigation strategy development was initiated by identifying the Plan's mitigation goals and objectives, which were sourced from the 2020 Union County Comprehensive Plan. New mitigation actions were developed based on LPC input, the results of the HIRA, other planning documents, and the public mitigation strategy survey. All mitigation actions were incorporated into a database for easy tracking and updating by the county.

4.4.1 LPC Mitigation Strategy Workshop

The LPC mitigation strategy workshop was held on July 2, 2020, via webinar. The current COVID-19 pandemic forced this to be a virtual event.

The major goals of this workshop were to confirm mitigation goals/objectives, review the results of the public mitigation strategy survey, discuss plan maintenance and integration, and create new mitigation actions.

The major outcomes of the workshop were discussions around plan maintenance, implementation, and integration (additionally discussed below and in Chapter 5 of this Plan). The MAP (mitigation action plan) was presented to the LPC, to be used by all participants for the creation of mitigation actions, which would be centrally collected in the database for simplified tracking. Additionally, it was determined to subjectively rank new mitigation actions based on priorities discussed during the workshop. It was decided to review the Plan annually by providing updates during the 1st quarter LEPC meetings. The following post-meeting action items were discussed for the LPC:

- Finalize new Mitigation Actions
- Review draft updated Plan
- Initiation of public review and comment period

4.5 Phase IV: Implement the Plan and Monitor Progress

As discussed previously, the implementation phase was examined during the mitigation strategy workshop. It was determined that the Plan will be reviewed at an established quarterly LEPC meeting, ensuring it is an agenda item at least once a year. Further discussion about implementation, monitoring, and Plan integration is discussed in Chapter 5 of this Plan.

4.6 Phase V: Plan Adoption

Ultimately, it was determined that Union County and the Town of Clayton would formally adopt this Plan. Records of adoption can be found in section 7.1 - Jurisdictional Adoptions.

5. Plan Maintenance, Revision, & Integration

5.1 Introduction

This section describes the ongoing methods to keep the Plan current. It describes how the Plan will be reviewed annually, how the public will be kept involved, and how the Plan will be integrated into other planning mechanisms. The plan maintenance details the formal process that will ensure the Union County Multi-Jurisdictional Hazard Mitigation Plan remains an active and relevant document. The procedures include a schedule for monitoring and evaluating the Plan annually, as well as revising it every five years.

5.2 Plan Monitoring, Evaluation, and Enhancement

The Union County Emergency Manager and local emergency planning committee (LEPC) are tasked with the overall responsibility of monitoring this Plan. The Plan will be periodically reviewed to ensure it reflects current vulnerabilities and priorities of the county and participating jurisdictions. Reviewing and monitoring the Plan also allows jurisdictions an opportunity to report progress made and provides the public with an opportunity to see mitigation implementation.

5.2.1 Annual Meeting and Review

The Plan will be reviewed during the 1st quarter LEPC meeting, on an annual basis. The Union County Emergency Manager will be tasked with meeting preparation and facilitation. During these public meetings, participants will evaluate the effectiveness of mitigation implementation and reflect changes in organizational programs that may affect mitigation priorities. As part of the evaluation process, responsible organizations will be invited to share an update on their mitigation actions at the meeting.

In addition, the following questions will be asked:

- Have any potential hazards developed that were not addressed in the Plan?
- Have any natural disasters occurred that were not addressed in the Plan?
- Has any unanticipated development occurred that is vulnerable to hazards?
- Are there any additional mitigation actions that need to be incorporated?
- Have mitigation projects been initiated and or completed?
- What are the barriers to completing projects identified in the Plan?
- Are the Plan goals still reflective of community priorities to reduce hazard vulnerabilities?

The purpose of these questions is to determine if the Plan's mitigation strategy is still current and what progress has been made towards implementation. Organizations responsible for mitigation actions will be asked to submit progress reports. The discussion will be documented, so when the Plan is revised the findings of the monitoring can be incorporated into the next five-year update.

5.2.2 Five Year Revision Procedures

Any of the following three situations could trigger a review and update of the Plan:

- Occurrence of a major natural disaster in or near the county
- Passage of five years

- Change in state or federal regulations

Should a major disaster occur in Union County, the LEPC shall meet following the disaster to determine whether a review of the hazard mitigation plan is warranted. In the absence of a major disaster, the five-year review will take place during the year preceding the FEMA approval anniversary date (if not earlier). The Union County Emergency Manager will convene the hazard mitigation local planning committee (LPC), and with their assistance (and/or the assistance of a contractor as determined necessary) carry out the following tasks:

- Review the Hazard Mitigation Plan Review Tool form completed by the NM DHSEM and FEMA during their most recent review of the Plan.
- Examine and revise the risk assessment data as needed to ensure it is current.
- Update the mitigation strategies to incorporate completion of actions and add any needed strategies or projects.
- Identify problems that may be hindering or affecting implementation of the Plan and recommend actions for resolving those problems.
- Recommend any necessary revisions to the hazard mitigation plan.
- Comply with all applicable regulations and statutes.

The Plan will be thoroughly reviewed and updated at the five-year mark unless it has undergone a more recent revision (with associated FEMA approval). During this Plan update, several questions will be asked:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- What additional hazard events have occurred?
- Have the capabilities changed including social, technical, administrative, political, legal, economic, and environmental?
- Are there any coordination issues that should be addressed?
- What progress has been made to complete mitigation actions?
- How has the public remained involved over the last five years?
- Did the identified organizations participate in the Plan implementation process as assigned?

Forty-five days prior (or earlier) to the five-year anniversary date, a final draft of the revised plan will be submitted to DHSEM, and then to FEMA. Plan adoption will occur following an “approved pending adoption” status by FEMA. Once this status has been received, the county and participating municipalities need to adopt the Plan. Adoption will occur via a resolution.

5.3 Continued Public Involvement

The public is encouraged to be involved in the continual updates to the hazard mitigation plan. Through the 2019-2022 planning process, the county and municipalities implemented a public engagement effort which can continue to be used and expanded for ongoing public involvement. The County Emergency Manager lead these efforts to ensure public involvement over the next five years. This will be done through multiple channels including leveraging LPC partnerships with the local newspaper and radio station to reach those community members that may not prefer digital outreach, as well as using social media and community websites. Messaging to involve and inform the public on ongoing hazard mitigation efforts and to request ideas for future projects, through surveys or meetings, will keep

mitigation relevant to the community. A crucial factor in this continued engagement and outreach is updating and encouraging feedback in person at public meetings.

There are multiple public, published meetings held regularly that give opportunities for community members to stay informed and offer input. These include an LEPC meeting quarterly, an EOC meeting monthly, and the monthly Board of Commissioners meeting. The Commissioner's meeting has a formal agenda, published prior to the meeting, and an open floor period or "Citizen's Forum" to bring a public perspective based on local experiences to any review of the plan that is necessary. All departments report out in these meetings, giving the Emergency Manager the opportunity to update the commissioners and the public on the status of the plan and any impending reviews and updates.

5.4 Integration of Hazard Mitigation

The participating jurisdictions will integrate this Plan into relevant government decision-making processes or mechanisms, where feasible. This includes integrating with other local planning documents, such as comprehensive or capital improvement plans, when appropriate.

The members of the LPC, led by the Union County Emergency Manager, will remain charged with ensuring that the goals and actions of new and updated local planning documents are consistent and do not conflict with the goals and actions of this Plan. Further, they will ensure that any planned actions will not contribute to increased hazard vulnerability in the county.

Much of the information in this Plan, such as the risk assessment, will be incorporated into other emergency management planning efforts. The County LEPC will consider the hazard mitigation plan in its efforts, by referencing the Plan for guidance on past occurrences and future impacts.

Jurisdictions can also utilize the plan to seek out grants and projects that fulfill the mitigation requirements outlined in the Plan.

6. Hazard Identification and Risk Assessment (HIRA)

6.1 HIRA Overview

6.1.1 Hazard Identification

As part of the plan development process, the hazards to be profiled in this Plan were identified by the local planning committee (LPC) during the first two planning workshops. Hazards profiled by neighboring counties were reviewed and then cross-checked with hazards in the 2018 New Mexico State Hazard Mitigation Plan (State Plan). Determinations were made by the LPC concerning the inclusions of hazards into this plan.

The following table presents the Union County hazards profiled in this Plan, referenced to those in the State Plan and the LPC's reasoning notes for determining hazards.

Table 6-1 Hazards Profiled

Union County 2022 HMP	New Mexico 2018 HMP	Notes
Dam Failure	Dam Failure	
Drought	Drought	
Earthquake	Earthquake	
Flood / Flash Flood	Flood / Flash Floods	
Hazard Soils	Expansive Soils & Land Subsidence (Collapsible Soils)	LPC chose to combine these hazards into a single profile as mitigation efforts will be similar.
High Wind / Tornado	High Wind & Tornadoes	LPC chose to combine these hazards into a single profile as mitigation efforts will be similar.
Landslide / Rockfall	Landslide	
Severe Winter Storm	Severe Winter Storms	
Thunderstorm (including Lightning & Hail)	Thunderstorms (including Lightning & Hail)	
Volcano	Volcanoes	For hazard awareness, volcanoes were analyzed, however LPC determined mitigation actions would not be created due to lack of ability to mitigate against the impacts of a volcano eruption.
Wildland Fire	Wildland / Wildland-Urban Interface Fire	

Union County 2022 HMP	New Mexico 2018 HMP	Notes
Hazardous Material Release (HazMat)		Human-caused hazards are not profiled in the State Plan.
Agricultural Disease		Human-caused hazards are not profiled in the State Plan.
Terrorism		Human-caused hazards are not profiled in the State Plan.
	Extreme Heat	LPC chose not to include in this initial Plan. Hazard risk is currently not deemed large enough to warrant mitigation efforts at this time.

It is important to note that many of these hazards are interconnected (for example, prolonged drought can increase risk to wildfire and subsequent flooding). Therefore, discussion of these hazards overlaps throughout the Risk Assessment.

6.1.2 Major Disaster History

Major disaster declarations were also used to identify and assess hazards in Union County. The following table presents a list of all federal disaster and emergency declarations that have occurred in the county, according to the Federal Emergency Management Agency (FEMA)[1]. This list presents support for identifying which hazards pose the greatest risk to Union County communities.

Table 6-2 Union County Major Disasters (1953-2021)

Event/Hazard	Year	Declaration Type	Notes
Hurricane	2005	Major Disaster Declaration (DR-3229)	Funding to assist with Katrina evacuee support
Wildfire	2000	Emergency Declaration (EM-3154)	
Severe Winter Storm	1998	Major Disaster Declaration (DR-1202)	
Drought	1977	Emergency Declaration (EM-3034)	
Severe Storm, Flood	1973	Major Disaster Declaration (DR-380)	

The following figures show the number of major disasters across the state, both by county and as presented in a timeline. While Union County and the entire eastern border of the state have the lowest

[1] https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties

number of disasters to date, it seems apparent that New Mexico as a whole experienced a dramatic increase in disaster events over the past 20 years.

Figure 6-1 New Mexico Major Disasters

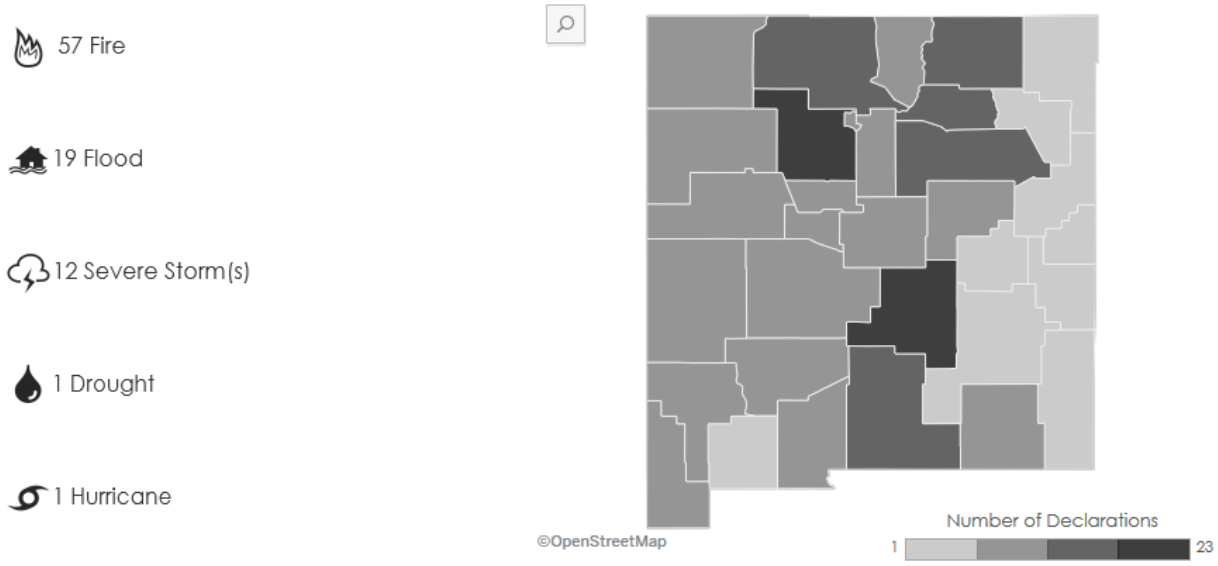
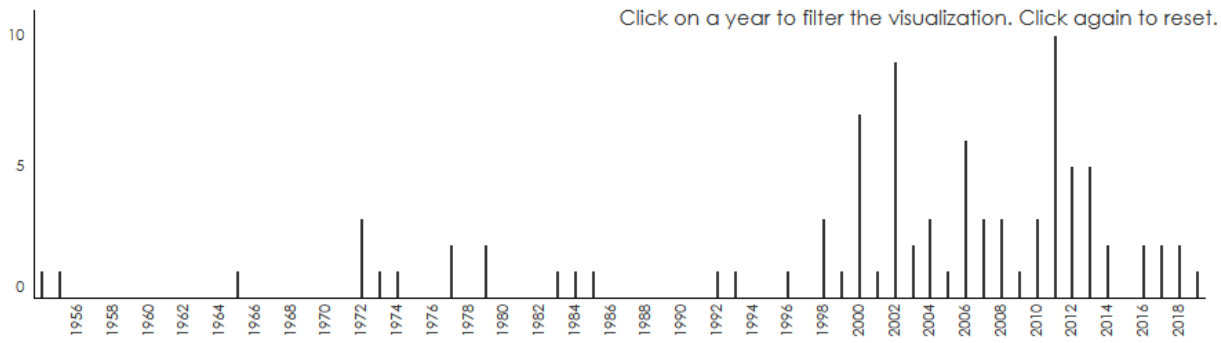


Figure 6-2 New Mexico Major Disaster Timeline



The following table presents a list of emergency designations that have occurred in the county, designated by the U.S. Department of Agriculture (USDA)[2]. USDA secretarial disaster declarations are classified as being a primary or contiguous county and can be made for drought, freeze, frost, high wind, excessive heat, hail, and hard rain events. Union County has received disaster designations eight of the last nine years.

Table 6-3 Union County USDA Secretarial Disaster Designations (2012-2020)

Year	Designation Type
2020	Primary

[2] https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index

Year	Designation Type
2019	Primary
2018	Primary
2017	Contiguous
2015	Primary
2014	Primary
2013	Primary
2012	Primary

6.1.3 Hazard Ranking

Hazards were ranked subjectively for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. Each Union County jurisdiction assigned a value of 1 (low), 2 (moderate), or 3 (high), for each hazard, for each of the following categories:

- the probability of a damaging event occurring,
- the potential impact to property/structures from a damaging event,
- the potential impact to the local economy from a damaging event,
- and the potential impact to people from a damaging event.

The values were subjective as quantifying the categories is difficult for a variety of reasons, primarily lack of accurate and consistent data. Therefore, personal experiences of the LPC and community member input highlighted areas where a risk ranking may have differed if solely looking at the HIRA.

The results were then averaged across each hazard per jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following table. Overall, risk varies somewhat with each jurisdiction, but consistently high ranked hazards include drought, severe winter storm, thunderstorm, and wildland fire.

Figure 6-3 Union County Hazard Ranking

Jurisdiction	Dam Failure	Drought	Earthquake	Flood / Flash Flood	Hazard Soils	High Wind / Tornado	Landslide / Rockfall	Severe Winter Storm	Thunderstorm (Hail, Lightning)	Volcano	Wildland Fire	HazMat	Agricultural Disease	Terrorism
Unincorporated Union County	L	H	L	M	L	H	L	H	H	L	H	M	M	M
Town of Clayton	L	H	L	M	M	H	L	H	H	L	H	M	M	M
Village of Des Moines	L	H	L	L	L	M	L	H	H	L	H	L	M	L

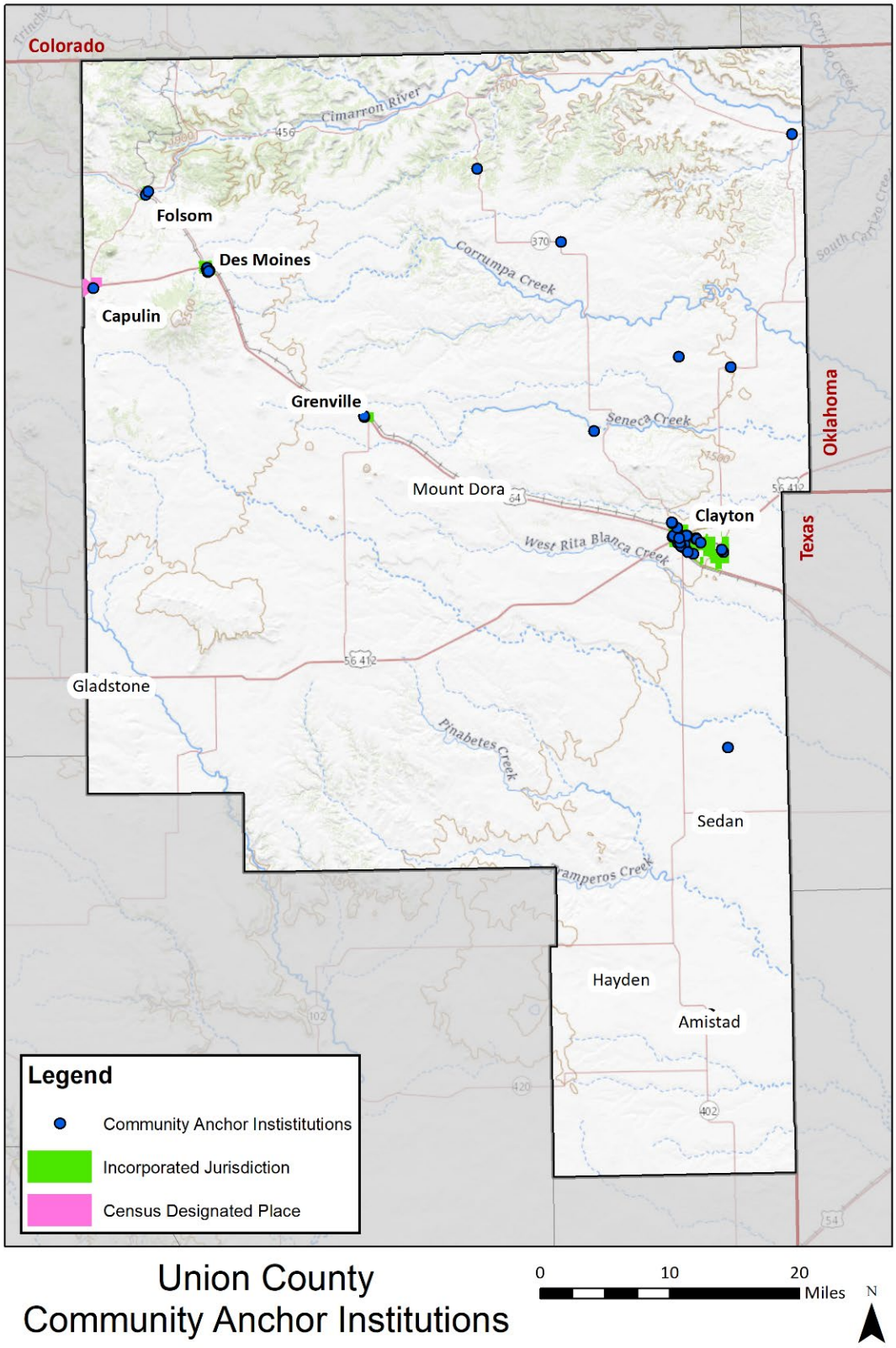
Jurisdiction	Dam Failure	Drought	Earthquake	Flood / Flash Flood	Hazard Soils	High Wind / Tornado	Landslide / Rockfall	Severe Winter Storm	Thunderstorm (Hail, Lightning)	Volcano	Wildland Fire	HazMat	Agricultural Disease	Terrorism
Village of Folsom	L	H	M	H	L	H	L	H	H	L	H	L	L	L
Village of Grenville	L	H	L	L	L	M	L	H	H	L	H	L	M	L

6.1.4 Critical Facilities

For the purpose of this Plan, 'critical facilities' refer to Union County's Community Anchor Institutions (CAI), which are vital to the health, safety, and well-being of residents and visitors during the time of and following a disaster. These facilities can include schools, library, medical, public safety, government facilities, fire stations, law enforcement, etc.

These CAI's are essential to the community's long-term disaster resilience as they are vital delivery pathways for diverse crisis management services and resources. As part of the planning process, Union County identified CAI facilities based on a New Mexico Department of Information and Technology request. The CAI facilities were analyzed for each hazard. The following figure provides an overview of the 53 CAI's assessed as part of this Plan.

Figure 6-4 Union County Community Anchor Institutions



6.1.5 Hazard Profile Methodology

The hazard profiles, found in section 6.2, for each identified hazard include the description, location, previous occurrences, extent, probability of occurrence, vulnerability assessment, and summary. The hazard profiles are consistently formatted to cover the same information. This format includes seven different subsections that are described below:

- **Description:** A scientific explanation of the hazard.
- **Location:** Geographical areas within the county that are affected by the hazard.
- **Extent:** The strength or magnitude of the hazard. Measures of extent may include, but are not limited to, an established scientific scale, wind speed, speed of onset, or duration of the hazard event.
- **Previous Occurrences:** Information regarding historical events of the hazard in Union County. Previous occurrence data was derived from a variety of sources, including but not limited to, the LPC, news articles, the State of New Mexico, and federal databases. Additional details on the main federal data sets used are included in the following section.
- **Probability:** The likelihood of future events impacting the county. Given that an exact probability is often difficult to quantify, this characteristic is categorized into ranges to be used in hazard profiles:
    - Unlikely: Less than 1% annual probability
    - Possible: Between 1% and 10% annual probability
    - Likely: Between 10+% and 90% annual probability
    - Highly Likely: Greater than 90% annual probability
- **Vulnerability Assessment:** The vulnerability assessment addresses conditions that may increase or decrease vulnerability. This section will include the inventory exposed/impacts, potential losses, and future conditions.
    - **Inventory Exposed/Impacts:** A qualitative or quantitative analysis of impacts on structures, the economy, people, and the environment.
    - **Critical Facilities Exposed/Impacts:** A qualitative or quantitative analysis of impacts on critical facilities (i.e. – Community Anchor Institutions).
    - **Loss estimations**: A qualitative or quantitative analysis on potential losses from each hazard is conducted using best available data and resources. Methods utilized include GIS and Hazus analysis where data is available. Additionally, damage estimates are calculated based on reported damages from previous occurrences by jurisdiction, where available. For this Plan, a combination of damage data sources was utilized for a method of consistent loss estimations across hazards, when applicable. It is noted that many data sources only report on a county-wide scale, so it is not possible to determine losses by jurisdiction using this data.
    - **Future Conditions:**
        - **Land Use and Development**: Discusses the impact of development trends on jurisdiction's vulnerability to each hazard. Land use and development data was obtained from jurisdiction planners and population statistics from the U.S. Census Bureau.
        - **Climate**: Brief discussion on potential future climate impacts on each hazard, when applicable.

6.1.6 Hazard Data Sources

Multiple hazard data sources have been utilized as part of this risk assessment. Every attempt has been made to cite these sources throughout this chapter, as footnotes or within the text. Additional details pertaining to two of the more robust data sources are provided below.

The National Oceanic and Atmospheric Administration's (NOAA) National Center for Environmental Information (NCEI), which has been tracking severe weather since 1950, is a primary database used for previous hazard occurrences in this Plan. NCEI's Storm Events Database[3] tracks severe weather events on a county basis. The Storm Events Database contains archived National Weather Service (NWS) storm data and unusual weather phenomenon reports. These include the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, or disruption to commerce.

The Storm Events Database contains data from 1950 to the present, and the Database contains over 1.2 million records. The Storm Events Database allows users to search for various types of storms recorded by state, county, and event type. The data contain a chronological listing of tornadoes, thunderstorms, hail, floods, drought conditions, lightning, high winds, snow, temperature extremes, and other weather phenomena.

The Spatial Hazard Events and Losses Database for the United States (SHELDUS) Version 18.1[4] was utilized to assess losses for many of the hazards profiled in this plan. SHELDUS is a county-level dataset that allows for consistent comparison of losses across hazards. SHELDUS utilizes data from 1960 to 2018. All SHELDUS loss information used in this Plan is reported in 2018 dollars to facilitate even comparison across hazards. It is recognized that this data is not reported by jurisdiction but can provide value in consistent comparison across hazards at the county-level.

SHELDUS data covers thunderstorms, floods, wildfires, and tornados, as well as perils such as flash floods, heavy rainfall, etc. The database contains information on the date of an event, affected location (county and state) and the direct losses caused by the event (property and crop losses, injuries, and fatalities). It also includes insured crop losses (indemnity payments by the U.S. Department of Agriculture [USDA]), which are covered during the period from January 1989 to December 2018.

6.1.7 HIRA Historical Events Summary

It is difficult to compare historical hazard event information across all hazards profiled in a plan. This is caused by many factors such as: varied data sources, under reporting of events, lack of data, reporting inconsistencies, etc. The information contained in this section attempts to address this issue, as best available data allows.

The following table presents a historical hazard event summary across all hazards profiled for Union County. Event and loss data has been compiled from a combination of sources, including: NOAA's NCEI Storm Events Database, NWS, and Storm Prediction Center; SHELDUS (with inputs from U.S. Department of Agriculture [USDA]); United States Geological Survey [USGS] (representing multiple federal agencies: Bureau of Indian Affairs [BIA], Bureau of Land Management [BLM], Bureau of Reclamation [BOR], U.S.

[3] https://www.ncdc.noaa.gov/stormevents/
[4] https://cemhs.asu.edu/sheldus

Forest Service [USFS], U.S. Fish and Wildlife Service [FWS], National Park Service [NPS]); and other industry sources. Where conflicting data exists, this assessment utilized the more detailed source or the larger loss amount. It should also be noted that documented injuries and fatalities are oftentimes associated with a regional hazard event and therefore those reported losses have been divided across all impacted counties. While this is not an actual number, it does still provide a useful reference.

This data clearly reveals that damaging thunderstorm events (including lightning and hail) are the most common to impact Union County. Thunderstorm events also rank near the top for all documented losses shown across the table. The hazards of high wind / tornado and severe winter storm are additional hazards that stand out against the others, tallying high rankings for occurrences and losses.

It is also apparent at this time that some hazards do not show the expected occurrences or losses for Union County. Wildfire, for example, seems to be underreported based on the available data presented. The same can be said for many of the other hazards that currently do not have any historical event or loss information: hazard soils, landslide / rockfall, hazmat, and agricultural disease. These apparent data gaps have been acknowledged by the LPC and efforts will be made to improve this information during the Plan's update in five years.

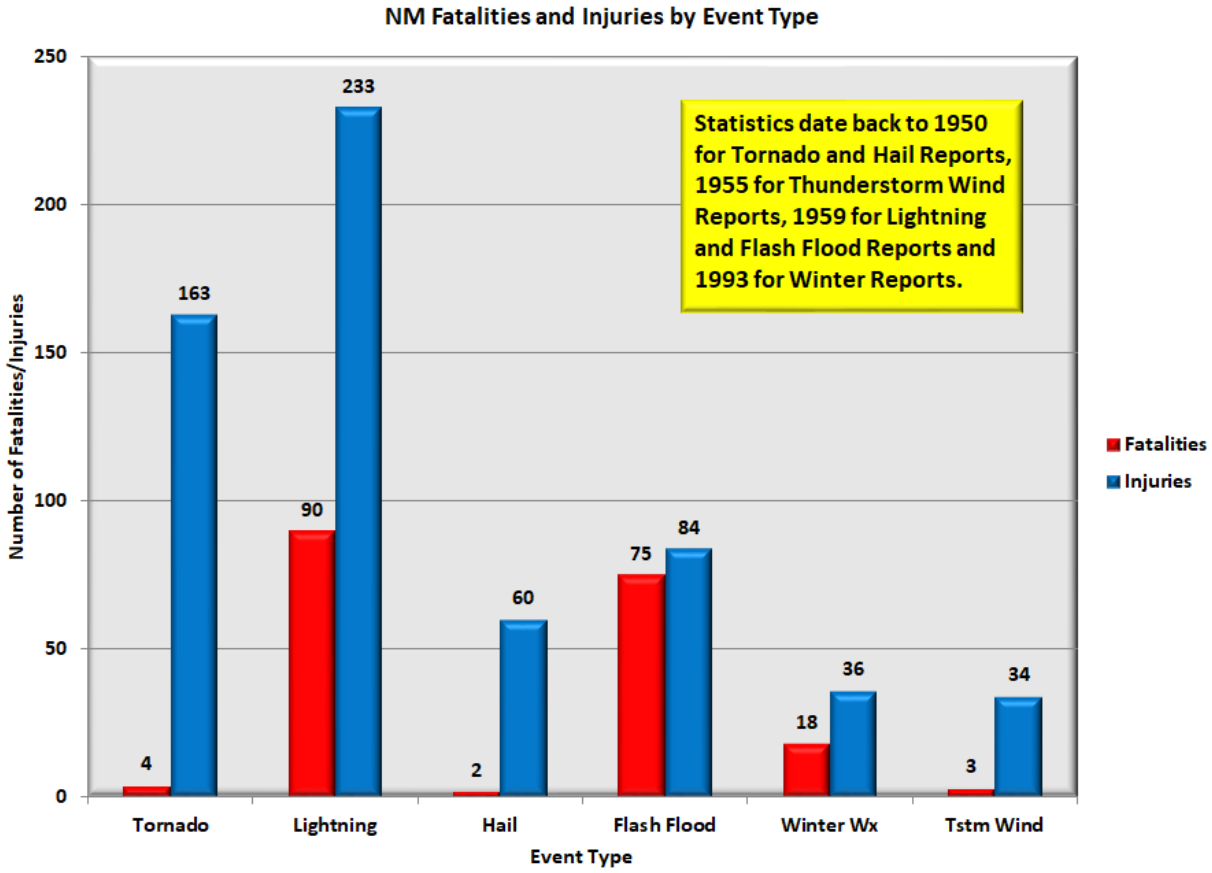
What this analysis provides is a partial, quantifiable comparison across many of the hazards impacting Union County. While helpful for this initial county risk assessment, one takeaway from this analysis is that the best available data currently does not paint the full picture of historical events across all hazards. This fact is acknowledged and stresses the value of input from the LPC and general public as part of the planning process. It is vital for the HIRA to be influenced by the community when data gaps exist, as many individuals have lived in this area for most of their lives and have their own valuable experiences and memories to contribute to this Plan.

Table 6-4 Historical Events Summary Table

Hazard	Years of Record	# of Damaging Events	# of Damaging Events (annually)	Property Damages (per capita)	Crop Damages (per capita)	Injuries	Fatalities	# of Crop Insured Events (annually)	Crop Indemnity (per capita)
Dam Failure	-	-	-	-	-	-	-	-	-
Drought	68	127	1.87	$ 0	$ 0	0	0	3.92	$ 364
Earthquake	-	-	-	-	-	-	-	-	-
Flood / Flash Flood	68	28	1.04	$ 59	$ 22	0	0.03	0.04	$ 0
Hazard Soils	-	-	-	-	-	-	-	-	-
High Wind / Tornado	68	215	3.16	$ 6,837	$ 221	3	0	4.83	$ 1,459
Landslide / Rockfall	-	-	-	-	-	-	-	-	-
Severe Winter Storms	68	77	1.13	$ 4,743	$ 119	0.74	0.63	2.96	$ 1,116
Thunderstorms (incl. Lightning and Hail)	68	348	5.27	$ 728	$ 218	2.04	2.06	5.21	$ 2,092
Volcanoes	-	-	-	-	-	-	-	-	-
Wildland Fire	68	31	0.86	$ 595	$ 0	0	0	0	$ 0
HazMat	-	-	-	-	-	-	-	-	-
Agricultural Disease	-	-	-	-	-	-	-	-	-
Terrorism	-	-	-	-	-	-	-	-	-

The following figure from the National Weather Service (NWS) compares hazard-caused fatalities and injuries across those hazards on records. Across the board, it can be seen that lightning is the top cause of both fatalities and injuries across the State. Hazards with notable fatality totals also include tornado, followed by flash flood and then hail. Tornado is the cause of the second most injuries Statewide, followed then by flood.

Figure 6-5 NM Fatalities and Injuries by Hazard



6.1.8 Drought – Wildfire – Flood Cycle

This section is referenced from the State Plan[5] and is vital for all New Mexico communities to understand and consider as future mitigation strategies are developed and implemented. It is also important that Union County is aware of the current state efforts to mitigate this large-scale hazard.

*The drought-wildfire-flood cycle includes **dam failure, drought, flood/flash floods, landslide and wildland/wildland-urban interface fire**. This unique combination of hazards is connected to ecosystem health and land management practices, particularly to historic wildfire suppression. New Mexico has experienced nine floods, severe storm and debris flow federal disaster declarations since 2010. There have also been 21 FMAG declarations since 2010. A description of the drought-wildfire-flood cycle is shown below in Figure 4-5 with reference to federal disaster declarations since 2010.*

The drought-wildfire-flood cycle is in part caused by long-term drought which is discussed in length in the Hazard Identification and Risk Assessment Drought section (4.5.2). As it relates to this multi-hazard cycle, drought can be a contributor to an unhealthy ecosystem. Unhealthy ecosystem traits may include: 1) high density vegetation, 2) biodiversity degradation and 3) habitat fragmentation and deterioration.

[5] https://www.nmdhsem.org/wp-content/uploads/2019/06/NM-HMP-Approved-Body-9-13-18-V2-low-res.pdf

These traits are also caused by settlement patterns, human disruption, and intervention of natural fire and flood cycles, unsustainable use of natural resources, and natural climatic variations. The result is New Mexico's susceptibility to catastrophic wildfire, compromised watersheds, decreased water supply, accelerated erosion, and desertification hazards.

New Mexico's ecosystems have departed from their original, or reference conditions. This departure is due to past land management activities and fire suppression which have decreased the forests, grasslands, and riparian areas natural resilience to wildfire, drought, and water stress. Historically, New Mexico's arid ponderosa pine and dry mixed conifer forests were dominated by large fire-resistant tree species which were naturally maintained by frequent low-intensity fires. Regular, low-intensity wildfire cleared the forest understory, leaving stands less dense than they are today. Current forest resilience has been depleted by the decline of mature canopy structures, open meadows, understory shrubs, and ground cover resulting in young, dense, homogeneous closed-canopy stands that are extremely susceptible to catastrophic wildfire.

Catastrophic wildfire occurs when vegetation is consumed at a high-intensity leaving the forest floor susceptible to erosion and is referred to as the burn scar area. The burn scar area is where topsoil, duff, woody materials, and ash from the catastrophic wildfire event can intensify post-fire flooding. Largescale erosion from burn scars can lead to the degradation of water resources for an entire region due to sediment transport. This type of sedimentation is due in part to soil damage during catastrophic wildfire. Organic components of the soil are lost and burnt which creates a soil condition called "hydrophobic." Hydrophobic soils lack the ability to infiltrate water which in turn can increase the potential for post wildfire flooding events by a four-hundred-fold increase. Monsoon rainstorms can amplify the poor soil condition with high volumes of precipitation which is then transported during flood events settling in arroyos, ditches, and flood control infrastructure.

Vegetation loss from wildfire can also increase flooding potential and water stress. When New Mexico's coniferous dominated forest communities burn, their natural ability to absorb and deflect the precipitation load is lost. The combination of vegetation loss, hydrophobic soils, and monsoon rainstorms can lead to highly destructive flooding events called "debris flows." Debris flows are a long-term risk to watersheds that have experienced wildfire. Loss of life, damage to property, and significant infrastructure impacts are commonplace when debris flow flooding events occur. More than 30% of the state's water supply is affected adversely by debris flow-laden runoff throughout the Upper Rio Grande watershed. Debris flows move high amounts of sediment leading to sedimentation issues, including temporary dams or sediment plugs along existing waterways which can have further flooding impacts to downstream ecosystems and communities when the dams or plugs fill and break, resulting in a flood wave. The waterway is also damaged limiting its functionality as a both a natural water storage and/or water delivery conveyance for communities, thus increasing water stress.

Healthy forest ecosystems are less susceptible to the drought-wildfire-flood cycle. They function properly to capture winter precipitation in the form of snow and in turn, release it in the spring either to natural waterways or into regional aquifers, alleviating drought-related water stress. This basic watershed regulation function provided by healthy forests is compromised when catastrophic wildfire occurs, creating large scale impacts on the landscape. Freshly burned landscapes are at risk to burn scars, debris flow, and flooding. Damages due to floods originating in areas burned during wildfire lead to cascading impacts to ecosystems, infrastructure, and water quality downstream. Flooding is exacerbated by post-fire conditions such as loss of protective vegetative cover, large volumes of ash, and burn debris, and hydrophobic soils.

The complexity of this hazard cycle has led to New Mexico's determination that a targeted, 10 -year approach is necessary to correct it. The New Mexico Forest and Watershed Health Plan was developed to facilitate, streamline and strengthen current forest restoration work. The Plan includes an integrated and collaborative approach to ecosystem restoration which includes a three-part vision:

- *diverse ecosystems are characterized by integrity and resiliency;*
- *diverse human communities are sustained by ecologically healthy landscapes that provide resources and amenities; and*
- *economies thrive by using the inherent productivity of healthy ecosystems.*

6.2 Hazard Profiles

6.2.1 Dam Failure

Description

Dam failure incidents involve unintended releases, or surges, of impounded water. Dam failure can be caused by rainfall, earthquakes, blockages, animal activity (such as burrowing), landslides, lack of maintenance, improper operation, poor construction, vandalism, and terrorism.

Dam failures can be arranged into four classifications: overtopping, foundation failure, structural failure, and other unforeseen failures. Overtopping failures result from the uncontrolled flow of water over, around, and adjacent to the dam. Earthen dams are most susceptible to this type of failure. Hydraulic failures account for approximately 28% of all dam failures. Foundation and structural failures are usually tied to seepage through the foundation of the main structure of the dam. Deformation of the foundation or settling of the embankment can also result in dam failure. Structural failures account for approximately 28% of all dam failures, and foundation problems account for another 25%. Earthquakes or sabotage account for 12% of all dam failures, while inadequate design and construction account for the remaining 7% of failures. According to the Association of State Dam Safety Officials, the average age of dams in the U.S. is 51 years. This means many dams are likely reaching their useful life cycle and are in need of maintenance.

Dams are classified through the U.S. Army Corps of Engineers (USACE) based upon hazard potential. This classification is based on the consequences if the dam were to fail, *not the potential of failure, or the existing condition of the dam*. The dams are rated (1) high, (2) significant, or (3) low hazard. The Army Corps of Engineers based the hazard potential designation on such items as acre-feet capacity of the dam, distance from nearest community downstream, population density of the community, and age of the dam.

- **High Hazard Dam Failure:** In case of failure of the dam, the dam would likely cause loss of life.
- **Significant Hazard Dam Failure:** Dam would, in case of failure, likely cause significant property damage, but no loss of life.
- **Low Hazard Dam Failure:** Dam would likely cause only minimal property damage. Hazard potential classification is no guarantee of safety.

Location

According to the State Plan, the Dam Safety Bureau of the New Mexico Office of the State Engineer (NMOSE) identified 20 dams in Union County, all of which are earthfill dams. The following table illustrates the last date of inspection and ownership of the dam, as well as the normal storage capacity, according to data from USACE. It is important to note that inundation mapping for each of these dams is currently unavailable in the county, inhibiting the implementation of dam failure related mitigation actions.

Table 6-5 Dams in Union County

Dam Name	Inspection Date	Owner Type	Normal Storage
Brown Reservoir Dam	8/13/2013	Private	7,057,000 ft^3
Claude Hutcherson no. 1 Dam	11/19/2002	Private	3,398,000 ft^3
Claude Hutcherson no. 2 Dam	11/19/2002	Private	0 ft^3
Claude Hutcherson no. 3 Dam	11/19/2002	Private	304,920 ft^3
Claude Hutcherson no. 4 Dam	11/19/2002	Private	87,120 ft^3
Claude Hutcherson no. 5 Dam	11/19/2002	Private	0 ft^3
Clayton Dam	9/4/2014	State	1,786,000 ft^3
Eklund Storage Works Dam	6/4/2013	Private	0 ft^3
Gardner Dam	10/23/2013	Private	5,227,000 ft^3
Howard Robertson Dam	10/23/2013	Private	0 ft^3
Poling Erosion Control Dam	10/22/2013	Private	7,710,000 ft^3
Poling Irrigation System Dam	10/22/2013	Private	7,754,000 ft^3
Smithson Reservoir no. 1	6/16/2015	Private	5,053,000 ft^3
Smithson Reservoir no. 2	3/31/2010	Private	2,134,000 ft^3
Smithson Reservoir no. 3	6/16/2015	Private	5,097,000 ft^3
Smithson Reservoir no. 4	6/16/2015	Private	5,401,000 ft^3
Snyder Lake Dam	9/4/2014	Private	9,583,000 ft^3
Tramperos Creek no. 2 Dam	10/22/2013	Local Government	2,766,000 ft^3
Tramperos Creek Site 1 Dam	10/22/2013	Local Government	223,030,000 ft^3
Weatherly Reservoir Dam	9/4/2014	Private	13,070,000 ft^3

Extent

Extent can be measured using the ratings of high, significant, and low hazard dams, as well as factors such as speed of onset and warning time. The speed of onset depends on the type of failure. If a dam is inspected regularly, small leaks allow for adequate warning time. Once a dam is breached, however, failure and resulting flooding occurs rapidly. Dams can fail at any time of year, but the results are most catastrophic when the dams fill or overtop during winter or spring rain/snowmelt events.

Previous Occurrences

There is no history of previous dam failures in Union County. However, there have been over 52 dam incident notifications in New Mexico since 1890, with 25 total dam failures.

Probability

Based on no previous occurrences, the probability of a dam failure in the county is unlikely. However, as dams age and as development occurs, it is still important to consider the impacts of a failure event. This is especially true in Union County, where most all dam's condition assessment were classified as 'Poor' (with one being 'Fair'). Although a low probability of occurrence, a dam failure could cause devastating impacts.

New Mexico leads the nation with the highest percentage of high-hazard dams in poor condition or worse. The Office of the State Engineer received a special appropriation of $200,000 for a dam safety risk assessment project, and the Legislature approved more than $10 million for dams and other flood control projects in 2019. Lawmakers are also considering additional funding for dam restoration and repair in 2020. As smaller, lower-hazard dams, those in Union County may not be a high priority for funding, but dam owners should work with the Office of the State Engineer and other officials to complete the necessary studies to understand the full hazard potential and pursue funding for repairs, if necessary.

Source: 2020 Union County Comprehensive Plan

Vulnerability Assessment

Inventory Exposed/Impacts

Dam failures can result in downstream flooding. Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. Factors that influence the potential severity of a full or partial dam failure include the amount of water impounded; the density, type, and value of downstream development and infrastructure; and the nature of the terrain between the dam and the downstream development. A dam failure event can dislodge trees and boulders, carrying them downstream into developed areas.

A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety would depend on the warning time and the resources available to notify and evacuate the public. A failure could result in major loss of life and potentially catastrophic damage to roads, bridges, and homes. Associated water quality and health concerns could also be an issue.

According to the newly crafted Union County Comprehensive Plan (2020), the NMOSE's current safety assessment of county dams is presented in the following table.[6] The hazard potential for all of these dams is low however, all but one dam have been assigned a 'Poor' condition assessment. Dams in 'Poor' condition are those where a dam safety deficiency is recognized for realistic loading conditions, or when

[6] Source: Northeast New Mexico Regional Water Plan, 2016.

uncertainties exist as to critical analysis parameters. Further investigations and studies may be necessary.

Table 6-6 Dams in Union County

Dam	Condition Assessment	Deficiency	Hazard Potential	Estimated Repair Cost
Brown Reservoir Dam	Poor	Spillway capacity - 69% of required flood; unauthorized alter of spillway	Low	$2,500,000
Clayton Dam	Poor	Spillway capacity 30% of required flood; seepage at downstream toe; woody vegetation; lack of design information	Low	$3,000,000
Eklund Storage Works Dam	Poor	Outlet inoperable; woody vegetation; erosion on crest	Low	$200,000
Gardner Dam	Poor	Spillway capacity - 37% of required flood; lack of design information	Low	$2,500,000
Howard Robertson Dam	Poor	Severe erosion of embankment; conduit plugged; lack of maintenance	Low	$100,000
Poling Erosion Control Dam	Poor	Spillway capacity 5% of required flood	Low	$2,500,000
Poling Irrigation System Dam	Poor	Woody vegetation; inoperable outlet intake (buried in sediment); maintenance needed	Low	$100,000
Smithson Reservoir No. 1	Poor	Spillway capacity <20% of required flood	Low	$2,500,000
Smithson Reservoir No. 3	Poor	Spillway capacity <7% of required flood	Low	$2,500,000
Smithson Reservoir No. 4	Poor	Spillway capacity <5% of required flood	Low	$2,500,000
Snyder Lake Dam	Poor	Spillway capacity <20% of required flood	Low	$2,500,000
Tramperos Creek Site 1 Dam	Fair	Lack of design information	Low	$100,000
Weatherly Reservoir Dam	Poor	Lack of design information	Low	$100,000

Dam failure is a related component of the previously mentioned Drought – Wildfire - Flood Cycle. Dams located in wildfire burn areas are vulnerable to the increased sedimentation that post-fire conditions can bring to a watershed, in addition to the increased flows of rainwater on the resulting burn scars.

Critical Facilities Exposed/Impacts

With the lack of dam inundation mapping currently available, it is not possible to determine those facilities potentially vulnerable to dam failure events. Any facilities downstream of dams are potentially at risk.

Potential Losses

Since there are no documented previous occurrences of dam failure in Union County, there are no annual loss estimates available for this Plan. Significant losses could occur from a dam failure, including (but not limited to) building damage, flooding, infrastructure damage, and potential deaths and injuries.

Future Conditions

Land Use and Development

Although dam failures are a relatively low frequency hazard, future development could still be threatened if structures are built in inundation zones, another reason mapping is needed.

Flooding due to a dam failure event is likely to exceed the special flood hazard areas, where available, regulated through local floodplain ordinances. Jurisdictions should consider the dam failure hazard when permitting development downstream of dams. One important fact to note is that low hazard dams can become significant or high hazard, if development occurs below them.

Accurate mapping; regular monitoring of dams; development, exercising, and updating of Emergency Action Plans (EAPs); and rapid response to problems detected at dams are ways to mitigate the potential impacts of these rare, but potentially catastrophic events.

Climate

At this time, there has not been a definitive link between long-term, changing weather patterns and an increase or decrease in the frequency or severity of dam failures in the State of New Mexico.[7]

Dams and other hydrologic containment structures are designed based on calculations of a river's flow behavior, and any changes in weather patterns can have significant effects on the hydrologic information used for the design of a dam. Although there is no consensus that annual mean precipitation will increase in New Mexico due to climate change, it is possible that precipitation may increasingly come in the form of extreme storms. Extreme precipitation events may result in large floods that could stress dams, and thus potentially increase the risk of failure of these structures. In the last 100 years, overtopping due to inadequate or improperly designed spillways is the leading cause of dam failure and resulting loss of life.[8] The 2018 Colorado-New Mexico Regional Extreme Precipitation Study utilized an updated methodology to more accurately predict extreme precipitation events for dam safety. This study utilized the latest climate predictions and science for the region to incorporate into the model. These methods and results can be utilized to predict dam failures more accurately, due to extreme precipitation events, in the face of a changing climate.

Additionally, the structural integrity of earthfill dams may be compromised by climate change impacts, such as drought and severe storms. Changes in vegetation and prolonged drying due to increased frequency of drought, embankment erosion due to severe storms, and more extreme fluctuations in water levels due to severe storms all make earthfill dams vulnerable to climate change.

[7] 2018 New Mexico State Hazard Mitigation Plan
[8] Colorado-New Mexico Regional Extreme Precipitation Study (REPS) handout; https://www.esrl.noaa.gov/psd/outreach/resources/handouts/co-nm-precip-handout-psd.pdf

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes, low (L), moderate (M), and high (H). The results are shown in the following table. All communities ranked the risk from dam failure to be low, compared to other profiled hazards.

Table 6-7 Dam Failure Risk Ranking

	Risk Rank
Unincorporated Union County	Low
Town of Clayton	Low
Village of Des Moines	Low
Village of Folsom	Low
Village of Grenville	Low

6.2.2 Drought

Description

Drought is a condition of climatic dryness that is severe enough to reduce soil moisture and water below the minimum capacity for sustaining plant, animal, and human life systems. Influencing factors include temperature patterns, precipitation patterns, agricultural and domestic water supply needs, and growth. Lack of annual precipitation and poor water conservation practices can result in drought conditions.

Drought is a complex issue involving many factors, it occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects:

- Meteorological drought is usually defined by a period of below average water supply.
- Agricultural drought occurs when there is an inadequate water supply to meet the needs of the State's crops and other agricultural operations such as livestock.
- Hydrological drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.
- Socioeconomic drought occurs when a drought impacts health, well-being, and quality of life or when a drought starts to have an adverse economic impact on a region.

Location

All of Union County is at risk to drought conditions including the populated areas (domestic needs) and unincorporated areas of the county (agricultural, environmental, and recreational needs).

Extent

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or wildfires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and can take years before the consequences are realized. It is often not obvious or easy to quantify when a drought begins and ends. Droughts can be a short-term event over several months or a long-term event that lasts for years or even decades.

The Palmer Drought Severity Index (PDSI) was developed by Wayne Palmer in the 1960s and uses temperature and rainfall information in a formula to determine dryness (Table 6-8). Over time it has become the semiofficial drought index for risk assessment and hazard analysis. The Palmer Index is most effective in determining long term drought, a matter of several months, and is not used for short-term forecasts (a matter of weeks). It uses a zero as normal conditions and drought is shown in terms of negative numbers; for example, -2 is moderate drought, -3 is severe drought, and -4 is extreme drought. The following table provides an overview of the Palmer Index compared to other drought classification systems. The return period is related to how often the type of drought typically occurs. For example, a minor drought occurs every three to four years.

Table 6-8 Palmer Drought Severity Index

			Drought Monitoring Indices		
Drought Severity	**Return Period (years)**	**Description of Possible Impacts**	**Standardized Precipitation Index (SPI)**	**NDMC* Drought Category**	**Palmer Drought Index**
Abnormal Drought	3 to 4	Going into drought, short term dryness slowing growth of crops or pastures. Fire risk above average. Coming out of drought, some lingering water deficits, pastures or crops not fully recovered.	-0.5 to -0.7	DO	-1.0 to -1.9
Moderate Drought	5 to 9	Some damage to crops or pastures, fire risk high, streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-0.8 to -1.2	D1	-2.0 to -2.9
Severe Drought	10 to 17	Crop or pasture losses likely, fire risk very high, water shortages common, water restrictions imposed.	-1.3 to -1.5	D2	-3.0 to -3.9

Drought Severity	Return Period (years)	Description of Possible Impacts	Drought Monitoring Indices		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
Extreme Drought	18 to 43	Major crop and pasture losses, extreme fire danger, widespread water shortages or restrictions	-1.6 to -1.9	D3	-4.0 to -4.9
Exceptional Drought	44+	Exceptional and widespread crop and pasture losses, exceptional fire risk, shortages of water in reservoirs, streams, and wells creating water emergencies.	Less than -2.0	D4	-5.0 or less

*National Drought Monitoring Center

Previous Occurrences

Previous occurrences of drought can be measured in several ways. For this Plan, previous occurrences were determined by reviewing precipitation averages over time to identify periods with precipitation amounts below the long-term average, and by reviewing U.S. Drought Monitor records/current conditions. Drought conditions based on precipitation deficits are described in Table 6-9, indicating the top five years of precipitation deficit departure from the long-term average of 16.34 inches. [9]

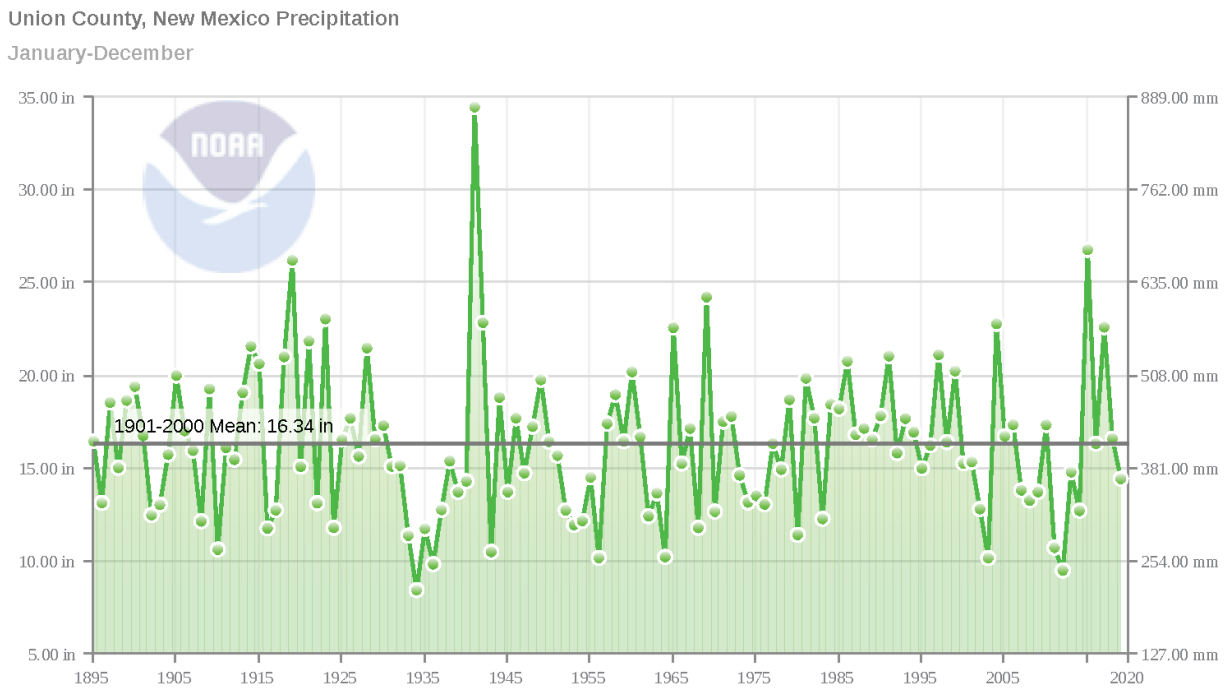
Table 6-9 Precipitation Deficits 1895-2018

1901-2000 Precipitation Average	Year	Total Precipitation	Deficit
16.34 in.	1934	8.46 in.	7.88 in.
	2012	9.52 in.	6.82 in.
	1936	9.86 in.	6.48 in.
	2003	10.19 in.	6.15 in.
	1956	10.20 in.	6.14 in.

Precipitation deficit history is further shown in Figure 6-6, a NOAA timeline of annual precipitation for Union County, beginning in 1895. It is evident that significant precipitation deficits have occurred throughout history in Union County.

[9] https://www.ncdc.noaa.gov/cag/county/time-series for Union County

Figure 6-6 Precipitation Deficits 1895-2018



Drought conditions based on U.S. Drought Monitor records are shown in Figure 6-7. [10] Based on this data, the most severe drought conditions during this timeframe occurred from approximately 2011 to 2015, with extreme droughts occurring every couple of years.

Figure 6-7 U.S. Drought Monitor Previous Droughts, 2000-2020

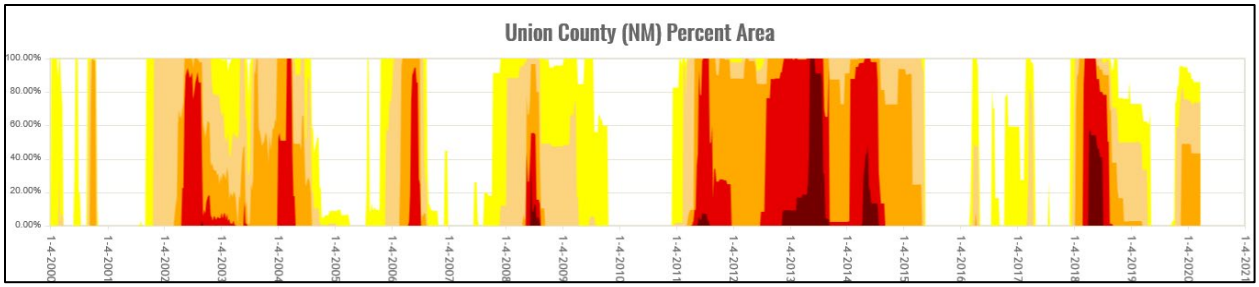


Figure 6-8 shows drought conditions in New Mexico on March 24, 2020. [11] The County is currently experiencing drought conditions ranging from None to Severe.

[10] https://droughtmonitor.unl.edu/Data/Timeseries.aspx
[11] U.S. Drought Monitor

Figure 6-8 Drought Conditions in New Mexico 3/2020

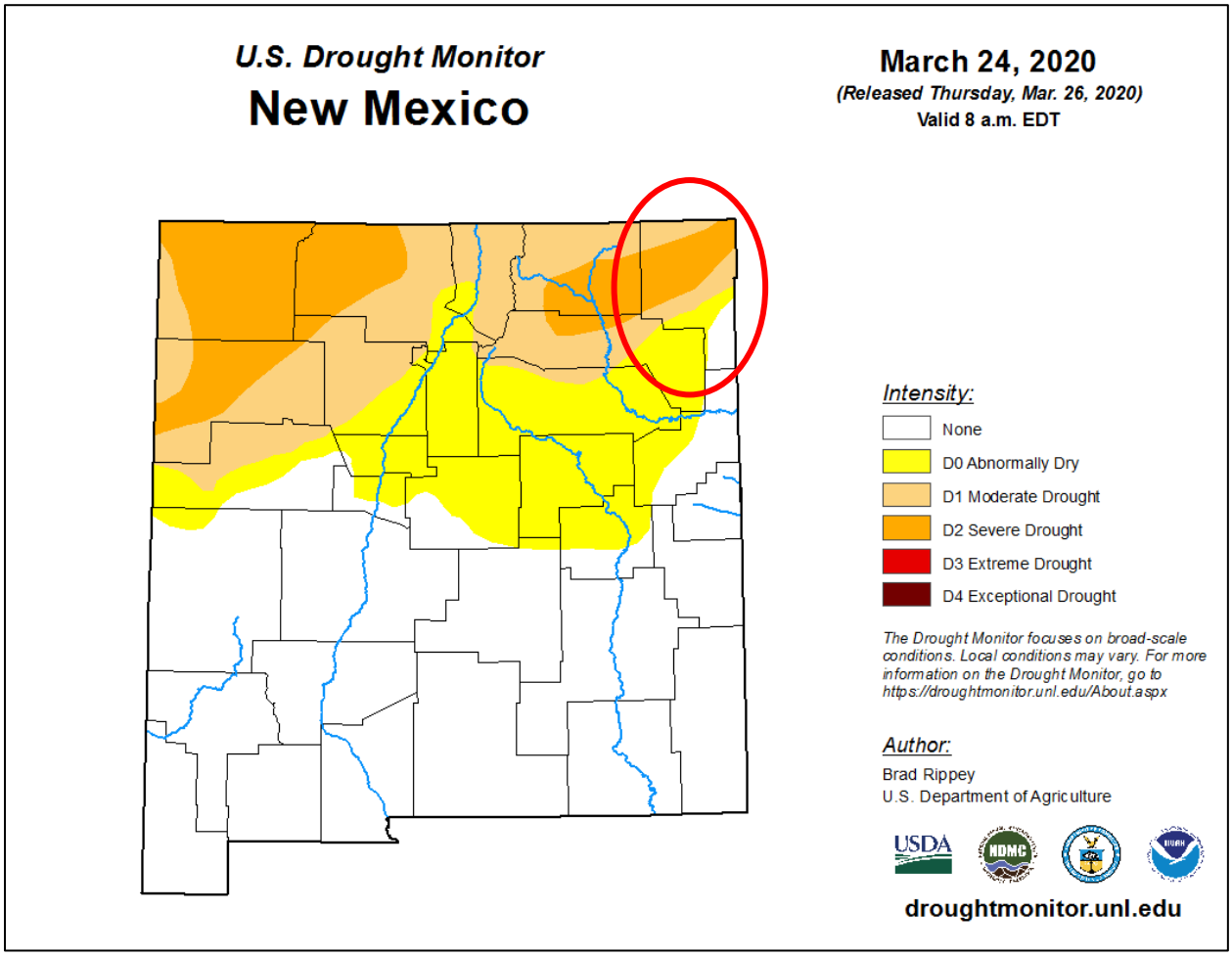
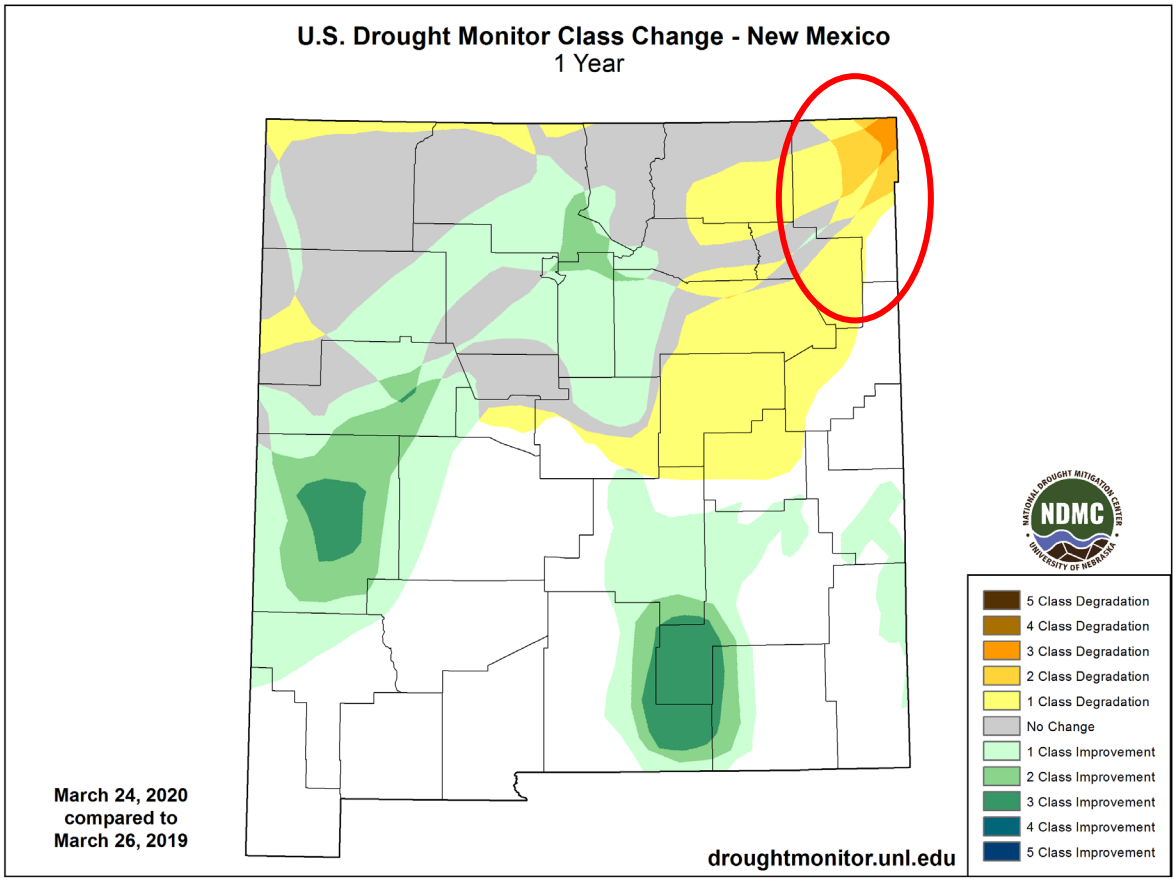


Figure 6-8 shows the one-year change in drought conditions in New Mexico on March 24, 2020.[12] A substantial portion of the county is currently experiencing varying classes of degradation (a worsening of drought conditions).

[12] U.S. Drought Monitor

Figure 6-9 Drought Condition Change in New Mexico 3/2020



Per the State Plan, USDA Secretarial Drought Designations have been made for Union County every year since 2012.

Probability

According to the State Plan, the probability of a drought occurring in any given year is 100%, equating to a highly likely probability. Due to the limited time-series data for Union County specifically, this is the most accurate probability estimate for the county. Based on the historical data presented in Table 6-4, damaging drought is expected to occur annually.

Vulnerability Assessment

Inventory Exposed/Impacts

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in New Mexico are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. An ongoing drought may leave an area more prone to wildfires, as mentioned when discussing the Drought – Wildfire – Flood Cycle. Drought conditions can cause soil to compact which increases an area's susceptibility to flooding and can reduce vegetation cover, which exposes soil to wind and erosion. Water quality deterioration is a potential problem. Drought impacts increase with the

length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

Overall, a severe drought will affect the entire economy, particularly in relation to agriculture, water supply, and wildfire concerns. Drought is one of the few hazards that has the potential to impact, directly or indirectly, each and every person within Union County, as well as adversely affect the local economy.

Critical Facilities Exposed/Impacts

Facilities are generally not vulnerable to drought events and are not expected to experience any additional hazard risk.

Potential Losses

Limited loss information was available from previous drought events. However, potential losses could be significant, particularly related to impacts on the local agricultural sector. Based on the historical data presented in Table 6-4, all-time drought crop insurance indemnity costs have totaled close to $1.5 million to date, which equates to an annual cost per year of $51,488, and an overall per capita cost of $364. From 1989-2018, there have been 94 insured events.

Future Conditions

Land Use and Development

Population growth and increased development can place a greater demand on limited water resources. Per the Union County Comprehensive Plan (2020), all areas of the county are expected to see continued population stagnation, with future projections suggesting population decline through 2040.

Climate

Increased temperatures are projected to increase the frequency of drought events in New Mexico. Increased droughts could impact Union County in many ways, including increasing the wildfire risk and the economic effects of decreased agricultural production.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. All communities ranked the risk from drought to be high, compared to other profiled hazards.

Table 6-10 Drought Risk Ranking

	Risk Rank
Unincorporated Union County	High
Town of Clayton	High

Village of Des Moines	High
Village of Folsom	High
Village of Grenville	High

6.2.3 Earthquake

Description

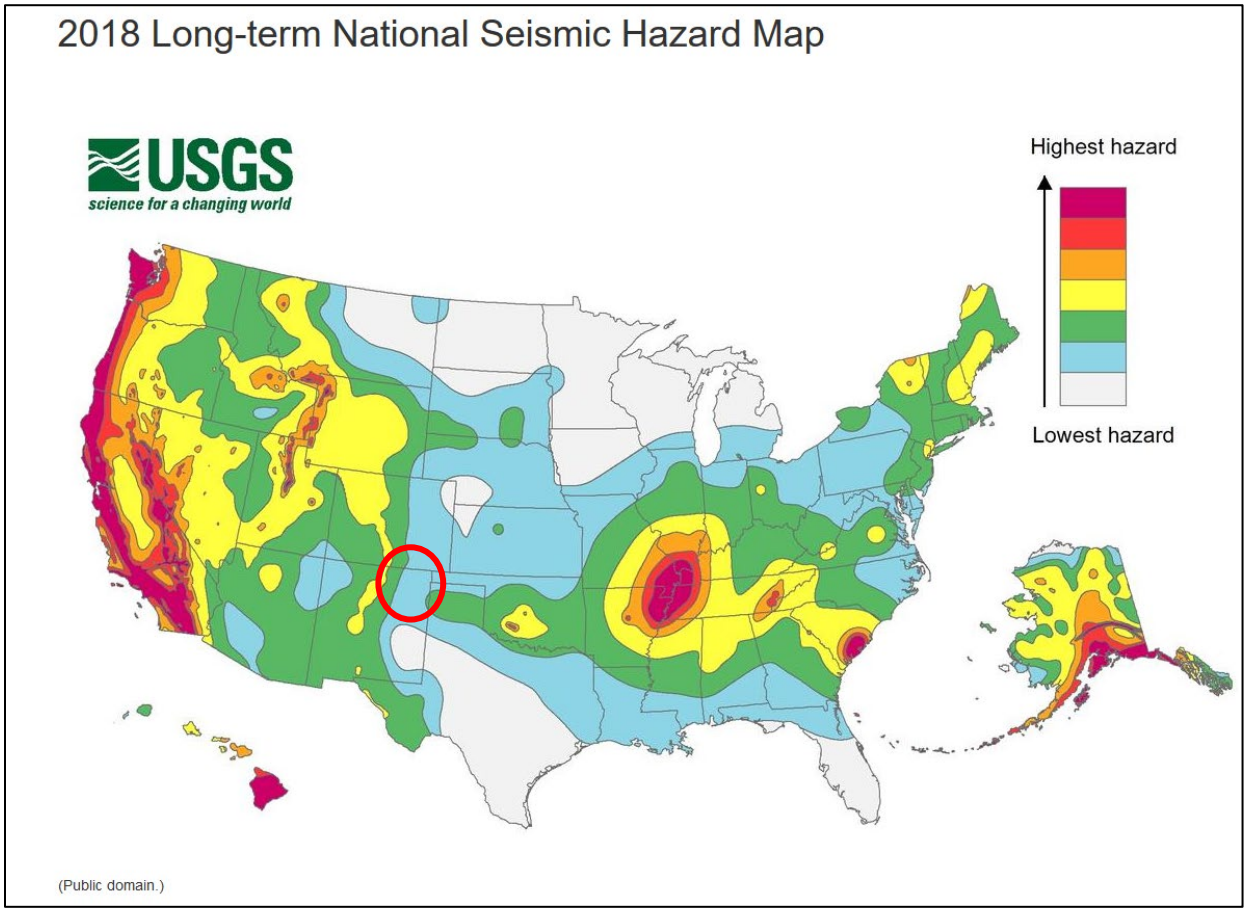
An earthquake is caused by a sudden slip on a fault, which is a plane of weakness in the earth's crust. Stresses in the earth's outer layer push the sides, or plates, of the fault together. Stress builds up and the plates slip suddenly, releasing energy in waves which travel through the earth's crust and cause the shaking that is felt during an earthquake. The amount of energy released during an earthquake is typically expressed as a Richter magnitude and is measured based on the ground movement as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking, often the greatest cause of losses to structures during earthquakes, at any given location on the surface as felt by humans and defined in the Modified Mercalli Intensity Scale.

Liquefaction is the phenomenon that occurs when the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Essentially, the soil acts like a fluid, similar to wet sand near the beach, resulting in ground failure. Liquefaction causes two types of ground failure, lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and entails the sidelong movement of large masses of soil, as an underlying layer liquefies. Loss of bearing strength results when the soil supporting structures liquefies and causes structures to collapse.

Location

All of Union County, including the incorporated areas, could be impacted by earthquakes. Population centers and areas with older building stocks could endure the greatest losses if a significant earthquake were to occur. The following figure from the United States Geological Survey (USGS) show a summary of seismic hazard across the nation.

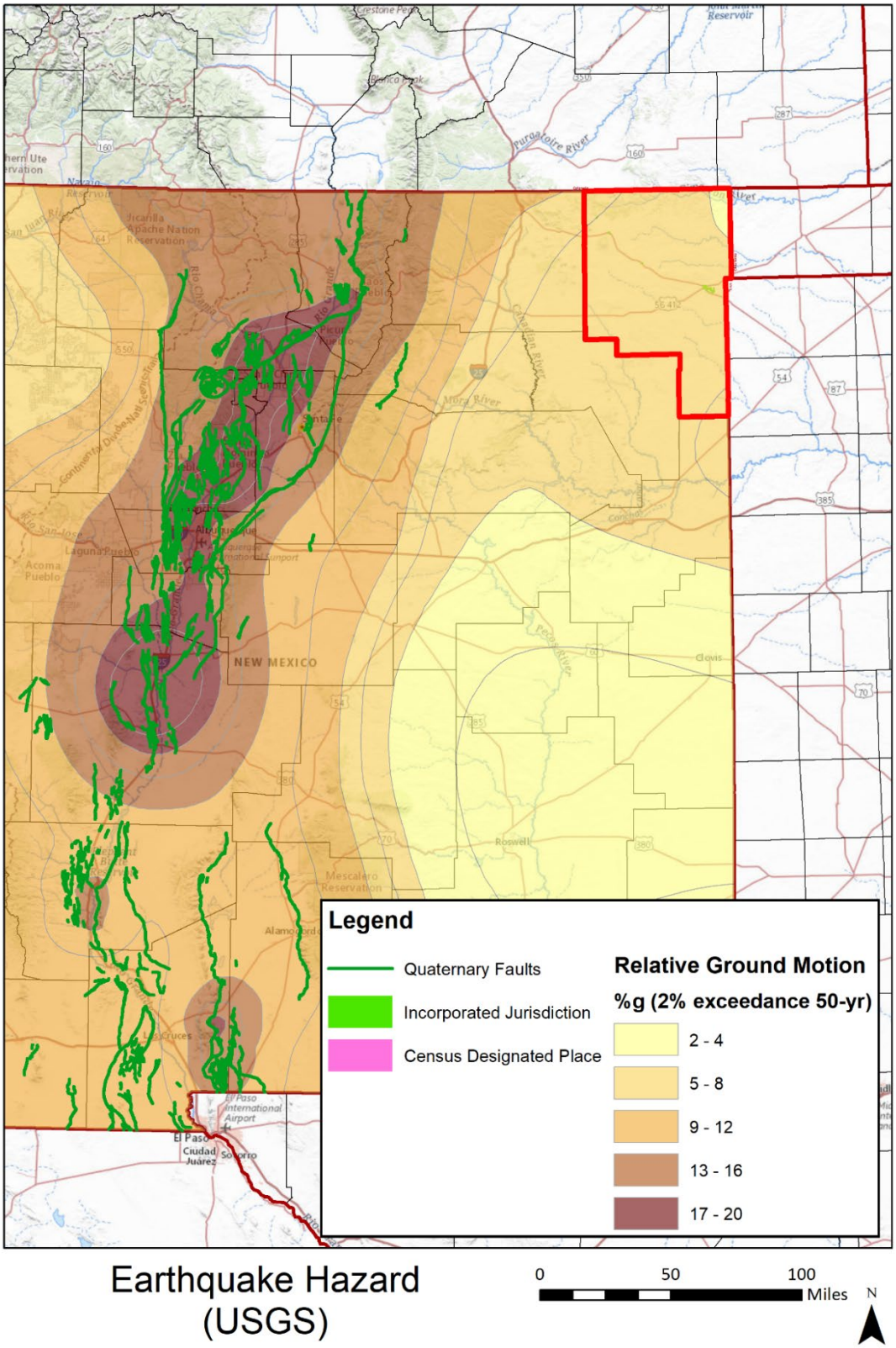
Figure 6-10 United States Seismic Hazard



Earthquakes are caused by the movement of faults and understanding the history of the region's faults can help determine potential future earthquake locations. There are no identified faults in Union County, nor in the immediately surrounding areas. The following figure supplies an overview.

Additionally, this figure shows the peak ground acceleration (PGA) for a 2% probability event in 50 years. This equates to a 2,500-year return period, which is also the return period now used as the basis for International Building Codes. It is evident that Union County has some of the lower expected PGA intensities in the state. The hazard is slightly lower for the northeast corner of the county.

Figure 6-11 Quaternary Faults and Relative Ground Motion



Extent

Earthquake magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (Table 6-11).[13] Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy.

Table 6-11 Richter Scale

Richter Magnitudes	Earthquake Effects
< 3.5	Generally, not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Intensity is commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from "I" corresponding to imperceptible (instrumental) events to "XII" for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in the following table.

Table 6-12 Modified Mercalli Intensity Scale for Earthquakes

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on 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

[13] FEMA

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
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

Another way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak ground acceleration (PGA) measures the strength of ground movements in this manner and represents the rate in change of motion of the Earth's surface during an earthquake as a percent. PGA can be partly determined by what soils and bedrock characteristics exist in the region. Unlike the Richter scale, PGA is not a measure of the total energy released by an earthquake, but rather of how hard the earth shakes at a given geographic area (the intensity). PGA is measured by using instruments including accelerographs and correlates well with the MMI scale. PGA is represented as %g and is described in Table 6-13 below.

Table 6-13 PGA Intensity Descriptions

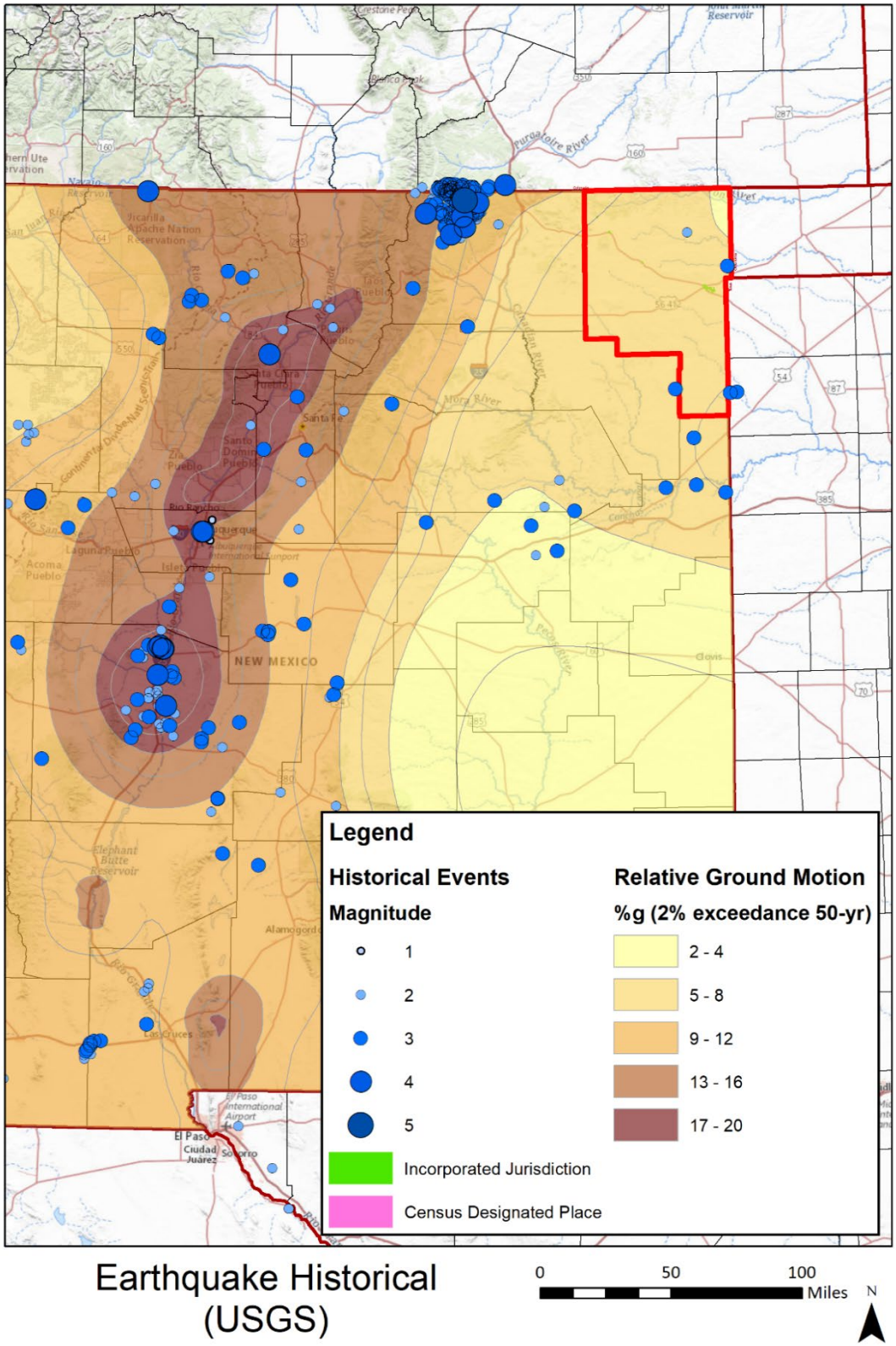
Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
Potential Damage	None	None	None	Very light	Light	Moderate	Moderate/ Heavy	Heavy	Very Heavy
Peak Acc (%G)	< .17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
Peak Vel (Cm/S)	< 0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
Instrumental Intensity	I	II-III	IV	V	VI	VII	VIII	IX	X+

Previous Occurrences

Figure 6-12 shows previous occurrences across much of the state, since 1897, based on USGS available data.[14] It is recognized that this is not a comprehensive list of all previous earthquakes, but gives a picture of where previous earthquakes occurred across the region based on available GIS data.

[14] https://earthquake.usgs.gov/earthquakes/search/

Figure 6-12 Previous New Mexico Earthquakes, 1897-2020



Overall, Union County has experienced 2 previous earthquakes that originated within the county. One occurred in 2013, 35km NNW of Clayton (magnitude 2.7) and the other in 2002 along the Oklahoma border (magnitude 3.7). There have been a handful of epicenters closely surrounding the county, with magnitudes of that same range from 2.7 - 3.7.

Probability

Based on 2 previous occurrences of earthquakes in Union County from 1897 to 2020, there is approximately a 1-2% annual chance of occurrence, or a possible probability.

Vulnerability Assessment

Inventory Exposed/Impacts

It can be assumed all existing and future buildings and populations are exposed to the earthquake hazard, though the risk is low. Impacts could include collapsed walls and damages to the transportation and utility systems across Union County. Buildings constructed to the latest International Building Code will be less vulnerable, conversely older building stock and non-reinforced masonry construction is at most risk.

Critical Facilities Exposed/Impacts

All critical facilities are exposed to the risk from earthquake. Expected impacts would be higher for structures with non-reinforced masonry construction.

Potential Losses

The most appropriate loss estimation methodology for seismic hazards involves scenario modeling using FEMA's Hazus loss estimation software. There are two levels of Hazus analysis, 'Standard,' which uses the default FEMA-derived datasets and damage functions, and 'Enhanced,' which uses independently compiled and accurately verified structure and infrastructure inventories and damage functions. The earthquake analysis conducted for this Plan includes a Standard level analysis using the latest version, Hazus-MH Earthquake Model V4.2. This risk assessment leveraged census tract data to conduct a Standard Hazus probabilistic scenario for Union County. Due to the county's low population, the entire county is included in a single census tract, so no detailed mapping of the modeled losses is possible.

A 2,500-year return period (2% probability event in 50 years) probabilistic scenario was used for the analysis. A 2,500-year return period was chosen because the new International Building Code uses a 2,500-year map as the basis for building design. Based on the State Plan, the highest magnitude earthquake that could be expected to occur in Preparedness Area 2 (which included Union County) is 5.5. The most probable epicenter was located in Las Vegas, NM which has a much higher seismic hazard than Union County (so this assessment likely overestimates losses).

Results

The entire county is aggregated as one Census Tract, so it is not possible to determine losses by jurisdiction. It can be assumed the highest losses will be in areas with a higher concentration of buildings, particularly in the municipalities.

For building-related losses, Hazus estimates close to $2.4 million for the entire county. Single family buildings will sustain close to half of these losses and commercial structures will experience an additional quarter of those modeled losses. The following figure presents a summary of this information.

Figure 6-13 Hazus Building-Related Economic Loss Estimate

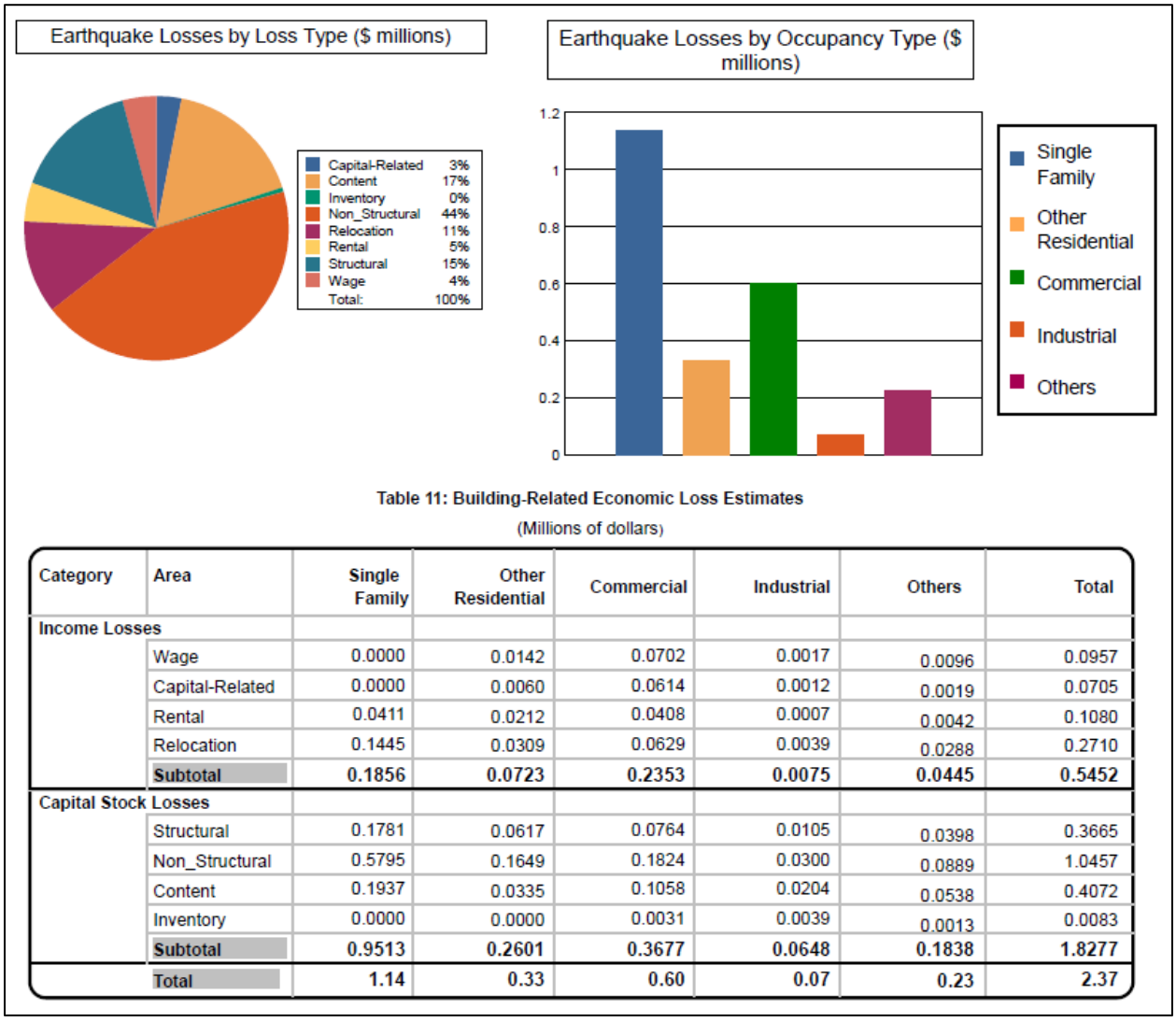


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0142	0.0702	0.0017	0.0096	0.0957
	Capital-Related	0.0000	0.0060	0.0614	0.0012	0.0019	0.0705
	Rental	0.0411	0.0212	0.0408	0.0007	0.0042	0.1080
	Relocation	0.1445	0.0309	0.0629	0.0039	0.0288	0.2710
	Subtotal	**0.1856**	**0.0723**	**0.2353**	**0.0075**	**0.0445**	**0.5452**
Capital Stock Losses							
	Structural	0.1781	0.0617	0.0764	0.0105	0.0398	0.3665
	Non_Structural	0.5795	0.1649	0.1824	0.0300	0.0889	1.0457
	Content	0.1937	0.0335	0.1058	0.0204	0.0538	0.4072
	Inventory	0.0000	0.0000	0.0031	0.0039	0.0013	0.0083
	Subtotal	**0.9513**	**0.2601**	**0.3677**	**0.0648**	**0.1838**	**1.8277**
	Total	**1.14**	**0.33**	**0.60**	**0.07**	**0.23**	**2.37**

Related to expected building damages, it is estimated that 46 buildings will be moderately damaged and 4 extensively. A vast majority of these will impact the residential occupancy type (see following figure).

Figure 6-14 Hazus Building Damage Estimate

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	13.78	0.59	0.82	0.64	0.34	0.74	0.05	1.22	0.00	1.66
Commercial	123.81	5.27	8.63	6.69	3.89	8.41	0.64	14.29	0.02	16.30
Education	9.15	0.39	0.57	0.44	0.25	0.53	0.03	0.78	0.00	0.94
Government	14.65	0.62	0.94	0.73	0.37	0.80	0.04	0.88	0.00	1.08
Industrial	24.38	1.04	1.72	1.34	0.77	1.66	0.12	2.69	0.00	2.72
Other Residential	302.05	12.85	38.97	30.19	19.11	41.28	0.85	18.84	0.02	16.37
Religion	24.84	1.06	1.49	1.15	0.60	1.29	0.07	1.61	0.00	2.14
Single Family	1838.33	78.19	75.94	58.83	20.97	45.30	2.68	59.70	0.08	58.79
Total	2,351		129		46		4		0	

Transportation system economic losses are estimated to be relatively minor. For this worst-case modeled event, $600 thousand in losses are expected, mainly due to highway bridge and airport facility impacts. No expected moderate or complete damages are expected to these transportation systems. The following figure presents the transportation system losses modeled by Hazus.

Figure 6-15 Hazus Transportation System Economic Loss Estimate

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	2816.6920	0.0000	0.00
	Bridges	28.1483	0.0044	0.02
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**2844.8403**	**0.0044**	
Railways	Segments	128.7281	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**128.7281**	**0.0000**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	10.6510	0.5925	5.56
	Runways	75.9280	0.0000	0.00
	Subtotal	**86.5790**	**0.5925**	
	Total	**3,060.15**	**0.60**	

Utility system losses were also modeled for this event. Similar to transportation losses, the estimates are relatively minor for this large event and would mainly impact potable water and wastewater systems. Hazus modeled no service interruptions for either potable water or electric power due to this theoretical event, nor any moderate or complete damages to utility facilities. The following two figure summarizes these utility results.

Figure 6-16 Hazus Utility System Economic Loss Estimate

Table 13: Utility System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	257.2312	0.2067	0.08
	Subtotal	**257.2312**	**0.2067**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	154.3387	0.1038	0.07
	Subtotal	**154.3387**	**0.1038**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	102.8925	0.0356	0.03
	Subtotal	**102.8925**	**0.0356**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0960	0.0013	1.35
	Subtotal	**0.0960**	**0.0013**	
	Total	**514.56**	**0.35**	

Figure 6-17 Hazus Utility System Pipeline Damage Estimate

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	7,992	46	11
Waste Water	4,795	23	6
Natural Gas	3,197	8	2
Oil	0	0	0

Specifically analyzing essential facilities (as defined by Hazus), there are no expected damages modeled by Hazus.

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates no households to be displaced due to the earthquake and no persons seeking temporary shelter.

Hazus also estimated casualties due to the earthquake at three contrasting times of day, including: 2:00 am representing a time when residential occupancy is at a maximum, 2:00 pm representing a time when business sectors are at a maximum, and 5:00 pm representing peak commute time. There are no expected casualties from this modeled event. If an earthquake were to occur during peak tourism times (for example, summer weekends or holiday weekends), the potential for casualties would be much higher.

A number of variables are included in Hazus analyses to arrive at the estimated values of loss due to earthquake. For this reason, it is important to note that the Hazus loss estimates detailed above should not be used as a precise measure, but rather viewed from the perspective of the potential magnitudes of expected losses.

Future Conditions

Land Use and Development

Any new construction built to code in the county should generally be able to withstand earthquakes, but the potential for nonstructural losses will increase with any new future development. Per the Union County Comprehensive Plan (2020), all areas of the county are expected to see continued population stagnation, with future projections suggesting population decline through 2040.

Climate

Future climatic conditions are not projected to impact the earthquake hazard in Union County.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. Most communities ranked the risk from earthquake to be low compared to other profiled hazards, except Folsom.

Folsom ranked this a moderate risk, based on proximity to the Capulin Volcano and the potential earthquakes associated, as well as the possible impact to the critical archaeology site, which holds significance for history and is a primary tourist attraction.

Table 6-14 Earthquake Risk Ranking

	Risk Rank
Unincorporated Union County	Low
Town of Clayton	Low
Village of Des Moines	Low
Village of Folsom	Moderate
Village of Grenville	Low

6.2.4 Flood / Flash Flood

Description

Riverine flooding is defined as when a watercourse exceeds its "bank-full" capacity. Riverine flooding generally occurs due to prolonged rainfall, or rainfall that is combined with soils already saturated from previous rain events. The area adjacent to a river channel is its floodplain. In its common usage, "floodplain" most often refers to that area that is inundated by the 100-year flood, the flood that has a 1% chance in any given year of being equaled or exceeded. Other types of floods include general rain floods, thunderstorm/monsoon generated flash floods, debris flow, alluvial fan floods, snowmelt and rain on snow floods, dam failure floods, and local drainage floods. The 100-year flood is the national standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP).

The potential for flooding can change and increase through various land use changes and modifications to land surface. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining watersheds or natural drainage channels. These changes are commonly created by human activities. These changes can also be created by other events such as wildfires. Wildfires create hydrophobic soils, a hardening or "glazing" of the earth's surface that prevents rainfall from being absorbed into the ground, thereby increasing runoff, erosion, and downstream sedimentation of channels. Post-wildfire areas are also at risk to increased debris flow events, where flood waters collect large quantities of woody debris which can result in additional flooding.

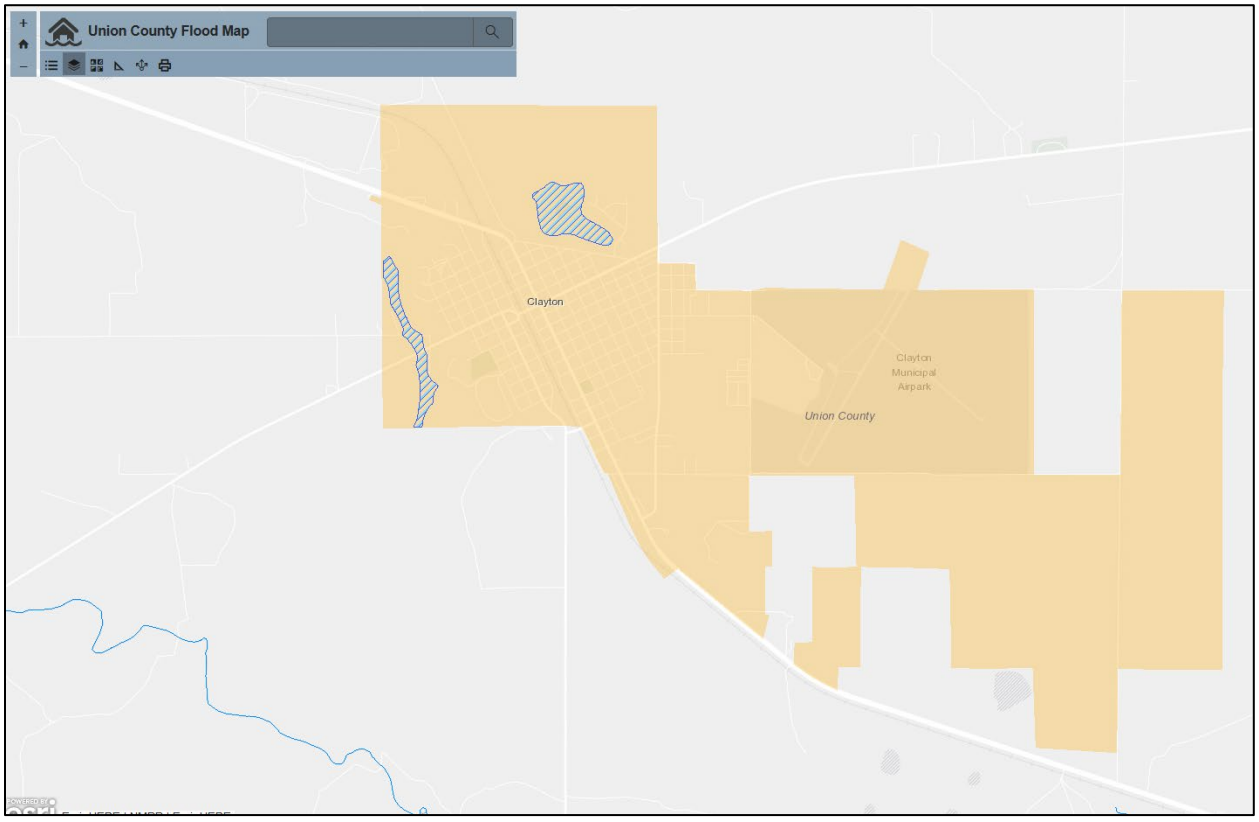
Location

Union County currently does not have any floodplain maps countywide. All of the county is unmapped by the Federal Emergency Management Agency (FEMA) with the exception of a portion of the Town of Clayton.

The following figures show the 100-year floodplain presently identified in the Town of Clayton.[15]

[15] Source: NMFlood (EDAC)

Figure 6-18 Town of Clayton Floodplains



As part of this plan's risk and vulnerability assessment, FEMA's Hazus software was used to create estimated countywide floodplains. These 1% annual-chance flood hazard areas (commonly referred to as the "100-year floodplain") were generated using 30-meter digital elevation models (DEMs) and were then modified in GIS to clean up some inconsistencies. It should be noted that these are very coarse floodplains that are not regulatory in nature. These floodplains have been created for the purpose of this Plan's hazard identification and risk assessment and should only be utilized as currently best available data. New FEMA flood maps, when available in the future, will greatly enhance the accuracy of these floodplains.

The following figures present these floodplains at a county-scale, then smaller-scale maps are provided for the communities across Union County. Note the floodplain processing for the Village of Folsom resulted in numerous errors and no floodplain was able to be produced for that area.

Figure 6-19 Union County Floodplains

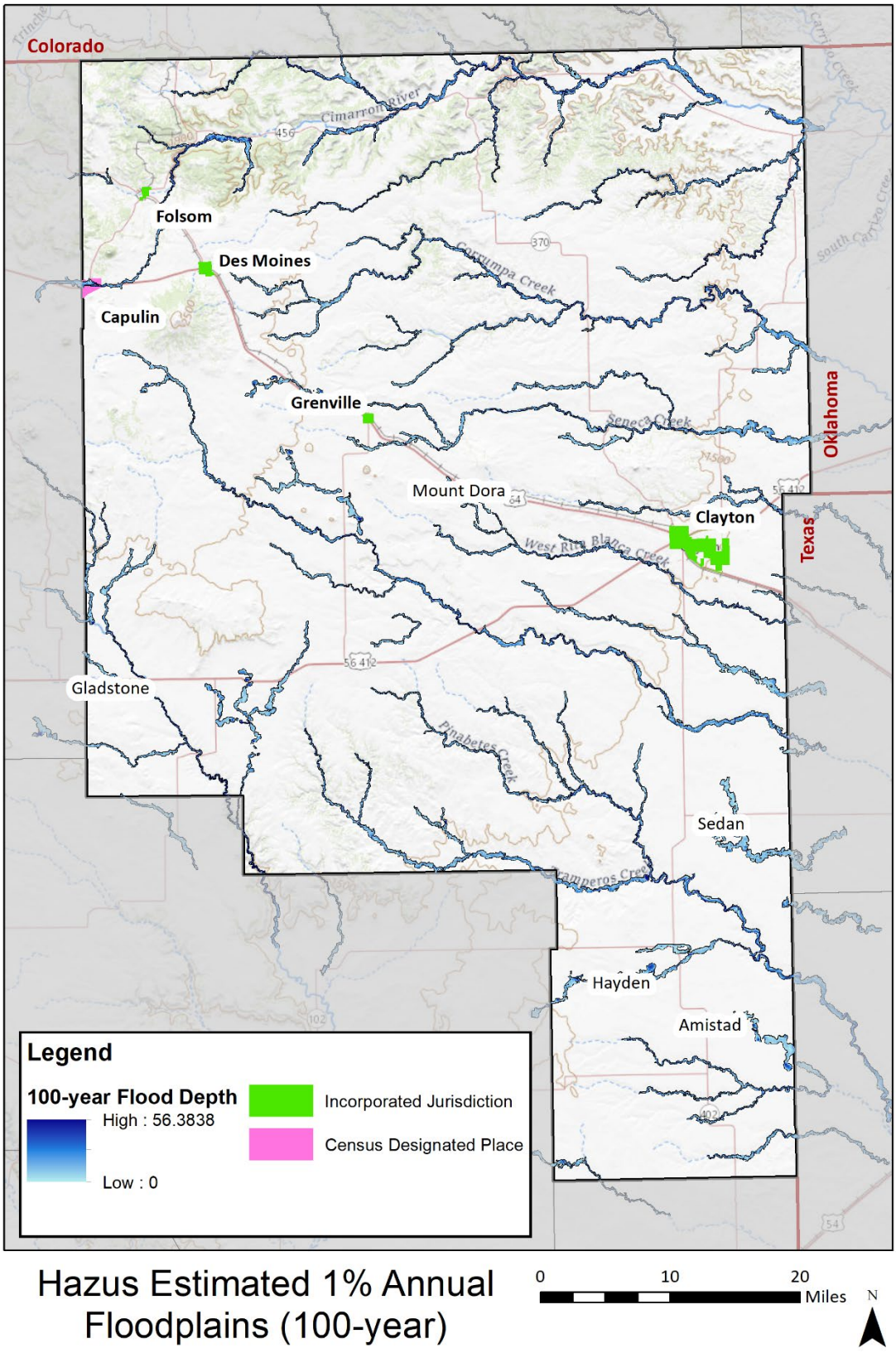


Figure 6-20 Clayton Floodplains

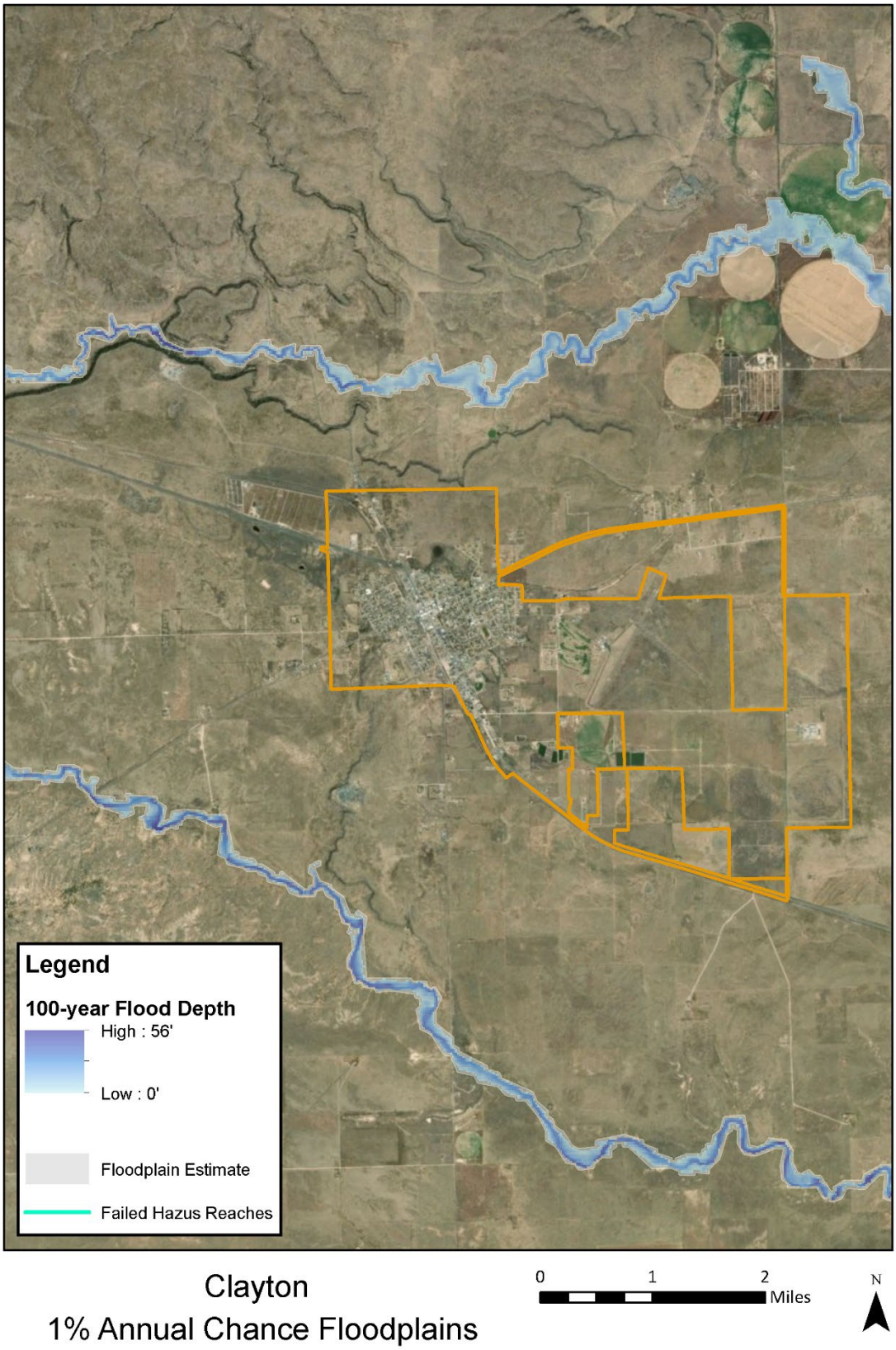


Figure 6-21 Des Moines Floodplains

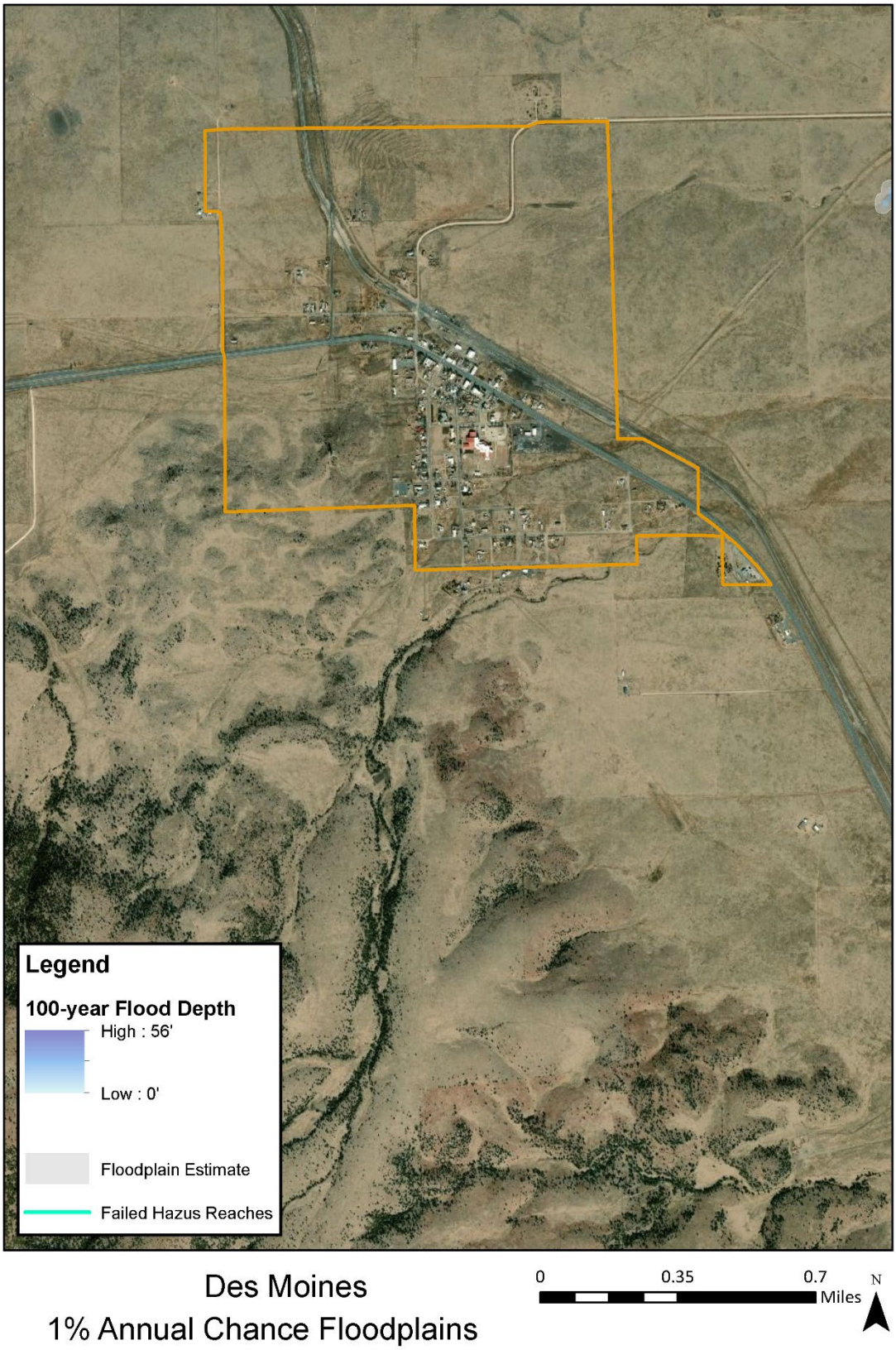


Figure 6-22 Grenville Floodplains

Grenville
1% Annual Chance Floodplains

Figure 6-23 Folsom Floodplains

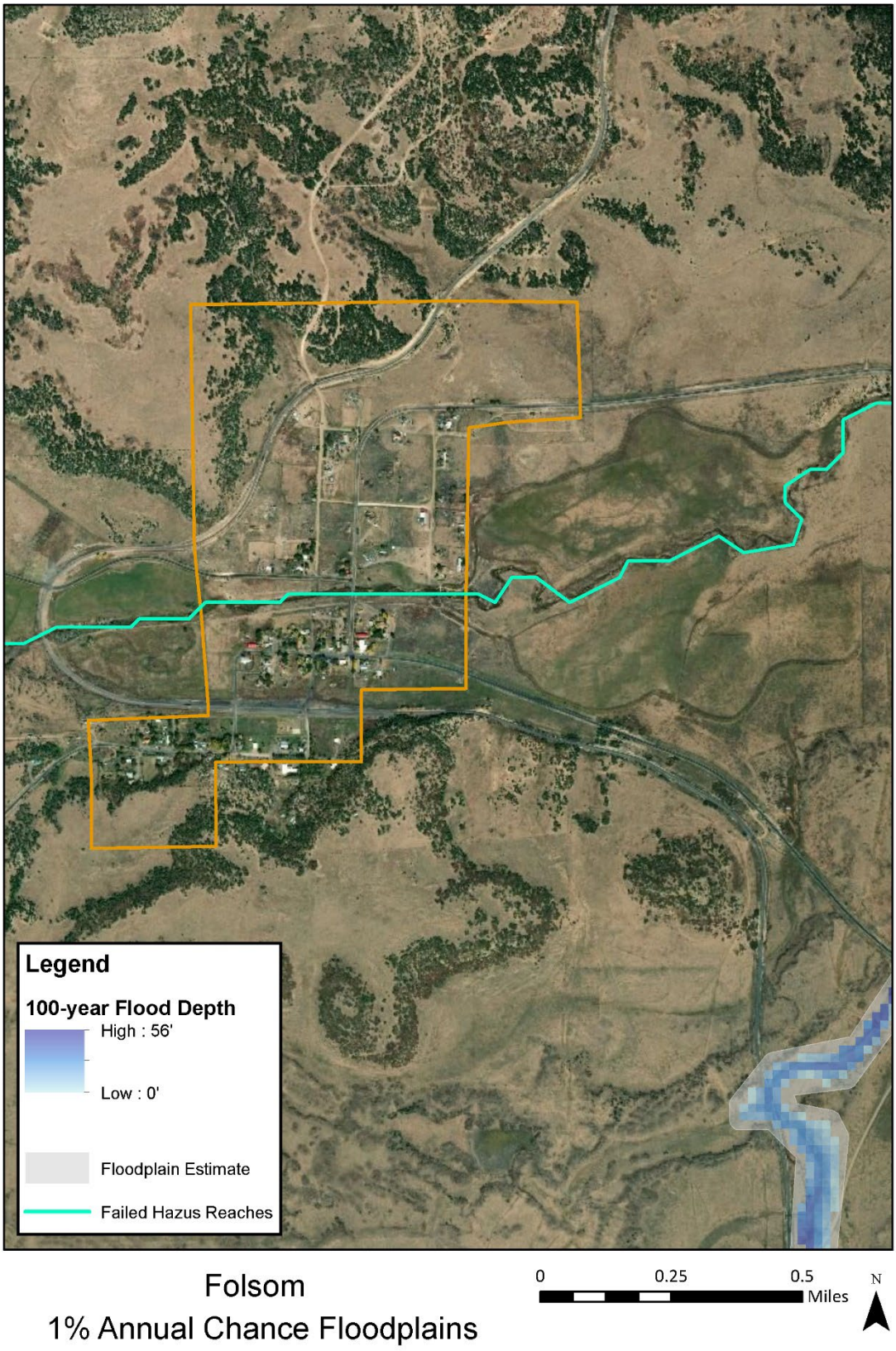


Figure 6-24 Capulin Floodplains

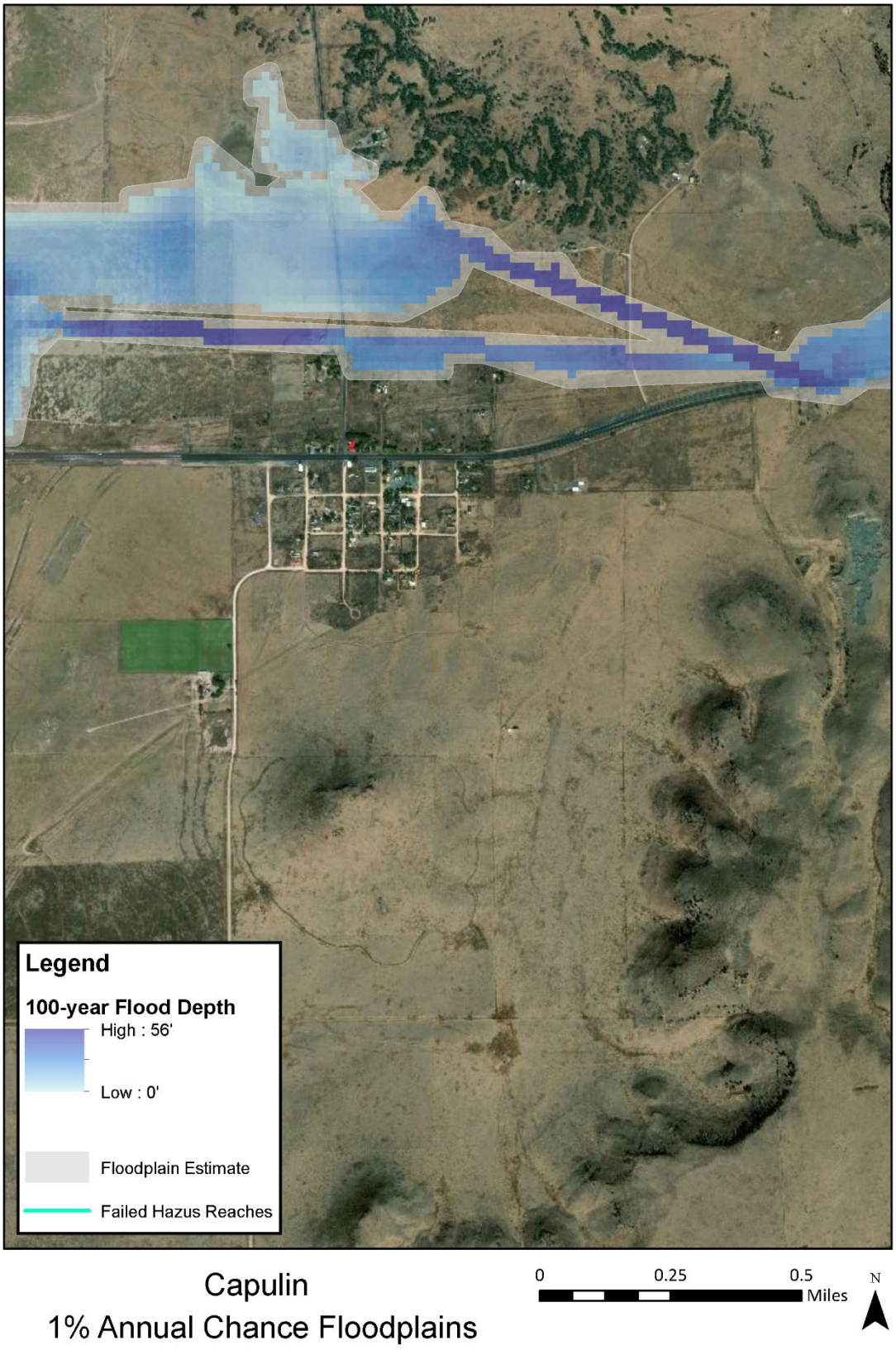


Figure 6-25 Sedan Floodplains

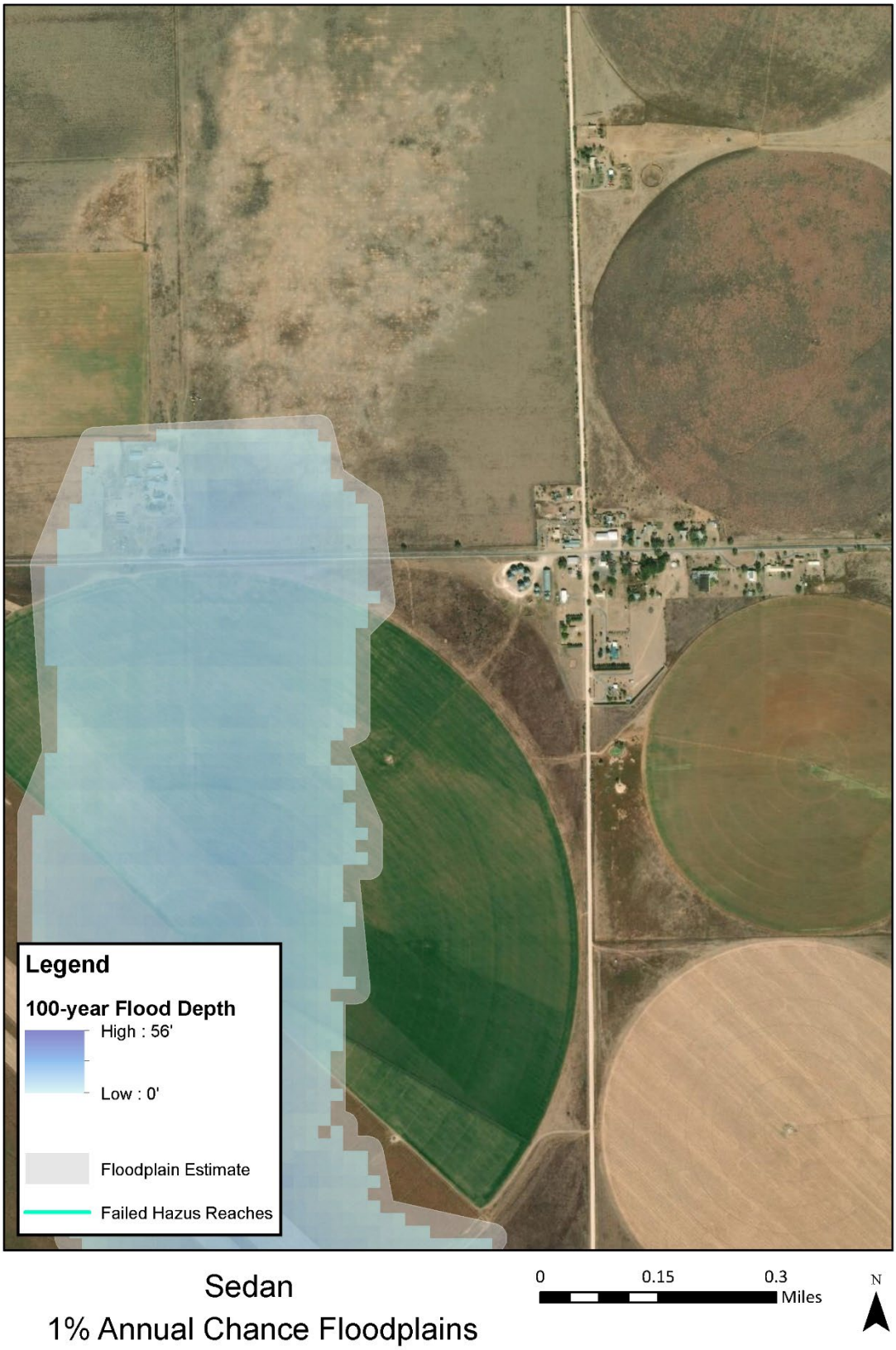


Figure 6-26 Mount Dora Floodplains

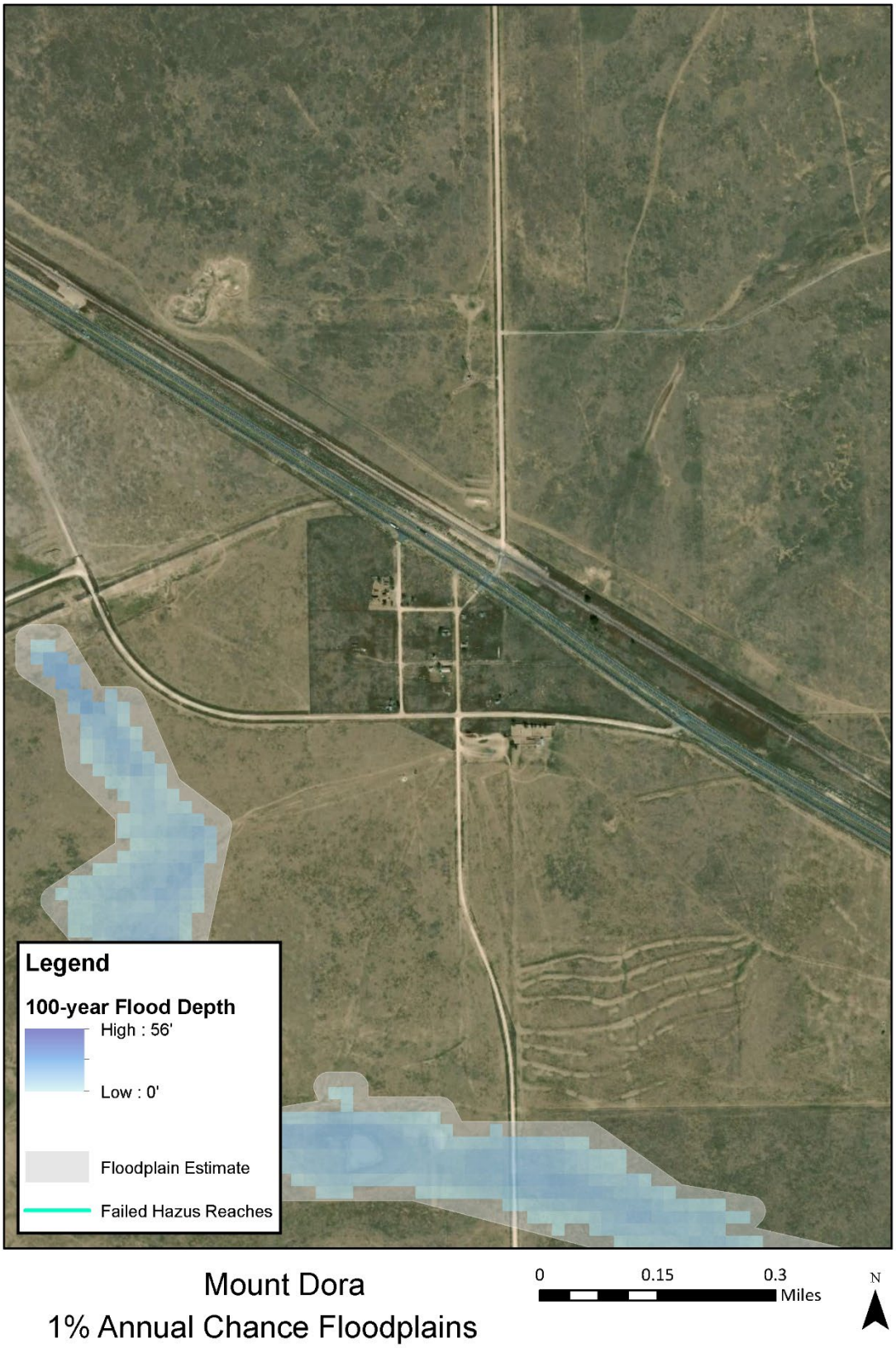


Figure 6-27 Hayden Floodplains

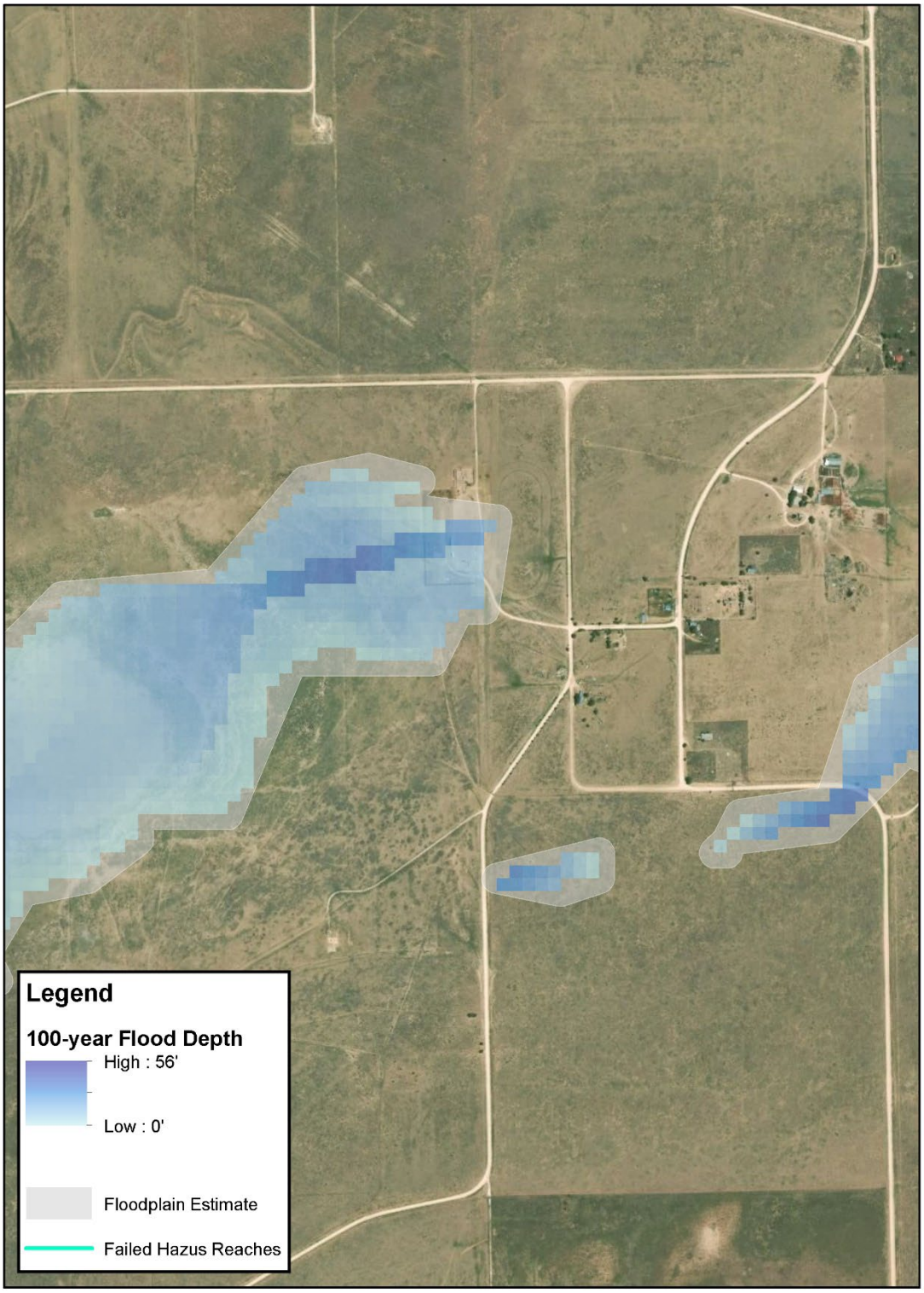


Figure 6-28 Gladstone Floodplains

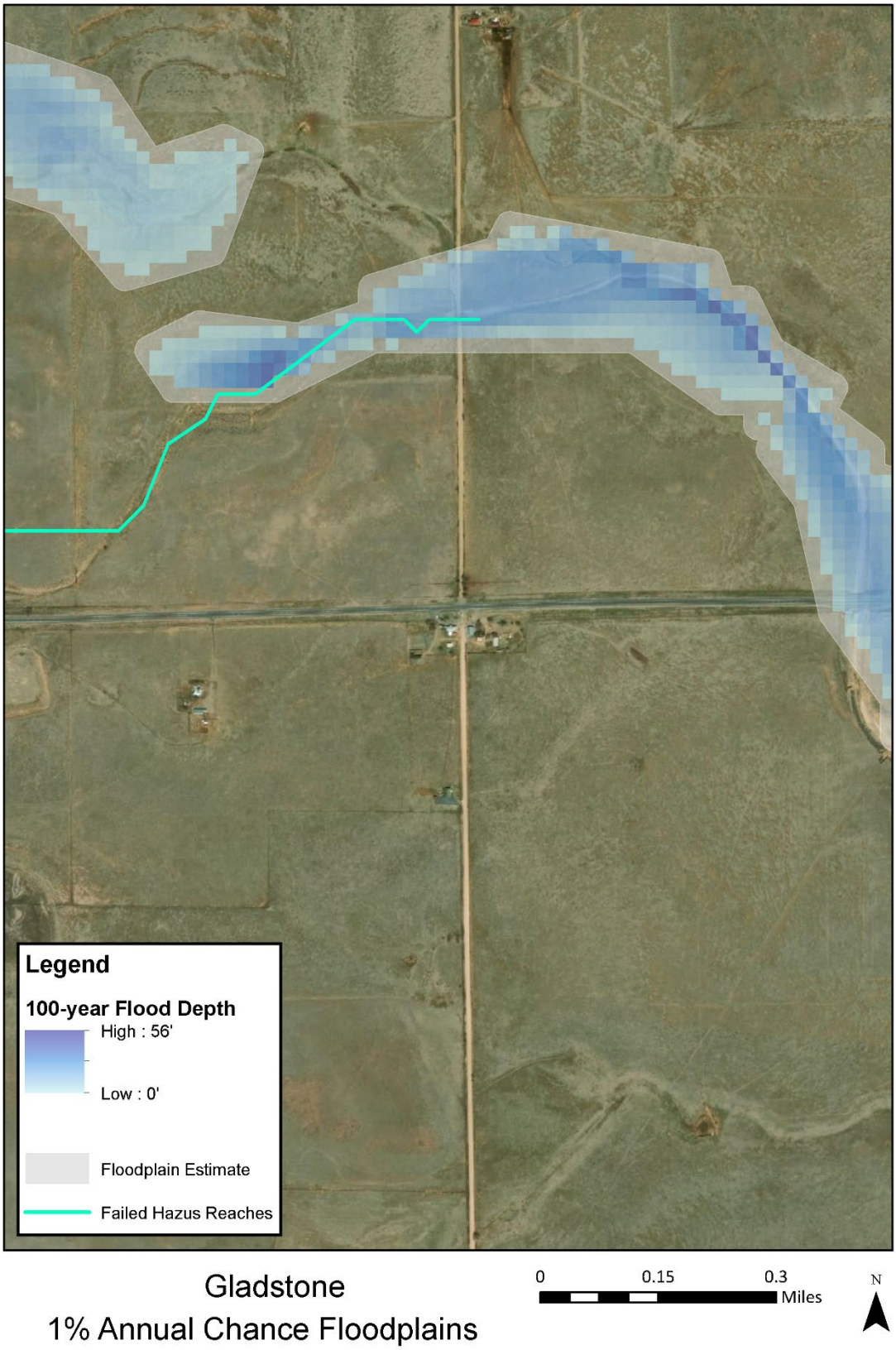
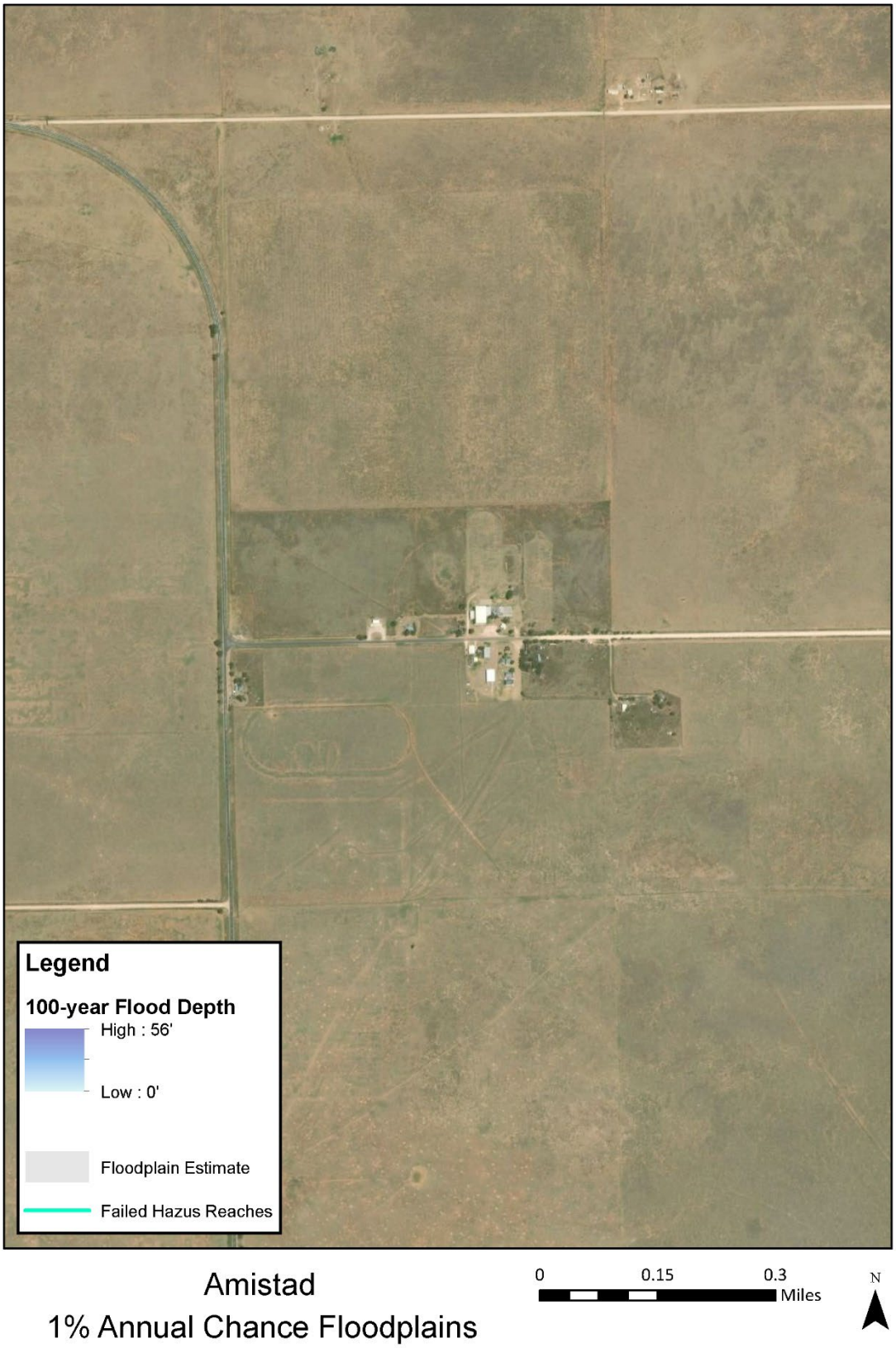


Figure 6-29 Amistad Floodplains



Extent

Flood events are typically described based on frequency, such as the 100-year or 500-year flood event. Frequencies are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1% chance of occurring in any given year, and the 500-year flood drops to a 0.2% chance of occurring in any given year. Therefore, they are commonly referred to as the 1% annual chance flood and 0.2% annual flood, respectively. It should be noted that flooding is possible every year and even multiple times each year.

Additionally, flash floods are common in Union County. Flash floods occur very suddenly but usually dissipate within hours. Flash floods are usually preceded with warning from the National Weather Service (NWS) in terms of flash flood advisories, watches, and warnings. According to the NWS, a Flash Flood Watch is issued when conditions are favorable for flash flooding. It does not mean that flash flooding will occur, but it is possible. A Flash Flood Warning is issued when flash flooding is imminent or occurring.[16]

Previous Occurrences

The following table summarizes the best available historical loss information relating to flood. As presented in the HIRA Historical Events Summary table at the beginning of this HIRA chapter, flood events are some of the least documented and least damaging hazards in the county, per best available data.

Table 6-15 Flood / Flash Flood Historical Losses

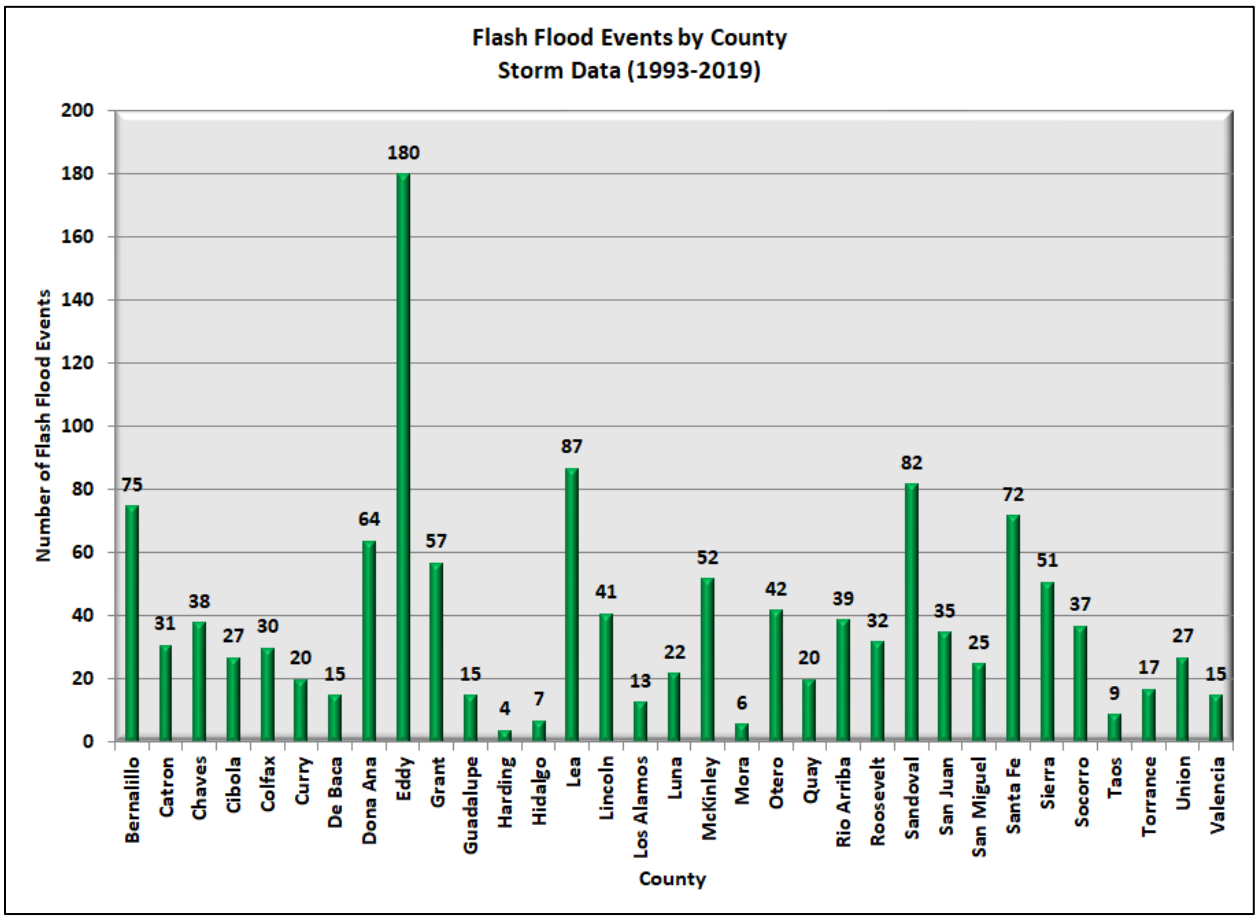
Source	# of Damaging Events	Years of Record	# of Damaging Events (annually)	Property Damages	Property Damages (per capita)	Crop Damages	Crop Damages (per capita)	Injuries	Fatalities
NCEI	28	68	0.41	$185,000	$44	$0	$0	0	0
SHELDUS	13	58	0.22	$278,010	$59	$120,782	$22	0	0.03
NOAA	27	26	1.04	-	-	-	-	-	-

The SHELDUS data provided additional information pertaining to crop insurance, which includes record of one insured event related to flood, resulting in indemnity payments of $1,117 (which equates to $38 annually).

[16] https://www.weather.gov/lwx/WarningsDefined#Flash%20Flood%20Watch

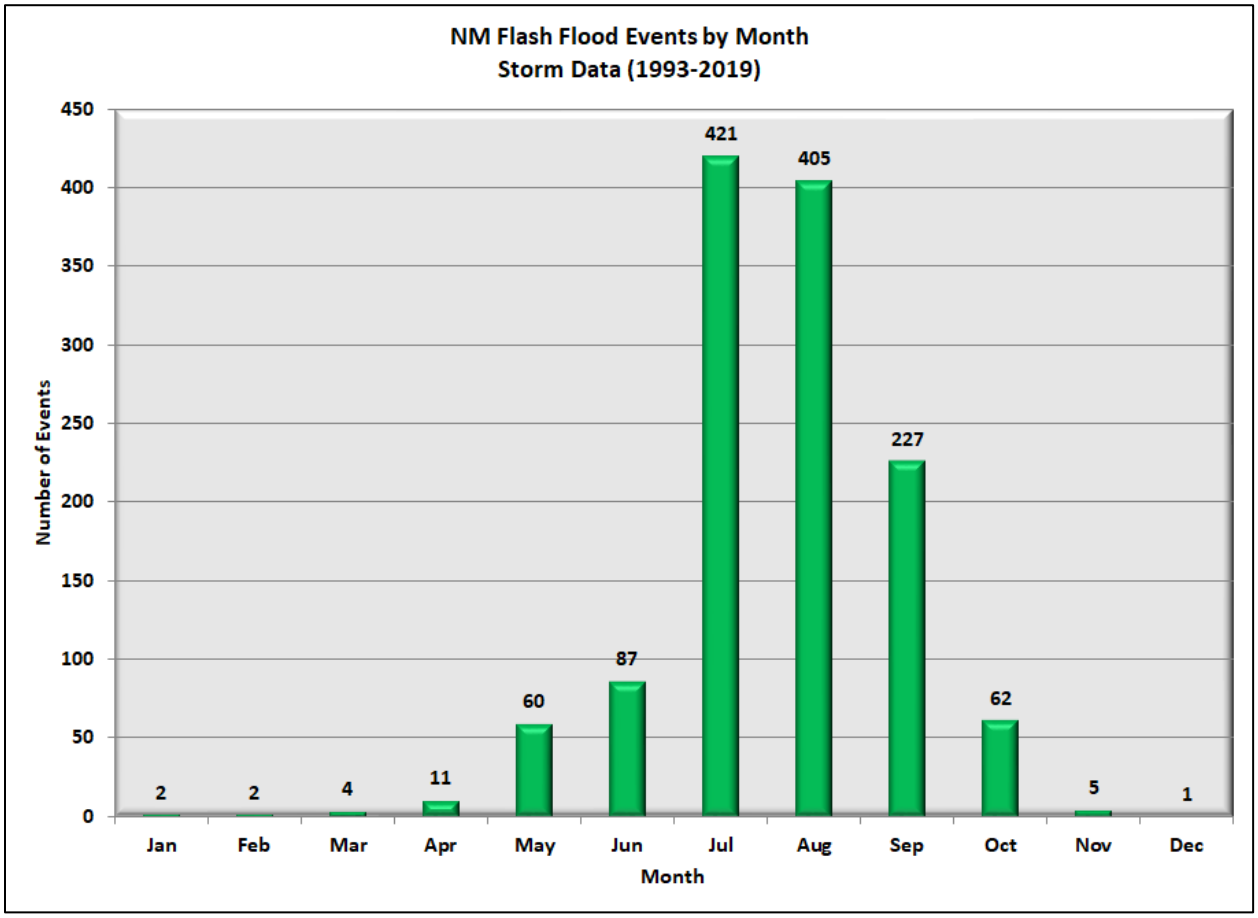
The following figure from the National Weather Service compares Union County flash flood events to other counties across the state. Union County sits on the lower state average for events per county.

Table 6-16 New Mexico Flash Flood Events by County



As it pertains to flood's seasonal patterns, the following figure from the NWS presents flash flood events, per month, across the entire state. Almost all events occur between the months of May to October, with a vast majority occurring in July and August. This peak in historic flooding is tied to the annual monsoon season that is typically experienced across the county during these same months.

Table 6-17 New Mexico Flash Flood Events by Month



Probability

Based on various historical data sources, Union County has a likely to highly likely probability of experiencing a flood event every year.

NFIP Participation

Union County and most municipalities do not currently participate in FEMA's National Flood Insurance Program (NFIP). The Town of Clayton is the only participating municipality in the NFIP. There are no repetitive loss properties anywhere in Union County at the time of the development of this Plan.

Some barriers to the county and other municipalities participating in NFIP have to do with a lack of relevant information and regulatory obstacles. Since the only existing mapping in the county is for Clayton, the other municipalities are likely unaware of the location and risk of the local floodplain to homes and buildings. These small communities may not have been dramatically impacted by historical flooding and do not see a need to enroll. Additionally, the regulatory code and administrative requirements may prove difficult for communities with minimal staffing resources to ensure compliance.

Vulnerability Assessment

Inventory Exposed/Impacts

Floods have the potential to incur damages across the county and all municipalities. Structures within the floodplain are most at risk, but even structures outside of the floodplain can be impacted by flood events. Utilities and infrastructure in floodplains are also continually exposed to potential flood damages. Impacts from flooding can be large and widespread, or small and localized. As previously mentioned, the Drought – Wildfire – Flood Cycle can compound the issue of flooding and related debris flow damages, which can further exacerbate the impacts of an event.

Critical Facilities Exposed/Impacts

Similar to the overall inventory exposed, critical facilities within the floodplain are most at risk. GIS analysis was conducted, using the countywide floodplains developed as part of this Plan. There were no critical facilities that overlaid those floodplains, but it should be reiterated that improved floodplain mapping is needed and may present a different risk assessment to critical facilities.

Potential Losses

The most appropriate loss estimation methodology for flood hazards involves scenario modeling using FEMA's Hazus loss estimation software. There are two levels of Hazus analysis, 'Standard,' which uses the default FEMA-derived datasets and damage functions, and 'Enhanced,' which uses independently compiled and accurately verified structure and infrastructure inventories and damage functions. The flood analysis conducted for this Plan includes a Standard level analysis using the latest version, Hazus-MH Flood Model V4.2. This risk assessment leveraged census block data to conduct a Standard Hazus 1% annual-chance flood event scenario for Union County.

Results

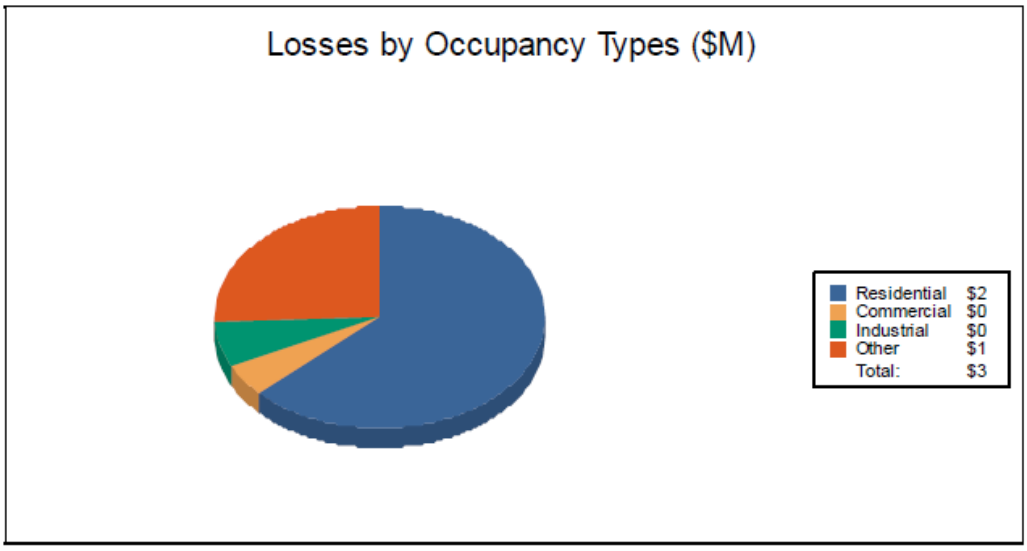
For building-related economic losses, Hazus estimates close to $3.3 million for the entire county. This figure includes not only building specific losses, but also building content and inventory, in addition to business interruption estimates. Residential buildings will sustain close to 2/3 of these losses. The following figure presents a summary of this information.

Figure 6-30 Hazus Building-Related Economic Loss Estimate

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	1.24	0.02	0.06	0.05	1.38
	Content	0.56	0.05	0.12	0.30	1.04
	Inventory	0.00	0.00	0.01	0.01	0.02
	Subtotal	**1.80**	**0.08**	**0.20**	**0.36**	**2.43**
Business Interruption						
	Income	0.01	0.03	0.01	0.11	0.16
	Relocation	0.21	0.00	0.00	0.03	0.24
	Rental Income	0.05	0.00	0.00	0.00	0.06
	Wage	0.02	0.04	0.01	0.36	0.42
	Subtotal	**0.29**	**0.07**	**0.02**	**0.50**	**0.87**
ALL	**Total**	**2.09**	**0.15**	**0.21**	**0.86**	**3.31**



The following figures present these estimated losses at a county-scale, then smaller-scale maps are provided for the communities across Union County. Losses are calculated at the census block level and are not site specific. Note the floodplain processing for the Village of Folsom resulted in errors and no floodplain (and thus no loss estimates) were able to be produced.

Figure 6-31 Union County Flood Loss Estimates

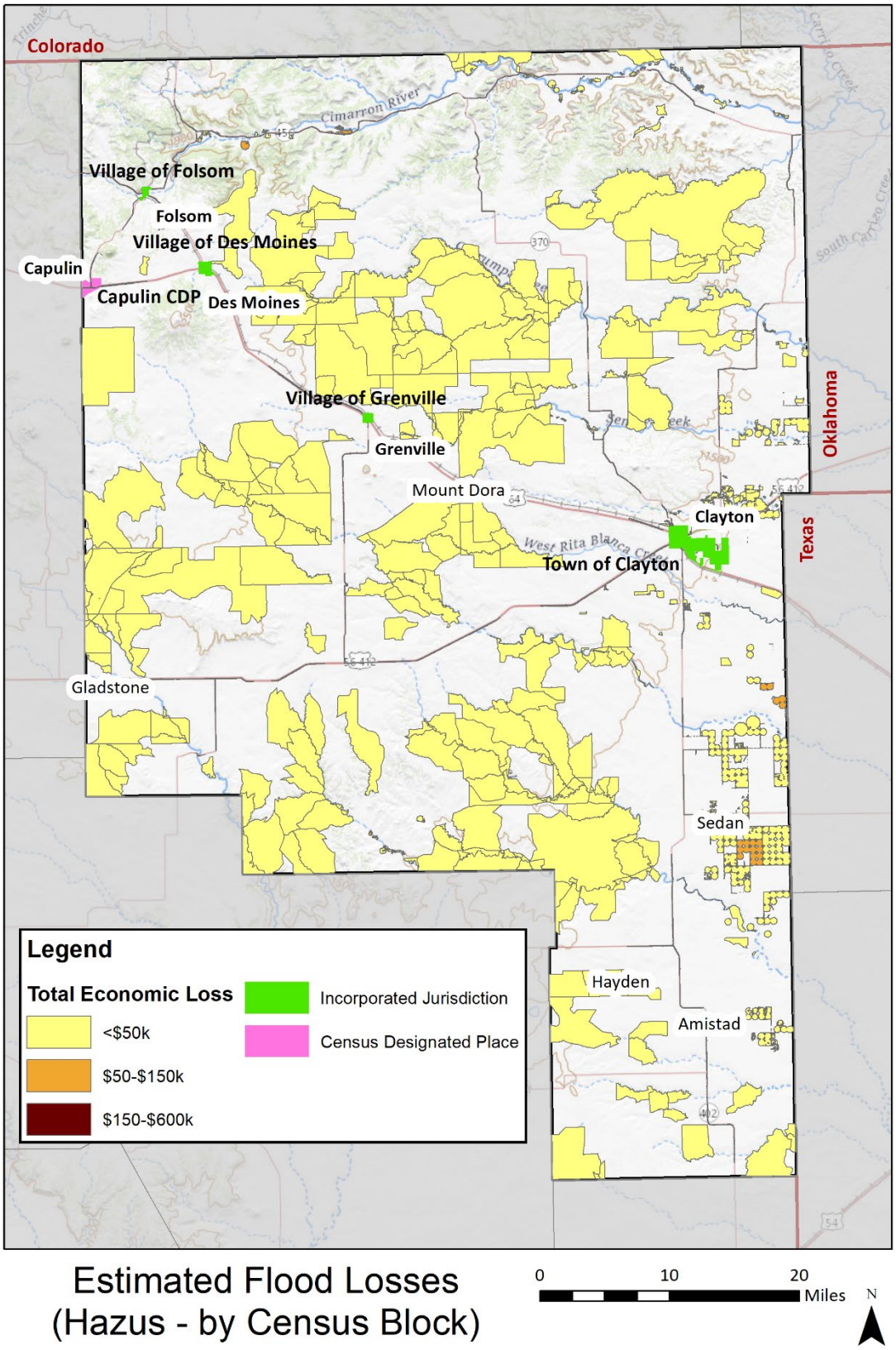


Figure 6-32 Clayton Flood Loss Estimates

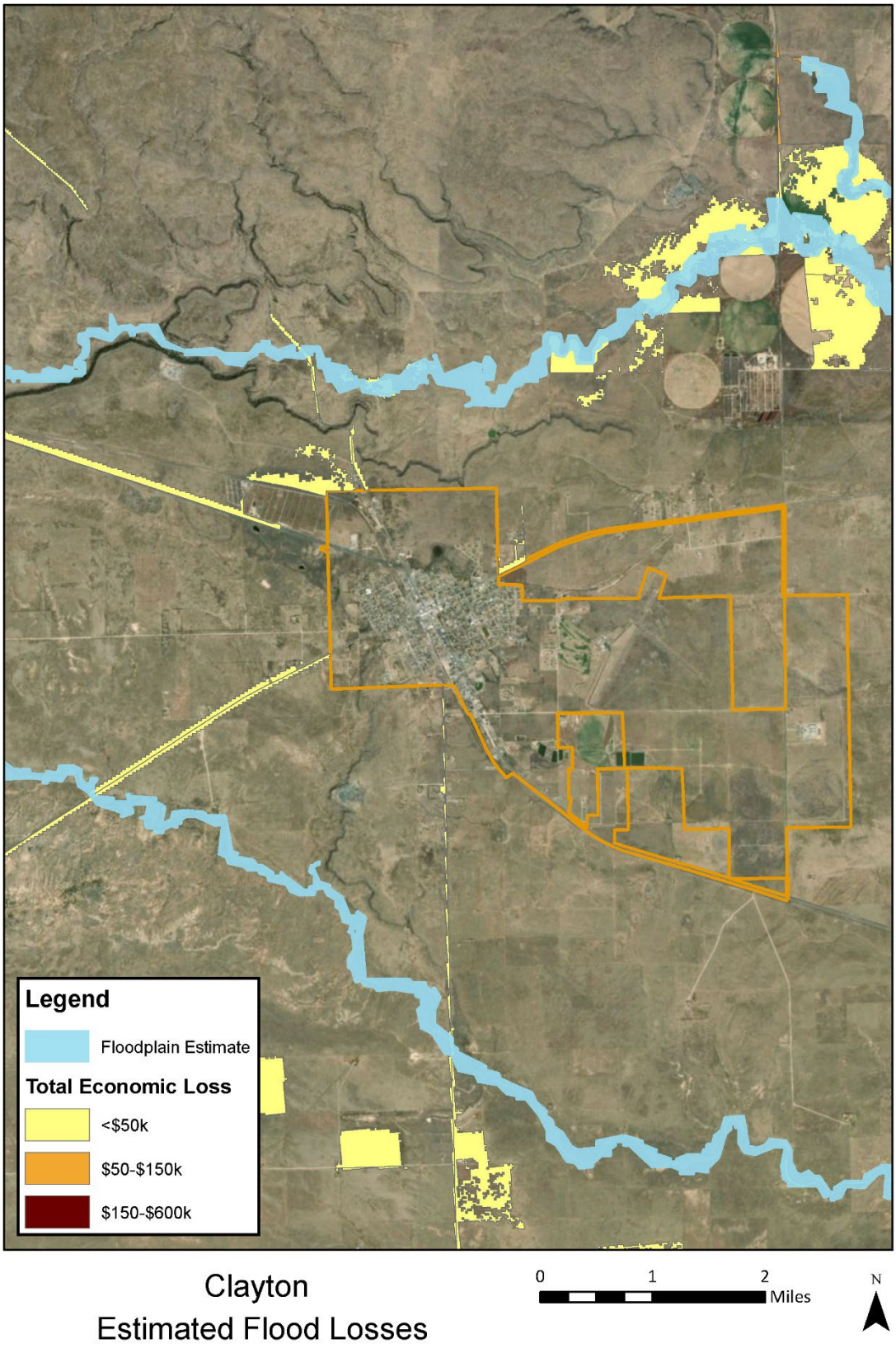


Figure 6-33 Des Moines Flood Loss Estimates

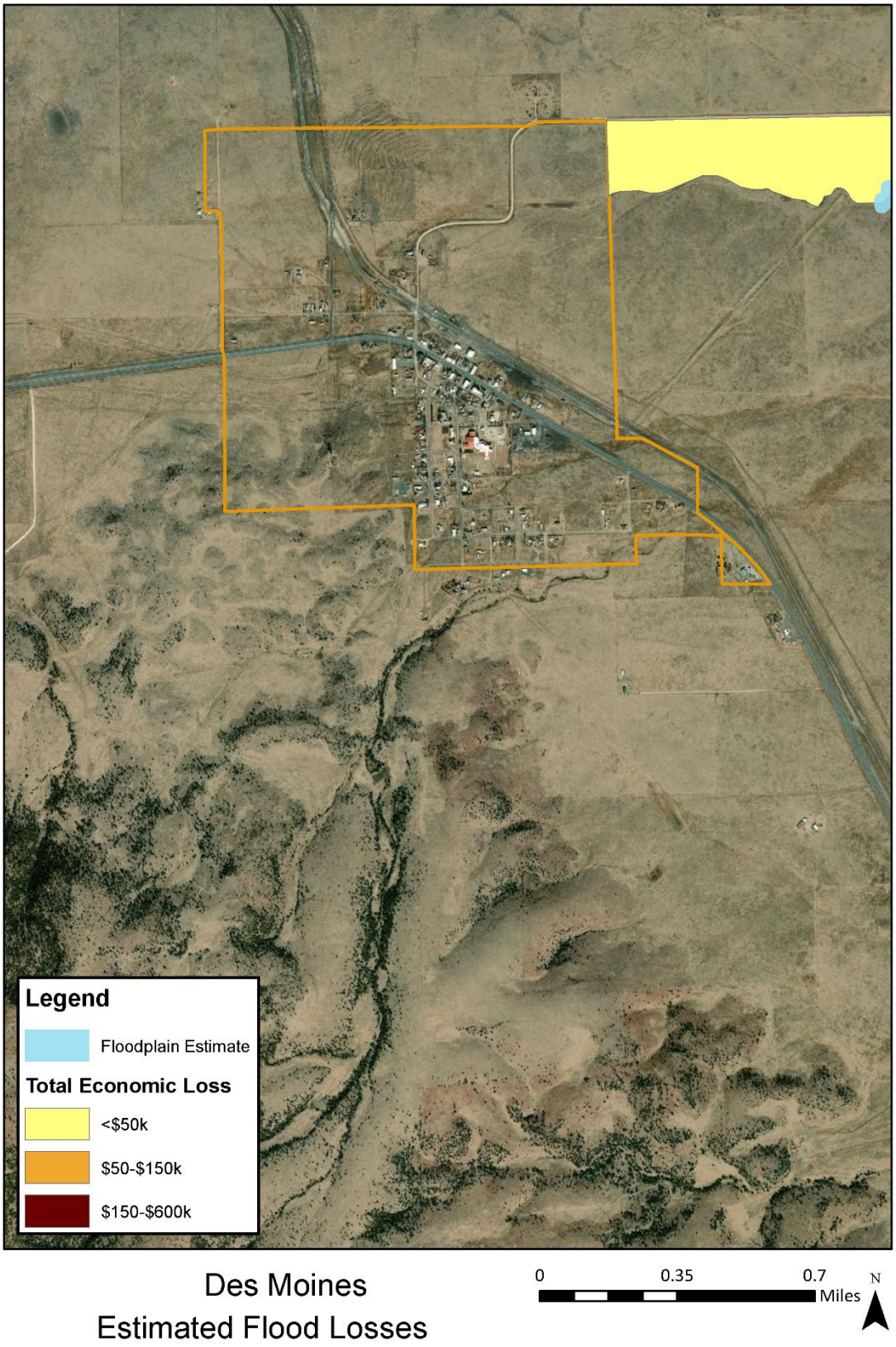


Figure 6-34 Grenville Flood Loss Estimates

Figure 6-35 Folsom Flood Loss Estimates

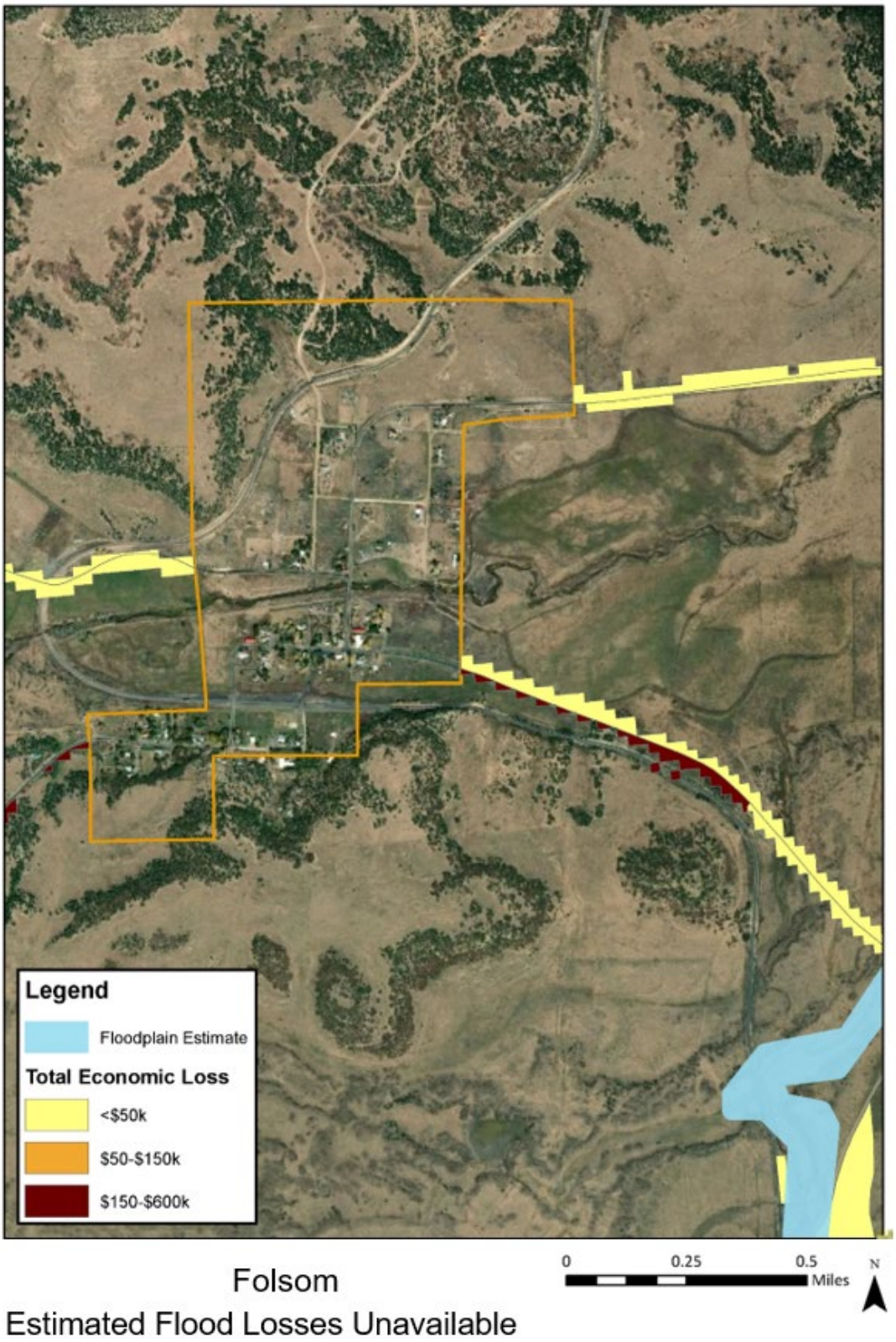


Figure 6-36 Capulin Flood Loss Estimates

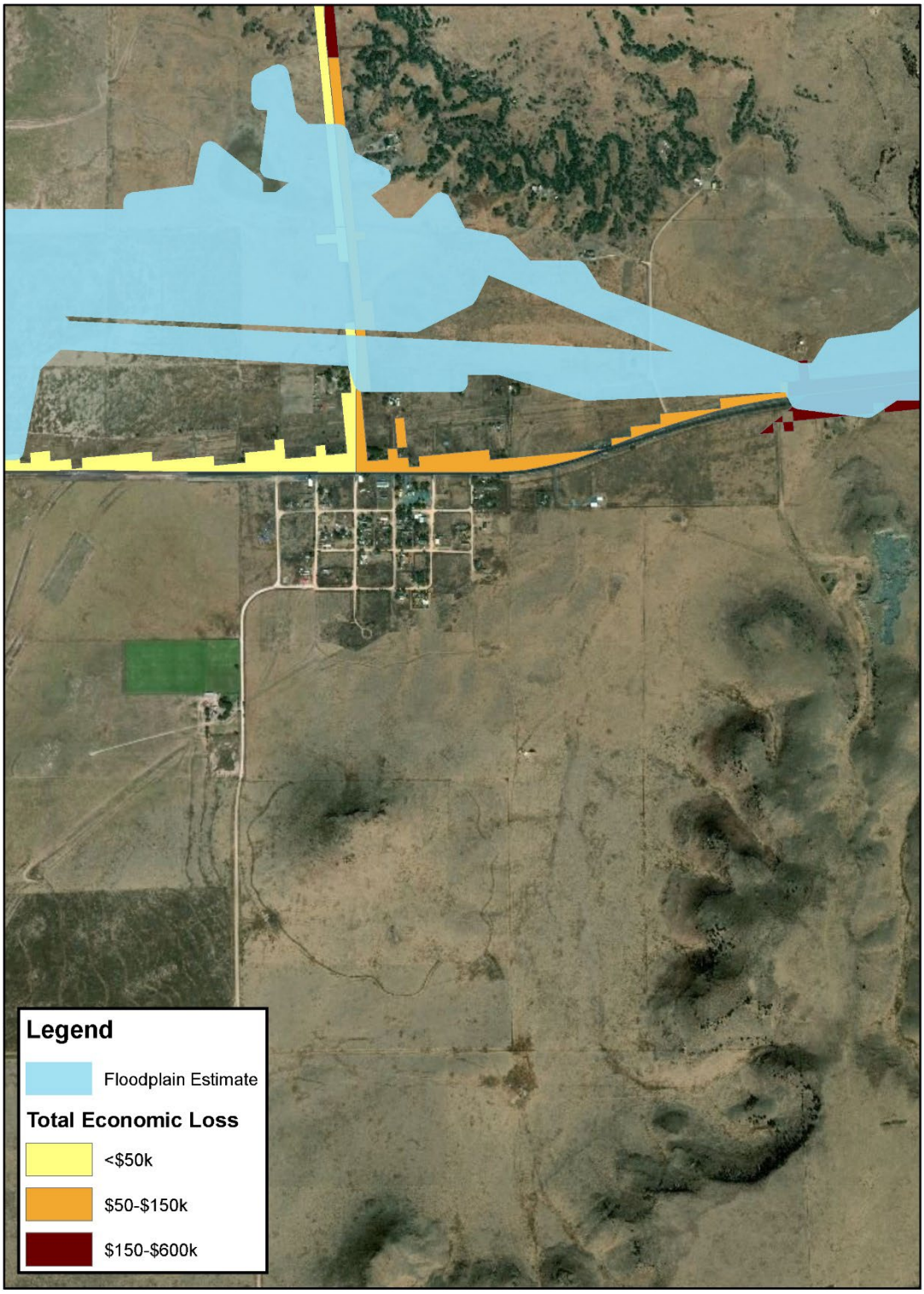


Figure 6-37 Sedan Flood Loss Estimates

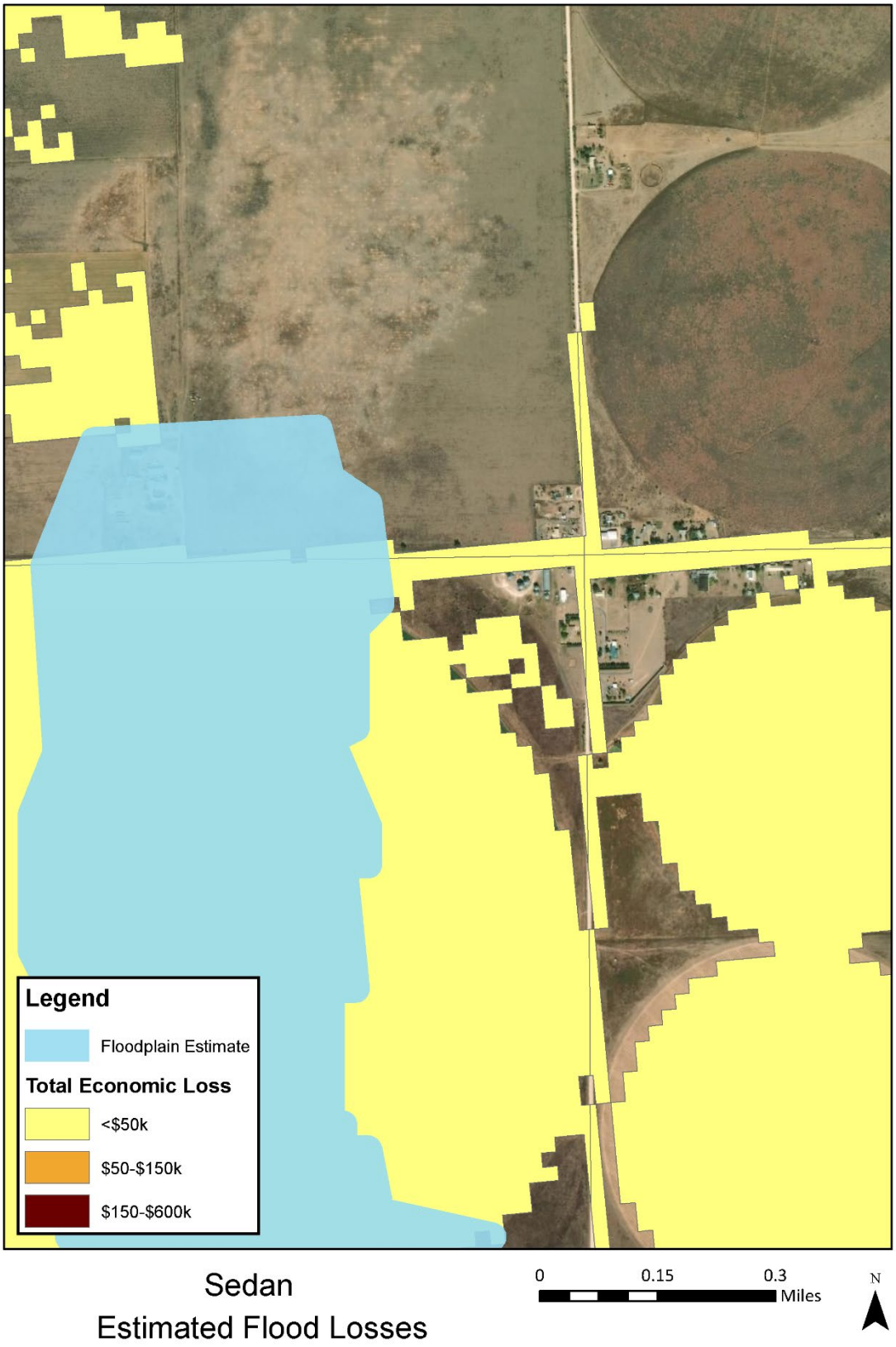


Figure 6-38 Mount Dora Flood Loss Estimates

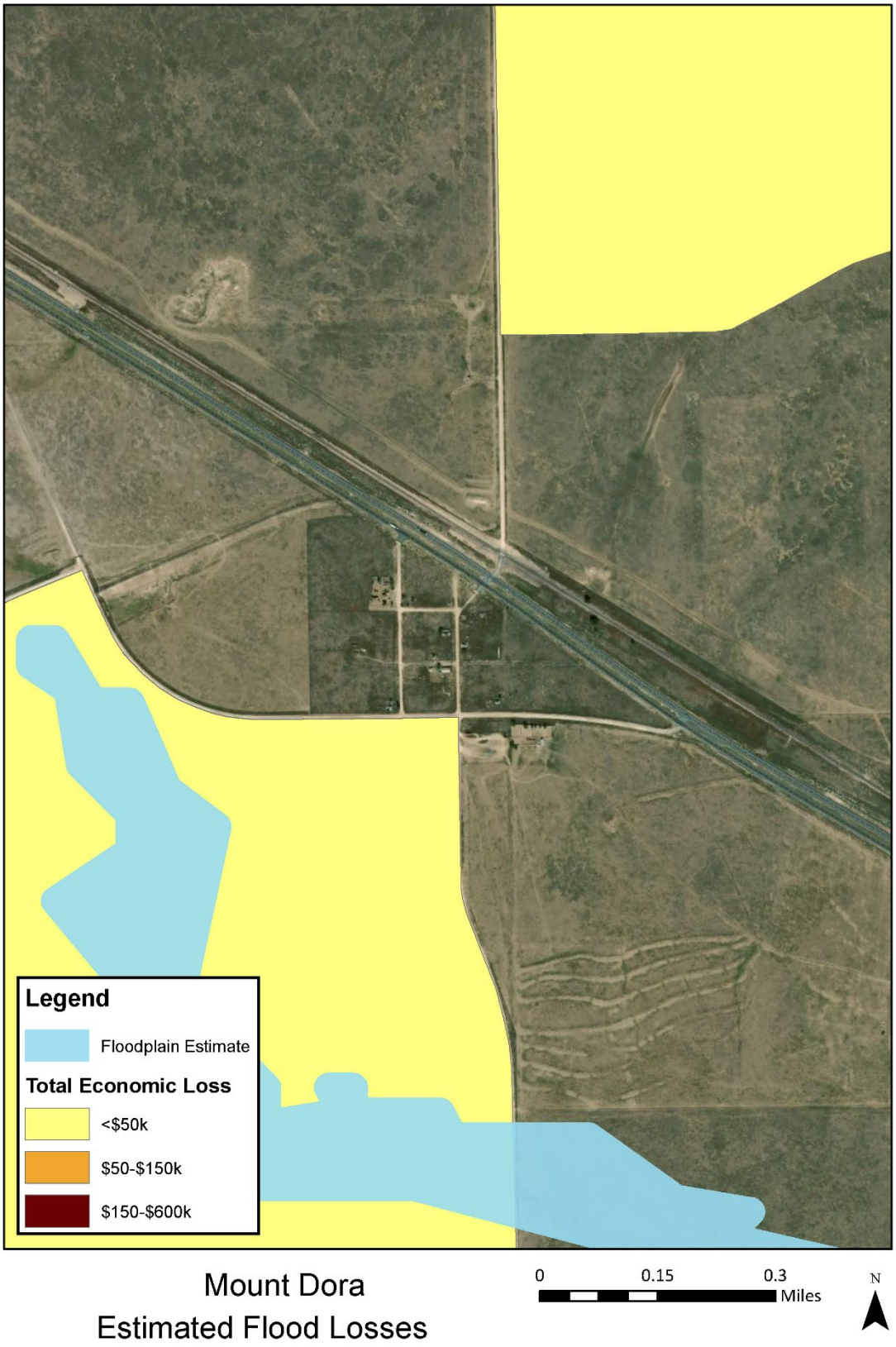


Figure 6-39 Hayden Flood Loss Estimates

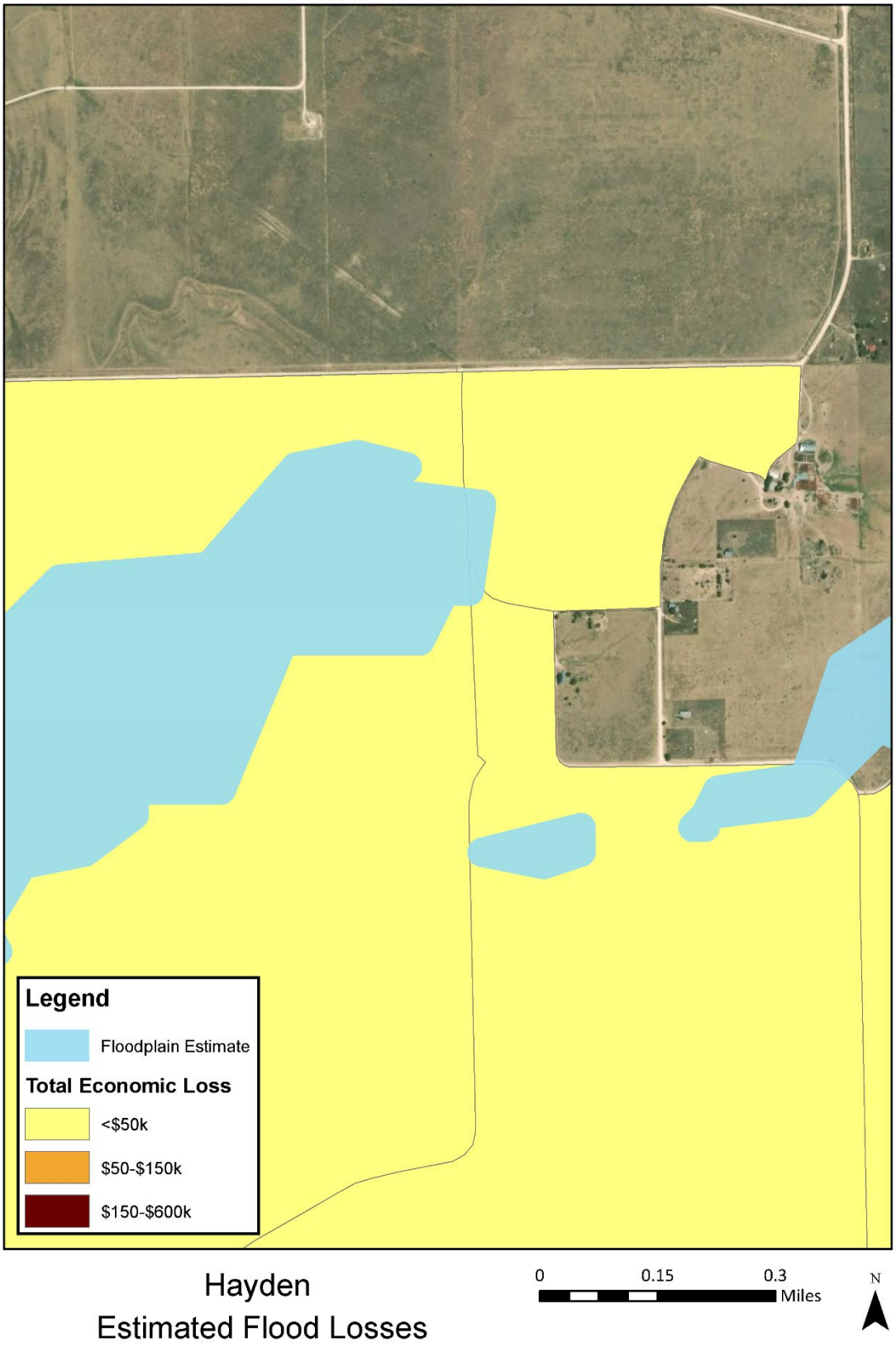
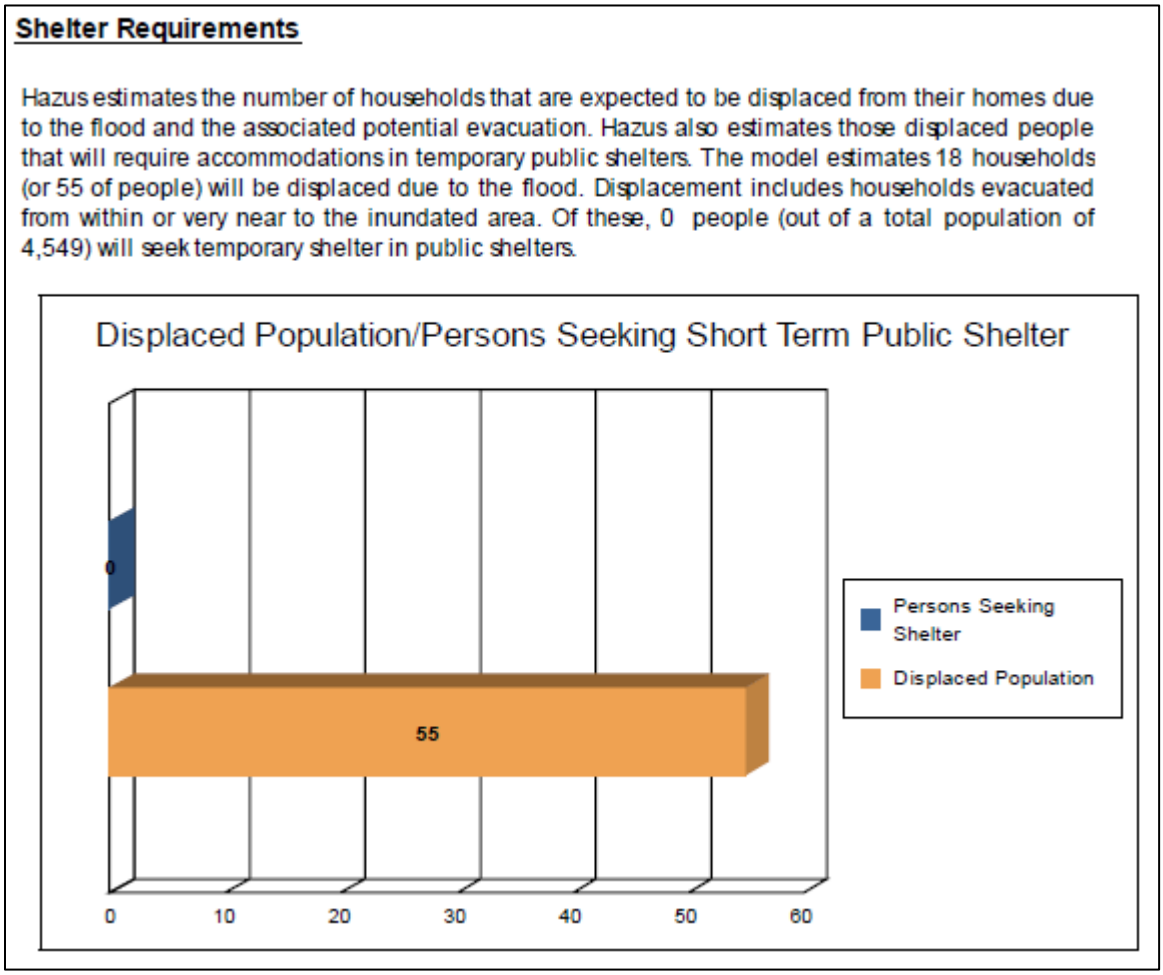


Figure 6-40 Gladstone Flood Loss Estimates

Figure 6-41 Amistad Flood Loss Estimates

Hazus estimates the number of households expected to be displaced by the modeled event. The following figure shows that 55 persons are estimated to be displaced by this modeled flood event. Of those displaced, no one is expected to seek additional shelter.

Figure 6-42 Hazus Sheltering Estimates



Hazus also provided estimates relating to expected damages to essential facilities across the county. The following figure shows those results, which estimate no moderate or substantial damages to any of the county's essential facilities.

Figure 6-43 Hazus Expected Damage to Essential Facilities

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities			
		At Least Moderate	At Least Substantial	Loss of Use	
Emergency Operation Centers	1	0	0	0	
Fire Stations	15	0	0	0	
Hospitals	1	0	0	0	
Police Stations	2	0	0	0	
Schools	7	0	0	0	

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

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

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

A number of variables are included in Hazus analyses in order to arrive at the estimated values of loss due to flood. For this reason, it is important to note that the Hazus loss estimates detailed above should not be used as a precise measure, but rather viewed from the perspective of the potential magnitudes of expected losses.

Future Conditions

Land Use and Development

There is not much development expected in the near future across Union County. The risk of flooding to future development could be minimized by joining the NFIP and implementing floodplain management programs for the county and its municipalities.

Climate[17]

Flash floods associated with short duration, high intensity rainfall events affect New Mexico every year. A vast majority of flash floods accompany slow-moving thunderstorms during the monsoon season. While there has not been a definitive link between long-term, changing weather patterns and the frequency of flash flood events associated with thunderstorms in the State of New Mexico, a greater number of significant wildfires owing to an increase in the frequency, duration and intensity of drought would contribute to a higher likelihood of potentially devastating burn scar flash flooding in parts of the State. Additionally, flooding impacts from snowmelt runoff along tributaries of main stem rivers could shift to earlier in the runoff season.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a

[17] 2018 New Mexico State Hazard Mitigation Plan

damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. Community risk varied across the county, with Folsom ranking flooding as a high risk, compared to Clayton and unincorporated areas ranking moderate, compared to other profiled hazards.

Table 6-18 Flooding Risk Ranking

	Risk Rank
Unincorporated Union County	Moderate
Town of Clayton	Moderate
Village of Des Moines	Low
Village of Folsom	High
Village of Grenville	Low

6.2.5 Hazard Soils

Description

Expansive Soils

Expansive, or swelling, soils or rock are defined as soils or soft bedrock that increase in volume as they get wet and shrink as they dry out. They are known as bentonite or montmorillinitic soils and are commonly called adobe or clay (note: not all adobe in New Mexico is expandable). Swelling soils contain a high percentage of certain kinds of clay particles that are capable of absorbing large quantities of water. Soil volume may expand 10 percent or more as the clay becomes wet. The powerful force of expansion is capable of exerting pressures of 20,000 pounds-per-square-foot or greater on foundations, slabs, or other confining structures. Exposure to natural or human-caused water sources during or after development results in swelling. In many instances, the soils do not regain their original dryness after construction but remain moist and expanded due to the changed environment.

Collapsible Soils[18]

Land subsidence is the loss of surface elevation and affects nearly every U.S. State. Land subsidence has several causes such as 1) underground fluid withdrawal, 2) collapse of subsurface caverns, 3) collapse of underground mines, 4) hydrocompaction of collapsible soils, or 5) compaction of organic soils. Subsidence can occur uniformly over large areas or as localized sinkholes. Wide-area compaction commonly occurs when large amounts of groundwater have been withdrawn from certain types of rocks, such as unconsolidated fine-grained sediments. The sediments compact as the water is partly responsible for bearing the weight of overlying sediments. When the water is withdrawn, the sediment compacts. Subsidence may occur abruptly or over many years.

Common causes of land subsidence from human activity are pumping water, oil, and gas from underground reservoirs; dissolution of limestone, gypsum, or other soluble rocks to form sinkholes; collapse of underground mines; drainage of organic soils; and initial wetting of dry soils under load (hydrocompaction). Land subsidence from pumping of fluids is usually not noticeable because it occurs over a large area over a period of time, but the ground surface may subside several feet. However, differential subsidence may form along hydrogeologic boundaries when subsidence is caused by regional pumping.

Location

Expansive Soils[19]

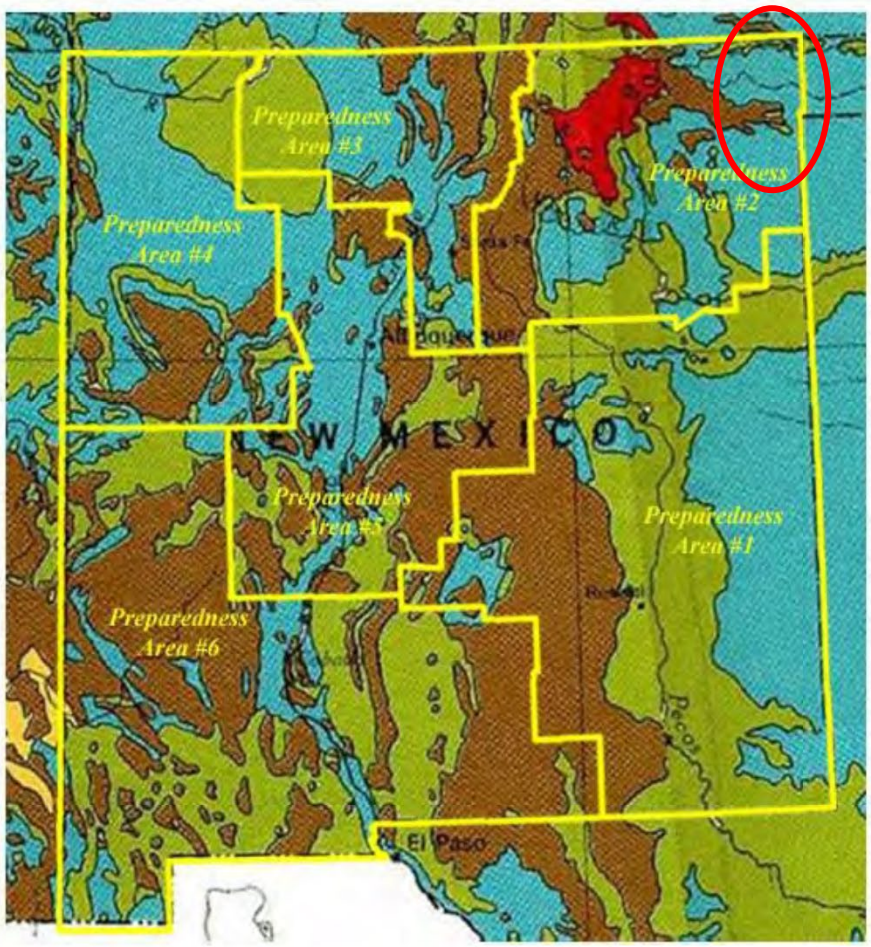
Expansive soils are fine-grained soils generally found in areas that historically were a floodplain or lake areas. Expansive soils swell when wet and shrink when dry. They contain abundant expandable clay that generally accumulates in low-energy areas. Expansive soil is subject to swelling and shrinkage, varying in proportion to the amount of moisture present in the soil. As water is absorbed into the soil (by rainfall or watering), expansion takes place. If dried out, the soil contracts, often leaving small fissures or cracks. Excessive drying and wetting of the soil can progressively deteriorate “slab on grade” foundations over the years and can rupture pipes, leading to further problems.

[18] 2018 New Mexico State Hazard Mitigation Plan
[19] 2018 New Mexico State Hazard Mitigation Plan

The following figure shows the areas of expansive soils across New Mexico. Union County sits on three main units, the most swelling potential of which is identified in the blue areas ("part of unit consists of clay having high swelling potential").

Figure 6-44 New Mexico Expansive Soils

Figure 4-73 New Mexico Expansive Soils and Preparedness Areas



	Unit contains abundant clay having high swelling potential
	Part of unit (generally less than 50%) consists of clay having high swelling potential
	Unit contains abundant clay having slight to moderate swelling potential
	Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential
	Unit contains little or no swelling clay
	Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shownin westernmost of State only)

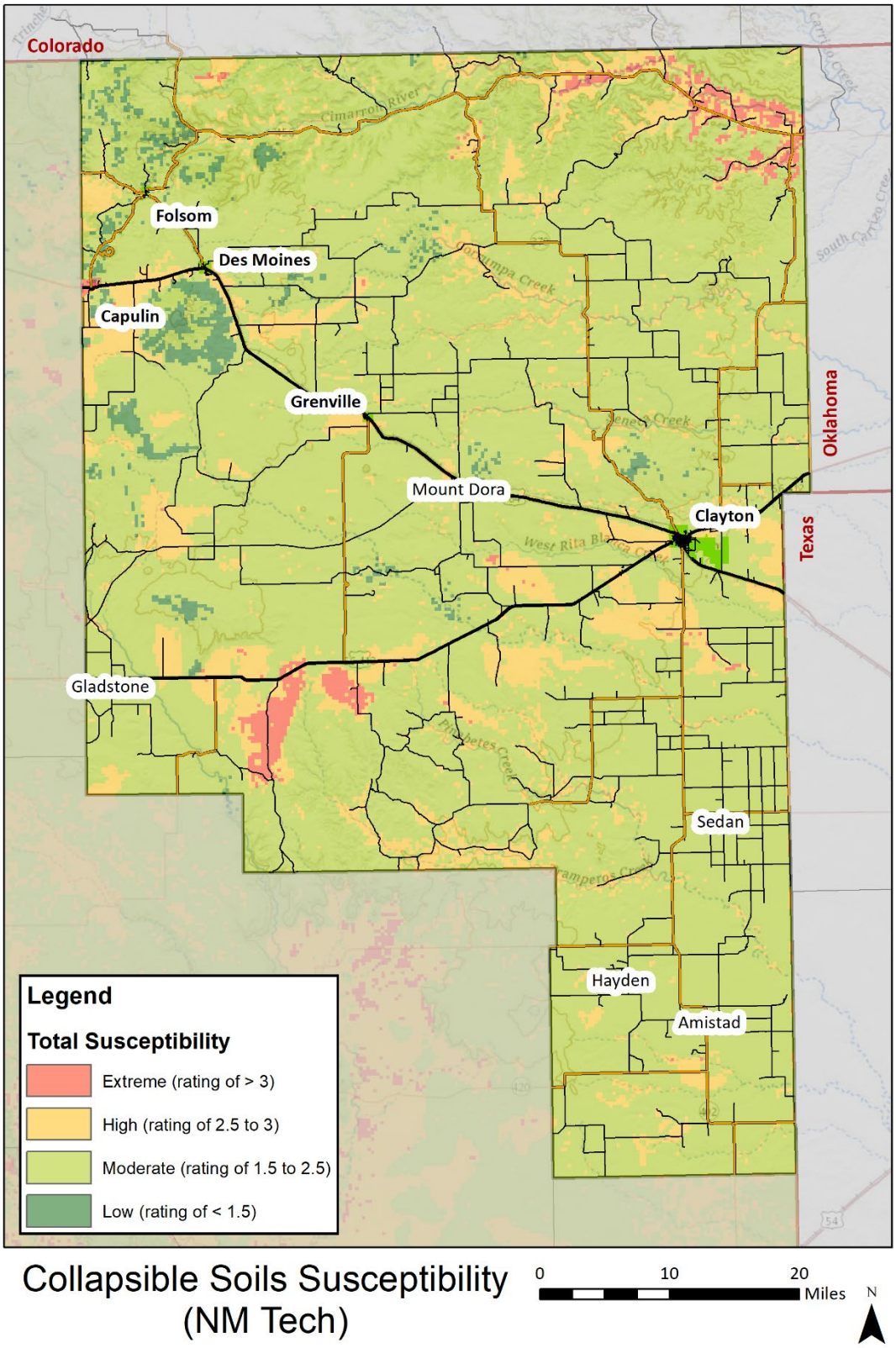
Collapsible Soils[20]

New Mexico Tech (NM Tech) has constructed a 500-m resolution collapsible soils susceptibility map for the entire State of New Mexico. Given the lack of required reporting of hydrocompactive subsidence events, this study chose to use an expert-driven spatial weighted average of multiple indirect proxies, or an overlay method, to estimate collapsible soil susceptibility. This included several sets of proxies: climate zone proxies derived from spatially distributed air temperate and precipitation products; landform age, style of emplacement, depositional environment, source lithology and grain size; NRCS soil map-derived parent material texture and soil taxonomic order, suborder and great group; NLCD land-use; and depth-to-water maps derived from New Mexico Office of the State Engineer Water Rights Report System database. A quality factor was assigned for each proxy based on both the reliability of the proxy and the degree of correlation of the proxy with collapsible soils. A susceptibility value for all of the proxy values was assigned through expert judgement and iterative comparison of the proxy and final susceptibility maps with known hydrocompaction incident locations.

The following figure presents the susceptibility for collapsible soils. Union County experiences locations that span the entire susceptibility range. Areas of most risk are located in the northeast corner of the county and in the southwest portion.

[20] 2018 New Mexico State Hazard Mitigation Plan

Figure 6-45 New Mexico Collapsible Soils



Extent

Expansive Soils

Expansive soils vary by the potential for linear extensibility. The higher the shrink-swell potential of the soil, the greater the damage that may occur to buildings or infrastructure built in those areas. Expansive soils with linear extensibility potential of less than 3 percent have a low shrink-swell potential, 3-6 percent is moderate, and 6-9 percent is high, and above 9 percent is very high.

Collapsible Soils

There is not a formal scale to measure collapsible soil extent. Factors such as volume and size can be used to determine an extent.

Previous Occurrences [21]

Expansive Soils

In conducting research for this hazard there were no previous occurrences identified at this time. While damages due to expansive soils are occurring in New Mexico, the onset takes a long time and damages are cumulative rather than instantaneous.

Collapsible Soils

Per the State Plan, there are no known collapsible soils currently identified in Union County. Previous occurrences of land subsidence in New Mexico have been recorded, however, data on the extent of such events is extremely limited.

Probability [22]

Expansive Soils

Based on input from the New Mexico Bureau of Geology and Mineral Resources, the risks associated with expansive soils are not subject to frequency; they are a static feature with damage occurring due to wetting and drying cycles. The wetting-drying cycle may be human-caused or from natural precipitation. Therefore, this hazard is in a constant cycle and changes daily.

Collapsible Soils

Due to a lack of historical data, the probability of experiencing future land subsidence could not be calculated. It is assumed that the probability is possible to likely.

Vulnerability Assessment

Inventory Exposed/Impacts

Hazard soils are one of the nation's most prevalent causes of damage to buildings and construction. The losses include severe structural damage, cracked driveways, sidewalks, and basement floors, heaving of roads and highway structures, condemnation of buildings, and disruption of pipelines and utilities.

Critical Facilities Exposed/Impacts

Critical facility exposure and impacts are no different than for all other structures and infrastructure. A lack of available data makes it difficult to evaluate in more detail.

[21] 2018 New Mexico State Hazard Mitigation Plan
[22] 2018 New Mexico State Hazard Mitigation Plan

One exception relates to collapsible soils, which did allow for additional analysis. The following 16 critical facilities were located in high susceptibility areas. There were none located in extreme areas.

Table 6-19 Critical Facilities in High Susceptibility Collapsible Soils Areas

Location	Facility
DES MOINES	FIRE DEPT
DES MOINES	POST OFFICE
GRENVILLE	FIRE DEPT.
GRENVILLE	VILLAGE HALL
CAPULIN	FIRE DEPT
CLAYTON	GENISIS CLAYTON NURSING HOME / REHAB
FOLSOM	SUBSTATION FIRE DEPT.
GRENVILLE	VILLAGE BUILDING
CLAYTON	TOWN BUILDING
CAPULIN	EMS
DES MOINES	EMS
CLAYTON	UNION COUNTY HOSPITAL
DES MOINES	FIRE DEPARTMENT
DES MOINES	HEALTH OFFICE
DES MIONES	NMDOT PATROL SHOP
DES MOINES	UNION COUNTY SUBSTATION OFFICE

Due to the statewide scale of the data used for this analysis, site specific exposure assessments are a suggested next step to determine if an actual risk is present.

Potential Losses

A lack of recorded losses due to hazard soils does not permit for potential loss estimations.

Future Conditions

Land Use and Development

Per the Union County Comprehensive Plan (2020), all areas of the county are expected to see continued population stagnation, with future projections suggesting population decline through 2040. Unless mitigated through regulatory processes, any potential development will continue to occur on soils with higher risk to shrink-swell potential, which could increase the county's collective risk to these hazards.

Climate[23]

Future climate conditions are not expected to directly influence future expansive soil events. New Mexico will likely see an increased incident of collapsible soils from groundwater withdrawal as climate changes. A warming climate, regardless of precipitation patterns, will require greater irrigation and

[23] 2018 New Mexico State Hazard Mitigation Plan

other water use in New Mexico. This will lead to greater reliance on groundwater reserves, likely lowering groundwater levels below historical levels. Once groundwater levels drop below historical lows, the likelihood of subsidence increases greatly.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. Most communities ranked the risk from hazard soils to be low (with the exception of Clayton who ranked this a moderate risk), compared to other profiled hazards.

Table 6-20 Hazard Soils Risk Ranking

	Risk Rank
Unincorporated Union County	Low
Town of Clayton	Moderate
Village of Des Moines	Low
Village of Folsom	Low
Village of Grenville	Low

6.2.6 High Wind / Tornado

Description

High Wind

High winds, often accompanying severe thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. Windstorms in Union County are typically straight-line winds. Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 miles per hour, that are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks

Clayton Golf Course Shed – 2/29/2020 68 MPH Wind Event (credit: Marianne Rose)

like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase. One type of straight-line wind is the downburst, which can cause damage equivalent to a strong tornado and can be extremely dangerous to aviation. Since these winds are associated with thunderstorms, the most common time for straight-line winds or downbursts to occur in Union County is from April through September.

Tornado

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also usually accompanied by lightning or large hail.

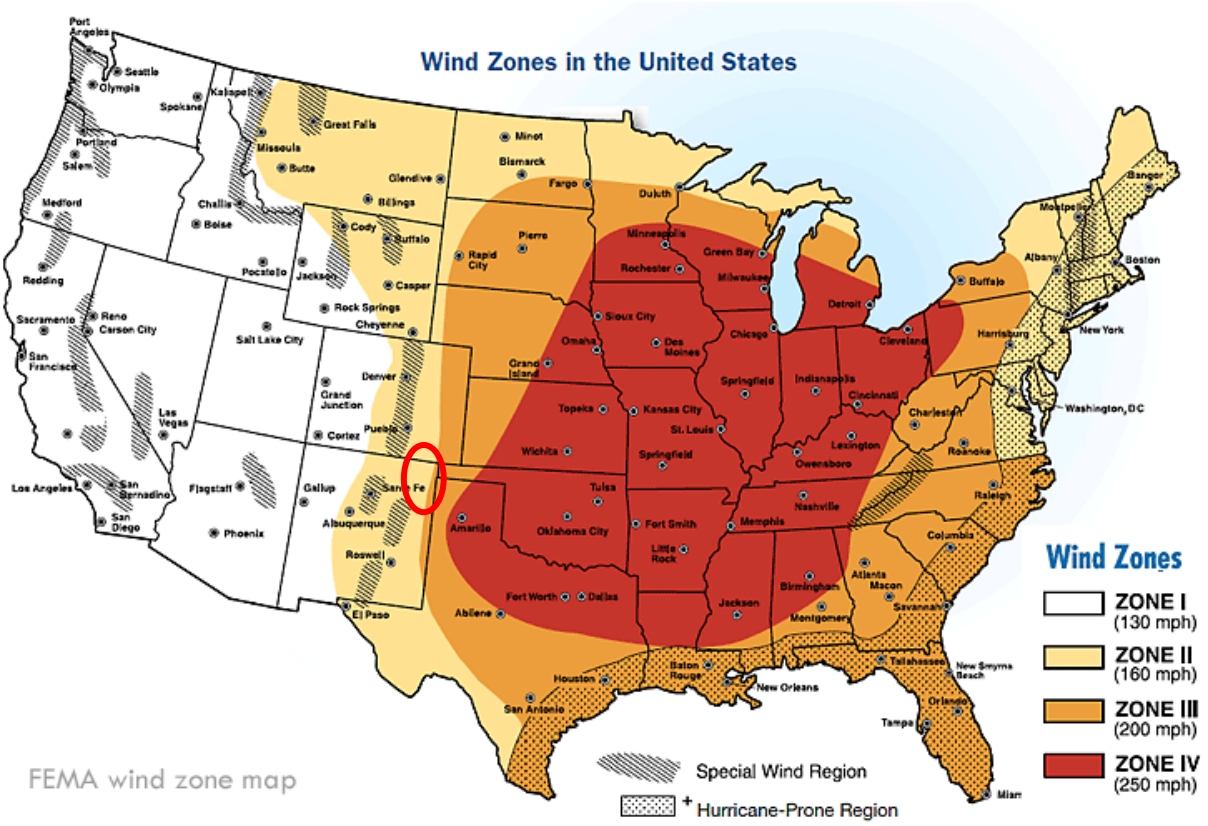
Location

High Wind

Overall, high wind events can occur anywhere in Union County. FEMA recognizes four wind zones in the U.S., depicted in the following figure. Union County falls into Zones II and III. Winds speeds reach up to 160 miles per hour in Zone II and 200 mph in Zone III.[24]

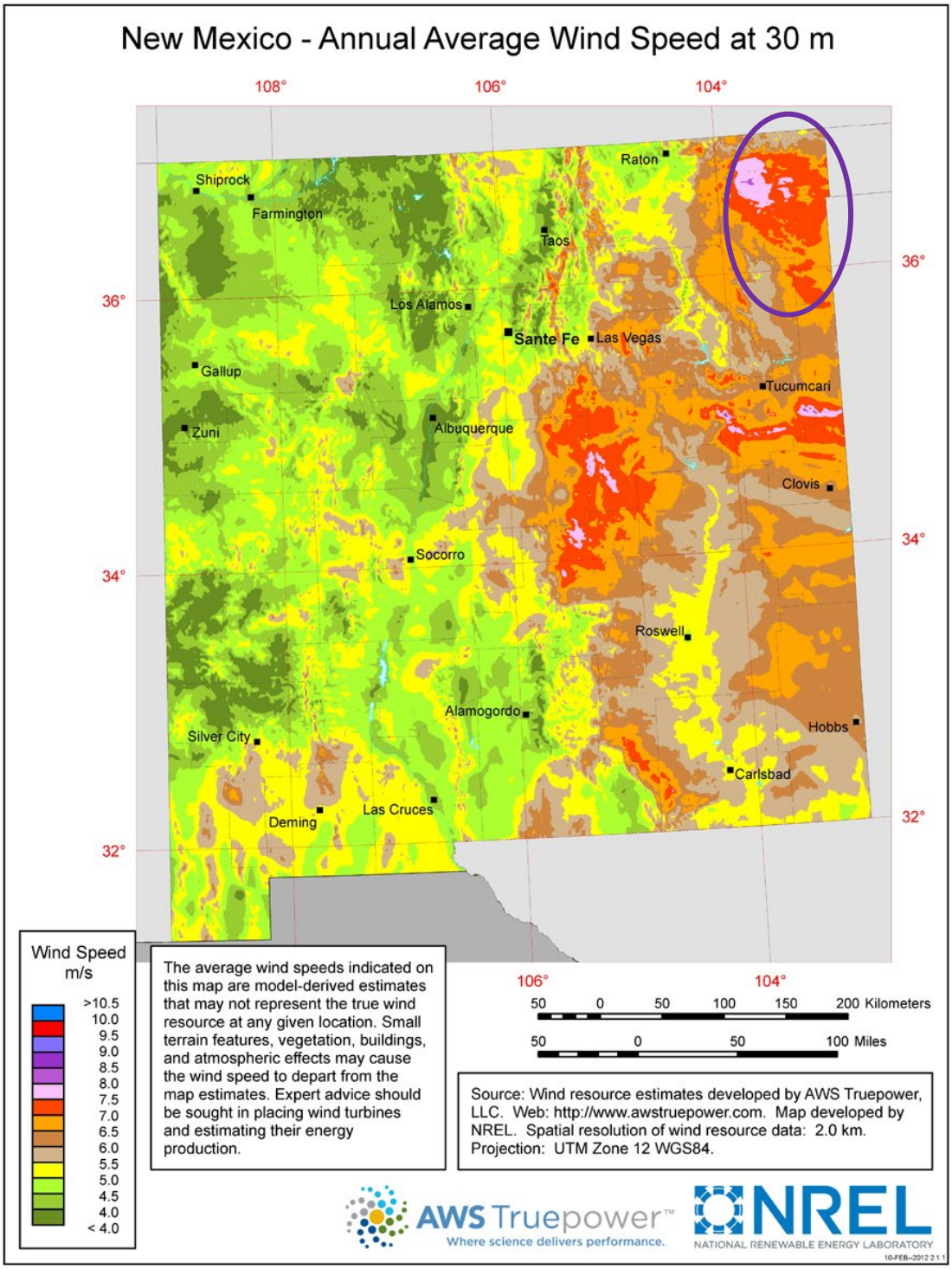
[24] FEMA

Figure 6-46 Wind Zones in the United States



Additionally, the following figure shows wind speeds at 30 meters across New Mexico. It is evident that Union County experiences some of the largest areas of the State's highest average wind speeds.

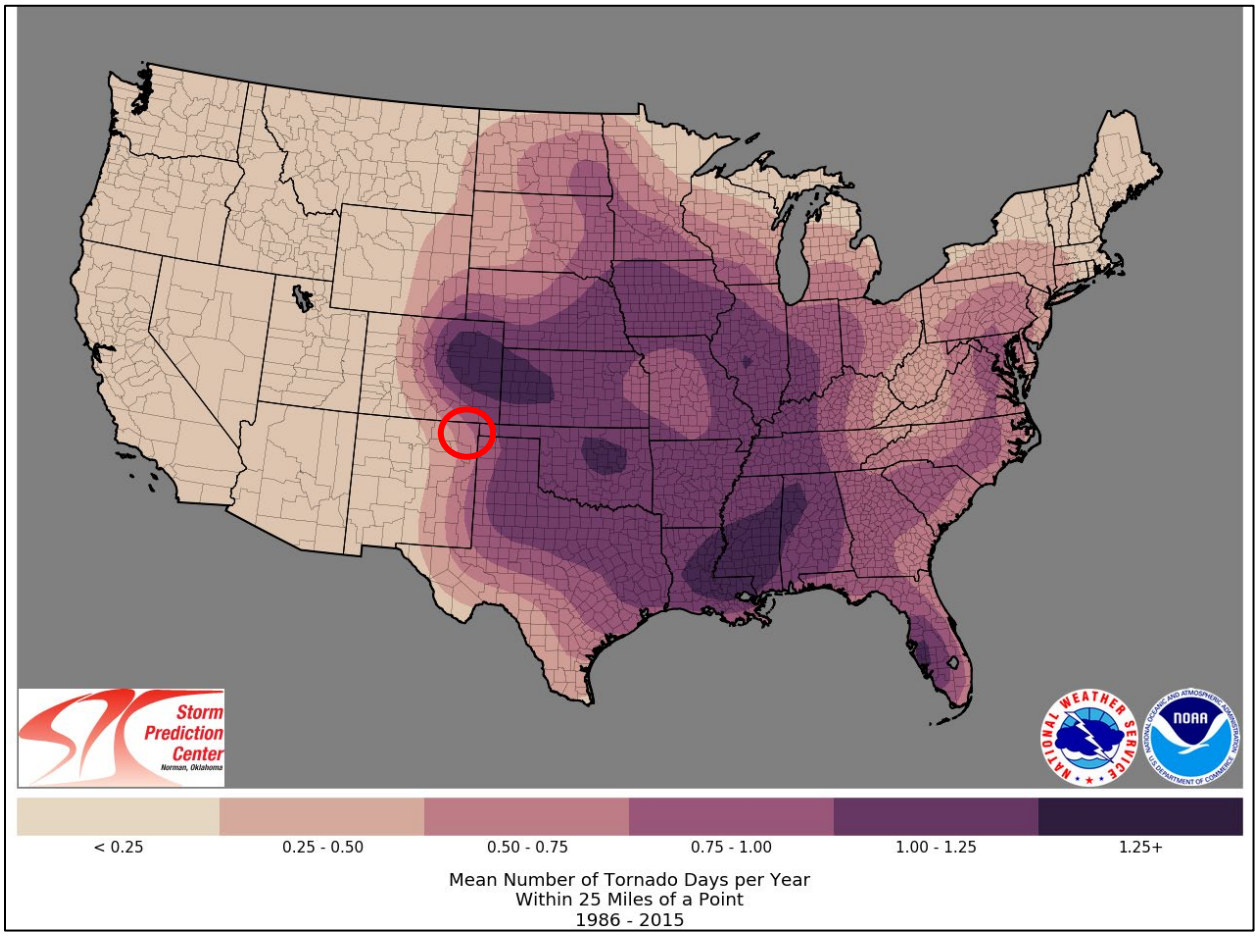
Figure 6-47 New Mexico Annual Average Wind Speed at 30 meters



Tornado

Tornadoes are possible across all of Union County. The following figure shows the average number of tornado days per year. Based on this graphic, the majority of Union County experiences 0.50-0.75 tornado days per year, on average. In addition, a portion of the county in the northeast corner, has an average of 0.75-1.00 tornado days per year, based on the data[25]

Figure 6-48 Average Number of Tornado Days per Year



Extent

High Wind

Wind can be categorized by the Beaufort Wind Scale as shown in the following table.[26]

Table 6-21 Beaufort Wind Scale

Appearance of Wind Effects			
Force	**Wind (Knots)**	**WMO Classification**	**On Land**
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes

[25] https://scied.ucar.edu/webweather/tornadoes/where-tornadoes-happen
[26] https://www.spc.noaa.gov/faq/tornado/beaufort.html

Appearance of Wind Effects			
Force	**Wind (Knots)**	**WMO Classification**	**On Land**
2	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	
12	64+	Hurricane	

Additionally, straight-line winds associated with thunderstorms are considered “damaging” when they exceed 50 mph.[27]

Tornado

Tornadoes are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touchdown briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long. According to the National Weather Service, tornado wind speeds normally range from 40 miles per hour to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more, are capable of causing extreme destruction, and can turn normally harmless objects into deadly missiles. Tornado magnitude is reported according to the Fujita and Enhanced Fujita Scales (shown in the following tables). Tornado magnitudes prior to 2007 were determined using the traditional version of the Fujita Scale. Tornado magnitudes that were determined in 2007 and later were determined using the Enhanced Fujita Scale.

Table 6-22 Fujita Scale (effective prior to 2007)

F-Scale Number	Intensity	Wind Speed	Damage
F0	GALE TORNADO	40–72 MPH	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.

[27] https://www.nssl.noaa.gov/education/svrwx101/wind/

F-Scale Number	Intensity	Wind Speed	Damage
F1	MODERATE TORNADO	73–112 MPH	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT TORNADO	113–157 MPH	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE TORNADO	158–206 MPH	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING TORNADO	207–260 MPH	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE TORNADO	261–318 MPH	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6[28]	INCONCEIVABLE TORNADO	319–379 MPH	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

Table 6-23 Enhanced Fujita Scale (effective 2005 and later)

EF-Scale Number	Intensity Phrase	3 Second Gust (Mph)	Damage
EF0	GALE	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	MODERATE	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.

[28] F6 is not always included but has been used to describe extremely strong tornadoes that far surpass F5 levels.

EF-Scale Number	Intensity Phrase	3 Second Gust (Mph)	Damage
EF2	SIGNIFICANT	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	SEVERE	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	DEVASTATING	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	INCREDIBLE	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Previous Occurrences

As presented in the HIRA Historical Events Summary table at the beginning of this HIRA chapter, the collective historical high wind and tornado losses are more frequent and damaging than all other hazards profiled, outside of thunderstorms and severe winter storms.

High Wind

The following table summarizes the best available historical loss information relating to high wind events.

Table 6-24 High Wind Historical Losses

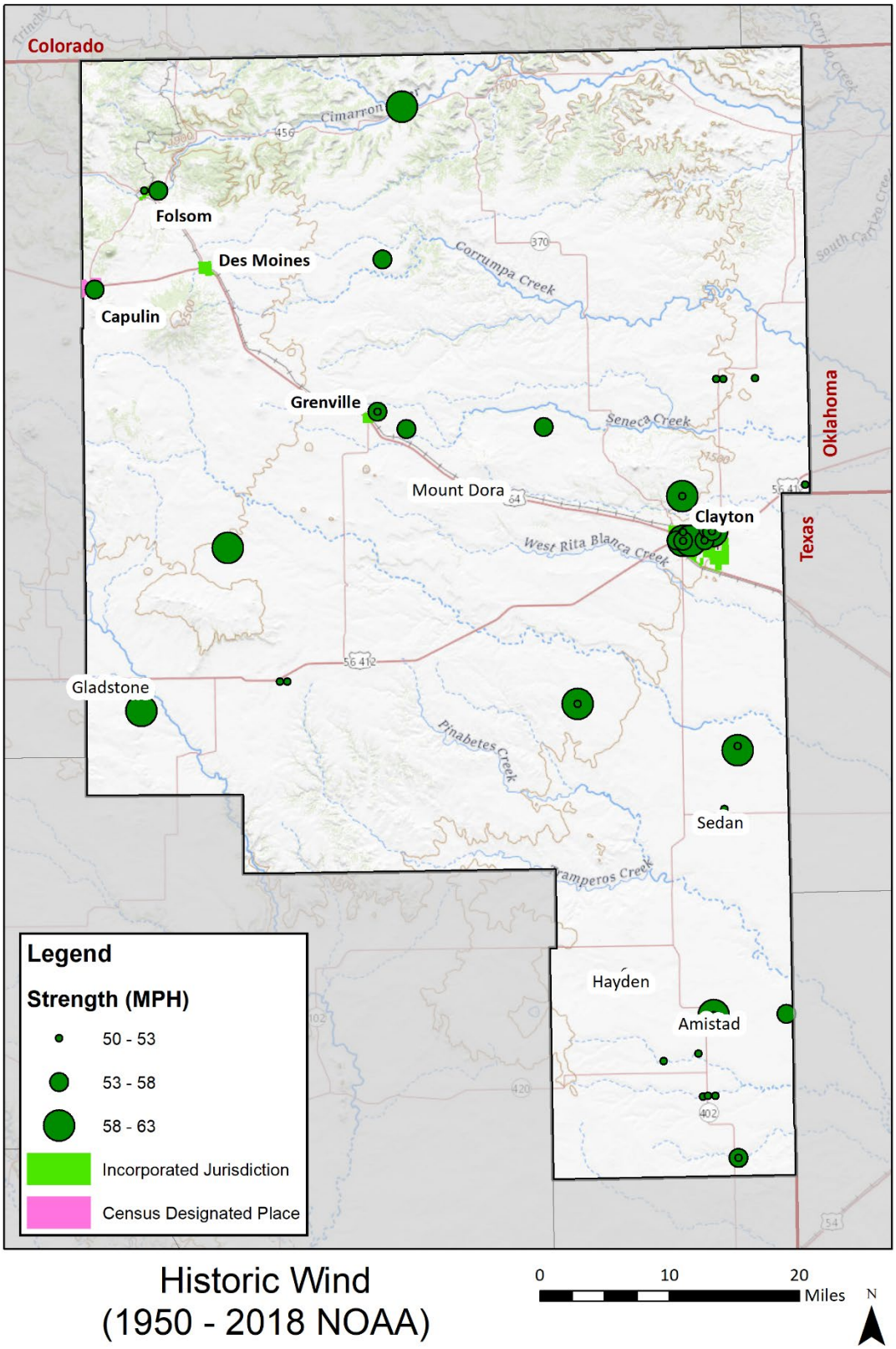
Source	# of Damaging Events	Years of Record	# of Damaging Events (annually)	Property Damages	Property Damages (per capita)	Crop Damages	Crop Damages (per capita)	Injuries	Fatalities
NCEI	154	68	2.26	$831,000	$198	$3,000	$1	0	0
Storm Prediction Center	74	63	1.17	$3,503	$1	-	-	0	0
SHELDUS	56	58	0.97	$10,645,606	$2,137	$1,119,109	$221	0.36	0

Landspout near Capulin Volcano NM (credit: Jeffrey Bezore)

The SHELDUS data provided additional information pertaining to crop insurance, which includes record of 116 insured events related to high wind, resulting in indemnity payments of over $6.2 million (which equates to $214,919 annually).

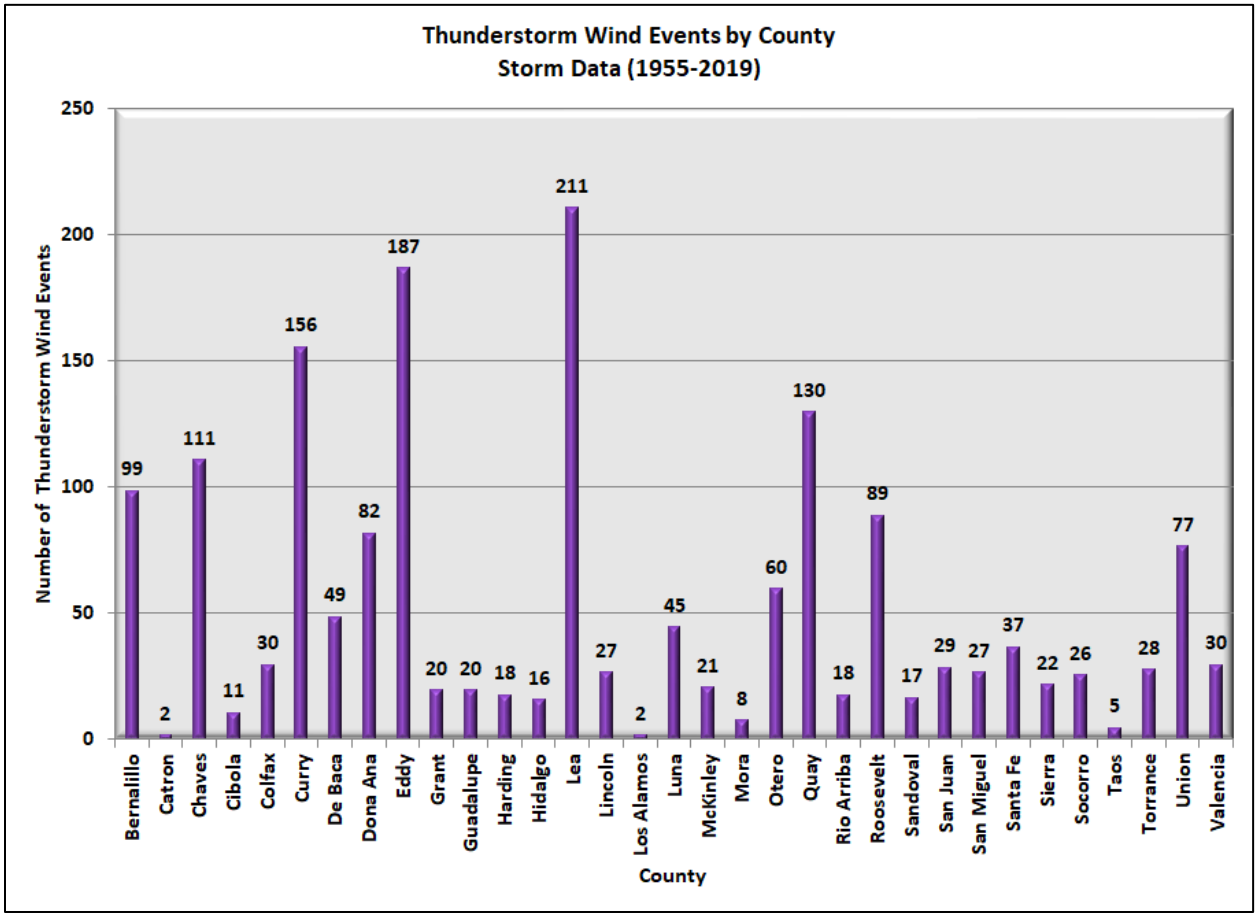
The following figure presents a map of the historical high wind events.

Figure 6-49 Historical High Wind Events



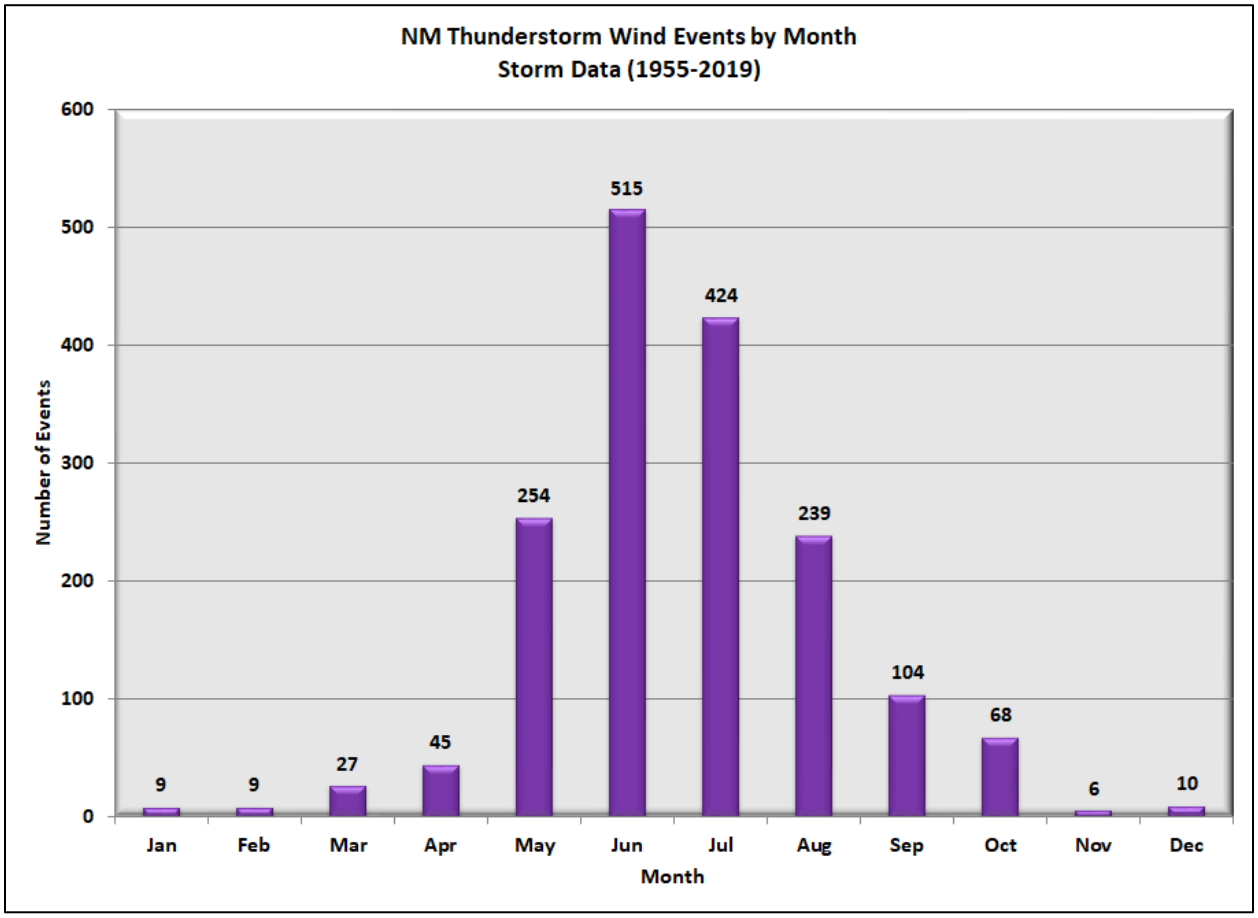
The following figure from the NWS compares Union County high wind events to other counties across the state. Union County has experienced a number of events, well above the state average.

Table 6-25 New Mexico Wind Events by County



As it pertains to high wind's seasonal patterns, the following figure from the NWS presents thunderstorm wind events, per month, across the entire state. May through August see the majority of events, but high wind events are possible at any time of the year.

Table 6-26 New Mexico Wind Events by Month



Tornado

The following table summarizes the best available historical loss information relating to tornado events.

Table 6-27 Tornado Historical Losses

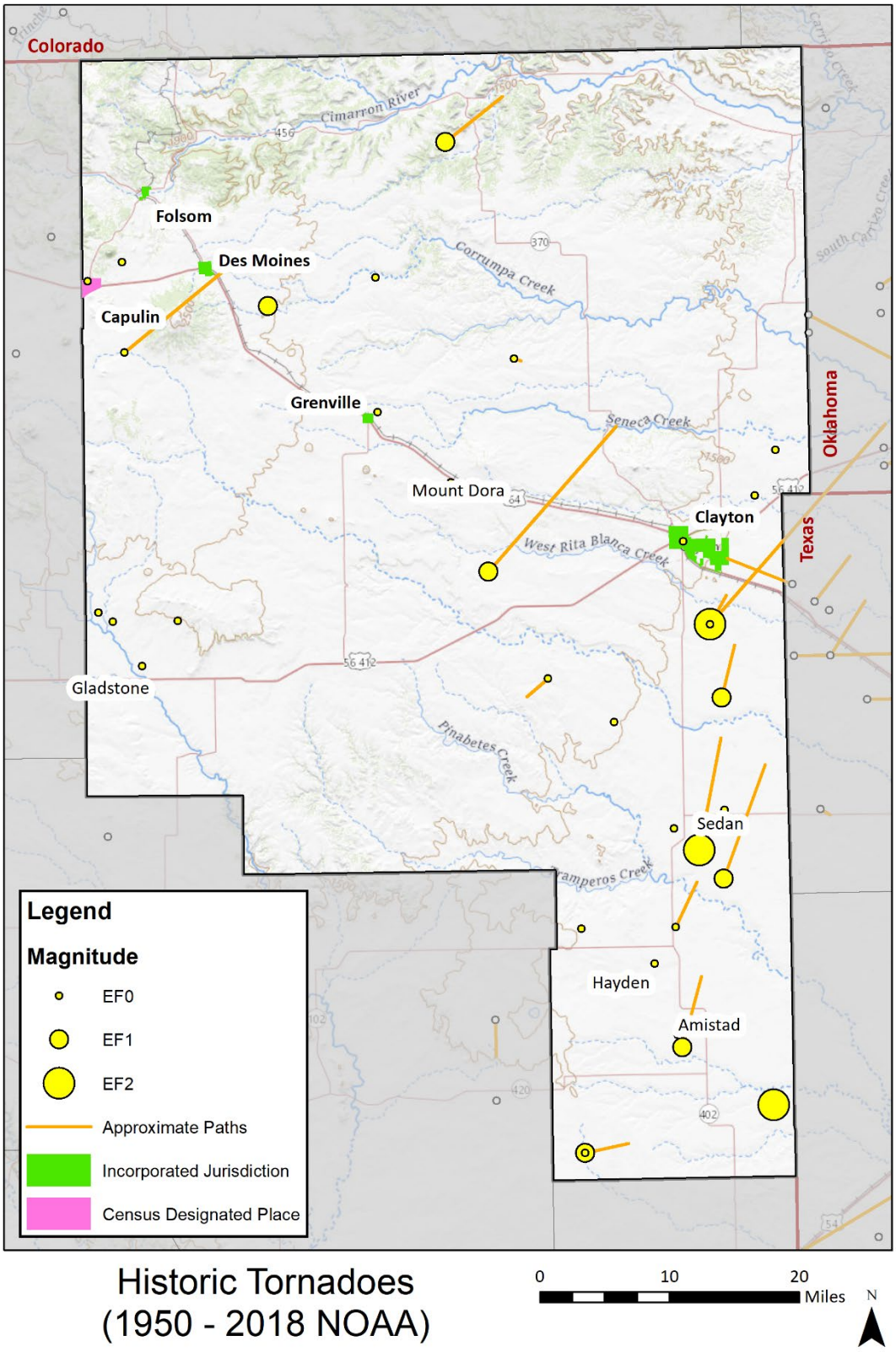
Source	# of Damaging Events	Years of Record	# of Damaging Events (annually)	Property Damages	Property Damages (per capita)	Crop Damages	Crop Damages (per capita)	Injuries	Fatalities
NCEI	61	68	0.90	$803,120	$191	-	-	0	0
Storm Prediction Center	38	68	0.56	$19,740,000	$4,700	-	-	0	0
SHELDUS	12	58	0.21	$927,811	$201	-	-	0	0

Significant past occurrences are highlighted below:

- August 13, 2006: A back door cold front surged southwest across New Mexico and interacted with a very rich plume of monsoon moisture surging northward into the State. A strong thunderstorm around Ojo Encino produced a brief landspout tornado. This tornado captured lots of attention at a nearby baseball field. Another tornado was reported near Capulin on a distant mesa. No damage was reported from either storm. A funnel cloud was also spotted near Ocate. The most impactful thunderstorm of the day occurred along Interstate 40 near San Fidel. Several inches of penny size hail accumulated on the interstate. Brief rope tornado touched down on a distant mesa near Capulin Volcano National Monument.
- May 23, 2010: Swarm of tornadoes tracked through Union County.

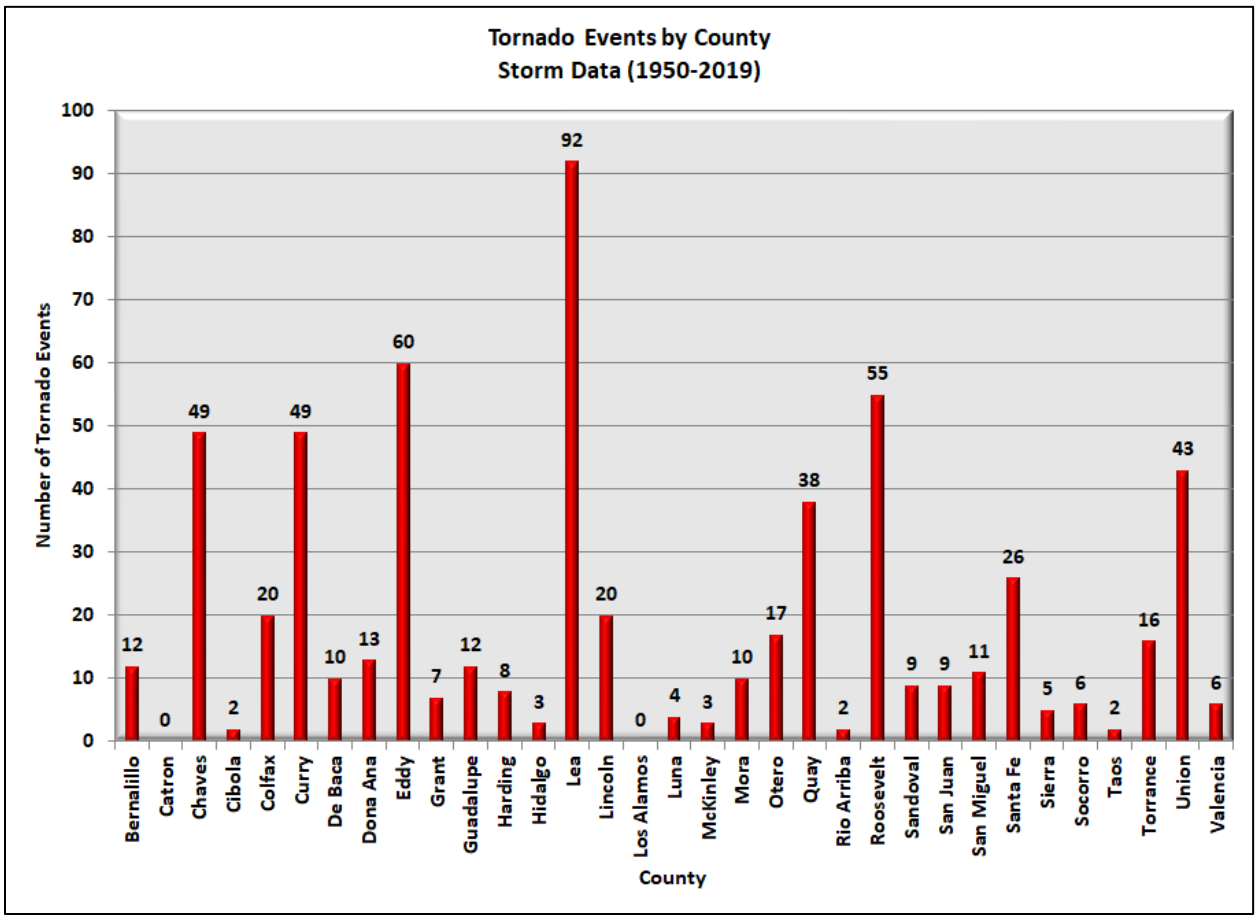
The following figure presents a map of the historical tornado events.

Figure 6-50 Historical Tornado Events



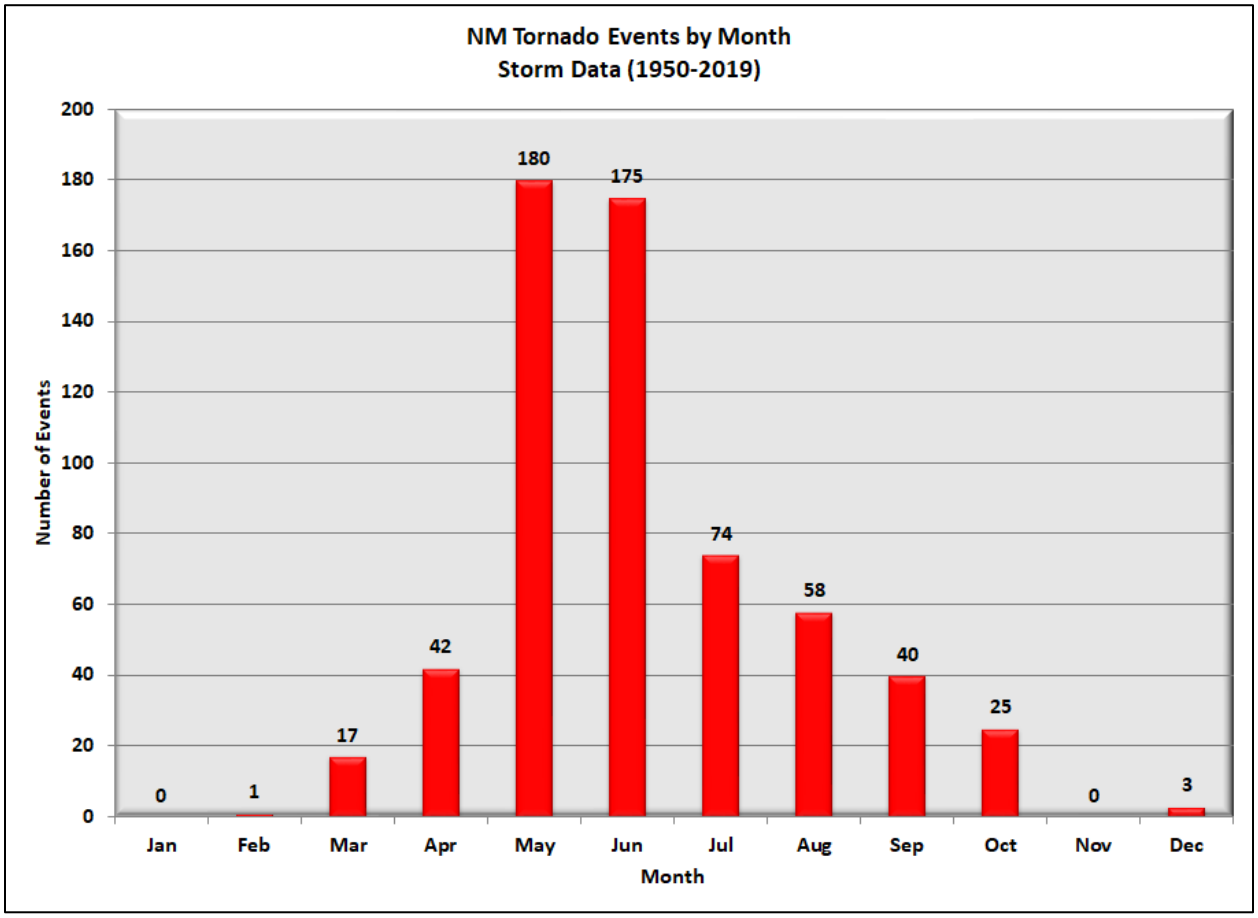
The following figure from the NWS compares Union County tornado events to other counties across the state. Union County is ranked 6th statewide for having the most events per county.

Table 6-28 New Mexico Tornado Events by County



As it pertains to tornado's seasonal patterns, the following figure from the NWS presents tornado events, per month, across the entire state. Across the state, May and June are the top tornado producing months.

Table 6-29 New Mexico Tornado Events by Month



Probability

Based on best available event data, the probability of annual occurrence for high wind events is 100%, a highly likely probability. Tornado events are less common but are still expected to occur annually 90% of this time, a likely probability.

Vulnerability Assessment

Inventory Exposed/Impacts

All current and future buildings and populations are at risk to wind and tornado events in Union County. Wind can result in a variety of impacts to current and future buildings and populations including:

- Torn-off roofs and shingles
- Downed trees and limbs
- Damaged utilities
- Debris generation

The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population to these hazard events. However, there are also segments of the population that are especially exposed to the indirect impacts of high wind and tornado events, particularly the loss of electrical power. These populations include the elderly or disabled, especially those with medical needs and treatments

dependent on electricity. Nursing homes, Community Based Residential Facilities, and other special needs housing facilities are vulnerable if electrical outages are prolonged, since backup power generally operates only minimal functions for a short period of time. In terms of property losses caused by these hazard events, the actual damages will depend on the building density and quality of construction in the impacted area. Buildings that are close to large trees or overhead power lines are at greater risk of suffering more extensive damages. Construction practices can help maximize the resistance of the structures to damage. High wind and tornado events have the potential to wreak havoc on above-ground infrastructure, such as power and communication lines. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. Additionally, high winds that occur on hot, dry days can cause dangerous fire conditions, and winds can cause a fire to spread rapidly.

Critical Facilities Exposed/Impacts

All critical facilities experience the same exposure to the hazard of high wind / tornado. Impacts are expected to be the same as described in the previous section.

Potential Losses

The highest recorded losses from high wind events total close to $10.6 million in property damages, which equates to $183,544 in annualized losses from this hazard. In addition, crop damages total over $1.1 million, equating to an additional $19,984 annually. Relating to crop insurance, there were over $6.2 million in indemnity payments made over the data reporting period, which equals an annual amount of $214,919 paid.

The highest recorded losses from tornado events total close to $20 million in property damages, which equates to $183,544 in annualized losses from this hazard. In addition, crop damages total over $1.1 million, equating to an additional $19,984 annually.

Future Conditions

Land Use and Development

Per the Union County Comprehensive Plan (2020), all areas of the county are expected to see continued population stagnation, with future projections suggesting population decline through 2040. Future development would expose more people and structures across the county to impacts from high winds and tornadoes. Additionally, future residential or commercial buildings built to code should be able to withstand high winds in Union County.

Climate[29]

At this time, there has not been a definitive link between long-term, changing weather patterns and an increase or decrease in the frequency or severity of high wind or tornado events in the State of New Mexico.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential

[29] 2018 New Mexico State Hazard Mitigation Plan

impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. Community risk varied across the county, with Des Moines and Grenville ranking high wind / tornado as a moderate risk, compared to other profiled hazards. All other communities ranked the risk as high.

Table 6-30 High Wind / Tornado Risk Ranking

	Risk Rank
Unincorporated Union County	High
Town of Clayton	High
Village of Des Moines	Moderate
Village of Folsom	High
Village of Grenville	Moderate

6.2.7 Landslide / Rockfall

Description

Landslide

A landslide is a general term for a variety of mass-movement processes that generate a downslope movement of soil, rock, and vegetation under gravitational influence. Some of the natural causes of ground instability are stream and lakeshore erosion, heavy rainfall, and poor-quality natural materials. In addition, many human activities tend to make the earth materials less stable, and thus increase the chance of ground failure. Human activities contribute to soil instability through grading of steep slopes or overloading them with artificial fill, extensive irrigation, construction of impermeable surfaces, excessive groundwater withdrawal, and removal of stabilizing vegetation. Landslides typically have a slower onset and can be predicted, to some extent, by monitoring soil moisture levels and ground cracking or slumping in areas of previous landslide activity. Additionally, landslides become a hazard in areas burned by previous wildfires, which can become a debris flow hazard during rainfall events.

Rockfall

A rockfall is the falling of a detached mass of rock from a cliff or down a very steep slope. Weathering and decomposition of geological materials produce conditions favorable to rockfalls. Rockfalls are caused by the loss of support from underneath through erosion or triggered by ice wedging, root growth, or ground shaking. Changes to an area or slope, such as cutting and filling activities, can also increase the risk of a rockfall. Rocks in a rockfall can be of any dimension, from the size of baseballs to houses. Rockfall occurs most frequently in mountains, or other steep areas, during the early spring when there is abundant moisture and repeated freezing and thawing. Rockfalls are a serious geological hazard that can threaten human life, impact transportation corridors and communication systems, and result in other property damage.

Location

As expected, landslides and rockfalls are most prone to occur in steep, mountainous terrain. These types of locations can be found all across Union County but are mostly concentrated in the northern and

southwestern portions of the county. New Mexico Tech has developed separate landslide and rockfall susceptibility GIS datasets for all of New Mexico, which are presented for Union County in the following figures.

Figure 6-51 Landslide Susceptibility in Union County

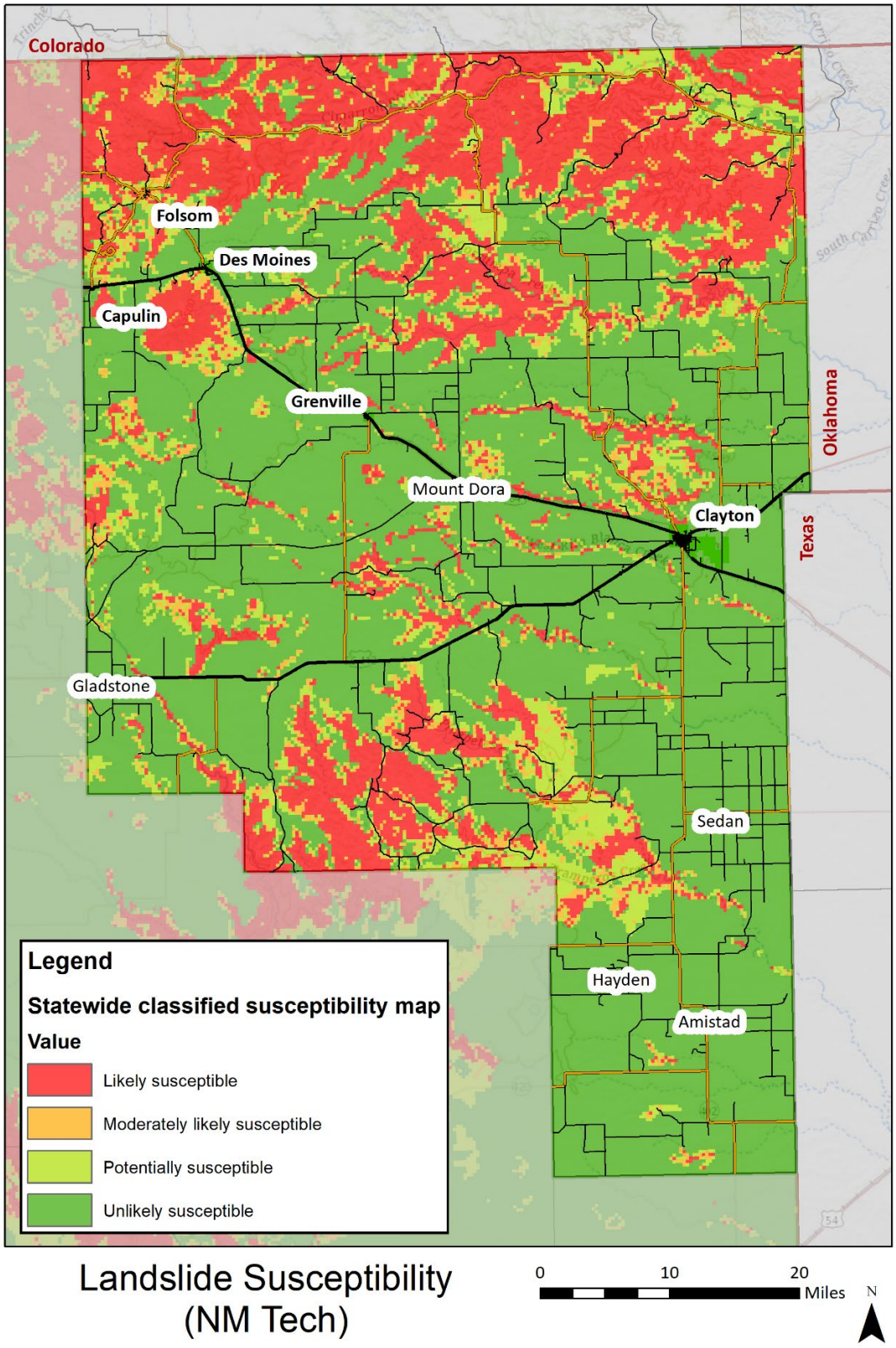
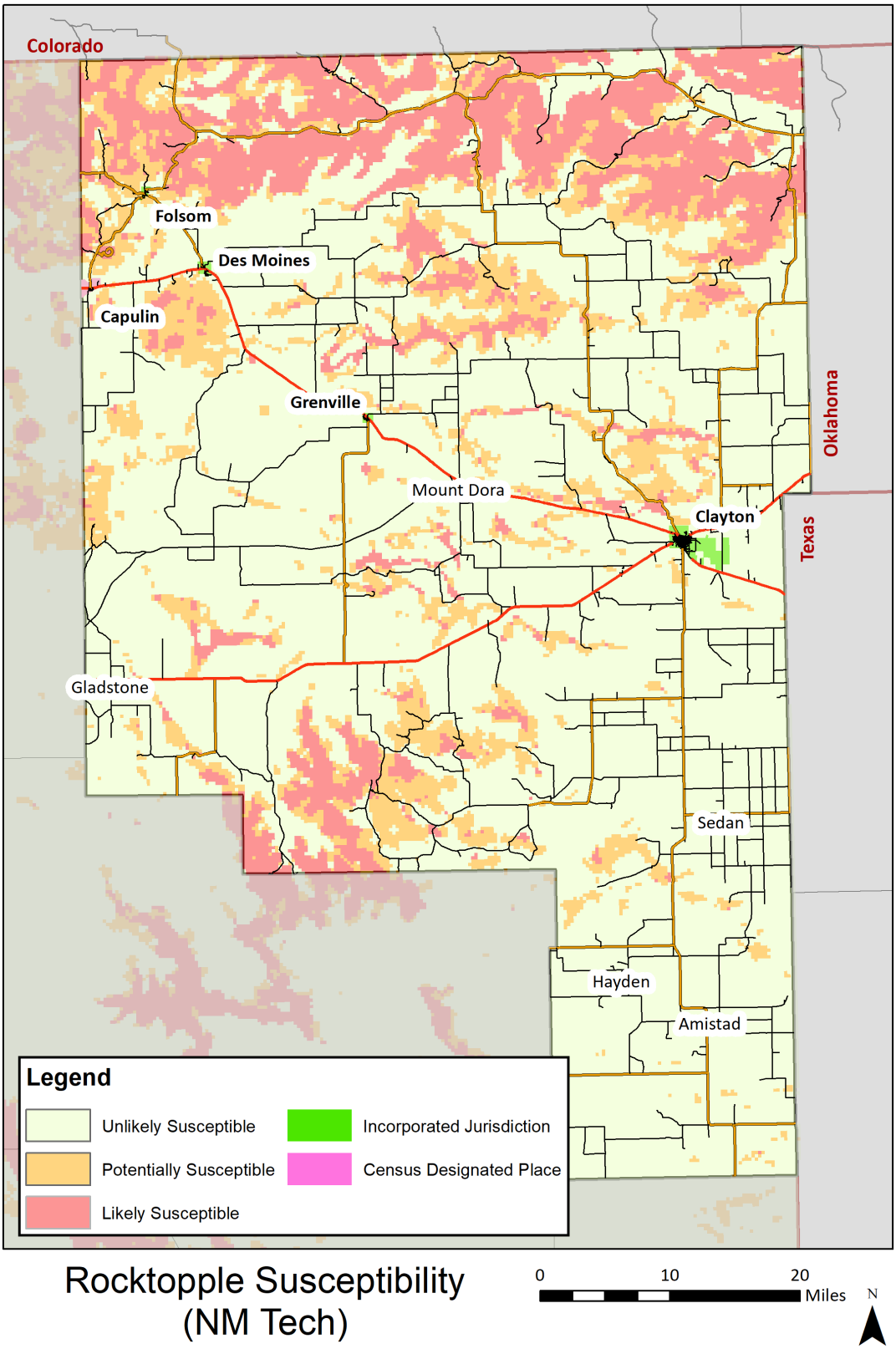


Figure 6-52 Rockfall Susceptibility in Union County



Extent

There is not a formal scale to measure landslide or rockfall extent. Factors such as volume and size can be used to determine an extent. Characteristics determining extent can vary widely between the different landslide types. Some landslides are slow moving (for example, a "creep" landslide), while others occur suddenly and quickly.

While data is not available for past events in Union County, it is estimated that a large landslide along a highway could result in ~5,000 tons of material covering the road. Smaller landslides could transport ~1,000 tons. The following excerpt from the NM Bureau of Geology and Mineral Resources (New Mexico Earth Matters, Winter 2020) provide another idea of the expected extent across the state:

"Although not as costly or widespread as debris flows, rockfalls have caused deaths over the past 30 years, and are a persistent concern for the NM Department of Transportation along some highways. On July 11, 2008, three homeless people died in Gallup when a rock fell on them while they slept. One of the most problematic rockfall areas in the state is the Rio Grande Gorge along NM 68 between Taos and Española, where rockfall events occurred on September 12, 1988 and July 25, 1991. In 1988, a boulder struck a bus, killing five and injuring 14. In 1991, numerous rockfalls and debris flows trapped 20 cars and closed the highway for 19 hours. A 300-ton boulder ricocheted off the highway, creating a crater 45 feet long and 15 feet deep before coming to rest on the far side of the river. Cleanup costs for this one event were about $75,000. The average, annual cost of rockfall response in the state is estimated at tens of thousands of dollars.

Although deep-seated landslides are a common feature in the New Mexican landscape, they happen less frequently than debris flows or rockfalls. When they have occurred in the recent past, it is often due to human activity that destabilized a steep slope or a preexisting landslide. One of the more destructive modern landslides occurred on April 10, 2007, when a landslide covered 300 yards of the Farmers Mutual Ditch in San Juan County. The cost to remove the material and fix the ditch was $263,408. Landslides have damaged roads near Luna in southwestern New Mexico and on US 64 east of Tierra Amarilla. In 1993, a landslide damaged NM 570 near Taos. The expense of stabilizing the hillslope was so high that the Department of Transportation closed the highway."

Previous Occurrences

While there are no local records of specific historical landslide or rockfall events, there is data available to help understand past occurrences.

New Mexico Tech has developed a landslide deposit GIS dataset for the State. The following figure shows these known deep-seated landslide deposits across the county. As the figure presents, most of these larger known landslide deposits are located in the northernmost portion of the county. There is a scattering of smaller (< 1 sq. km.) deposits countywide.

Similarly, New Mexico Tech also developed a rockfall density GIS dataset, that presents the historical risk to certain areas across the county. Similar to the landslide map, this figure shows most of these high risk rockfall areas are located in the northernmost portion of the county. The highest risk areas are mainly grouped into the upper northeastern corner of the county and a pocket around the northcentral county/state line.

Figure 6-53 Known Landslide Deposits in Union County

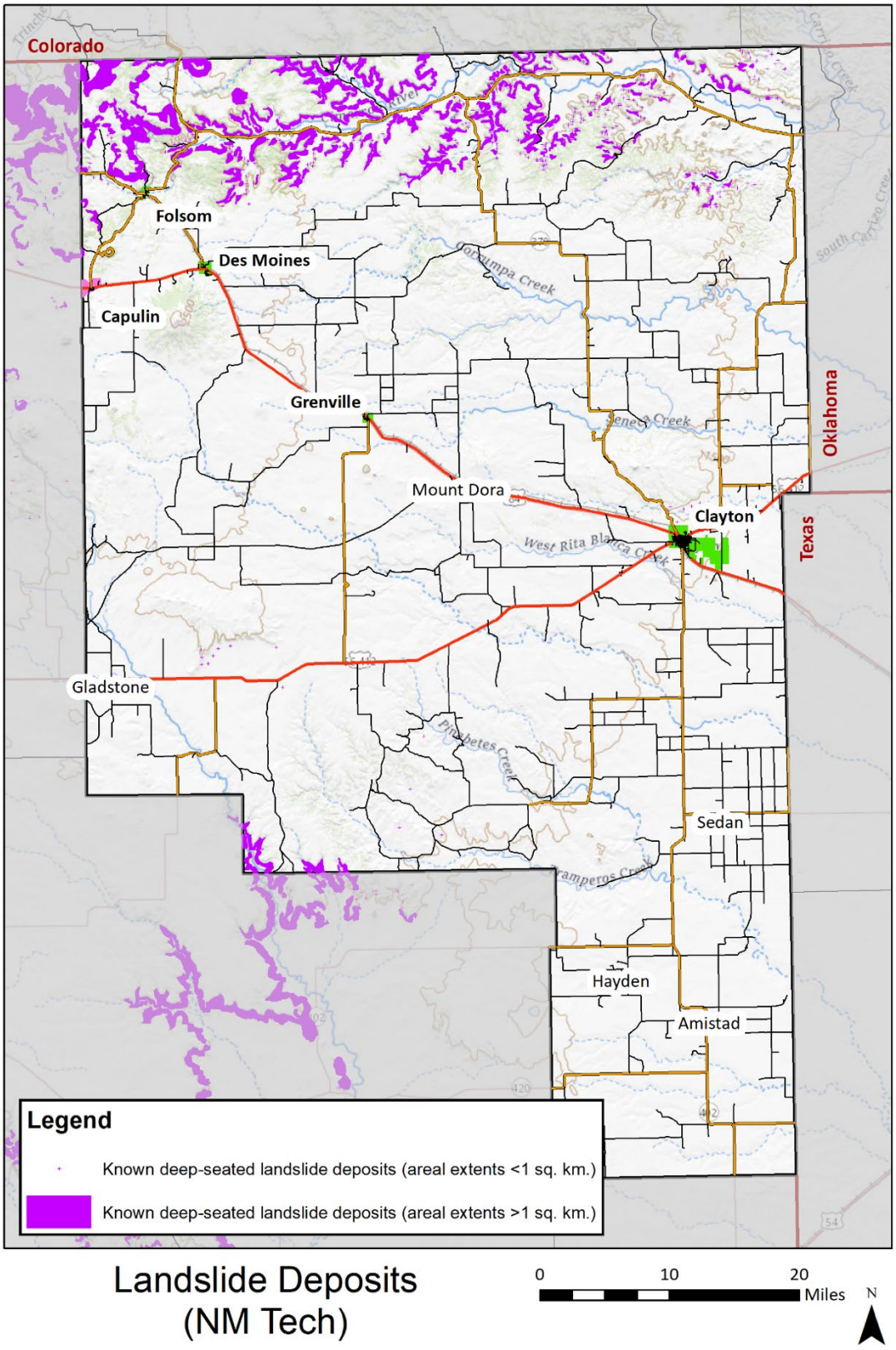
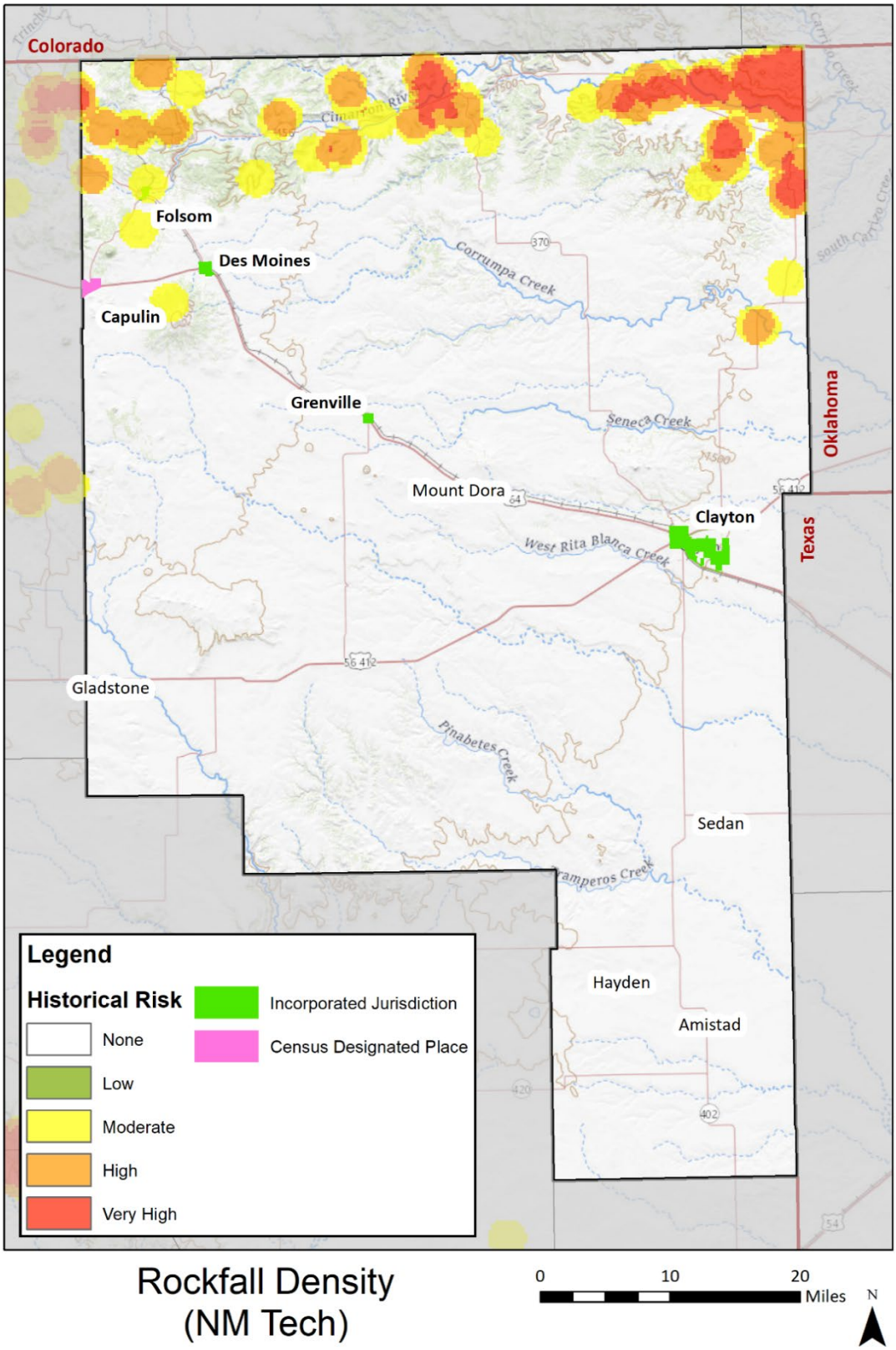


Figure 6-54 Historical Rockfall Risk in Union County



Probability

While there are currently no records of damaging landslide events in the county, it is highly likely that landslides have occurred outside of populated areas and were not reported. Accurately calculating a probability of landslide events is difficult without comprehensive records, however the New Mexico Tech information, in the figures above, offers insight through the historic rockfall risk and existing landslide deposits, as well as likely susceptible areas for landslides and rockfalls.

Probability is informed by considering the expanse of susceptible areas in the north and south of the county, the historically affected areas in the northern most portion of the county, and the constant geologic and environmental processes which contribute to landslides and rockfalls occurring. Therefore, it is reasonable that landslides will continue to occur and have a highly likely probability of occurring every year.

Vulnerability Assessment

Inventory Exposed/Impacts

Impacts from landslides and rockfalls are typically isolated to the direct area, and many of the issues can be mitigated with proper awareness and engineering design. Landslides can create flood hazards by blocking up rivers or by contributing to dam failures. Landslides and rockfall hazards threaten several transportation corridors in the county. Rockfall can cause severe injuries and fatalities. If a landslide event were to cut off a major roadway, people could become stranded, deliveries of supplies could be delayed, emergency response could be hindered, etc. Landslides within and outside of the county also pose a threat to power lines, utilities, and infrastructure. A landslide could impact power line infrastructure and thus contribute to extended power outages.

An assessment was performed utilizing countywide structure data, to identify those structure potentially exposed to these hazards. Of the 3,041 structures contained in the county's GIS dataset, 160 (~5%) are located in likely susceptible landslide areas and 53 (~2%) are located in likely susceptible rockfall areas.

Critical Facilities Exposed/Impacts

When evaluating critical facilities exposure, a similar assessment was performed as was done for the structure inventory. There were no critical facilities in the likely susceptible landslide areas, but there was one (Folsom Post Office) located in a moderately susceptible area. Likewise, there were no critical facilities in the likely susceptible rockfall areas, but there were three (Folsom Post Office, a NMDOT storage barn, and the office at the Clayton Lake State Park) located in a potentially susceptible area.

Due to the statewide scale of the data used for this analysis, site specific exposure assessments are a suggested next step to determine if an actual risk is present.

Potential Losses

There is currently no previous occurrences data to analyze potential losses.

Future Conditions

Land Use and Development

Development in any of the susceptible areas identified in this section would increase vulnerability to the hazards of landslide and rockfall. The severity of these hazard problems is directly related to the extent of human activity in hazard areas. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. The mountainous areas of the

county present considerable constraints to development, most commonly in the form of steep sloped areas. These areas are vulnerable to disturbance and can become unstable.

Climate

Future climatic conditions can impact landslides and rockfall in the county. Increased heavy precipitation can increase the landslide and rockfall risk. Additionally, changes in freeze/thaw cycles associated with changes in temperature/precipitation may impact rockfall events, particularly in the spring when rockfall events are more common.

An increased frequency of high-intensity wildfires can increase the risk of landslides or rockfall in burn scar areas during a rain event.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. All communities ranked the risk from landslide / rockfall to be low, compared to other profiled hazards.

Table 6-31 Landslide / Rockfall Risk Ranking

	Risk Rank
Unincorporated Union County	Low
Town of Clayton	Low
Village of Des Moines	Low
Village of Folsom	Low
Village of Grenville	Low

6.2.8 Severe Winter Storm

Description

A winter storm is an event in which varieties of precipitation are formed that only occur at low temperatures, such as snow, sleet, freezing rain, or ice. Snowstorms generally occur with the clash of different types of air masses, with differences in temperature, moisture, and pressure; specifically, when warm moist air interacts with cold dry air. Snow storms that produce a lot of snow require an outside source of moisture, such as the Gulf of Mexico or the Pacific Ocean. Blizzards are severe snow storms with winds in excess of 35 mph and visibility of less than a 1/4 mile for more than 3 hours. Freezing rain occurs when a layer of warm air hovers over a region, but the ground ambient temperature is sub-freezing.

Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack melts too quickly.

Location
Severe winter storms can impact all areas and municipalities across the county.

Extent
Winter storms are defined differently in various parts of the country relevant to their standard weather. Therefore, there are multiple ways in which to measure a winter storm, based on snowfall, temperatures, wind speeds, societal impact, etc.

For Union County, NOAA data from 1895 to 2020 shows the average temperature between November and March was 36.4 degrees Fahrenheit, while the average minimum temperature for the same period and range was 21.8 degrees Fahrenheit. The lowest temperature recorded was 11.8 degrees Fahrenheit in 1978.

Also based on NOAA data, the average annual snowfall for the county was 22.2 inches between 1896 to 2018. The largest one-day accumulation was 24" in Grenville in 1973. The largest two-day snowfall was also recorded in Grenville in 1980, totaling 30.4".

For a storm to be classified as a blizzard the National Weather Service specifies the following criteria:

- Sustained win or frequent gust of 16 meter per second (35 miles per hour) or greater,
- Sustained winds accompanied by falling or blowing snow
- Frequently reduced visibility to less than 400 meters (0.25 miles) for 3 hours or longer.

In the future, it is anticipated that the County will experience similar temperature lows and snowfall amounts.

Previous Occurrences
The following table summarizes the best available historical loss information relating to severe winter weather. As presented in the HIRA Historical Events Summary table at the beginning of this HIRA chapter, severe winter weather property damages rank as the second highest across the other profiled hazards, while the number of recorded damaging events are less than most hazards. It should be noted that historical losses do not currently include agricultural animal losses.

Table 6-32 Thunderstorm Historical Losses

Source	# of Damaging Events	Years of Record	# of Damaging Events (annually)	Property Damages	Property Damages (per capita)	Crop Damages	Crop Damages (per capita)	Injuries	Fatalities
NCEI	77	68	1.13	$100,000	$24	-	-	0	0
SHELDUS	42	58	0.72	$22,774,468	$4,743	$510,082	$119	0.74	0.63

The SHELDUS data provided additional information pertaining to crop insurance, which includes record of 71 insured events related to thunderstorms, resulting in indemnity payments of over $4.6 million (which equates to $160,944 annually).

Significant past occurrences are highlighted below:

- January 5, 2017: A major winter storm impacted nearly all of northern and central New Mexico just a few days after ringing in 2017. An extremely cold airmass shifted slowly south and west into eastern New Mexico on the 5th while a moist, slow moving upper level wave shifted north and east from Arizona through the 6th. The combination of bitterly cold air at the surface and abundant mid and upper level moisture resulted in a major winter storm across New Mexico. Temperatures in the single digits with widespread snowfall amounts of four to eight inches created severe travel conditions across the eastern plains. The Sangre de Cristo Mountains were pummeled with one to two feet of snowfall. Bitterly cold air seeped into the Rio Grande Valley from the eastern plains on the morning of the 6th while a band of snowfall pushed across the area. Temperatures in the middle teens with around one inch of snow created treacherous travel conditions across the Albuquerque metro area. Nearly 100 motor vehicle accidents shut down many roads across the city and closed schools. Shelters were opened in many areas and the New Mexico EOC was activated for several days until impacts improved. The coldest air since 2011 filtered into the State behind this storm. Wind chill values across the eastern plains fell to between 20 and 30 degrees below zero. Estimated property damage of $250,000.
- January 1, 2001: A slow-moving winter storm howled into northern and central New Mexico with gusty winds and heavy snow, which closed State highways and many rural roads and contributed to two deaths from exposure. Tribal police found one body just north of Gallup and another near Bluewater. The storm produced 18 to 36 inches of heavy snow that engulfed snow removal and closed roads from the eastern Sangre de Cristo Mountains south over Las Vegas into the central highlands to Vaughn and Corona and westward over the Estancia Valley and the east slope communities of the Sandia and Manzano Mountains. Some residents remained trapped in their homes for 4-5 days before enough snow removal opened both the major and minor county roads. A state of emergency was declared in several counties including Mora, San Miguel and Torrance.

Probability

Based on previous occurrences, there is a 100% annual chance of occurrence of a severe winter storm in Union County, equating to a highly likely probability.

Vulnerability Assessment

Inventory Exposed/Impacts

During the winter months, Union County and the Town of Clayton can be impacted by blizzard conditions, or ice storms that will demand the closure of Highway 64/87 to the west and southwest, Highway 56 to the east/west, and Highway 402 to the south. Closure of these main transportation arteries in and out of Clayton can cause a major impact to the town and county.[30]

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. These storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation,

[30] 2017 Union County Severe Weather Plan

livestock management, and business and commercial activities. Travelers on highways in Union County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance, and shelter provisions. The county can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities, as well as lead to serious damage to livestock populations and crops. Winter storms also have the potential to disrupt the delivery of food and fuel into the county. Limited phone and cell phone service in parts of the county mean that emergency reporting may be impossible during severe winter storm events.

Critical Facilities Exposed/Impacts

Critical facilities face the same exposure and impacts as to all other structures across the county.

Potential Losses

The highest recorded losses from severe winter storms total close to $23 million in property damages, which equates to $392,663 in annualized losses from this hazard. In addition, crop damages total over $500 thousand, equating to an additional $8,794 annually. Relating to crop insurance, there were over $4.6 million in indemnity payments made over the data reporting period, which equals an annual amount of $160,994 paid.

Future Conditions

Land Use and Development

Per the Union County Comprehensive Plan (2020), all areas of the county are expected to see continued population stagnation, with future projections suggesting population decline through 2040. Due to the frequency of severe winter weather in the county, all new development and populations may be impacted by severe weather. Building codes can help reduce the risk to structures from severe weather impacts.

Climate[31]

At the time there has not been a definitive link between an increase or decrease in the frequency or severity of extreme cold events or significant winter storms due to long-term, changing weather patterns.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. All communities ranked the risk from severe winter storms to be high, compared to other profiled hazards.

[31] 2018 New Mexico State Hazard Mitigation Plan

Table 6-33 Severe Winter Storms Risk Ranking

	Risk Rank
Unincorporated Union County	High
Town of Clayton	High
Village of Des Moines	High
Village of Folsom	High
Village of Grenville	High

6.2.9 Thunderstorm (including Hail & Lightning)

Description

Thunderstorm

Storms in the region are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10% of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is 1 inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado (profiled separately).

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, its cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at Earth's surface and causes strong winds associated with thunderstorms.

There are four ways in which thunderstorms can organize: single cell, multicell cluster, multicell lines (squall lines), and supercells. Even though supercell thunderstorms are most frequently associated with severe weather phenomena, thunderstorms most often organize into clusters or lines. Warm, humid conditions are favorable for the development of thunderstorms. The average single cell thunderstorm is approximately 15 miles in diameter and lasts less than 30 minutes at a single location. However, thunderstorms, especially when organized into clusters or lines, can travel intact for distances exceeding 600 miles.

Thunderstorms are responsible for the development and formation of many severe weather phenomena, posing great hazards to the population and landscape. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorms can produce tornadoes and waterspouts.

Hail

Hail forms when updrafts carry raindrops into extremely cold areas of the atmosphere where they freeze into ice. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 mph. Hail causes nearly $1 billion in damage to crops and property each year in the United States. Hail is also one of the requirements which the National Weather Service uses to classify thunderstorms as 'severe.' If hail more than ¾ of an inch is produced in a thunderstorm, it qualifies as severe.

When viewed from the air, it is evident that hail falls in paths known as hail swaths. They can range in size from a few acres to an area 10 miles wide and 100 miles long. Piles of hail in hail swaths have been so deep, a snowplow was required to remove them, and occasionally, hail drifts have been reported.

Lightning

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder, which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall.

Lightning is one of the more dangerous weather hazards in the United States and in New Mexico. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires, which contributes to the Drought – Wildfire – Flood Cycle discussed in this Plan. In addition, losses can include deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year.

U.S. lightning statistics compiled by the National Oceanic and Atmospheric Administration between 1959 and 1994 indicate that most lightning incidents occur during the summer months of June, July, and August and during the afternoon hours from between 2 and 6 p.m.

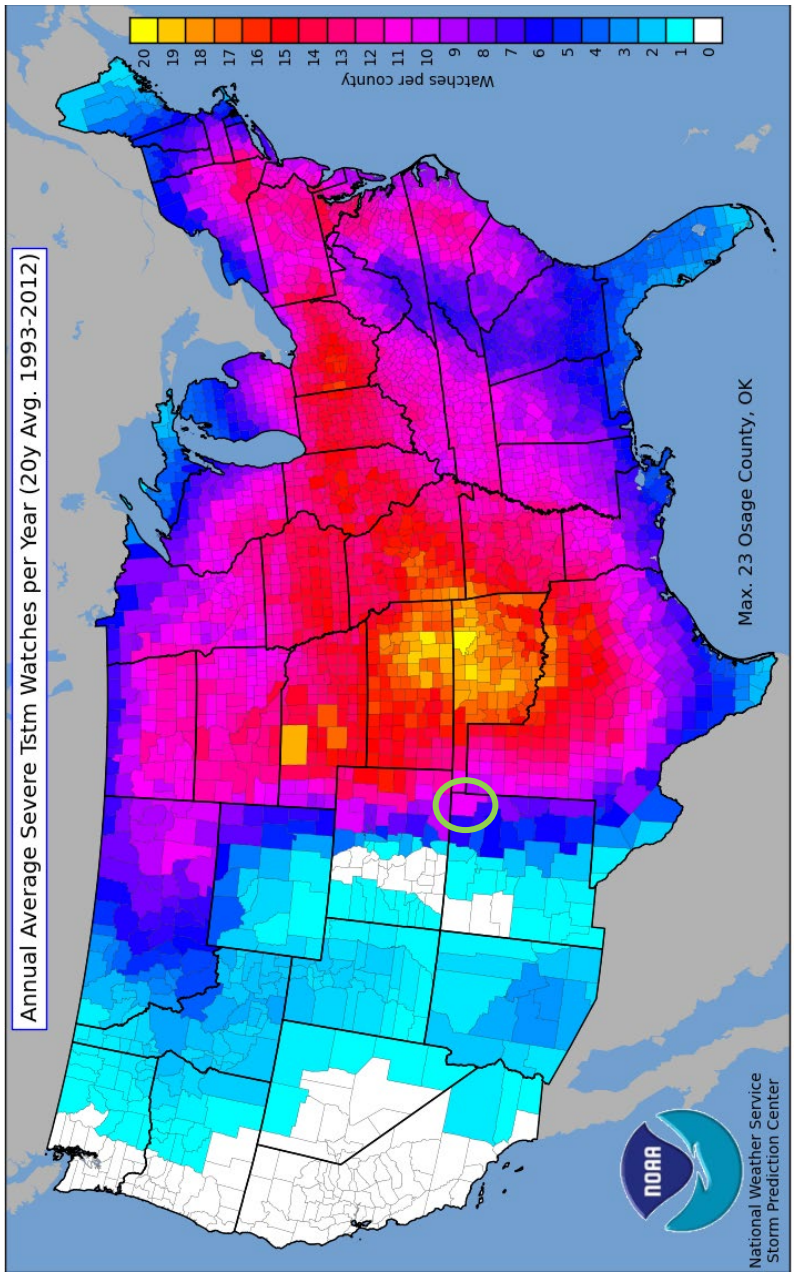
Location

Thunderstorm

The following figure shows the annual average number of severe thunderstorm watches per year from 1993 to 2012 in the United States.[32] Union County can be seen as having 10-11 severe thunderstorm watches per year, on average. This places the county at the highest risk to thunderstorms compared to any other New Mexico counties.

[32] National Weather Service, Storm Prediction Center; https://www.spc.noaa.gov/wcm/

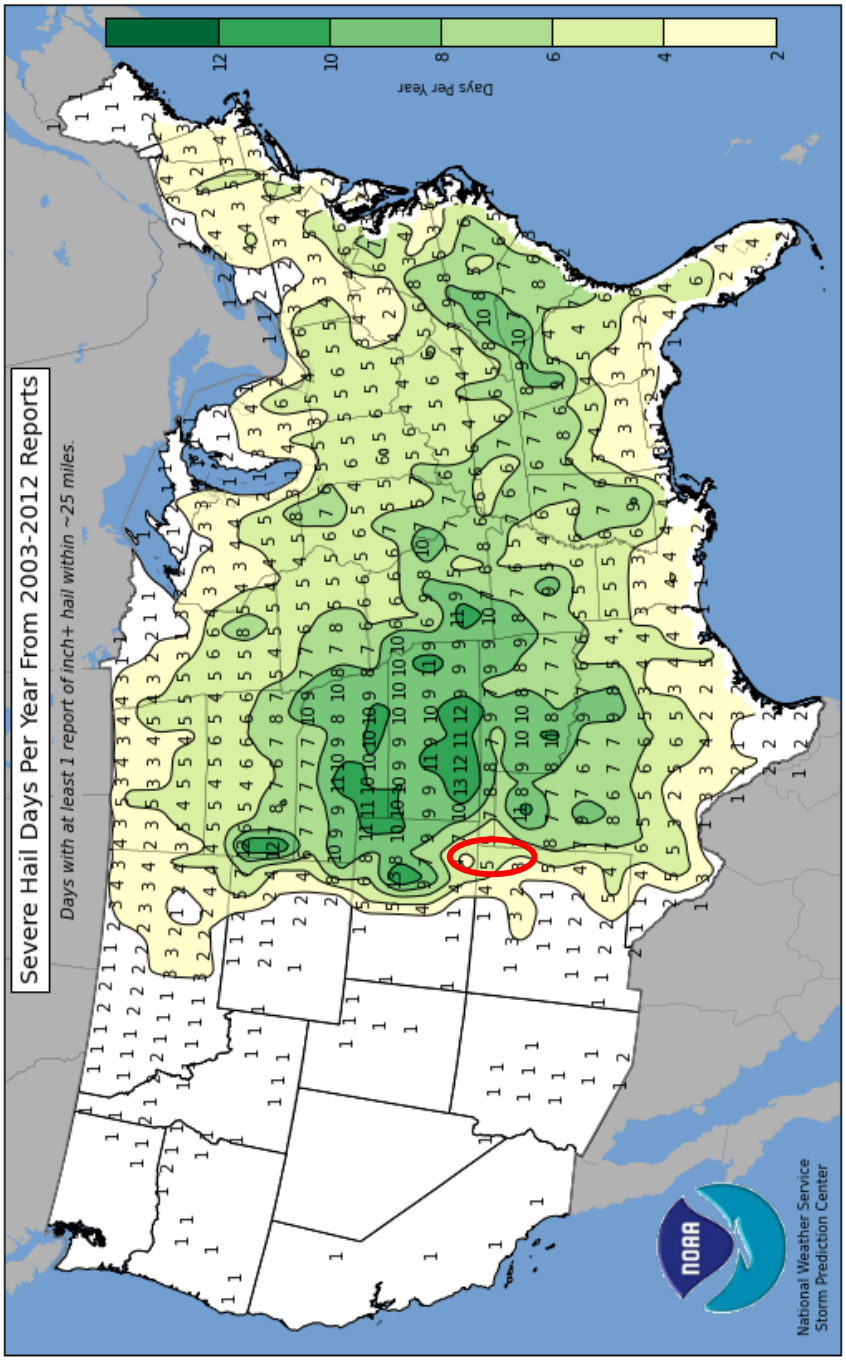
Figure 6-55 Annual Average Severe Thunderstorm Watches 1993-2012



Hail

The annual severe hail days per year from 2003 - 2012 are shown in the following figure.[33] Union County receives the highest number of days as compared to other New Mexico counties.

Figure 6-56 Annual Average Severe Hail Days 2003-2012

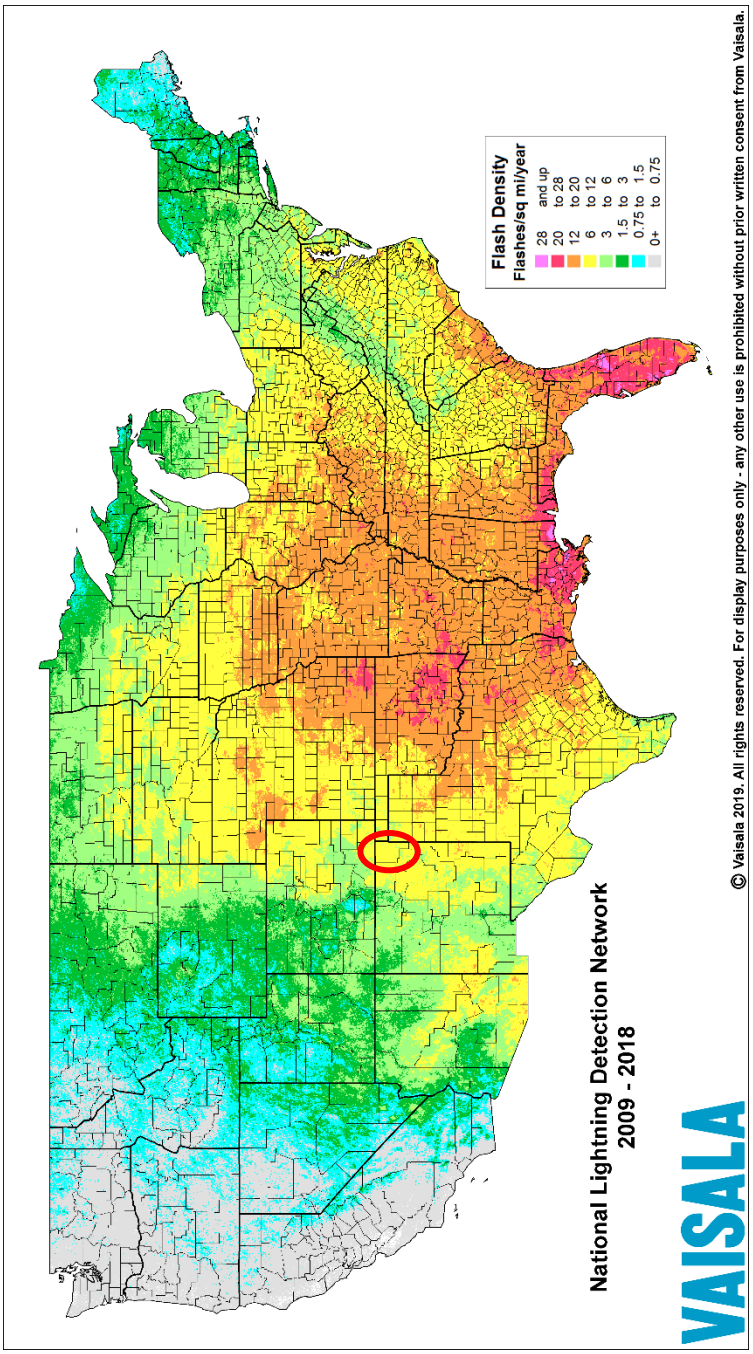


[33] NOAA National Severe Weather Laboratory

Lightning

The following figure shows the lightning flash density from 2009 – 2018.[34] Union County sees an average of 6-12 flashes, per square mile, per year, which is on the high end as compared across New Mexico but average for the nation.

Figure 6-57 Annual Average Flash Density 2009-2018



[34] https://www.weather.gov/images/pub/lightning/image_files/NLDN_CGFlash09-18-miles.png

Extent

Thunderstorm

A severe thunderstorm can happen very quickly, particularly in the afternoon in the summer months. Although these storms can form quickly (within an hour or 2), they can typically be predicted up to 10 days in advance. The National Weather Service (NWS) issues two types of alerts for severe thunderstorms:

- A Severe Thunderstorm Watch indicates when and where severe thunderstorms are likely to occur. Citizens are urged to watch the sky and stay tuned to NOAA Weather Radio, commercial radio, or television for information. Severe Thunderstorm Watches are issued by the Storm Prediction Center in Norman, OK.
- A Severe Thunderstorm Warning is issued when severe weather has been reported by spotters or indicated by radar. Warnings indicate imminent danger to life and property to those in the path of the storm. Severe Thunderstorm Warnings are issued by the NWS in Pueblo.

Based on the previous figure of NOAA severe thunderstorm watches nationwide, on average Union County had 11 severe thunderstorm watches per year between 1993 and 2012. This is the highest number of watches in the State over the same period.

Hail

Since hail is associated with severe thunderstorms, the extent is similar. Union County can expect 5-7 severe hail days per year, also the highest number across the state. Additionally, hail is measured by its diameter, and the size of the hail is directly associated with how much damage the hail can cause (the larger the hail, the more damage). The following table shows standard measurements for hail[35]. The county can expect 2-3" diameter hail events, based upon historical events.

Table 6-34 Standard Hail Measurements

Average Diameter	Corresponding Household Object Comparison
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

[35] National Weather Service

Lightning

Lightning is typically associated with a thunderstorm, so the extent between these hazards is similar.

Previous Occurrences

The following table summarizes the best available historical loss information relating to thunderstorms (including hail and lightning). As presented in the HIRA Historical Events Summary table at the beginning of this HIRA chapter, historical thunderstorm losses are the most frequent and damaging recorded hazard events as compared to the others profiled in this Plan.

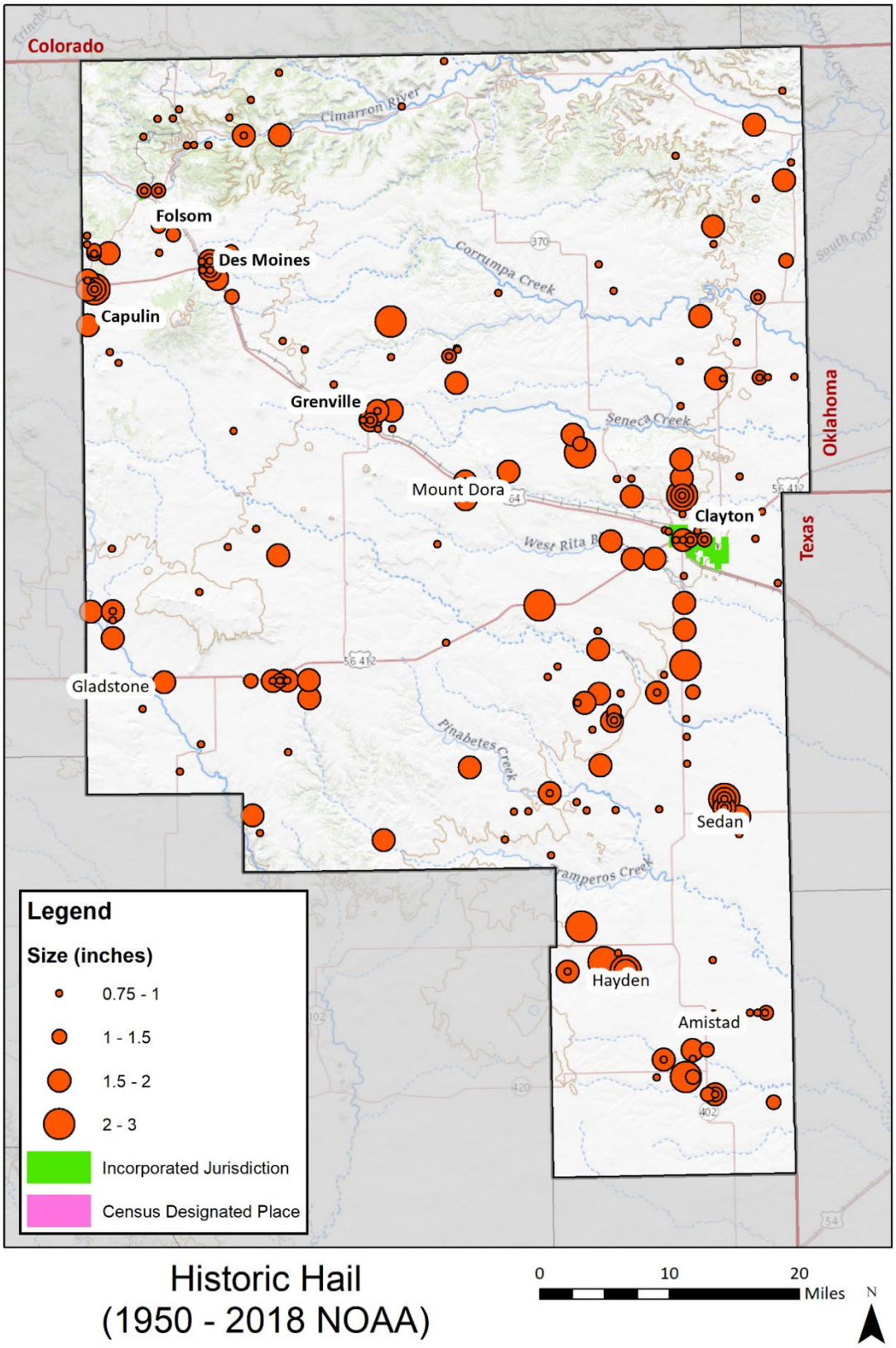
Table 6-35 Thunderstorm Historical Losses

Source	# of Damaging Events	Years of Record	# of Damaging Events (annually)	Property Damages	Property Damages (per capita)	Crop Damages	Crop Damages (per capita)	Injuries	Fatalities
NCEI	348	68	5.12	$151,000	$36	-	-	1	0
Storm Prediction Center	332	63	5.27	$57,511	$14	-	-	1	0
SHELDUS	46	58	0.79	$3,772,408	$728	$1,180,288	$218	2.04	2.06

The SHELDUS data provided additional information pertaining to crop insurance, which includes record of 125 insured events related to thunderstorms, resulting in indemnity payments of over $8.6 million (which equates to $297,170 annually).

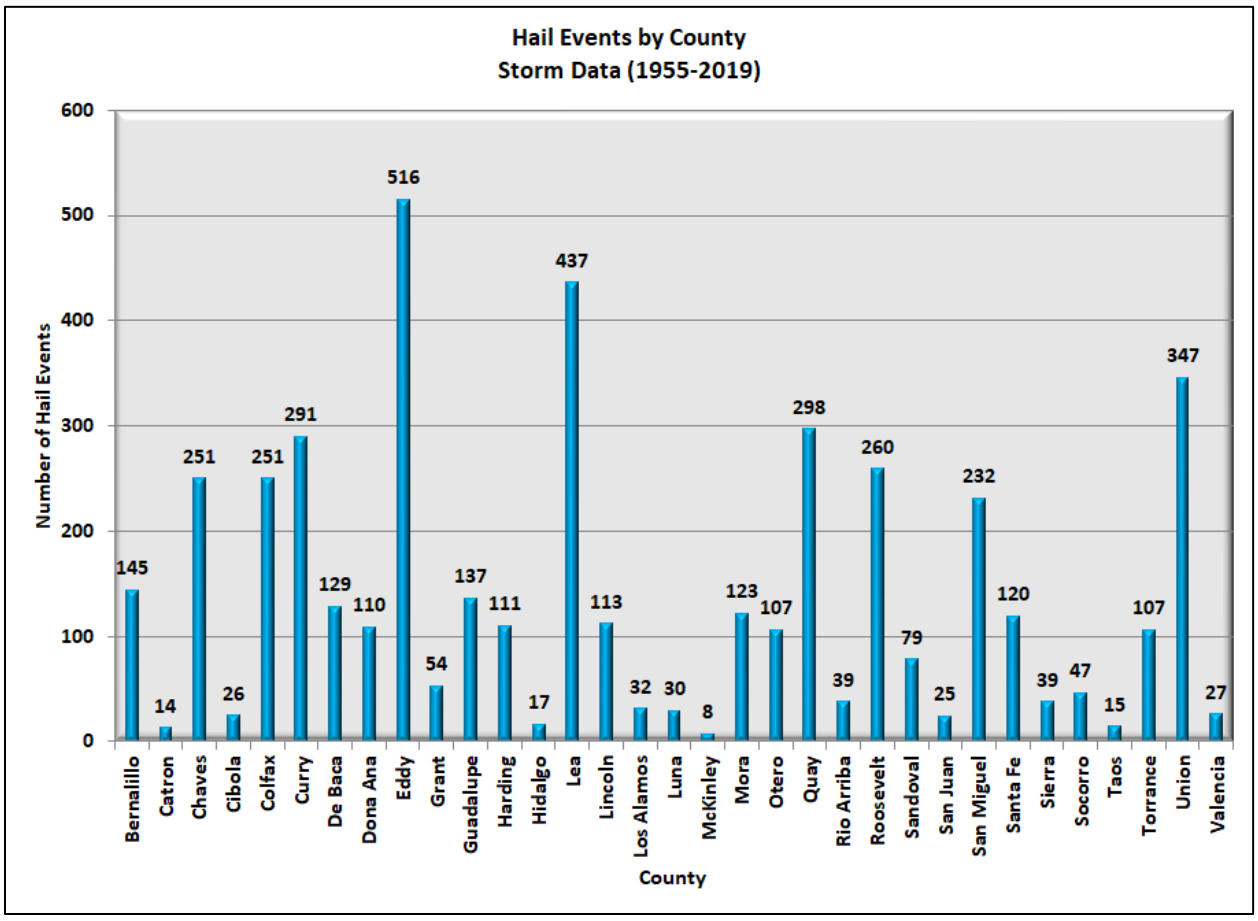
The following figure presents a map of the historical hail events. As expected, reported events tend to mirror population centers across the county.

Figure 6-58 Historical Hail Events



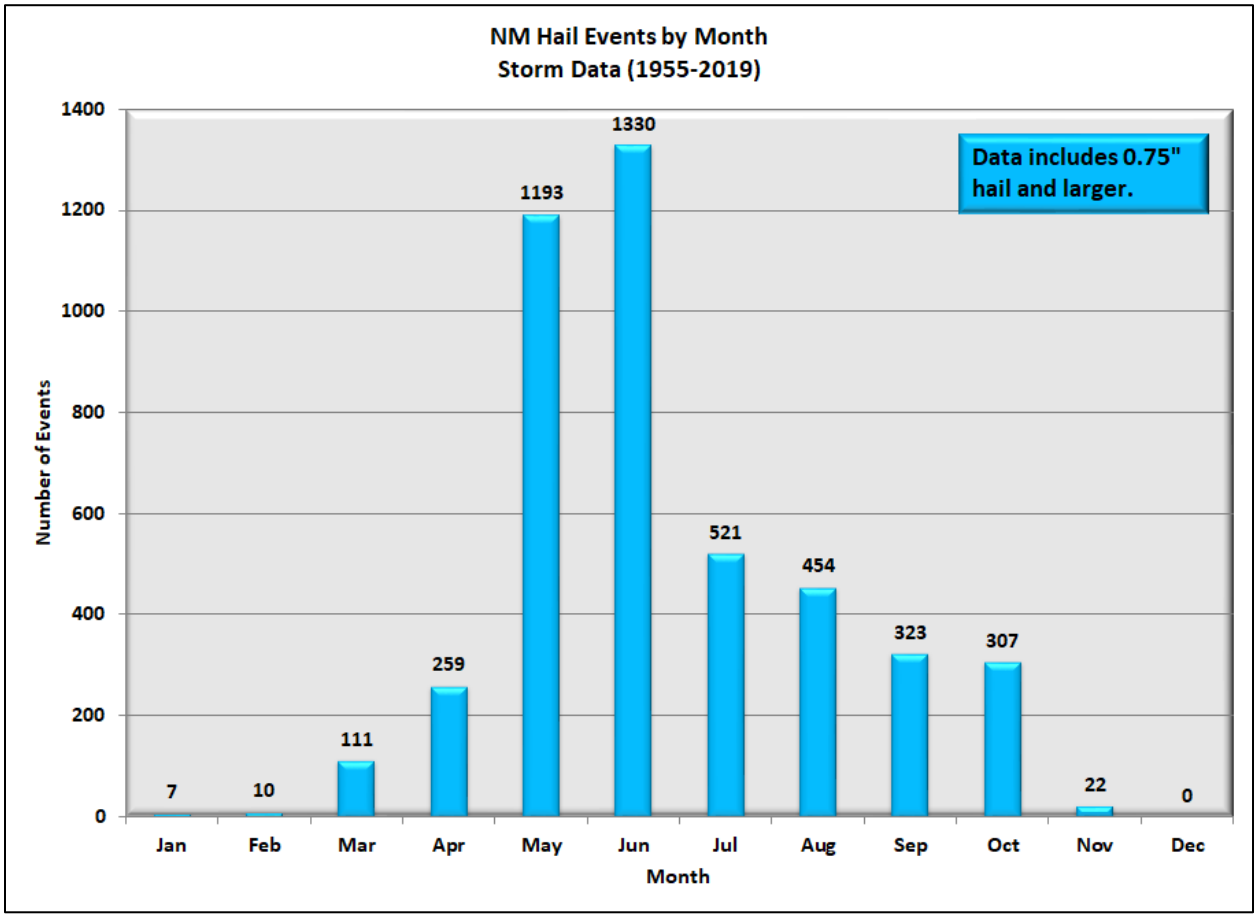
The following figure from the NWS compares Union County hail events to other counties across the State. Union County has seen the third-most hail events as compared to all counties in the State.

Table 6-36 New Mexico Hail Events by County



As it pertains to hail's seasonal patterns, the following figure from the NWS presents hail events, per month, across the entire State. These events rarely occur from November to February and peak in May and June.

Table 6-37 New Mexico Hail Events by Month



Probability

The probability of annual occurrence for all thunderstorm events (including hail and lightning) is 100%, or highly likely probability. However, there is little historical data pertaining specifically to damaging lightning.

Vulnerability Assessment

Inventory Exposed/Impacts

Thunderstorms producing hail and lightning are a common occurrence in the county between early spring and late fall. Impacts from previous occurrences of thunderstorm events include infrastructure, building, and vehicle damage. Populated areas present the most exposure to property damage, as well as injuries and fatalities, from thunderstorm events. Unincorporated County areas have similar vulnerabilities, as well as increased risk to agricultural losses from thunderstorms.

Based on previous occurrences and frequency of hail events, the entire county is at risk to hail events. Similar to thunderstorm damages, populated areas present the most exposure to property damages, such as broken windows, roof damages, outbuildings and vehicles damaged, as well as injuries and fatalities. Hail can also cause significant agricultural damage in unincorporated county.

Given the lightning statistics, the entire county is at risk and vulnerable to the effects of lightning. Persons recreating or working outdoors during the months of April through September will be most at

risk to lightning strikes. Fortunately, there have been no incidents of death or injury associated with lightning in the county.

Lightning can cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning can also cause wildfires, which could lead to significant losses.

Critical Facilities Exposed/Impacts

Critical facilities face the same exposure and impacts as all of the other structures across the county.

Potential Losses

The highest recorded losses from thunderstorms total close to $3.8 million in property damages, which equates to $65,041 in annualized losses from this hazard. A vast majority of these damages ($~3.3 million) were directly caused by hail events, whereas the remainder were classified as having been caused by generic 'thunderstorm' events. In addition, crop damages total almost $1.2 million (2/3 of which were directly caused by hail, the remainder being again caused by generic 'thunderstorm' events), equating to an additional $20,349 annually. Relating to crop insurance, there were over $8.6 million in indemnity payments made over the data reporting period, which equals an annual amount of $297,170 paid.

Future Conditions

Land Use and Development

Per the Union County Comprehensive Plan (2020), all areas of the county are expected to see continued population stagnation, with future projections suggesting population decline through 2040. Due to the frequency of severe weather in the county, all new development and populations will be impacted by severe weather. Building codes can help reduce the risk to structures from severe weather impacts.

Climate[36]

At the time there has not been a definitive link between long-term, changing weather patterns and an increase or decrease in the frequency or severity of severe thunderstorm, hail, or lightning events in the State of New Mexico.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. All communities ranked the risk from thunderstorms to be high, compared to other profiled hazards.

[36] 2018 New Mexico State Hazard Mitigation Plan

Table 6-38 Thunderstorms (Hail & Lightning) Risk Ranking

	Risk Rank
Unincorporated Union County	High
Town of Clayton	High
Village of Des Moines	High
Village of Folsom	High
Village of Grenville	High

6.2.10 Volcano

Description[37]

A volcano is a vent through which molten rock and hot gases escape to the earth's surface. Unlike other mountains, which are pushed up from below, volcanoes are built by surface accumulation of their eruptive products (e.g., lava, pyroclastic flows and surges, and ashfall). When pressure from gases within a magma chamber becomes too great to be contained, an eruption occurs. Volcanic hazards include lava flows, pyroclastic flows and surges, ashfall, volcanic mudflows (lahars), landslides, earthquakes, and those related to gas emissions. Volcanoes produce a wide variety of hazards that can harm and kill people, destroy property, and disrupt vital transportation infrastructure. Large explosive eruptions can endanger people and property hundreds of miles away, as well as affect global climate patterns.

Eruption characteristics (size, style, and duration) are variable for different types of volcanoes and even for a single volcano at different times throughout its history. Eruptions are grouped into one of two categories, effusive and explosive. Effusive eruptions are relatively passive, producing lava flows that commonly creep across the land at speeds of two to 10 mph. Explosive eruptions can shoot columns of gases and rock fragments tens of miles into the atmosphere, producing devastating pyroclastic flows and surges, or depositing volcanic ash hundreds of miles downwind. A single eruptive episode can include both effusive and explosive components. The eruptive styles of volcanoes in New Mexico encompass the entire severity range from dangerously explosive to passive.

Lava flows are streams of molten rock that either pour from a vent quietly or through mildly explosive lava fountains. Lava flows destroy virtually everything in their path, but most move slowly enough that people and some property can be moved out of the way. The speed at which lava moves across the ground depends on several factors, including the type of lava erupted, which influences the viscosity, the steepness of the ground, and the rate of lava production at the vent. Lava flows are typically not dangerous to human life but are a significant fire hazard because of their intense heat. Because lava is fluid, the flows typically follow topographic lows and thus detailed knowledge of the topography surrounding dormant and active volcanoes is important for hazard preparedness.

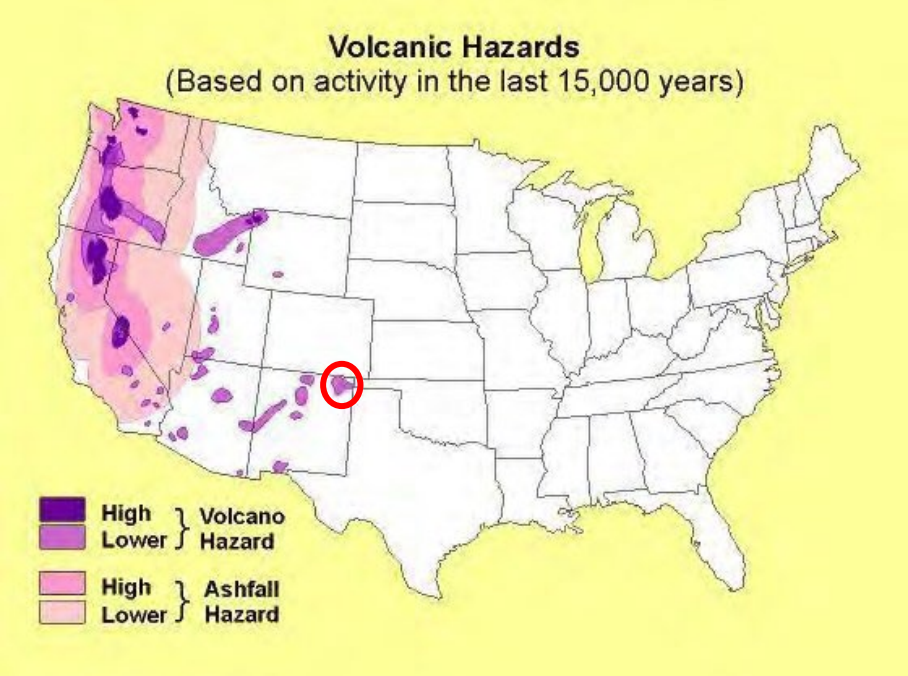
Location[38]

The following figure illustrates the volcanic hazard areas in the continental United States based on events over the last 15,000 years. Areas in purple and dark pink show regions at greater or lesser risk of

[37] From 2018 New Mexico State Hazard Mitigation Plan
[38] From 2018 New Mexico State Hazard Mitigation Plan

local volcanic activity, including lava flows, ashfalls, lahars (volcanic mudflows), and debris avalanches. Approximately six regions in New Mexico have been classified with lower risk volcanic hazards, which includes parts of Union County.

Figure 6-59 Volcanic Hazard areas in United States - based on events over the last 15,000 years [39]

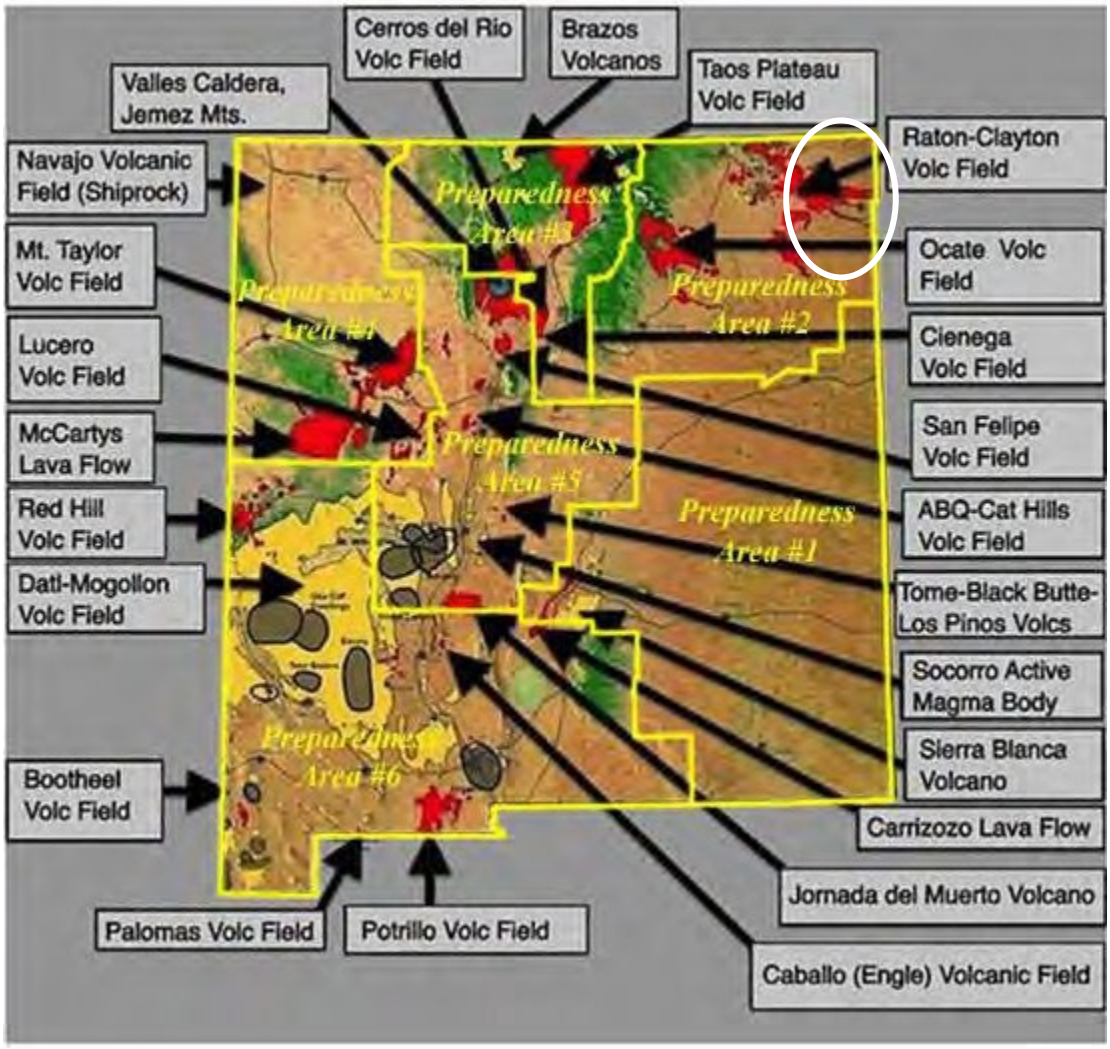


New Mexico has one of the greatest concentrations of young, well-exposed, and un-eroded volcanoes in North America, see the following figure below. Volcanism during the last five-million-years is distributed into about 10 major volcanic fields located throughout New Mexico and numerous isolated vents (shown in red). Although somewhat challenging to determine, because younger flows commonly cover older flows, an estimated 700 volcanoes have erupted during this time period. These volcanoes reside in all Preparedness Areas (1, 2, 3, 4, 5 and 6) with a majority of volcanic concentration in Preparedness Areas 4 through 6 (Figure 6-60).

The Raton/Clayton volcanic field is most relevant to Union County. This is a scoria cone / silicic dome field associated with the Capulin Volcano and is assessed as an intermediate volume volcano.

[39] Source: Mullineaux, D.R. 1976. Preliminary overview map of volcanic hazards in the 48 conterminous United State: U.S. Geological Survey Miscellaneous Field Studies Map MF-786.

Figure 6-60 Volcanic Hazard areas in New Mexico - based on events over the last 15,000 years[40]



Extent[41]

Volcanoes can vary by extent, depending on the specific type of event. Some eruptions may last for months, with others lasting a very brief time. Likewise, some events will have a very slow onset while others may occur very rapidly.

One way to quantify the magnitude of a volcanic eruption is the Volcanic Explosivity Index (VEI), which is proportional to the logarithm of ejecta volume (see following figure). While this index is useful once an eruption is occurring, there is not currently an application of this index to the planning area, as it is typically unknown what the extent of an eruption will be prior to the event.

[40] Source: http://nmnaturalhistory.org/online-exhibits-geoscience/volcanoes-new-mexico
[41] From 2018 New Mexico State Hazard Mitigation Plan

Figure 6-61 Volcanic Explosivity Index

Volcanic Explosivity Index				
VEI	**Description**	**Plume**	**Ejecta volume**	**Frequency**
0	Non-explosive	< 100 m	> 1000 m^3	daily
1	Gentle	100-1000 m	> 10,000 m^3	daily
2	Explosive	1-5 km	> 1,000,000 m^3	weekly
3	Severe	3-15 km	> 10,000,000 m^3	yearly
4	Cataclysmic	10-25 km	> 0.1 km^3	≥ 10 yrs.
5	Paroxysmal	> 25 km	> 1 km^3	≥ 50 yrs.
6	Colossal	> 25 km	> 10 km^3	≥ 100 yrs.
7	Super-colossal	> 25 km	> 100 km^3	≥ 1000 yrs.
8	Mega-colossal	> 25 km	> 1,000 km^3	≥ 10,000 yrs.

Previous Occurrences[42]

Previous occurrences have been included in the preceding section for this hazard. There have been more than 700 volcanic eruptions in New Mexico in the last five million years. At least three eruptions have occurred in the last 10,000 years.

Probability[43]

With respect to volcanoes and volcanic activity, New Mexico has one of the largest numbers, largest range of ages, largest diversity of types, largest range of preservation, and some of the best examples of types in North America. The question remains as to how likely it is that an eruption will occur in New Mexico in the near future, and what type of eruption this might be. There have been more than 700 volcanic eruptions in New Mexico in the last five million years. At least three eruptions have occurred in the last 10,000 years.

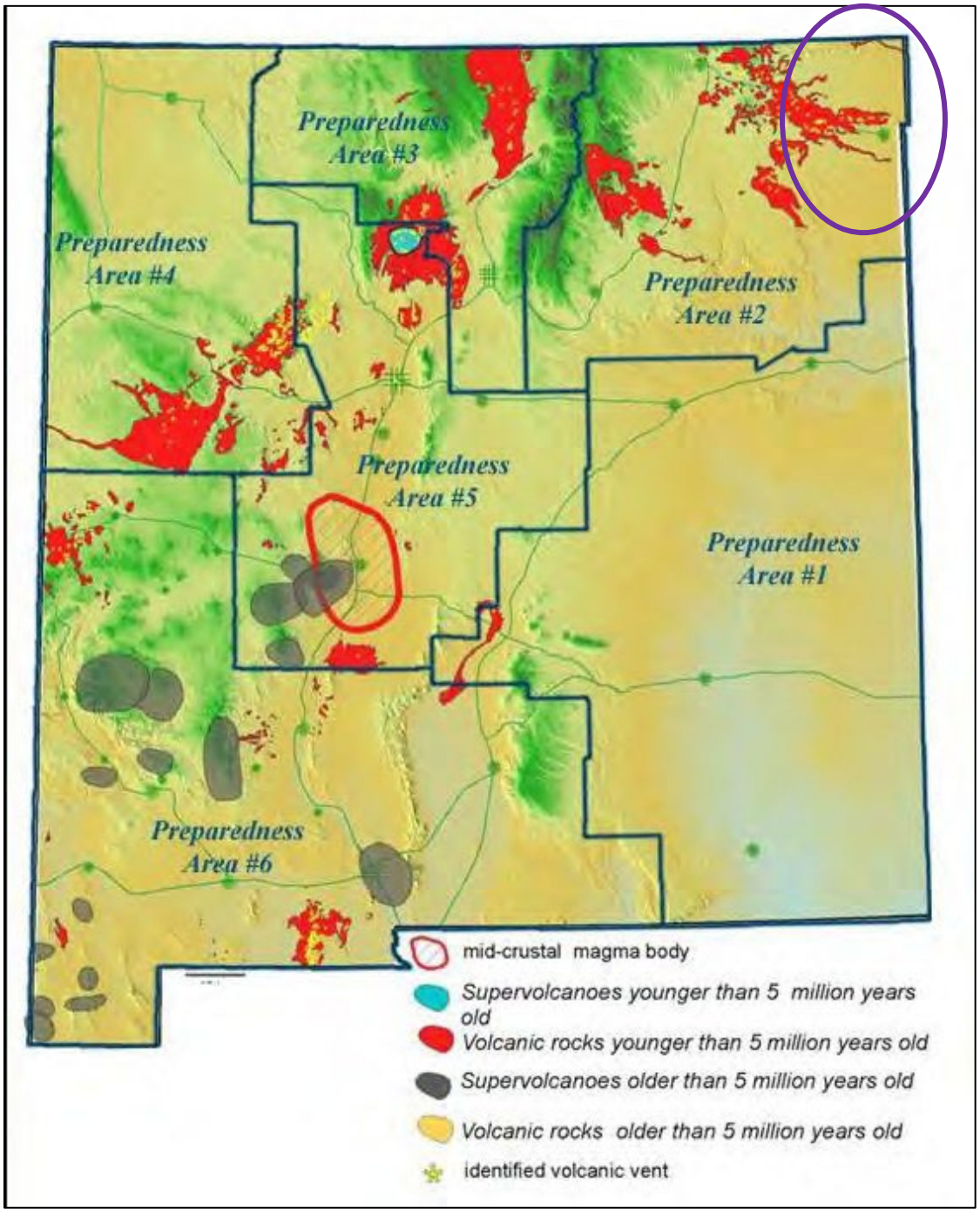
Prior to an eruption, magma (molten rock) migrates into a magma chamber, or reservoir, beneath a volcano. As magma moves toward the surface, it (1) releases gases such as water, sulfur dioxide and carbon dioxide, (2) produces small earthquakes, and (3) causes subtle swelling above the magma chamber and on the flanks of the volcano. Scientists can watch for these warning signs by monitoring gases emitted by the volcano, determining the location, size, and migration of small earthquakes under the volcano by using seismographs, and by measuring changes on the slopes or inflation of the volcano. To measure the slope changes, they use tiltmeters and geodetic methods, especially permanent and temporarily deployed GPS receivers.

The probability of a volcanic event in the county is unlikely. As stated previously, the last volcanic episode in the State occurred approximately 3,900 years ago. Based on past occurrence of volcanism in the state (see following figure), it can be loosely estimated that there is roughly a 1% chance that some

[42] From 2018 New Mexico State Hazard Mitigation Plan
[43] From 2018 New Mexico State Hazard Mitigation Plan

type of volcanic eruption could occur somewhere in New Mexico in the next 100 years, and a 10% chance that an eruption will occur in the next 1,000 years.

Figure 6-62 New Mexico Volcanic Activity[44]



[44] Source: http://nmnaturalhistory.org/sci_volcanoes.html

Vulnerability Assessment

Inventory Exposed/Impacts

Exposure to a volcanic event depends on a number of factors, most importantly the type and location of the event and its magnitude. A volcanic event has the ability to impact all sectors of Union County including agriculture, the public, structures and infrastructures, the environment, and the economy.

Critical Facilities Exposed/Impacts

All critical facilities face the same exposure and potential impacts from a volcanic event.

Potential Losses

Due to a lack of historical loss data and the most recent damaging event occurring close to four-thousand years ago, there is no way to estimate potential losses from an event.

Future Conditions

Land Use and Development

Per the Union County Comprehensive Plan (2020), all areas of the county are expected to see continued population stagnation, with future projections suggesting population decline through 2040. Any new development in and around areas of known volcanic activity have a potential to increase the county's risk to volcanic events.

Climate

Future climatic conditions are not projected to impact the volcanic hazard in Union County.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. All communities ranked the risk from volcano to be low, compared to other profiled hazards.

Table 6-39 Volcano Risk Ranking

	Risk Rank
Unincorporated Union County	Low
Town of Clayton	Low
Village of Des Moines	Low
Village of Folsom	Low
Village of Grenville	Low

Due to the inability to execute mitigation measures for the Volcano Hazard, this section serves as analysis and awareness, but the hazard is not a part of the mitigation strategy.

6.2.11 Wildland Fire

Description

Wildfires are an ongoing concern for Union County. Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in the air. These conditions increase the potential for a wildfire to occur. Additionally, when combined with high winds and years of drought, fire conditions are exacerbated. A fire along the urban/rural interface can result in major losses of property and structures. The Wildland-Urban Interface (WUI) is defined as any area where manufactured improvements are built close to, or within, natural terrain and flammable vegetation. Limited access in some parts of the county complicates evacuation and control options and constitutes serious life risk to residents and firefighters alike.

In wildland fire vernacular, hazard is defined as the physical situation with potential for causing damage to resources or assets, measured by burn probability and fire intensity. Risk is the overall measure of the possibility for loss or harm caused by wildfire, and is based on the combination of wildfire hazard and vulnerability.

Fire danger refers to a combination of fuel moisture and weather conditions that combine with topography and other fuel characteristics to determine fire behavior as manifested in fire intensity and rate of spread. Fireline intensity is a function of rate of spread and heat per unit area; it is directly related to flame length and relates to the heat felt by a person standing next to the flames. Factors that contribute to fire risk are described below.

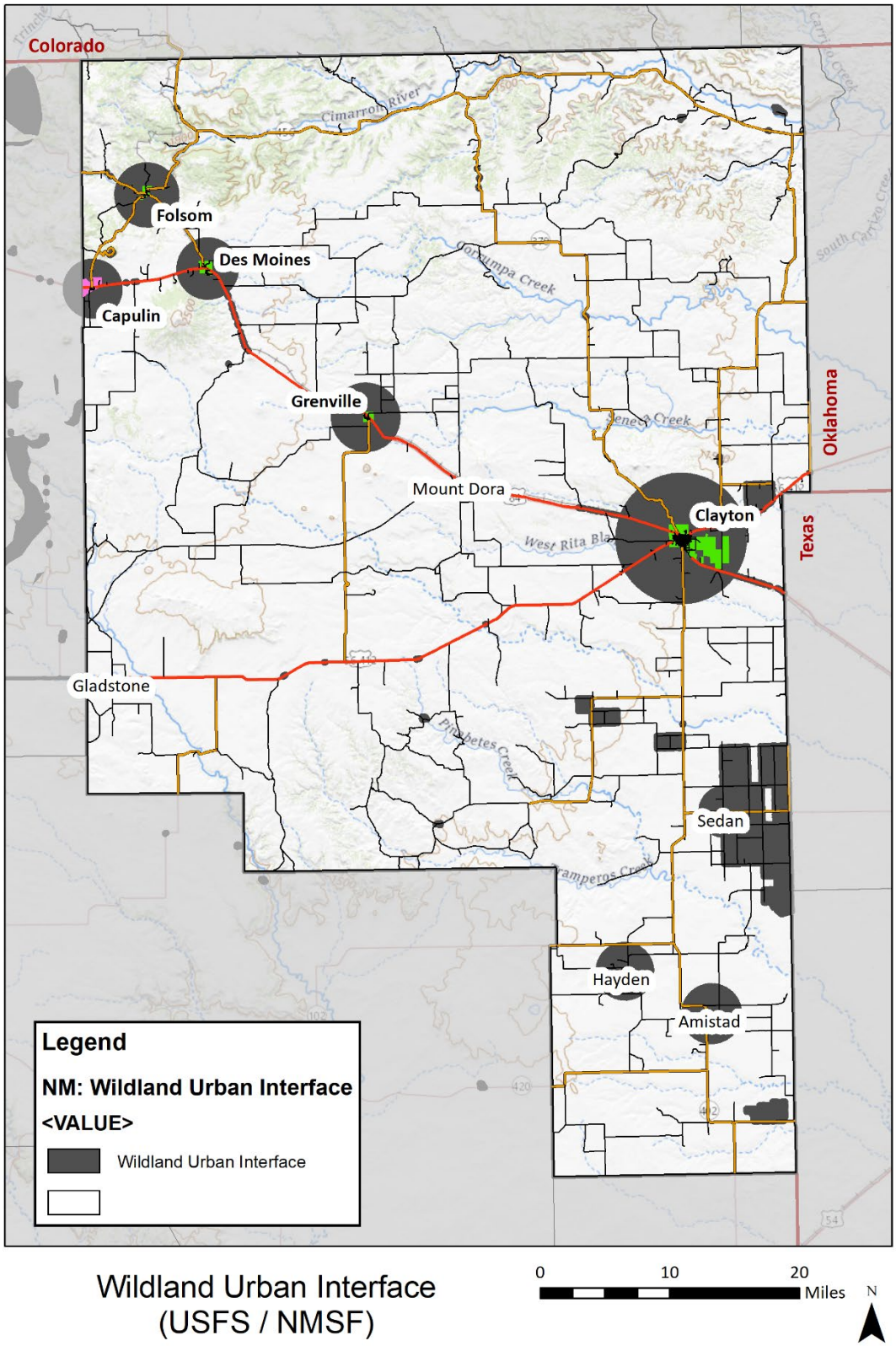
- **Fuel**— Vegetative fuels are characterized by size, continuity, and quantity and are often classified in terms of fire behavior fuel models (FBFM). These fuel characteristics determine responsiveness to weather conditions and ignition. Fuel sources are diverse and include ground fuels (roots, duff), surface fuels (forest litter, dead and down twigs and branches, grass, shrubs), and aerial fuels (the canopies of forest and brush). Structures and other associated combustibles are also considered fuel sources. Light surface and canopy fuels, such as cured grasses and drought stressed tree crowns, burn quickly, and serve as a catalyst for rapid fire spread.
- **Topography**—An area's terrain and land slopes affect its susceptibility to wildland fire spread. Fire intensities and rates of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The natural arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.
- **Weather**—Weather components such as temperature, relative humidity, wind, and lightning affect the potential for wildland fire. High temperatures and low relative humidity dry out the fuels that feed the wildland fire, creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most influential weather factor for fire intensity and the direction and rate of fire spread. Winds can be significant at times in Union County. In addition to high winds, wind shifts can occur suddenly due to frontal passage, temperature changes, or the interaction of wind with topographical features such as slopes or steep hillsides. Seasonal and episodic drought affects fuels' susceptibility for combustion.
- **Ignitions**—Wildland fires are ignited by natural causes, predominately lightning, or human causes. Federal agencies categorize human caused fires based on their source including equipment, smoking, campfires, debris burning, railroads, and arson. Human caused ignitions are associated with travel corridors, population centers, recreational use, and commercial activities.

Additionally, factors such as drought conditions, development, aircraft accidents, increase in outdoor activity, and forest health/management practices all contribute to wildfire risk in Union County. Wildland fire is a major component to the Drought – Wildfire – Flood Cycle detailed earlier in this chapter.

Location

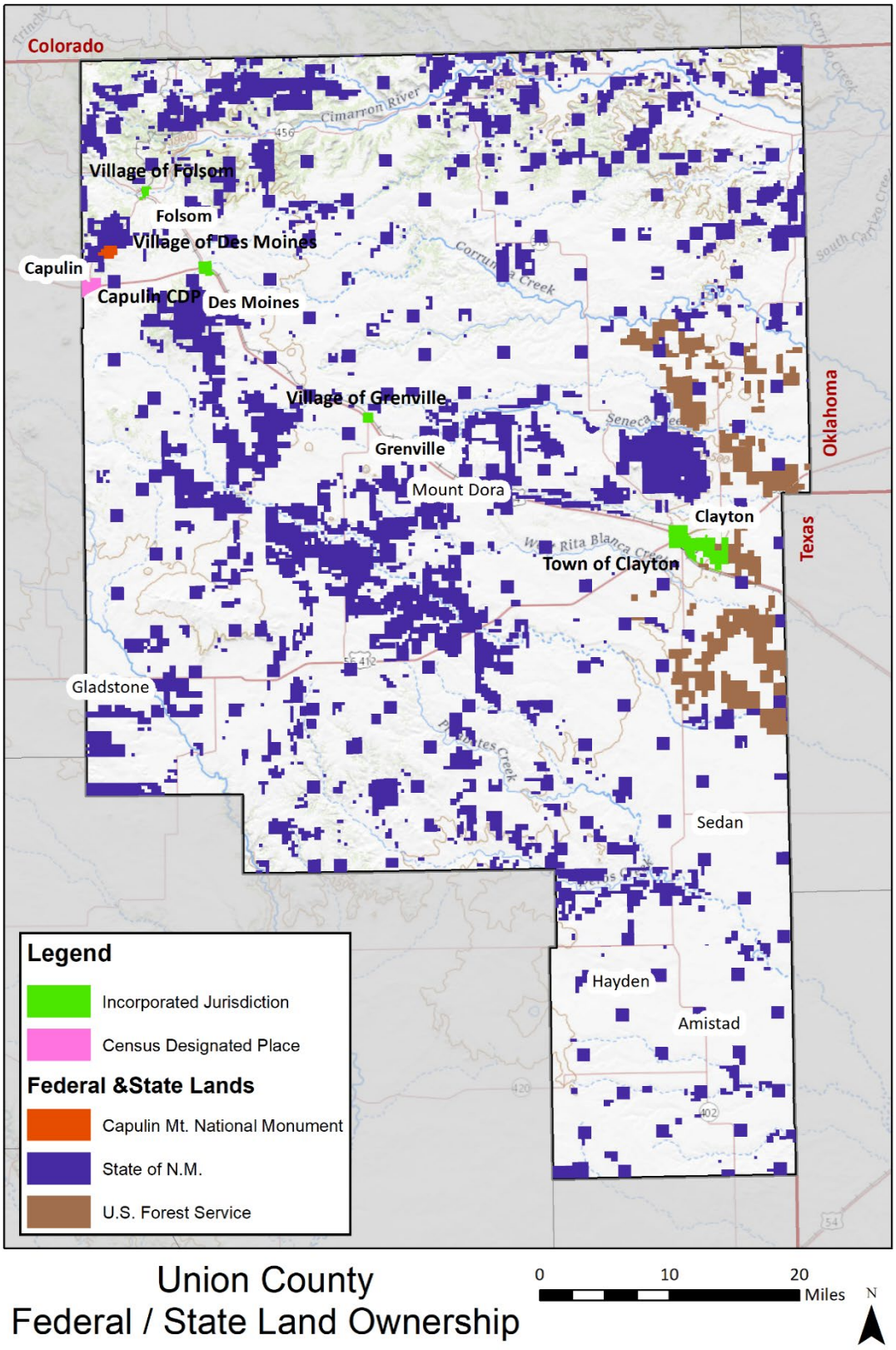
For the purposes of this Plan, the location of the wildfire hazard is analyzed based on the WUI that was defined as part of the Union County 2008 Community Wildfire Protection Plan (CWPP). The following figure presents these WUI areas, which surround the county's more developed areas.

Figure 6-63 Union County WUI



Additionally, it is important to recognize the varied state and federal land holdings across the county. The following figure shows the patchwork nature of these state and federal lands, which requires close coordination with all agencies from a wildland fire mitigation standpoint.

Figure 6-64 Union County State and Federal Lands



Extent

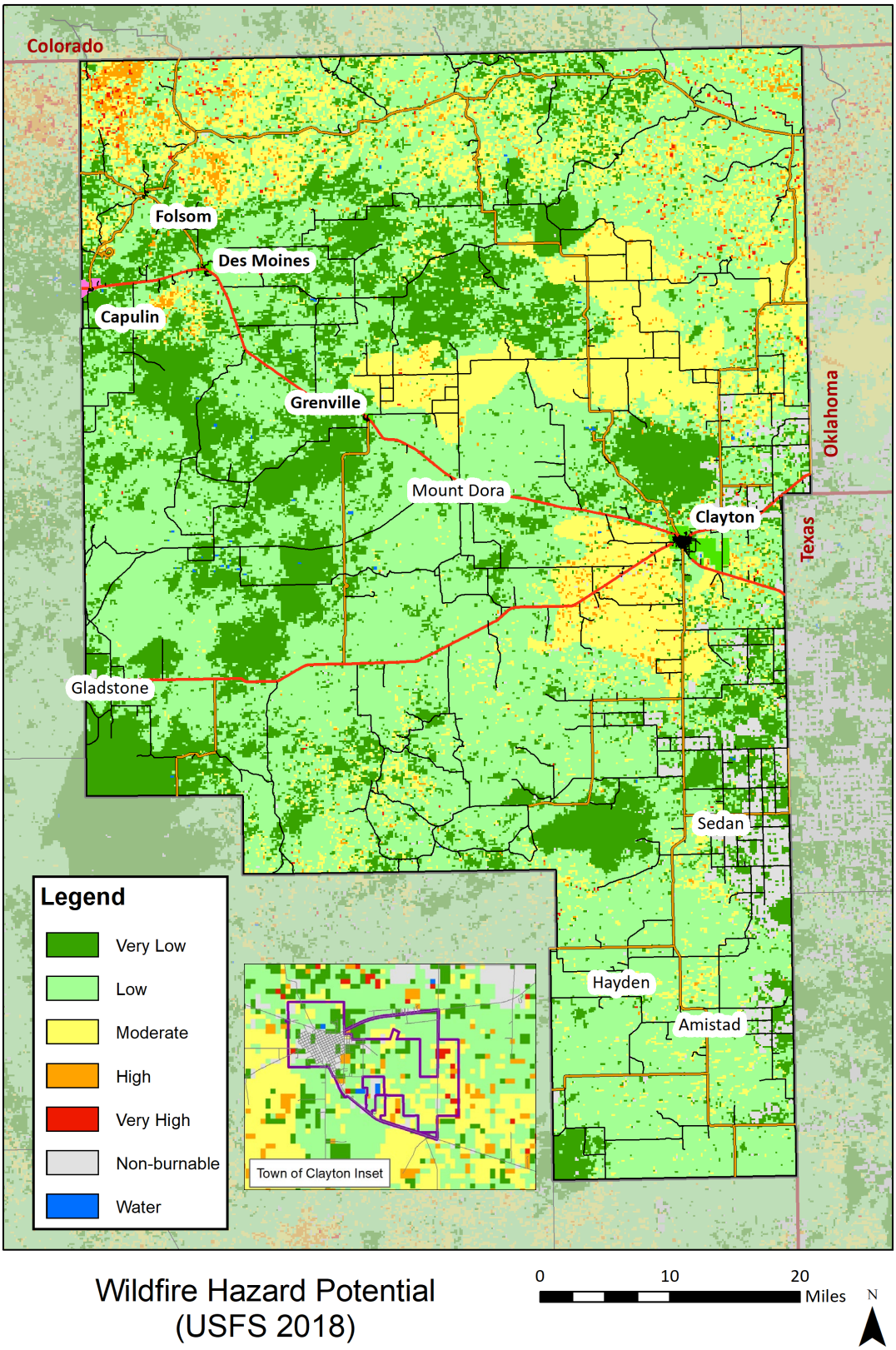
In Union County, small fires can grow rapidly when adequate fuels coincide with weather and topography favorable to fire. Wildfires can last from several hours to several months. Generally, the fire season extends from early spring to late fall.

The USDA Forest Service has created a nationwide Wildfire Hazard Potential GIS layer. Wildfire hazard potential (WHP) is an index that depicts the relative potential for wildfire that would be difficult for suppression resources to contain, based on wildfire simulation modeling. This dataset produced by the USDA Forest Service, Fire Modeling Institute in 2018 shows WHP at a spatial resolution of 270 meters across the entire conterminous United States, classified into five WHP classes of very low, low, moderate, high, and very high. Areas mapped with higher WHP values represent fuels with a higher probability of experiencing torching, crowning, and other forms of extreme fire behavior under conducive weather conditions, based primarily on 2012 landscape conditions."[45]

The following figure presents the WHP for Union County. Due to the scale of the data, it was not useful to perform mapping at the individual community level. As the figure shows, Union County experiences all classes of WHP, though most of the populated area's potential is very low to moderate. There are pockets of high and very high potential scattered across the county, with the most instances found in the north, particularly the northwest corner.

[45] https://usfs.maps.arcgis.com/home/item.html?id=fc7f208f4bf34cf3ad34eff72261b140

Figure 6-65 Union County Wildfire Hazard Potential



Previous Occurrences

The following table summarizes the best available historical loss information relating to wildland fire. As presented in the HIRA Historical Events Summary table at the beginning of this HIRA chapter, wildfire events are one of the seemingly least documented hazards in the county. As additional data sets from the state become available during future Plan updates, it is expected that there will be many additional historical events to document.

Table 6-40 Wildland Fire Historical Losses

Source	# of Damaging Events	Years of Record	# of Damaging Events (annually)	Property Damages	Property Damages (per capita)	Crop Damages	Crop Damages (per capita)	Injuries	Fatalities
NCEI	2	68	0.03	$2,500,000	$595	$0	$0	0	0
SHELDUS	4	58	0.07	$2,248,205	$522	$0	$0	0	0
USGS	31	36	0.86	-	-	-	-	-	-

Larger recent events documented by the state are presented in the following table. The county's largest wildfire over the past 20 years was the Stateline fire of 2018. It burned close to 28,000 acres, though much of this occurred across the state line in Colorado. The Gladstone Complex of 2006 was another large event, but not all of this event burned in Union.

Table 6-41 Recent Large Wildland Fire Events

Year	Name	Acres Burned
2018	Stateline	28,103
2018	Spool	447
2006	Rabbit	497
2006	Windy	6349
2006	Gladstone Complex	19,844
2006	Newby	400

Year	Name	Acres Burned
2005	K-48	135
2005	OK State Line	6,087
2001	Rinker	0
2000	Morris	661
2000	Kiowa 54	177
2000	Rabbitear	941
2000	Allen	428

Additional historical wildfire mapping is also available. The following figures present best available historical data from the state and federal government. The main takeaway from these maps is that wildland fires can and do occur across the entire county.

Figure 6-66 Union County Historical Wildland Fires (Federal)

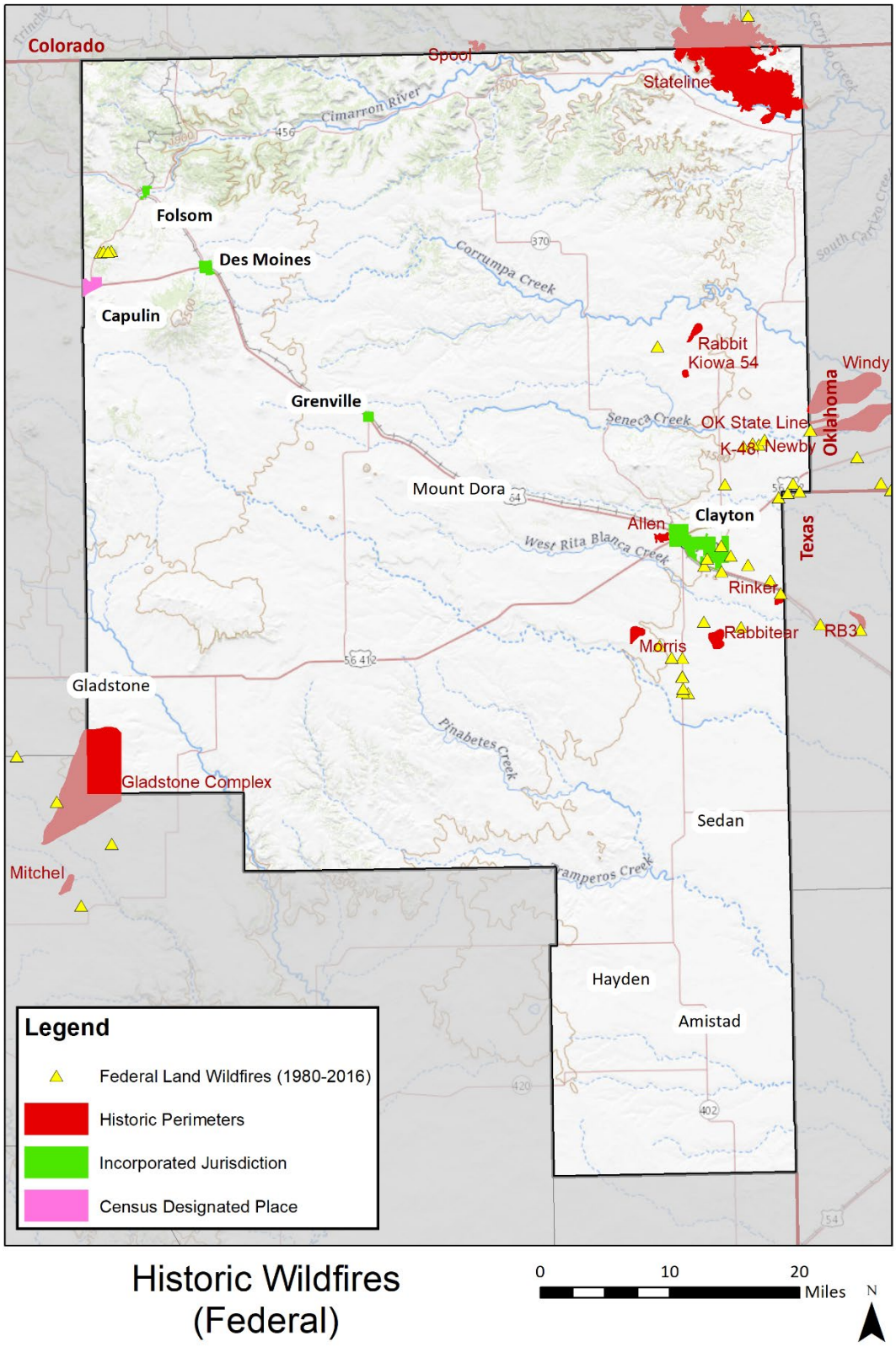


Figure 6-67 Union County Historical Wildland Fires (State Large)

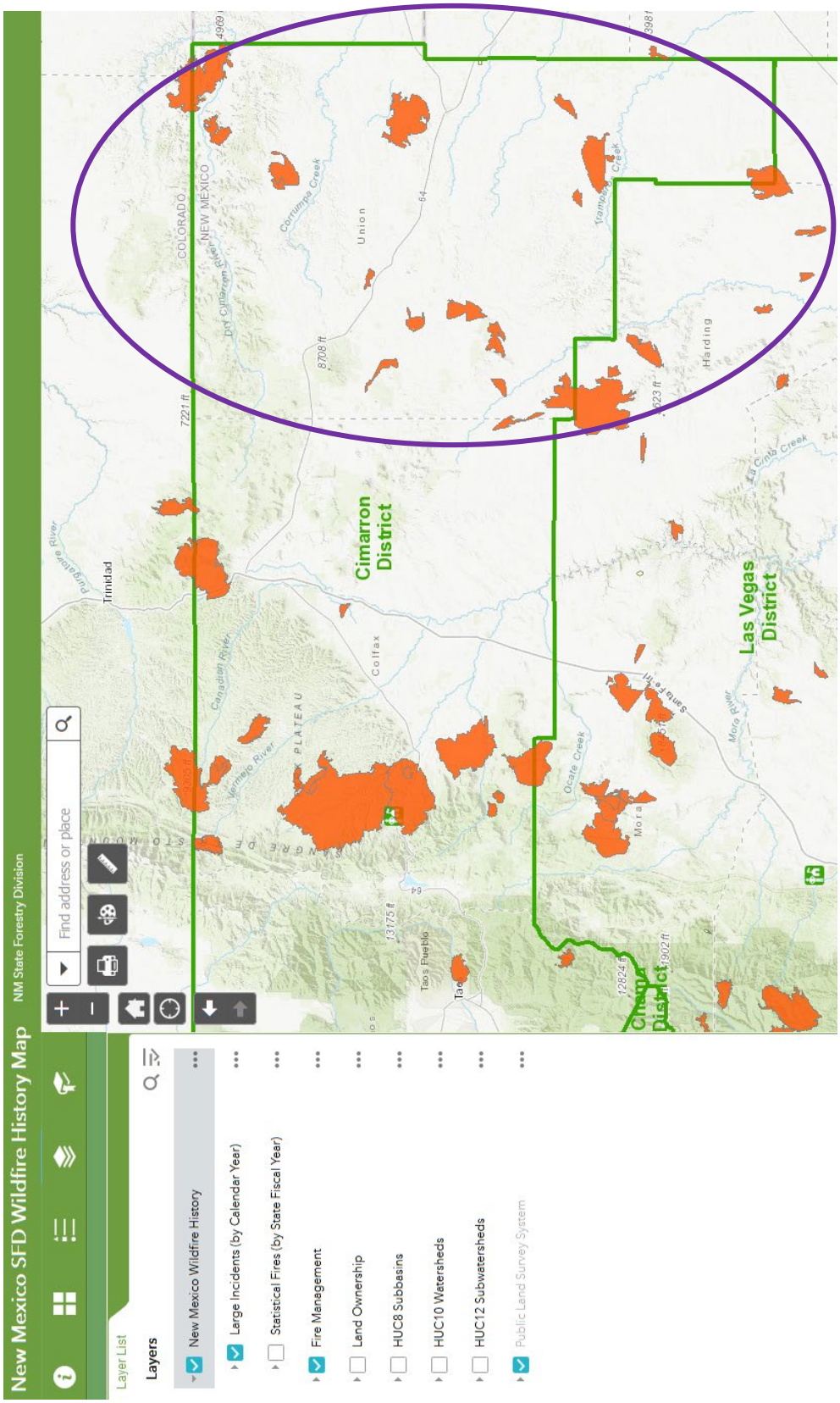
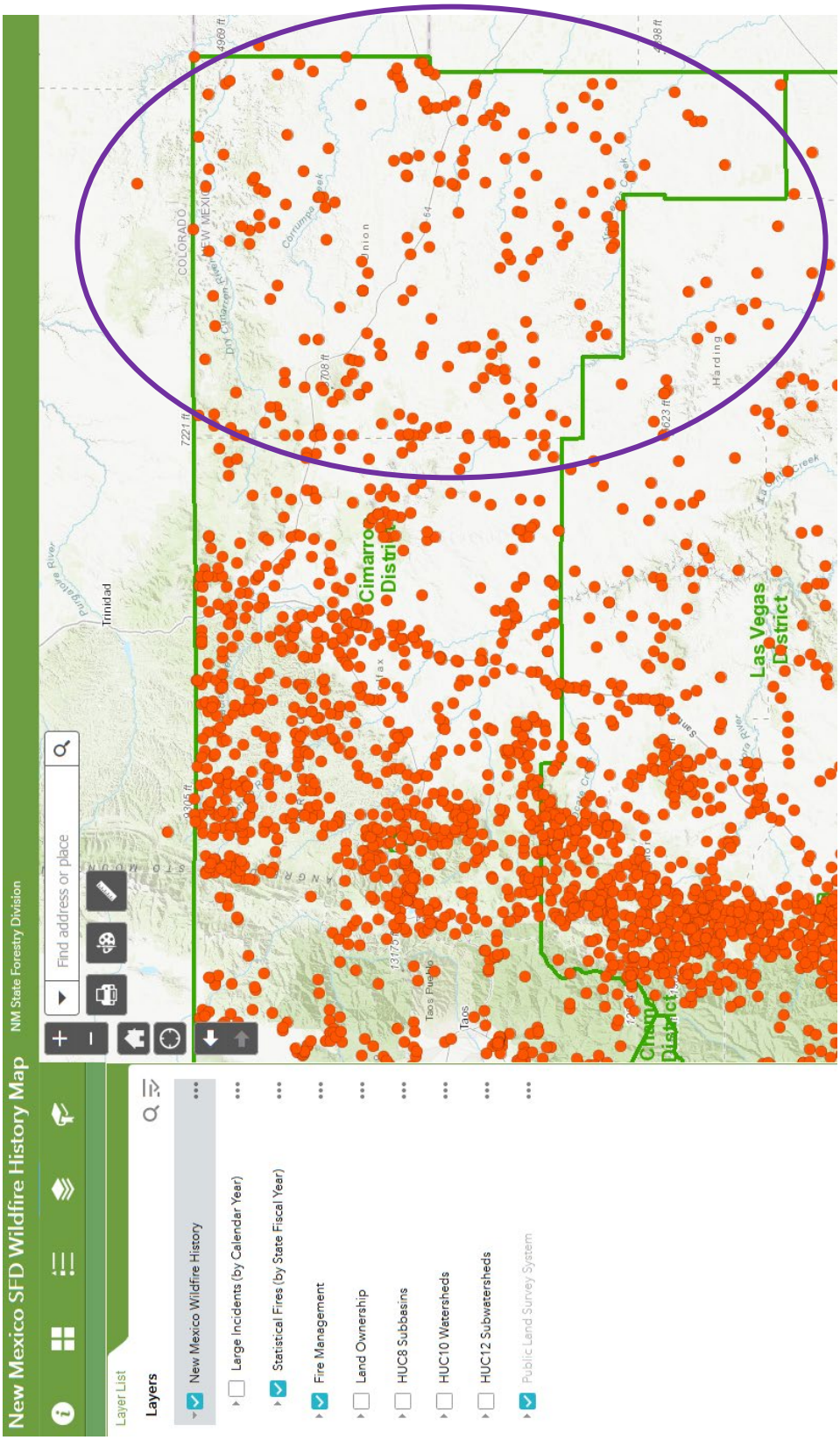


Figure 6-68 Union County Historical Wildland Fires (State All)



Probability

According to the available data (which is assumed to be under reporting events), Union County can expect a wildland fire to occur nearly annually, which correlates to a likely probability. The number, extent, and severity of these fires are subject to numerous climatic, weather, and stochastic factors. Historic trends and the condition of the local forests indicate that the occurrence of a large fire should be expected in the future.

Vulnerability Assessment

Inventory Exposed/Impacts

Although wildfires are a natural part of forested ecosystems, they present a major threat to people and property in Union County. A wildfire can cause evacuations, injuries, and loss of life. Additionally, wildfires can cause severe damage to buildings and infrastructure in the county. Damages to homes and businesses can impact the livelihood of county residents. A major wildfire can also impact the tourism economy. Life safety and human health are serious concerns due to some limited evacuation routes. Additionally, smoke from wildfires can have negative impacts on human health. Wildfire smoke is a contributor to particulate matter, which can become lodged deep in the lungs and can enter the bloodstream. It can also trigger asthma attacks, heart attacks and strokes, and, in some cases, cause lung cancer. Union County can also be impacted by smoke from fires originating outside of the county boundaries.

Although a natural process, wildfires can mar scenic view-sheds and watersheds, potentially reducing property values and negatively impacting tourism. Fires can be intensified by drought and can contribute to higher risk of debris flows by destroying vegetation that anchors the soil.

Wildfire risk and potential for losses has been exacerbated by the increase in high-intensity wildfires that the western United States has experienced. In order to reduce the risk of a catastrophic wildfire, mitigation measures must be comprehensive, and balance different needs such as forest health, access to recreation, and development.

Per the 2008 Union County Community Wildfire Protection Plan (CWPP), and as referenced in the 2019 New Mexico Communities at Risk Assessment Plan, the wildland fire risk for Union County communities is presented in the following figure.

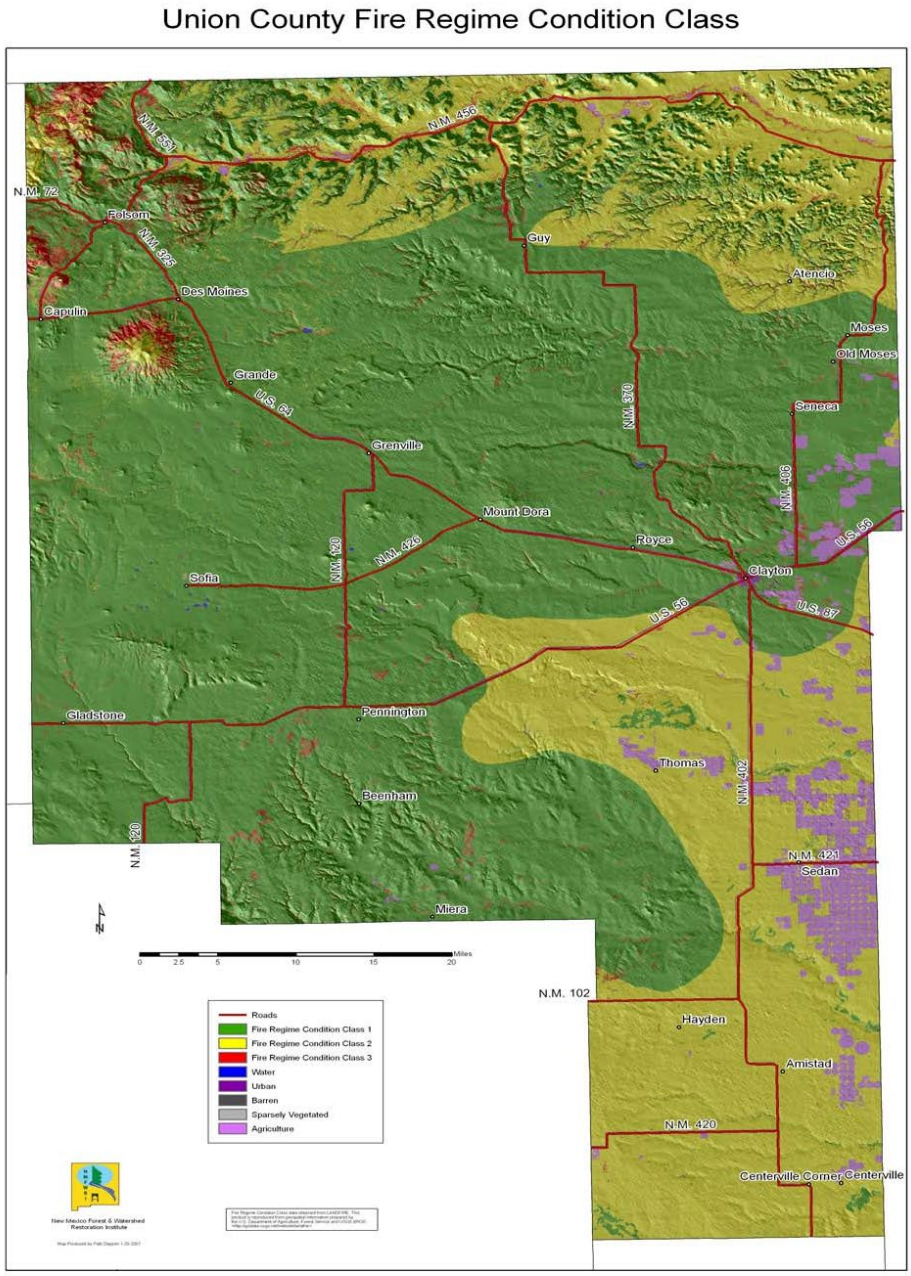
Figure 6-69 Union County Community Wildland Fire Risk Rankings

GOVERNMENT/CLASS	COMMUNITY	TOTAL
Union County		**12**
High Risk		0
Moderate Risk		2
	Capulin	
	Folsom	
Low Risk		10
	Amistad	
	Clayton	
	Des Moines	
	Gladstone	
	Grenville	
	Hayden	
	Mount Dora	
	Sedan	
	Strong City	
	Thomas	

The CWPP also provided information relating to wildfire risk and Fire Regime Condition Class (FRCC). FRCC provides an estimation of expected fire behavior as compared to historic "norms" in Union County. The majority of the county is within the natural, historical range of fuel composition, fire frequency, severity, and pattern. There are large areas that show a moderate departure and some small areas where a high departure has been measured.[46] The following figure shows the FRCC data showing areas across the county with higher wildfire risk. Note the highest risk areas are in the northwest portion of the county, while moderate (FRCC class 2) areas are mainly found in the north/northeast and central to southeastern areas of the county.

[46] 2008 Union County Community Wildfire Protection Plan

Figure 6-70 Union County FRCC Classifications

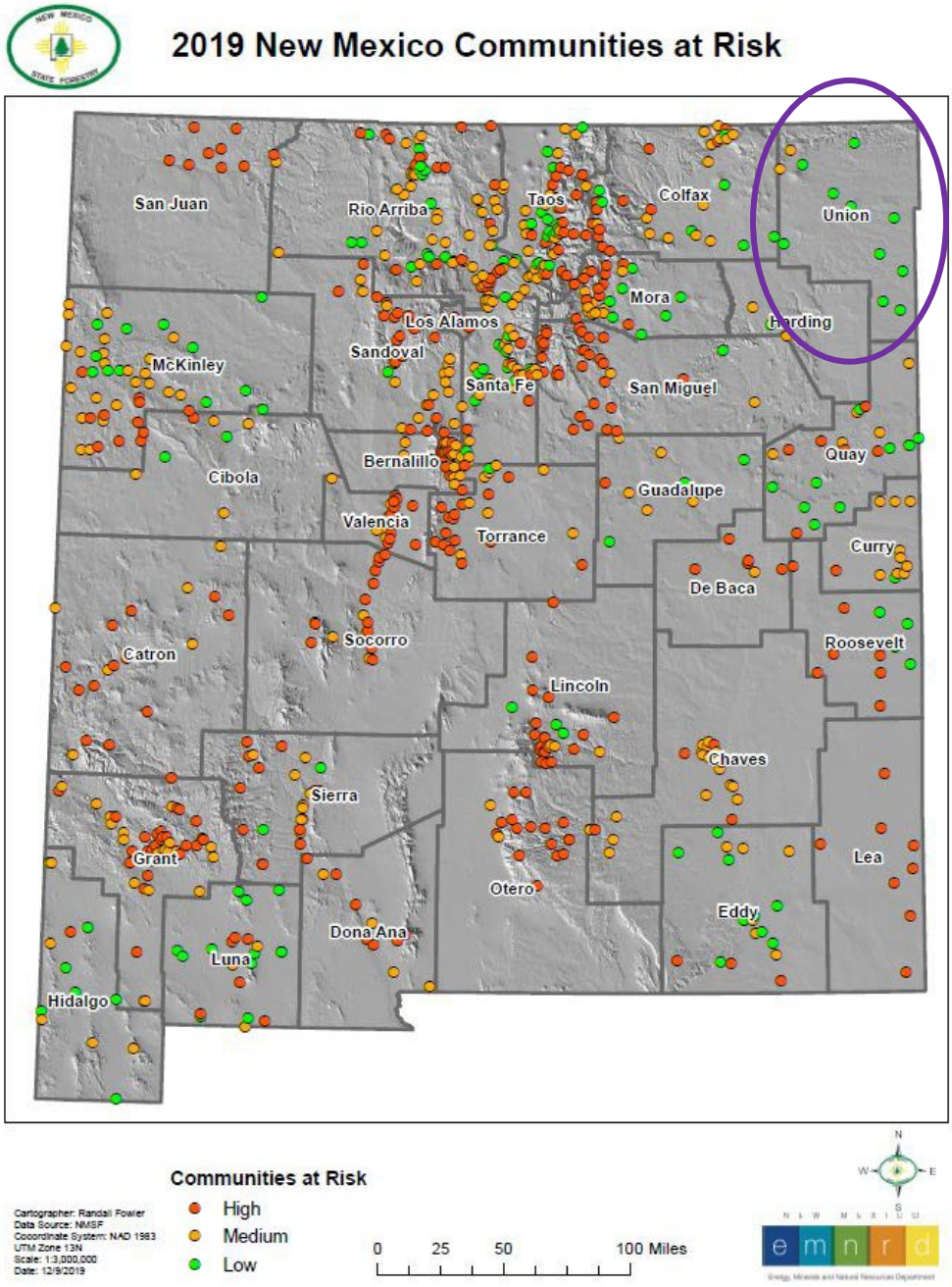


map date 01/2008

Union County Community Wildfire Protection Plan, June 2008 18

Additionally, the statewide risk results are mapped for reference. Overall, Union County has some of the lowest collective risk compared to other counties, but the Capulin and Folsom communities were ranked as being at moderate risk.

Figure 6-71 New Mexico Community Wildland Fire Risk Rankings



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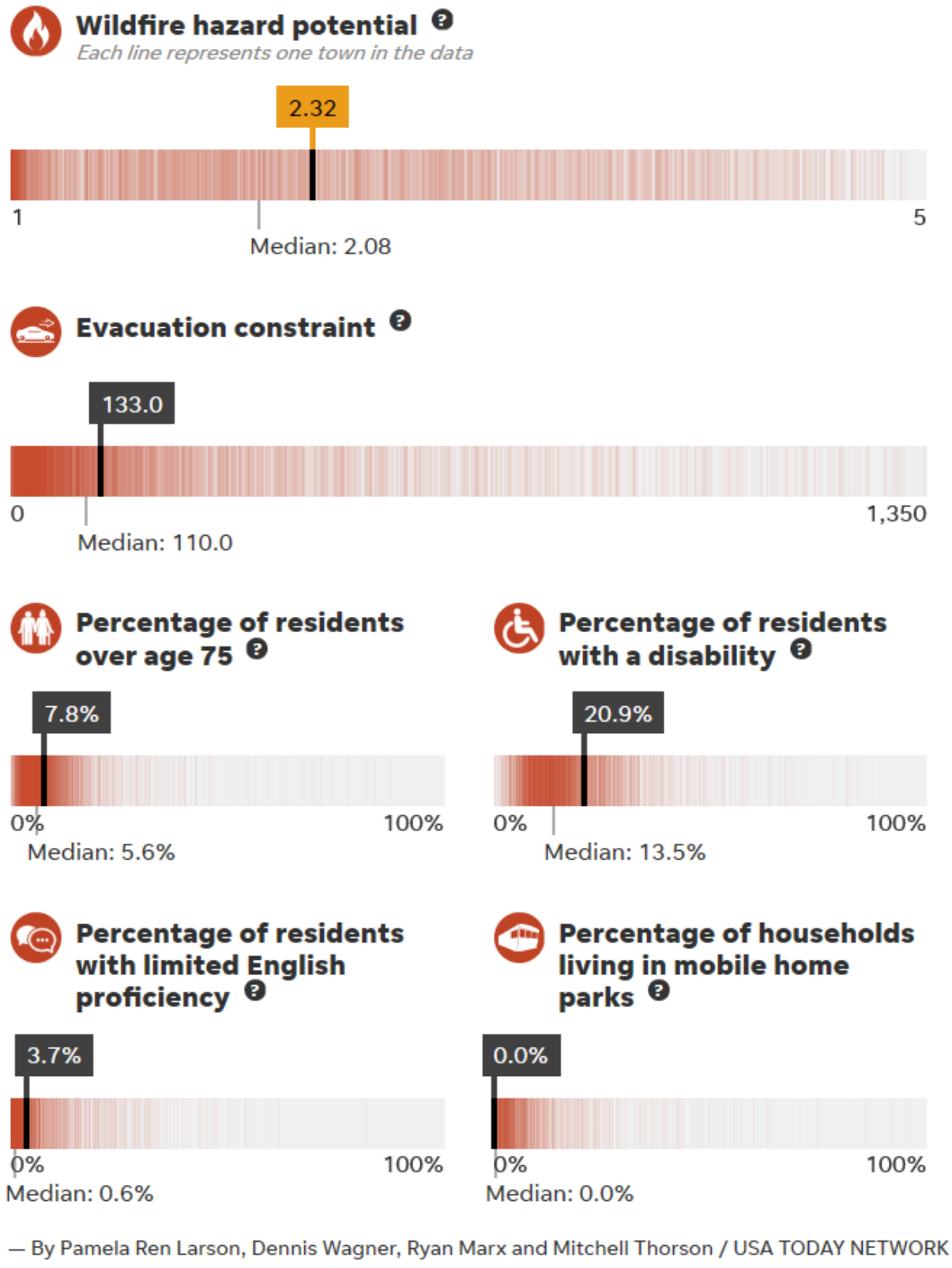
A report titled: 'Ahead of the Fire: Where will the West's next deadly wildfire strike? The risks are everywhere.[47]" was published in The Arizona Republic in the summer of 2019. The study, spurned by the devastating Paradise fire in California, looked across 5,000 small communities across 11 states to determine wildfire risk. Inputs into this analysis included the previously mentioned wildfire hazard potential (WHP) dataset, in addition to the following inputs: evacuation routes, resident age, disabilities, language spoken, emergency alerts, and mobile home inventories. A sample community report for the Town of Clayton is provided in the following figure.

Specifically, for the Town of Clayton, its wildfire hazard potential score of 2.32 is higher than the median score (2.08) across the study. The Town's evacuation constraints (133) were also assessed to be close to, but higher than the median score (110). The percentage of elderly, disabled, or limited English-speaking residents of the Town were found to be all higher than the study median. Lastly, Clayton met the median value for residents living in mobile home parks.

[47] https://www.azcentral.com/in-depth/news/local/arizona-wildfires/2019/07/22/wildfire-risks-more-than-500-spots-have-greater-hazard-than-paradise/1434502001/

Figure 6-72 Town of Clayton "Ahead of the Fire" Risk Report



— By Pamela Ren Larson, Dennis Wagner, Ryan Marx and Mitchell Thorson / USA TODAY NETWORK

The results for all communities across Union County included in this study are summarized in the following table. Note the top row represents the median score across the 5,000 communities in the study. Overall, the highest WHP is found in Clayton, followed by Folsom and Des Moines. The Town of Clayton was the only community in Union County scoring above the median for evacuation constraints.

Table 6-42 "Ahead of the Fire" Wildland Fire Risk Rankings

	Wildfire Hazard Potential	Evacuation constraint	% Residents over 75	% Residents with a disability	% Residents limited English	% Households living in mobile home parks
Median Study Score	(2.08)	(110)	(5.6%)	(13.5%)	(0.6%)	(0.0%)
Town of Clayton	2.32	133	7.8	20.9	3.7	0.0
Village of Des Moines	1.95	12	25.0	19.6	0.0	0.0
Village of Folsom	2.01	4	12.2	29.3	0.0	0.0
Village of Grenville	1.64	2	0.0	0.0	0.0	0.0
Capulin CDP	1.23	8	8.3	25.0	1.7	0.0

Critical Facilities Exposed/Impacts

There are 47 critical facilities located in the currently defined WUI, meaning only six of the overall 53 facilities are not within the WUI. One critical facility (NMDOT structure) was located in a high wildfire hazard potential area. There are five additional critical facilities found in moderate hazard potential areas. These include the Town of Clayton's sewage plant, jail, fire department, and town building, in addition to a Santa Fe Trail site.

Potential Losses

Wildland fire poses a major public safety hazard in Union County. Life safety and human health are serious concerns. Wildfire has the potential to cause widespread and severe damage to watersheds and property in the planning area.

The highest recorded losses from wildland fires total close to $2.5 million in property damages, which equates to $36,764 in annualized losses from this hazard. As mentioned throughout this section, it is well believed that the historical loss information for wildfires may be vastly under reported, so these documented losses should be considered an exceptionally low estimate for what future potential losses may be.

Future Conditions

Land Use and Development

Per the Union County Comprehensive Plan (2020), all areas of the county are expected to see continued population stagnation, with future projections suggesting population decline through 2040. With much of the county susceptible to wildfires, new developments, can substantially increase residents' risk to wildfire. During a wildfire, growth increases the resources needed to protect development from burning, as well as increases firefighting costs. Any new developments in the county should evaluate their risk to wildfire.

Climate[48]

It is important to note that changing climate impacts will increase vulnerability to several natural hazards, including wildland fire. Increased warming, drought, and insect outbreaks, all caused by or linked to climate change, have increased wildfires, and impacts to people and ecosystems in the Southwest. Fire models project more wildfire and increased risks to communities across extensive areas. The 2014 publication 'Climate Change Impacts in the United States'[49] cautions that climate change is exacerbating the major factors that lead to wildfire: heat, drought, and dead trees. Between 1970 and 2003, warmer and drier conditions increased burned area in western U.S. mid-elevation conifer forests by 650%. More wildfire is projected as climate change continues, including a doubling of burned area in the southern Rockies.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. All communities ranked the risk from wildland fire to be high, compared to other profiled hazards.

Table 6-43 Wildland Fire Risk Ranking

	Risk Rank
Unincorporated Union County	High
Town of Clayton	High
Village of Des Moines	High
Village of Folsom	High
Village of Grenville	High

6.2.12 Hazardous Materials Release

Description

Union County is susceptible to accidents involving hazardous materials (hazmat) on roads, highways, railways, and at fixed facilities that manufacture, use, or store dangerous chemical substances. A hazardous materials incident may occur at any time during routine business operations or as a result of a natural disaster. The release of hazardous materials can threaten people and natural resources in the immediate vicinity of the accident. Air releases can prompt large-scale population evacuations and spills into water, or onto the ground, can adversely affect public water and sewer systems.

[48] 2018 New Mexico State Hazard Mitigation Plan

[49] Source: National Climate Assessment, 2014. http://nca2014.globalchange.gov/report/regions/southwest.

A transportation incident refers to accidental and uncontrolled releases of chemicals or other hazardous materials during transport (i.e., highways, pipelines, and airways). A fixed-facility incident is an uncontrolled release of chemicals or other potentially hazardous materials from a facility. Fixed facilities include companies that store hazardous materials at their facility, as well as all hazardous waste sites.

The U.S. Department of Transportation (U.S. DOT) uses nine classes of hazardous materials:

- Explosives
- Compressed Gasses: Flammable Gasses; Non-Flammable Compressed Gasses; Poisonous Gasses
- Flammable Liquids: Flammable (Flash Point Below 141 degrees); Combustible (Flash Point 141 degrees – 200 degrees)
- Flammable Solids; Spontaneously Combustible; Dangerous When Wet
- Oxidizers and Organic Peroxides
- Toxic Materials: Material that is Poisonous; Infectious Agents
- Radioactive Material
- Corrosive Material: Destruction of Human Skin; Corrode Steel at a Rate of 0.25 Inches Per Year
- Miscellaneous

The U.S. DOT, U.S. Environmental Protection Agency (EPA), and the Occupational Health and Safety Administration (OSHA) all have responsibilities in regulating hazardous materials and waste.

Location

There are no designated routes for hazardous materials transporters in Union County. Union County does acknowledge transport of munitions through the county via highway and railway, as shipments head towards the Pueblo Chemical Depot, a chemical weapons storage and disposal site located in Pueblo County, Colorado. The Pueblo Chemical Depot is one of the last two sites in the United States with chemical munitions and chemical material. It is currently scheduled for closure in 2022 / 2023.

There are several methods to determine locations of fixed facilities in an area.

Started in 1988, the Toxics Release Inventory (TRI) is a federal program established by the U.S. Environmental Protection Agency that contains information on releases of nearly 650 chemicals and chemical categories. This data is gathered from industries including manufacturing, metal and coal mining, electric utilities, and commercial hazardous waste treatment, among others. TRI facilities must file reports of their disposal or other environmental releases, as well as other waste management quantities of regulated chemicals; if they manufacture, process, or otherwise use more than the established threshold quantities of these chemicals. Union County has no reported TRI data.

Another method of determining hazardous materials fixed facility sites is through the U.S. EPA's National Priorities List (NPL). The NPL is the list of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. Union County does not have any active NPL or Superfund sites.

Natural gas pipelines are another source of potential hazmat events in the county.

Extent

The extent for a hazmat release can vary widely based on the chemical released, the amount, current weather, and location/type of release.

Previous Occurrences

Statistics from the National Response Center (NRC), which serves as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories, is the only identified available resource for historical event information. Unfortunately, currently the NRC website does not allow for data or searches to be made or extracted specifically for Union County.

Probability

Since there are currently no available records of specific past hazmat events in the county, there is no way to calculate a probability. Based on the LPC's assumption that hazmat events will continue to occur, the probability of an event is considered likely.

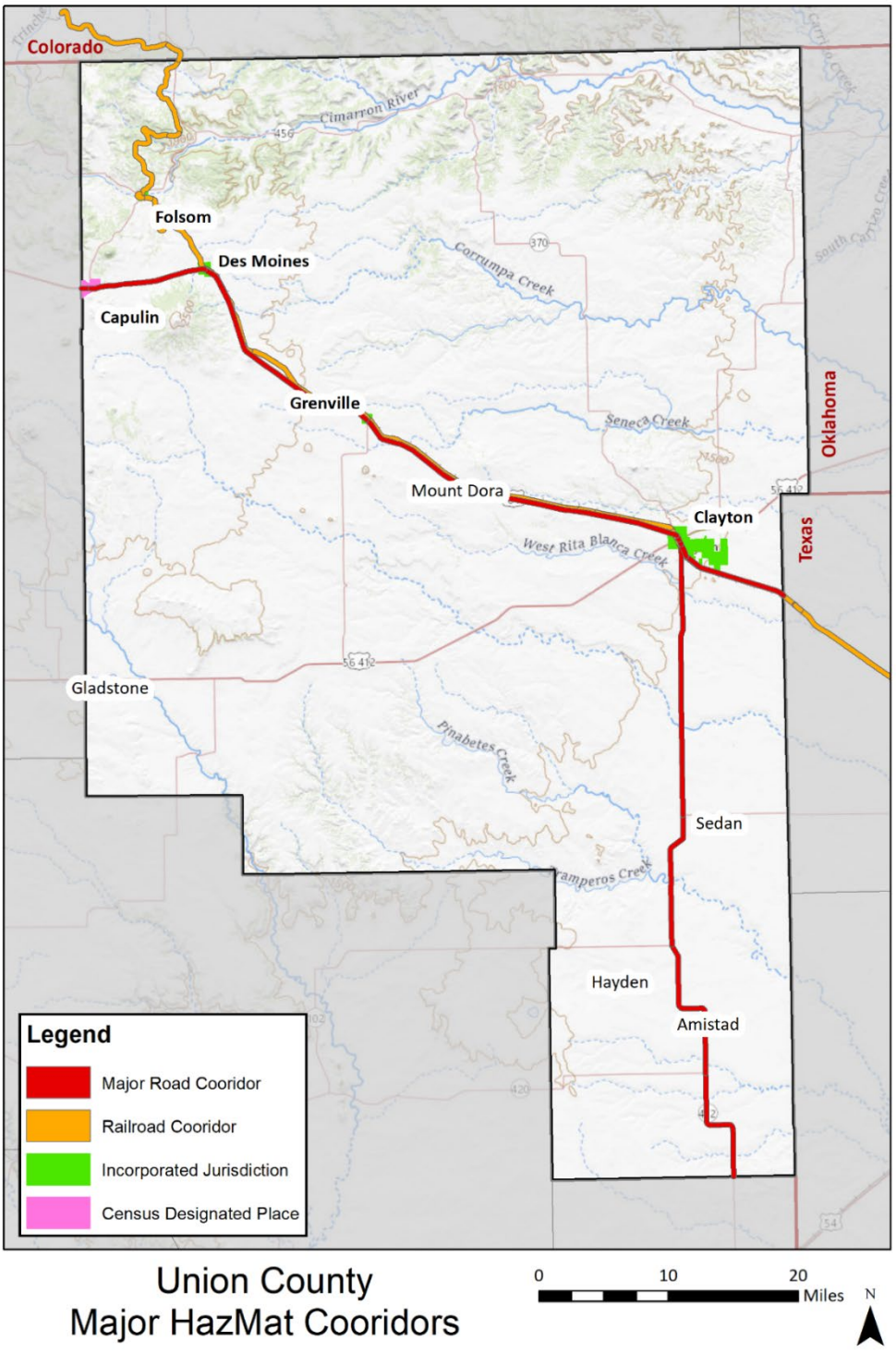
Vulnerability Assessment

Inventory Exposed/Impacts

People and the environment are at the highest risk to hazmat incidents in Union County. A hazmat release can cause acute or chronic impacts on human health, depending on the chemical released and level of exposure. Additionally, an incident causing an explosion or fire can cause injury or loss of life, as well as damages to structure or infrastructure. Releases in the environment may require costly remediation and can cause environmental damages, which could impact tourism and recreation in the county. Populated areas could experience a higher amount of people exposed to the impacts of a release.

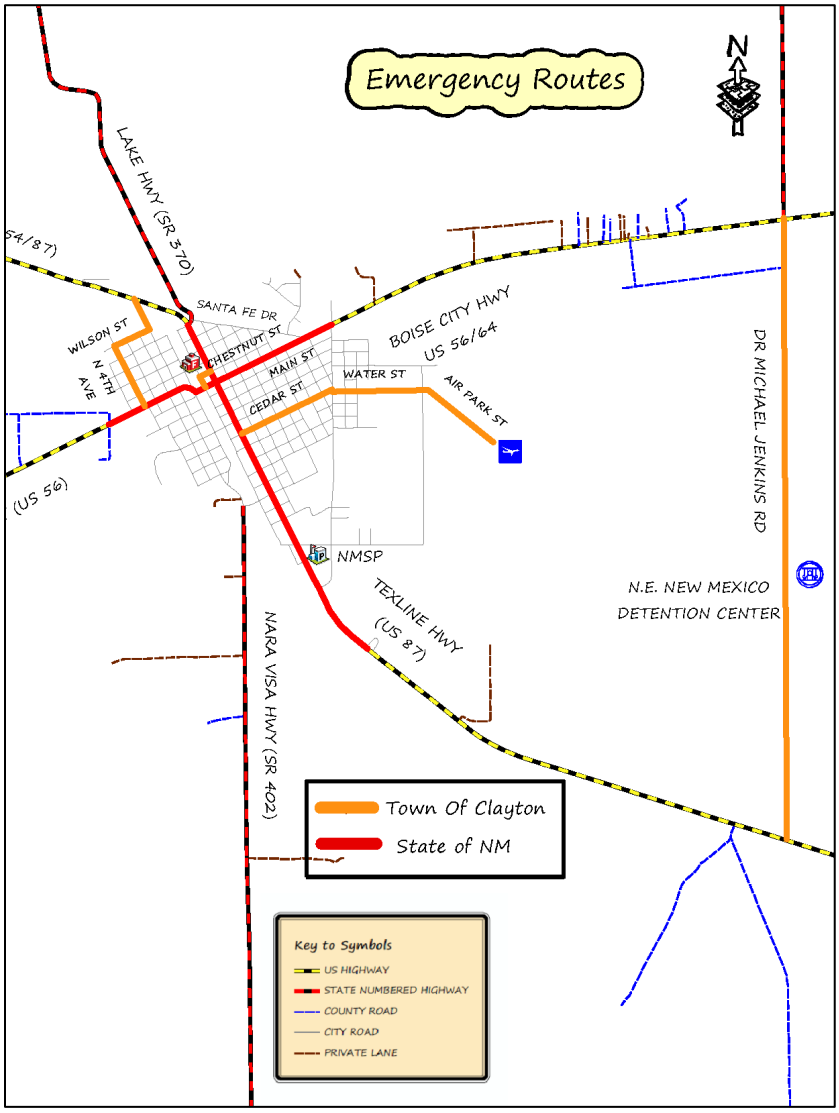
The following figure highlights the major road and railroad corridors across the county where hazmat is transported. As these corridors travel through all jurisdictions in the county, a generous portion of the county's residents are at risk for exposure to a transportation hazmat event.

Figure 6-73 Major HazMat Transit Corridors



A transportation hazmat release could cause road closures, which are a concern for the county as these hazmat transit routes are also identified as county and state emergency routes. See the following figure showing these emergency routes.

Figure 6-74 Emergency Routes



Fixed facility releases are assumed to be less common in the county due to lack of major facilities housing hazardous materials or waste. A current lack of data pertaining to these facilities has hindered any further analysis.

Critical Facilities Exposed/Impacts

Without additional information pertaining to the location of potential fixed-facility hazmat, no further analysis can be performed.

The potential exposure of critical facilities to a hazmat transportation incident were assessed. Between the major road and railroad corridors highlighted in the previous figure, there are 24 of 53 (45%) critical facilities within a 1,000' buffer.

Potential Losses

There are no recorded damage estimates for hazmat events in Union County at this time. Potential losses include injuries and loss of life, as well as cleanup costs for environmental contamination. All

municipalities in the county are located along highways and/or railways where hazmat is transported, so each is vulnerable to transportation related hazmat incidents and could experience more losses due to the denser populations in these areas.

Future Conditions

Land Use and Development

While Union County does not anticipate increases in new development, any population growth near major transportation corridors and any fixed facility hazmat sites will be at the highest risk to a hazmat release.

Climate

Due to the human-caused nature of hazmat incidents, this hazard is not projected to be impacted by changing climatic conditions.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. Community risk varied across the county, with Clayton and unincorporated areas ranking hazardous materials release as a moderate risk and the others a low risk, compared to other profiled hazards.

Table 6-44 Hazardous Materials Incident Risk Ranking

	Risk Rank
Unincorporated Union County	Moderate
Town of Clayton	Moderate
Village of Des Moines	Low
Village of Folsom	Low
Village of Grenville	Low

6.2.13 Agricultural Disease

Description

Animal disease outbreak, as defined by FEMA, is the introduction of a highly contagious, infectious, or economically devastating animal disease or agent. The introduction of a new strain of virus not previously seen in the animal population, the accidental or intentional introduction of a foreign animal disease, or the reintroduction of a previously eliminated disease are all included in this definition.

According to the World Health Organization (WHO), a disease epidemic occurs when there are more cases of that disease than normal. A pandemic is defined as a disease affecting or attacking the population of an extensive region which may include several countries and/or continents. A pandemic is

a worldwide epidemic of a disease and may occur when a new virus appears against which there is no immunity.

Zoonotic diseases are a significant hazard to the State's population and livestock. Zoonotic diseases are those which can be transmitted between animals and humans. The New Mexico Department of Health indicates that the most common of these diseases in the State are Hantavirus Pulmonary Syndrome, Plague, Rabies, West Nile Virus, and Zika Virus. It is important to realize that this Plan does not examine pandemic contingency plans, but instead focuses on examining the risk of a normal hazard occurrence.

Location

There is a widespread mixture of agricultural properties countywide and an outbreak could be expected anywhere. One location that presents an opportunity for increased vulnerability and exposure are the Livestock Research Center and Feedlots, five miles east of Clayton.

Extent

Epidemics result in mass mortality of animals, resulting in devastating economic impacts on industries and communities. Some animal diseases, such as Salmonella, influenza, and Equine Encephalitis, can also infect humans. Animal disease costs are due to loss of production, loss of animals, human morbidity and mortality, days of lost work, and legal actions (FEMA 2011).

Previous Occurrences

Currently, there is limited statewide data available on past occurrences of agricultural disease. The following table presents zoonotic occurrences that have been reported.

Table 6-45 Statewide Zoonotic Occurrences[50]

Disease	2020 (as of 4/20)	2019	2018	2017	2016	2015	2014
Hantavirus Pulmonary Syndrome (human cases)	0	3	0	5	8	1	6
	Between 1975 – 2019, 117 total cases, with 49 deaths, (1 case in Union County)						
Plague (human / animal)	0 / 0	1 / 2	0 / 3	4 / 28	4 / 34	-	-
	Between 1949 – 2019, 284 total cases, with 36 deaths, (no cases in Union County)						
Rabies (animal)	2	27	15	-	-	-	-
	From 2000 – 2019, in Union County there have been the following animal cases: bat (0), cat (1), dog (0), fox (0), skunk (7)						
West Nile Virus (human)	-	40	7	33	-	-	-

[50] NM Department of Health (https://nmhealth.org/about/erd/ideb/zdp/)

Disease	2020 (as of 4/20)	2019	2018	2017	2016	2015	2014
Between 2003 – 2019, 652 total cases, with near annual deaths, (2 cases in Union County – 2013, 2010)							
Zika Virus (human)	-	0	0	0	10*	-	-
	*No cases in Union County (all Statewide cases were infected abroad)						

Probability

There is a highly likely probability of an agricultural disease event across the state in any given year. Based on the very limited available data for Union County, it is assumed that there is a likely probability for an event in the county.

Vulnerability Assessment

Inventory Exposed/Impacts

It is difficult to estimate the impact that an agricultural disease outbreak could have on Union County, since each occurrence would require a different form of response. The agriculture industry functions as a system, and the impact of disease on any portion of the industry would create a trickle-down impact on the county's (and the state's / region's) economy.

Critical Facilities Exposed/Impacts

Critical facilities are not expected to be exposed nor experience impacts from agricultural disease.

Potential Losses

The agriculture industry in Union County is a major contributor to the economy of the State and to the nation. The negative impact of an outbreak of disease, or impact of a natural or man-made disaster could result in economic losses of enormous scale.[51]

The losses associated with an animal disease outbreak would not only directly impact the livestock value, but also the farming, transportation, processing, and animal medical industry that directly supports New Mexico's farmers.

Future Conditions

Land Use and Development

Future development has a limited relationship to agricultural disease. If an occurrence of agricultural disease outbreak were to impact and diminish industry, land currently used for agriculture could be converted for other uses.

Climate

[51] 2009 Union County Agriculture Response Annex

According to the best data available at the time of this plan development, the future impacts on the climate are expected to influence future agricultural disease events. This may be through increases in the prevalence of parasites and diseases that affect livestock, caused by earlier spring onset and warmer winters. These expected warmer winter temperatures may also allow new pests and diseases to become established in the county, or for existing pests to persist year-round.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. Most communities ranked the risk from agricultural disease to be moderate (with the exception of Folsom who ranked this a low risk), compared to other profiled hazards.

Table 6-46 Agricultural Disease Risk Ranking

	Risk Rank
Unincorporated Union County	Moderate
Town of Clayton	Moderate
Village of Des Moines	Moderate
Village of Folsom	Low
Village of Grenville	Moderate

6.2.14 Terrorism

Description

The Federal Bureau of Investigation (FBI) defines domestic terrorism as follows:

- Involve acts dangerous to human life that violate federal or state law;
- Appear intended: (i) to intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination. or kidnapping; and
- Occur primarily within the territorial jurisdiction of the U.S.

Certain facilities are at greater risk than others to a terrorist attack. The Department of Homeland Security (DHS) identifies a range of potentially high-risk targets including chemical plants, hospitals, colleges and universities, oil and gas production sites, and food processing sites. Other sites, such as large cities, well known landmarks, large gatherings, transportation systems, and water sources may be terror targets.

Acts of terror may include assassinations and armed attacks, kidnappings, hijackings, bomb scares and bombings, cyber-attacks (computer-based), and the use of chemical, biological, nuclear, and radiological weapons, and homegrown terrorism. Each act of terror is described below[52]:

- Assassinations/Armed Attack: Tactical assault or sniping from a remote location.
- Kidnapping: Capturing a person or persons against their will and holding them in false imprisonment, often for ransom.
- Hijacking: Robbing or seizing control of a vehicle by use of force.
- Bomb Scares and Bombing: A bombing is the result of a detonation of any material that will cause injury, death, or property damage. A bomb scare involves the verbal or written threat to detonate a bomb.
- Cyber Attack: This refers to the electronic attack using one computer system against another.
- Chemical Agent: Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles or containers; or munitions.
- Biological Agent: Liquid or solid toxic contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers.
- Nuclear Bomb: A nuclear device may be detonated underground, at the surface, in the air or at high altitude.
- Radiological Agent: Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers.

Location

Acts of terrorism may occur anywhere and cannot be predicted. High-risk targets are potentially of greater concern, but all areas are at risk. In Union County, the Town of Clayton is the most populated municipality and could be a potential high-risk target for terrorism. Other potential facilities that could be considered targets include the Livestock Research Center and Feedlots, five miles east of Clayton.

Extent

It is difficult to describe the extent of an imminent threat due to the human-caused nature of the hazard. Factors such as the type of attack, location, time of day, and weather can all influence the impacts of an attack. The United States Department of Homeland Security utilizes the National Terrorism Advisory System (NTAS) to communicate information about terrorist threats by providing timely, detailed information to the public.

Previous Occurrences

There is no known history of an act of terror occurring in the county.

Probability

The probability of future terrorist attacks is unlikely, although a single event could have devastating effects on human lives, the economy, and way of life.

Vulnerability Assessment

Inventory Exposed/Impacts

All existing and future building, facilities, and populations in the county are considered to be equally exposed to this hazard and could potentially be impacted. A terrorist attack could impact the county

[52] Much of this information comes from the FEMA State and Local Mitigation Planning How-to-Guide: Integrating Manmade Hazards

significantly. An attack could cause deaths, injuries, structural damage, and economic damage. These impacts could be long-term as communities recover after an attack. Cyber-attacks can significantly impact the economy and safety of the county.

Critical Facilities Exposed/Impacts

Critical facilities would be expected to be high priority targets of a terror act and could be impacted significantly.

Potential Losses

Given the lack of historical loss data on terror events, it is assumed that while one major event could potentially result in significant losses, annualizing those loses over a long period of time would most likely yield a very low annualized lost estimate for the county.

Future Conditions

Land Use and Development

Population increases would heighten the exposure to an attack, but future development trends would not impact this hazard.

Climate

Due to the human-caused nature of terrorism incidents, this hazard is not projected to be impacted by future climatic conditions.

Summary Risk Ranking

Hazards were ranked for each jurisdiction based on the results of this HIRA, LPC input, and public perception of risk. The overall ranks were derived by assigning each jurisdiction a value of 1 (low), 2 (medium), or 3 (high) for each hazard for: the probability of a damaging event occurring, the potential impact to property/structures from a damaging event, the potential impact to the local economy from a damaging event, and the potential impact to people from a damaging event. The results were then averaged across each jurisdiction to create an overall rank. Rankings were broken down into three classes: low (L), moderate (M), and high (H). The results are shown in the following figure below. Community risk varied across the county, with Clayton and unincorporated areas ranking terrorism as a moderate risk and the others a low risk, compared to other profiled hazards.

Table 6-47 Terrorism Risk Ranking

	Risk Rank
Unincorporated Union County	Moderate
Town of Clayton	Moderate
Village of Des Moines	Low
Village of Folsom	Low
Village of Grenville	Low

7. Appendixes

7.1 Jurisdictional Adoptions

7.2 Meeting Agendas / Attendance

Union County – Hazard Mitigation Plan

Pre Kick-Off Webinar (LEPC)

When: 10:00-11:00 MDT – August 21, 2019

Where: Webinar (https://cdrmaguire.zoom.us/j/412003451) – Conference Call (US: +1 669 900 6833 or +1 408 638 0968 \ Meeting ID: 412 003 451)

Invitees: Angie Gonzales, LEPC

Agenda:

1. Welcome & Introductions
2. Project Scope & Schedule
3. Roles & Responsibilities
4. Local Planning Committee (LPC)
5. Current HMP
6. Hazards to Profile
7. Recent Hazard Events
8. Recent Community Planning
9. Best Available Data
10. Local Planning Team
11. Public Involvement Strategy
12. Questions / Concerns / Other Topics

Post Meeting Action Items for Steering Committee:

A. Best Available Data / Recent Community Plans
B. LPC Participants
C. Public Involvement Input

Questions, Comments, Concerns? – Contact project manager Mike Garner at any point throughout the planning process: 303.710.9498 | Michael.Garner@CDRMaguire.com

Union County – Hazard Mitigation Plan

Kick-Off Workshop (Local Planning Committee)

When: 1:00pm-3:00pm MDT – November 20, 2019

Where: 25 Air Park Road, Clayton, NM 88415 (Armory) | Webinar: https://cdrmaguire.zoom.us/j/124435261 – Conference Call: +1 669 900 6833 or +1 408 638 0968 or +1 646 876 9923 / Meeting ID: 124 435 261

Invitees: See sign-in sheet, meeting appointment

Agenda:

1. Welcome & Introductions
2. Project Scope & Schedule
3. Roles & Responsibilities
4. Local Planning Team
5. Hazards to Profile
6. Recent Hazard Events
7. Recent Community Planning
8. Mitigation Capabilities
9. Best Available Data
10. Critical Facilities
11. Public Involvement Strategy
12. Questions / Concerns / Other Topics

Post Meeting Action Items for Planning Team:

A. Best Available Data / Recent Community Plans
B. Local Planning Team Participants
C. Mitigation Capabilities Input
D. Public Involvement Input

Questions, Comments, Concerns? – Contact project manager Lisa Clay at any point throughout the planning process: 720.325.3907 | Lisa.Clay@CDRMaguire.com

Union County Hazard Mitigation Plan
Hazard Identification and Risk Assessment Workshop

Location: Army National Guard Armory / Sheriff's Office - 25 Airpark St., Clayton, NM 88415
Date: Tuesday, March 31, 2020
Time: 9:00-11:00 AM
Invitees: See meeting calendar appointment / sign-in sheet

I. **Introductions**

II. **Hazard Mitigation Planning Review**

III. **Mitigation Funding**

IV. **Risk and Vulnerability Assessment Summary**

V. **Mitigation Capability Assessment**

VI. **Mitigation Strategy**

VII. **Mitigation Actions**

VIII. **Public Involvement**

IX. **Post Workshop Action Items for Planning Team:**

a) Continue local discussions relating to this project

b) Finalize mitigation capability assessment (if needed)

c) Begin identifying mitigation actions

d) Review draft Risk Assessment chapter

Union County Hazard Mitigation Plan
Mitigation Strategy Workshop

Location: Webinar
https://global.gotomeeting.com/join/192635917
(571) 317-3122
Access Code: 192-635-917
Date: Thursday, July 2, 2020
Time: 10:00-11:30 AM

I. **Project Status**

II. **Mitigation Strategy Inputs**

III. **Mitigation Strategy – Goals & Objectives**

IV. **Mitigation Strategy – Actions**

V. **Plan Maintenance / Implementation**

VI. **Plan Integration**

VII. **Funding Resources**

VIII. **Public Involvement**

IX. **Post Workshop Action Items for Planning Team:**

a) Finalize mitigation actions

b) Review draft plan

Emergency Preparedness Personnel Directory - LEPC Membership
Union County, New Mexico

Full Name	Title/Position	City/Town	E-Mail Address	Pre-kick off	Kick-off	HIRA Mtg.	Mit. Strat. Mtg
Bradley, Stacye	Union County General Hospital - Chief Nursing Officer	Clayton	stacye.bradley@ucgh.net		x	x	
Bramblett, Phillip	Village of Grenville Fire/Rescue	Grenville	bramblettk@bacavalley.com		x		
Briesh, Paul	Baca Valley Telephone - VP and GM	Des Moines	paulbvt@bacavalley.net				
Burmeister, Scotty	Baca Valley Telephone - Radio Tech	Des Moines	scottybvt@bacavalley.net				
Cardenas, Narce	NM Gas	Clayton					
Chancy, Darrell	NM Gas - Operations Supervisor	Clayton					
Christy, Kristen	Union County Health Network - Executive Director	Clayton					
Cooper, Judith	Union County Collaborative Health Council - Coordinator	Clayton	jcooper@plateautel.net				
Dale, Chris	Clayton PD - SGT/Investigator	Clayton	cpd.dale@tocpd.org				
Dempsey, Lori	Clayton Nursing & Rehab Center - Center Nursing Executive	Clayton					
Diller, Stacy	Clayton Superintendent	Clayton			x		
Drumm, Justin	Clayton Fire/Rescue - Fire Chief	Clayton	firechief@claytonfirenm.us		x	x	x
Drumm, Cassie	Union County General Hospital - Medical Staff Coordinator	Clayton			x		
Earp, Patty	GEO Group - Fire/Safety	Clayton	pearp@geogroup.com				
Fickling, Tanner	Pinnacle Propane - Manager	Clayton					
Fluhman, Jay	Clayton Family Practice - Family Nurse Practitioner	Clayton					
Gallegos, April	Clayton/UC Chamber - Executive Director	Clayton	cuchamber@plateautel.net				
Garcia, Ferdinand	Golden Spread Coalition- Supervisor	Clayton					
Garcia, Quirina	Pharmacist	Clayton					
Garcia, Josh	TOC Water Supervisor	Clayton					
Garcia, Albert	TOC Streets Supervisor	Clayton	tocstreets@plateautel.net				
Gerlitz, Sara	DHSEM Mitigation Specialist		saram.gerlitz@state.nm.us		x		
Gonzales, Angie	Union County Manager	Clayton	angie.gonzales@unionnm.us	x	x		
Grine, Art	Rabbit Ear Fire Dept.	Clayton	astrobarb@gmail.com				
Hass, Michael	Hass Funeral Director - NM OMI	Clayton	michael@hassfuneralhome.com				
Jones, Michael	GEO - EPMV - Corrections Lt.	Clayton					
Julian , Scott	Clayton PD - Chief of Police	Clayton	chief.julian@tocpd.org				

Updated: 10/12/2021

Emergency Preparedness Personnel Directory - LEPC Membership
Union County, New Mexico

Full Name	Title/Position	City/Town	E-Mail Address	Pre-kick off	Kick-off	HIRA Mtg.	Mit. Strat. Mtg
Kear, Carolyn	Clayton Nursing & Rehab Center - Center Executive Director	Clayton					
Kear, Russell	County Road Dept. - Superintendent	Clayton	rkunionco@yahoo.com		x		
Kiesling, Clay	Union County Commissioner	Clayton				x	x
King, Garland	Village of Capulin - Capulin Fire Dept.	Capulin	garland_k@hotmail.com				
Haisten, Anna	KLMX Radio- Media/Radio	Clayton	klmxfm@gmail.com			x	
Kohler, Rusty	Red Cross		rustykohler@yahoo.com		x		
Lawrence, Eva	Golden Spread Coalition- Supervisor	Clayton	eval.gs@plateautel.net		x		
Lobb, James	Union County Sheriff	Clayton	ucsheriff@plateautel.net				
Lucero, Phil	NMSHD Clayton - Patrol Supervisor	Clayton					
Lucero, Ferron	Clayton City Manager	Clayton	flucerotoc@plateautel.net		x	x	
Mann, Michael	Clayton PD - Patrolman	Clayton	cpd.mann@tocpd.org		x	x	
Mayfield , Jim	C&C Communications - Owner	Clayton	jamay@plateautel.net				
Nightingale, Briceson	Sedan Fire Dept. - Asst. Chief	Sedan	bricesonn@gmail.com				
O'Bryant, Jim	Wildland Fire Coord/County Fire Marshall	Clayton	ucfire@plateautel.net		x		
Orthman, Ken	Motor Transportation Division - Sgt	Clayton					
Osborn, Zach	Des Moines EMS Director	Des Moines	desmoinesems@bacavalley.com				
Palmer, Sandra	Clayton PD Dispatch - Comms Specialist Supervisor	Clayton	sandywyant@msn.com				
Pryor, Jan	NMDMAT - Paramedic	Des Moines	pryor_jan@bacavalley.com				
Reeser, Joe	Sedan Fire Dept. - Chief	Clayton	sedanfire@outlook.com			x	
Reif, Dr. Donald	Veterinarian	Clayton	dreif@plateautel.net				
Rose, Marianne	Union County Leader newspaper Reporter		ucl.marianne@gmail.com			x	
Sanchez, Earnest	Clayton Mayor	Clayton				x	
Sink, Levon	County GIS Coordinator/Rural Addressing	Clayton	gis@plateautel.net		x		
Sisneros, Edward	Clayton Airport Manager	Clayton	tocsisneros@hotmail.com				
Sullivan, Travis	Southwestern Electric Co-Op - General Manager	Clayton	tsullivan@swec-coop.org			x	
Sumpter, Kodi	Des Moines School Superintendent	Des Moines	ksumpterdms@bacavalley.com				

Updated: 10/12/2021

Emergency Preparedness Personnel Directory - LEPC Membership
Union County, New Mexico

Full Name	Title/Position	City/Town	E-Mail Address	Pre-kick off	Kick-off	HIRA Mtg.	Mit. Strat. Mtg
Union Co.Leader,	Media/Newspaper	Clayton	ucleader@plateautel.net				
Valdez, Talisha	NMSU Extension Office - County Program Director	Clayton	talisfra@nmsu.edu			x	
Vigil, Lawrence	NMHD Supervisor - Des Moines Station	Des Moines					
Windle, Gina	First National Bank - CFO	Clayton	gwindle@FNBofNM.com				
Wingo, Robert	Union County Emergency Manager	Clayton	emergencymgr@unionnm.us		x	x	x
Z,		**Clayton**		**x**	**x**	**x**	**x**
Z,		**Des Moines**					
Z,		**Folsom**					
Z,		**Grenville**			**x**		
Z,		**Union County**		**x**	**x**	**x**	**x**

Updated: 10/12/2021

Mike Garner

Subject: Rescheduled Union County Hazard Mitigation Plan - Planning Team Workshop #1

From: Robert Wingo <emergencymgr@unionnm.us>
Sent: Wednesday, November 20, 2019 6:24 PM
To: Robert Wingo <emergencymgr@unionnm.us>; dreif@plateautel.net; mjones@geogroup.com; gis@plateautel.net; garland_k@hotmail.com; paulbvt@bacavalley.net; angie.gonzales@unionnm.us; michael@hassfuneralhome.com; bigcat.7801@yahoo.com; flucerotoc@plateautel.net; cpd.dale@tocpd.org; klmxfm@gmail.com; fgarcia@plateautel.net; pryor_jan@bacavalley.com; jcooper@plateautel.net; scottybvt@bacavalley.com; ucleader@plateautel.net; rkunionco@yahoo.com; chief.julian@tocpd.org; phil.lucero@state.nm.us; desmoinesems@bacavalley.com; jamay@plateautel.net; stacye.bradley@ucgh.net; bramblettk@bacavalley.com; ucfire@plateautel.net; Michael Garner <michael.garner@cdrmaguire.com>; jay.fluhman@ucghc.com; gwindle@fnbofnm.com; astrobarb@gmail.com; emergencymgr@unionnm.us; TFickling@pinnpropane.com; sandywyant@msn.com; jdrummer77@gmail.com; bricesonn@gmail.com; tocsisneros@hotmail.com; sedanfire@outlook.com; cpd.mann@tocpd.org; Lisa Clay <Lisa.Clay@cdrmaguire.com>; cuchamber@plateautel.net; ucsheriff@plateautel.net; pharmacy@ucghc.com; tsullivan@swec-coop.org; evaL.gs@plateautel.net; lori.dempsey@pcitexas.net; tocstreets@plateautel.net; ksumpterdms@bacavalley.com; lawrence.vigil@state.nm.us; talisfra@nmsu.edu; pearp@geogroup.com; stacy.diller@claytonschools.us
Subject: Re: Rescheduled Union County Hazard Mitigation Plan - Planning Team Workshop #1

Next meeting will be in March.

SSG Robert Wingo
Union County Emergency Manager
25 Air Park St
Clayton, NM 88415
Phone: 575 207 5454

Sent from my iPhone

> On Nov 18, 2019, at 19:19, Robert Wingo <emergencymgr@unionnm.us> wrote:
>
> Please do not forget about this meeting.
> I hope you all we be there
>
> **Rescheduled Union County Hazard Mitigation Plan - Planning Team Workshop #1**
> Scheduled: Wednesday, Nov 20, 2019 from 13:00 to 15:00
> Location: 25 Air Park Road, Clayton, NM 88415 (Armory); https://cdrmaguire.zoom.us/j/124435261
> Invitees: Stacy Diller (stacy.diller@claytonschools.us), Michael Jones (mjones@geogroup.com), Levon Sink (gis@plateautel.net), Garland King (garland_k@hotmail.com), Dr. Donald Reif

(dreif@plateautel.net), Angie Gonzales - Union County Manager, Michael Garner, Michael Hass (michael@hassfuneralhome.com), Josh Garcia (bigcat.7801@yahoo.com), Ferron Lucero (flucerotoc@plateautel.net), Chris Dale (cpd.dale@tocpd.org), KLMX Radio (klmxfm@gmail.com), Ferdinand Garcia (fgarcia@plateautel.net), Jan Pryor (pryor_jan@bacavalley.com), Judith Cooper (jcooper@plateautel.net), Scotty Burmeister (scottybvt@bacavalley.com), Lisa Clay, Russell Kear (rkunionco@yahoo.com), Union Co. Leader (ucleader@plateautel.net), Zach Osborn (desmoinesems@bacavalley.com), Phil Lucero (phil.lucero@state.nm.us), Scott Julian (chief.julian@tocpd.org), Stacye Bradley (stacye.bradley@ucgh.net), Jim Mayfield (jamay@plateautel.net), Phillip Bramblett (bramblettk@bacavalley.com), Jim O'Bryant (ucfire@plateautel.net), Jay Fluhman (jay.fluhman@ucghc.com), Art Grine (astrobarb@gmail.com), Dusty Russell (emergencymgr@unionnm.us), Tanner Fickling (tfickling@pinnpropane.com), Justin Drumm (jdrummer77@gmail.com), Sandra Palmer (sandywyant@msn.com), Briceson Nightingale (bricesonn@gmail.com), Edward Sisneros (tocsisneros@hotmail.com), Joe Reeser (sedanfire@outlook.com), Michael Mann (cpd.mann@tocpd.org), April Gallegos (cuchamber@plateautel.net), Gina Windle (gwindle@FNBofNM.com), James Lobb (ucsheriff@plateautel.net), Quirina Garcia (pharmacy@ucghc.com), Travis Sullivan (tsullivan@swec-coop.org), Eva Lawrence (eval.gs@plateautel.net), Lori Dempsey (lori.dempsey@pcitexas.net), Albert Garcia (tocstreets@plateautel.net), Kodi Sumpter (ksumpterdms@bacavalley.com), Lawrence Vigil (lawrence.vigil@state.nm.us), Talisha Valdez (talisfra@nmsu.edu), Patty Earp (pearp@geogroup.com), Paul Briesh (paulbvt@bacavalley.net)

SSG Robert Wingo
Union County Emergency Manager
25 Air Park St
Clayton, NM 88415
Phone: 575 207 5454

Sent from my iPhone

Hazard Mitigation Plan

Last Name	First Name	Title/Position	E-Mail Address	Meeting 1 Sign-In
Bradley	Stacye	Union County General Hospital	stacye.bradley@ucgh.net	
Bramblett	Phillip	Village of Grenville Fire/Rescue	bramblettk@bacavalley.com	
Briesh	Paul	Baca Valley Telephone	paulbvt@bacavalley.net	
Burmeister	Scotty	Radio Tech - Baca Valley	scottybvt@bacavalley.com	
Cardenace	Narce	NNM Gas		
Chancy	Darrell	NNM Gas		
Christy	Kristen	Union County Health Network		
Cooper	Judith	Coordinator, Union Co. Collaborative Health Council	jcooper@plateautel.net	
Dale	Chris	SGT/Inves - Clayton PD	cpd.dale@tocpd.org	
Dempsey	Lori	Clayton Nursing & Rehab Center	lori.dempsey@pcitexas.net	
Diller	Stacy	Clayton Superintendent	stacy.diller@claytonschools.us	
Drumm	Justin	Severe Weather Rep - Clayton Fire/Rescue	jdrummer77@gmail.com	
Earp	Patty	GEO - Fire/Safety	pearp@geogroup.com	
Fickling	Tanner	Pinnacle Propane/Mgr	tfickling@pinnpropane.com	
Fluhman	Jay	Family Nurse Prac. - Clayton Family Practice	jay.fluhman@ucghc.com	
Gallegos	April	Clayton/UC Chamber	cuchamber@plateautel.net	
Garcia	Quirina	Pharmacist	pharmacy@ucghc.com	
Garcia	Ferdinand	Golden Spread	fgarcia@plateautel.net	
Garcia	Albert	TOC Streets Super.	tocstreets@plateautel.net	
Garcia	Josh	TOC Water Super.	bigcat.7801@yahoo.com	
Gonzales	Angie	Union County Manager	angie.gonzales@unionnm.us	
Grine	Art	Rabbit Ear Fire Dept.	astrobarb@gmail.com	
Hass	Michael	Hass Funeral Director - NM OMI	michael@hassfuneralhome.com	
Jones	Michael	GEO - EPMV	mjones@geogroup.com	
Julian	Scott	Chief of Police - Clayton	chief.julian@tocpd.org	
Kear	Carolyn	Clayton Nursing & Rehab Center	carolyn kear@pcitexas.net	
Kear	Russell	Superintendent - Union County Road Dept.	rkunionco@yahoo.com	
King	Garland	Village of Capulin - Capulin Fire Dept.	garland_k@hotmail.com	
KLMX Radio		Media/Radio	klmxfm@gmail.com	
Lawrence	Eva	Golden Spread	eval.gs@plateautel.net	
Lobb	James	Union County Sheriff	ucsheriff@plateautel.net	
Lucero	Ferron	City Manager - Clayton	flucerotoc@plateautel.net	
Lucero	Phil	Patrol Suervisor - NMSHD Clayton	phil.lucero@state.nm.us	
Mann	Michael	Clayton PD - Patrolman	cpd.mann@tocpd.org	
Mayfield	Jim	C&C Communications	jamay@plateautel.net	
Nightingale	Briceson	Sedan Fire Dept. - Asst. Chief	bricesonn@gmail.com	
O'Bryant	Jim	Wildland Fire Coord/County Fire Marshall	ucfire@plateautel.net	
Orthman	Ken	MTD/Sgt		
Osborn	Zach	Des Moines EMS Director	desmoinesems@bacavalley.com	
Palmer	Sandra	Communication Specialist Supervisor - Clayton PD Dispatch	sandywyant@msn.com	

Kick-Off Workshop 11/20/19

Hazard Mitigation Plan

Last Name	First Name	Title/Position	E-Mail Address	Meeting 1 Sign-In
Pryor	Jan	Paramedic - NMDMAT	pryor_jan@bacavalley.com	
Reeser	Joe	Sedan Fire Dept.	sedanfire@outlook.com	
Reif	Dr. Donald	Veterinarian	dreif@plateautel.net	
Sink	Levon	Rural Ddressing/GIS Coordinator	gis@plateautel.net	Levon Sink
Sisneros	Edward	Clayton Airport Manager	tocsisneros@hotmail.com	
Sullivan	Travis	SWEC	tsullivan@swec-coop.org	
Sumpter	Kodi	Des Moines School Superintendent	ksumpterdms@bacavalley.com	
Union Co.Leader		Media/Newspaper	ucleader@plateautel.net	
Valdez	Talisha	NMSU Extension Office	talisfra@nmsu.edu	
Vigil	Lawrence	NMHD Supervisor - Des Moines Station	lawrence.vigil@state.nm.us	
Windle	Gina	First National Bank - CFO	gwindle@FNBofNM.com	
Wingo	Robert	Union County Emergency Manager	emergencymgr@unionnm.us	
GERLITZ	SARA	Mitigation Specialist	saram.gerlitz@state.nm.us	SG
Driemal	Cassie	Union County General Hospital		
Kohler	Rusty	Red Cross	rustykohler@yahoo.com	

Kick-Off Workshop 11/20/19

Mike Garner

Subject: Union County Hazard Mitigation Plan Workshop

From: Michael Garner
Sent: Thursday, February 20, 2020 3:21 PM
To: Michael Garner; Angie Gonzales - Union County Manager; astrobarb@gmail.com; bramblettk@bacavalley.com; bricesonn@gmail.com; carolynkear@pcitexas.net; chief.julian@tocpd.org; cpd.dale@tocpd.org; cpd.mann@tocpd.org; cuchamber@plateautel.net; desmoinesems@bacavalley.com; dreif@plateautel.net; Robert Wingo (emergencymgr@unionnm.us); eval.gs@plateautel.net; flucerotoc@plateautel.net; garland_k@hotmail.com; gis@plateautel.net; gwindle@FNBofNM.com; jamay@plateautel.net; jcooper@plateautel.net; jdrummer77@gmail.com; klmxfm@gmail.com; ksumpterdms@bacavalley.com; michael@hassfuneralhome.com; paulbvt@bacavalley.net; pearp@geogroup.com; pryor_jan@bacavalley.com; rkunionco@yahoo.com; rustykohler@yahoo.com; sandywyant@msn.com; saram.gerlitz@state.nm.us; scottybvt@bacavalley.com; sedanfire@outlook.com; stacy.diller@claytonschools.us; stacye.bradley@ucgh.net; talisfra@nmsu.edu; tfickling@pinnpropane.com; tocsisneros@hotmail.com; tocstreets@plateautel.net; tsullivan@swec-coop.org; ucfire@plateautel.net; ucl.marianne@gmail.com; ucleader@plateautel.net; ucsheriff@plateautel.net
Cc: Scotty Burmeister - BVT; Michael Callender; Ferron Lucero
Subject: Union County Hazard Mitigation Plan Workshop
When: Tuesday, March 31, 2020 9:00 AM-11:00 AM (UTC-07:00) Mountain Time (US & Canada).
Where: Army National Guard Armory / Sheriff's Office - 25 Airpark St., Clayton, NM 88415

Hello HMP Local Planning Committee,

In light of on-going events, our next HMP workshop is being replaced by a webinar / conference call. Details are below to join (note for sound you can either call in or use the web audio).

I will share the slides prior to the meeting, so everyone should be able to hear/see everything depending on your situation.

Thanks for your understanding and flexibility,

mike

Please join my meeting from your computer, tablet or smartphone.

https://global.gotomeeting.com/join/865899317

United States: +1 (571) 317-3112

Access Code: 865-899-317

Agenda attached. I look forward to meeting many of you at the workshop in a few weeks. Besides bringing some initial ideas for potential mitigation actions to include in this plan, no other requests are needed from the local planning committee at this time.

Thanks,

mike

Hello HMP Local Planning Committee,

I wanted to get next month's hazard mitigation plan workshop on your calendars. Tuesday, March 31st, from 9-11 AM at the Sheriff's Office.

Adopting organizations (County, Town, & Villages) – please ensure your organization is represented at this workshop, to ensure you will be eligible to formally adopt this plan.

Thanks and let me know if there are any questions,

Mike

SYNERGY DISASTER RECOVERY

Setting the New Standard

Michael Garner

Planning Program Manager, CFM, GISP

C: 303.710.9498

SynergyDisasterRecovery.com

MGarner@SynergyDisasterRecovery.com

Chat Log from 3/31/2020 Risk Assessment Virtual Meeting
C:\Users\michael.garner\Documents\ChatLog Union Hazard Mitigation Plan _ Risk Assessment 2020_03_31 11_11.rtf

The chat below represents some of the community members who attended the meeting but only those that used the chat feature. The following list shows those attendees who did not use chat.

Stayce Bradley – Union County General Hospital – Chief Nursing Officer
Clay Kiesling – Union County Commissioner
Ferron Lucero – Clayton City Manager
Marianne Rose – Union County Leader Newspaper Reporter
Earnest Sanchez – Clayton Mayor
Robert Wingo – Union County Emergency Manager

Chat Log:
Michael Mann (Clayton PD) (to Everyone): 9:06 AM: Michael Mann (Clayton PD)
Travis Sullivan (to Everyone): 9:31 AM: Travis Sullivan With Southwestern Ele. Coop.
Anna Haisten (to Everyone): 9:32 AM: Anna Haisten with KLMX radio
Michael Mann (Clayton PD) (to Everyone): 9:37 AM: Does hazard soils include sink holes that form?
Justin Drumm (to Everyone): 10:15 AM: North East part of the county is due to none reporting of tornado's to the NWS
Michael Mann (Clayton PD) (Private): 10:22 AM: Hazardous materials being transported through the area via tractor trailer/semi from one lab to another lab
Joe Reeser (to Everyone): 10:22 AM: the railroad through Clayton is a very large risk partly due to distance and time for response
Talisha Valdez (to Everyone): 10:33 AM: Joe mute your mic LOL lots of feed back
Michael Mann (Clayton PD) (to Everyone): 10:37 AM: Terrorism I think needs to stay, even through there is no data, but there was a camp found in Taos, NM just a flew years ago.
Travis Sullivan (to Everyone): 10:38 AM: There is also a group in Roy that I hear people are watching. not sure if they are on a terrorism watch list or not.
Talisha Valdez (to Everyone): 11:02 AM: NMS Union County Extension also
Travis Sullivan (to Everyone): 11:03 AM: Thanks everyone!
Michael Mann (Clayton PD) (to Everyone): 11:06 AM: Thank you everyone. Stay Safe & Healthy
Talisha Valdez (to Everyone): 11:07 AM: thank you
Michael Garner (to Everyone): 11:08 AM: thanks for everyone's chat comments. I have recorded these all and will review.

Mike Garner

Subject: Union HMP - Mitigation Strategy Meeting

From: Michael Garner
Sent: Monday, June 22, 2020 2:20 PM
To: Michael Garner; stacy.diller@claytonschools.us; jdrummer77@gmail.com; pearp@geogroup.com; cuchamber@plateautel.net; tocstreets@plateautel.net; saram.gerlitz@state.nm.us; Angie Gonzales - Union County Manager; astrobarb@gmail.com; michael@hassfuneralhome.com; chief.julian@tocpd.org; rkunionco@yahoo.com; garland_k@hotmail.com; klmxfm@gmail.com; rustykohler@yahoo.com; eval.gs@plateautel.net; ucsheriff@plateautel.net; flucerotoc@plateautel.net; cpd.mann@tocpd.org; jamay@plateautel.net; bricesonn@gmail.com; ucfire@plateautel.net; desmoinesems@bacavalley.com; sandywyant@msn.com; pryor_jan@bacavalley.com; sedanfire@outlook.com; dreif@plateautel.net; ucl.marianne@gmail.com; gis@plateautel.net; tocsisneros@hotmail.com; tsullivan@swec-coop.org; ksumpterdms@bacavalley.com; ucleader@plateautel.net; talisfra@nmsu.edu; gwindle@FNBofNM.com; Robert Wingo (emergencymgr@unionnm.us); McKenzie Parrott; EOC COVID 19; LEPC
Cc: EOC COVID 19; LEPC; Stephen Gutleber; Scotty Burmeister - BVT
Subject: Union HMP - Mitigation Strategy Meeting
When: Thursday, July 2, 2020 10:00 AM-11:30 AM (UTC-07:00) Mountain Time (US & Canada).
Where: https://global.gotomeeting.com/join/192635917

Hello Local Planning Committee,
We have scheduled the final meeting relating to the hazard mitigation plan, so I wanted to get it on everyone's calendars. Thursday, July 2nd, from 10:00-11:30 AM.

I'll be sharing some additional materials over the next week, relating to the meeting and next steps.

Thanks,
mike

Please join my meeting from your computer, tablet or smartphone.

https://global.gotomeeting.com/join/192635917

You can also dial in using your phone.
(For supported devices, tap a one-touch number below to join instantly.)

United States: +1 (571) 317-3122
- One-touch: tel:+15713173122,,192635917#

Access Code: 192-635-917

New to GoToMeeting? Get the app now and be ready when your first meeting starts:
https://global.gotomeeting.com/install/192635917

Union HMP – Mitigation Strategy Meeting
7/2/2020 11:00 am

Attendees:
Michael Garner
McKenzie Parrott
Robert Wingo
Justin Drumm
Clay Kiesling

Project Schedule:
Org. Resources > Assess Risk > **Mitigation Strategy** > DHSEM/FEMA Review

More individual (one on one) meetings with municipalities (Adoptee Participation)
Can still prove there was participation (last challenge) facilitate calls / individual meetings

HMP Planning process:
Public Input
Planning team
Risk Assessment
Mt. Capabilities
Integration
Implement

Risk Assessment Results:
Multiple survey submissions (average results)
    Pretty clear / on same page with risk potential

Clarify "Natural Systems Protection"
    Is when you set aside areas that are hazard prone

Mitigation Goals / Objectives:
    Increase union county capacity to handle major storm events
    Reduce Union county vulnerability to natural hazards
    Reduce Union County's vulnerabilities to wildfires
    Minimize Union County vulnerability to and impact from flooding
    Improve capacity to respond

Goals and objectives should help aim the mitigation planning
    Specific actions to achieve the goals

Planning Effectiveness:
    Strong Planning team
    Project champions
Local level to make these implementations

Resources:
    Public Survey results

Risk Assessment results
Data Gaps
Capability improvements
Existing plans
Alignment with current projects
Ideas mentioned during planning process

Send Slides out / Action Idea document

Does the fire department trained in Hazmat / another district is the hazmat response team (ERG)/evacuate (question for Justin)

Action information needed:

Org.
Action
Lead
Priority
Goal
Hazard Addressed
Completion Date
Cost
Potential Funding

Plan Maintenance / Implementation:

Community involvement?
Keeping it current? (Yearly review>actions)

1st quarter (mainly in the fall is when we have the best support for LAPC meetings)

Are these meetings public? "They can be"

Plan Integration:

IS there a capital improvement planning process?

On the city side there is a committee
Yeah – yearly there is a capital improvement plan that must be submitted to the state (Clay)
City side – reluctant to speak for other individuals

HMGP Post Fire Program Grants

After large fire events FEMA will make mitigation funding available
If impacted areas to not apply the funds are released to the state to apply

LPC Action Items:

Start finalizing the actions (2 actions per hazard)
Comments on final plan before public
Planning committee potential edits
Formally adopt the plan once FEMA acceptance (Fall)