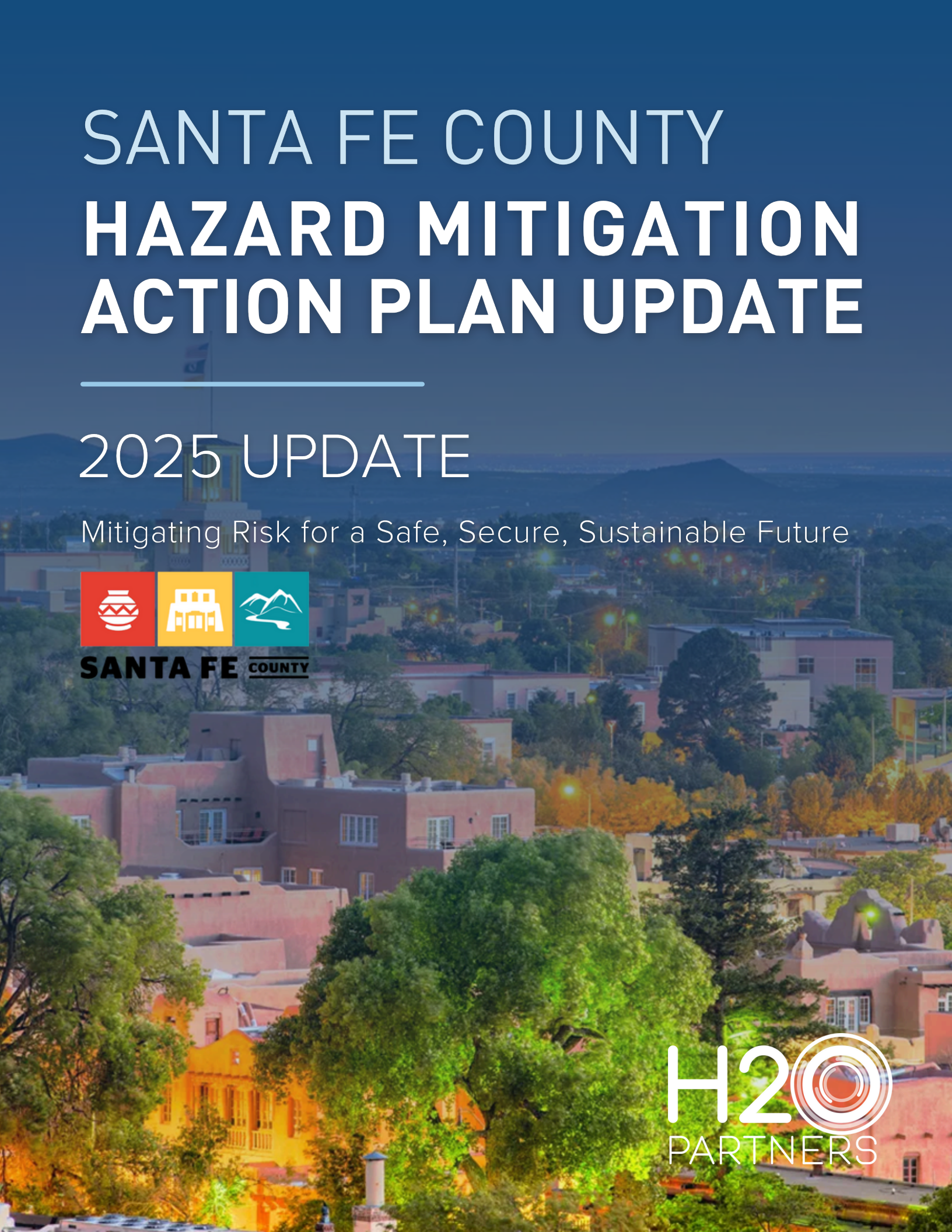
SANTA FE COUNTY
HAZARD MITIGATION ACTION PLAN UPDATE

2025 UPDATE

Mitigating Risk for a Safe, Secure, Sustainable Future

SANTA FE COUNTY



H2O PARTNERS

For more information, visit our website at:

https://www.santafecountynm.gov/

Written comments should be forwarded to:

H2O Partners, Inc.
P. O. Box 160130
Austin, Texas 78716
info@h2opartnersusa.com
www.h2opartnersusa.com

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SANTA FE COUNTY

SECTION 1
INTRODUCTION

SECTION 1: INTRODUCTION

BACKGROUND

Santa Fe County is located in north-central New Mexico and is home to the City of Santa Fe, both the county seat and state capital. The Rio Grande River runs through the northwestern portion of the county, with the higher elevations in the northeastern region of the county being drained by the Rio Grande and its tributaries. Santa Fe County also contains the southernmost portion of the Sangre de Cristo Mountains, a subrange of the Rocky Mountains, which includes the county's highest point, Santa Fe Baldy Peak, standing at 12,621 feet above sea level. Santa Fe County is bordered by the following counties: Rio Arriba County to the north, Mora County to the northeast, San Miguel County to the east, Torrance County to the south, Bernalillo County to the southwest, Sandoval County to the west, and Los Alamos County to the northwest.

New Mexico is prone to large wildfires, with the second most acres burned among all states in 2022.[1] While wildfire is a well-known risk, Santa Fe County is susceptible to a wide range of natural hazards, including but not limited to flood, extreme heat, lightning, high winds, and drought. These life-threatening hazards can destroy property, disrupt the economy, and lower the overall quality of life for individuals.

While it is impossible to prevent an event from occurring, the impacts from many hazards on people and property can be lessened through mitigation. The Federal Emergency Management Agency (FEMA) defines mitigation as *sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects.*[2] Communities participate in hazard mitigation by developing hazard mitigation plans. The New Mexico Department of Homeland Security and Emergency Management (NM DHSEM) is required to review the plan and FEMA has the authority to review and approve hazard mitigation plans through the Disaster Mitigation Act of 2000.

The Disaster Mitigation Act requires that hazard mitigation plans be reviewed and revised every five years to maintain eligibility for Hazard Mitigation Assistance (HMA) grant funding. FEMA approved the Santa Fe County HMAP Update in 2018[3] which then expired in 2023. Therefore, the County began the process of developing a Hazard Mitigation Action Plan Update in order to regain eligibility for grant funding. The HMAP Update planning process provided an opportunity for Santa Fe County to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss. Santa Fe County selected H2O Partners, Inc. to write and develop the 2025

[1] Source: National Interagency Fire Center https://www.iii.org/table-archive/23870
[2] Source: http://www.fema.gov/hazard-mitigation-planning-resources
[3] The Santa Fe County previous plan was drafted in 2016 but was not approved by FEMA and adopted by the community until 2018.

SECTION 1: INTRODUCTION

HMAP Update, hereinafter titled: "Santa Fe County Hazard Mitigation Action Plan Update 2025: Maintaining a Safe, Secure, and Sustainable Community" (Plan or Plan Update).

Hazard mitigation activities are an investment in a community's safety and sustainability. It is widely accepted that the most effective hazard mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive review of a hazard mitigation plan addresses vulnerabilities to hazards that exist today and in the foreseeable future. Therefore, it is essential that a plan identify projected patterns of how future development will increase or decrease a community's overall hazard vulnerability.

SCOPE

The focus of the Plan Update is to identify activities to mitigate hazards classified as "high" or "moderate" risk, as determined through a detailed hazard risk assessment conducted for Santa Fe County. The hazard classification enables the County to prioritize mitigation actions based on hazards which can present the greatest risk to lives and property in the geographic scope.

PURPOSE

The Plan Update was prepared by Santa Fe County and H2O Partners, Inc. The purpose of the Plan Update is to protect people and structures and to minimize the costs of disaster response and recovery. The goal of the Plan Update is to minimize or eliminate long-term risks to human life, property, operations, and the environment from known hazards by identifying risks and implementing cost-effective hazard mitigation actions. The planning process is an opportunity for Santa Fe County, stakeholders, and the general public to evaluate and develop successful hazard mitigation actions to reduce future risk of loss of life and damage to property resulting from a disaster in Santa Fe County.

The Mission Statement of the Plan Update is, "*Maintaining a secure and sustainable future through the revision and development of targeted hazard mitigation actions to protect life and property.*"

The Santa Fe County Planning Team identified 19 hazards, including natural and human-caused hazards, to be addressed in the Plan Update. The specific goals of the Plan Update are to:

- Provide a comprehensive update to the 2018 HMAP;
- Minimize disruption to Santa Fe County following a disaster;
- Streamline disaster recovery by articulating actions to be taken before a disaster strikes to reduce or eliminate future damage;
- Demonstrate a firm local commitment to hazard mitigation principles;
- Serve as a basis for future funding that may become available through grants and technical assistance programs offered by the state or federal government. The Plan will enable Santa Fe County to take advantage of rapidly developing mitigation grant opportunities as they arise; and
- Ensure that Santa Fe County maintains eligibility for the full range of future Federal disaster relief.

SECTION 1: INTRODUCTION

AUTHORITY

The Plan is tailored specifically for Santa Fe County and plan participants including Planning Team members, stakeholders, and the general public who participated in the Plan Update development process. The Plan complies with all requirements promulgated by the New Mexico Department of Homeland Security and Emergency Management (NM DHSEM) and all applicable provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390), and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Additionally, the Plan complies with the Interim Final Rules for the Hazard Mitigation Planning and Hazard Mitigation Grant Program (44 CFR, Part 201), which specify the criteria for approval of mitigation plans required in Section 322 of the DMA 2000 and standards found in FEMA's "Local Mitigation Policy Guide" (April 2023), and the "Local Mitigation Planning Handbook" (May 2023).

SUMMARY OF SECTIONS

Sections 1 and 2 of the Plan Update outline the Plan's purpose and development, including how Planning Team members, stakeholders, and members of the general public were involved in the planning process. Section 3 profiles Santa Fe County's population and economy.

Sections 4 through 23 present a hazard overview and information on individual natural and human-caused hazards in the planning area. For each hazard, the Plan Update presents a description of the hazard, a list of historical hazard events, and the results of the vulnerability and risk assessment process.

Section 24 presents hazard mitigation goals and objectives. Section 25 gives an analysis for the previous actions and Section 26 presents hazard mitigation actions for Santa Fe County. Section 27 identifies Plan maintenance mechanisms.

The list of planning team members and stakeholders is located in Appendix A. Public survey results are analyzed and presented in Appendix B. Appendix C contains a detailed list of critical facilities for the area. Appendix D contains information regarding Dam locations within Santa Fe County. Appendix E contains information regarding workshops and meeting documentation. Capability Assessment results for Santa Fe County are in Appendix F. Appendix G includes State and Federal Funding Opportunities.[4]

[4] Information contained in some of these appendices are exempt from public release under the Freedom of Information Act (FOIA).

SECTION 2
PLANNING PROCESS

SECTION 2: PLANNING PROCESS

PLAN PREPARATION AND DEVELOPMENT

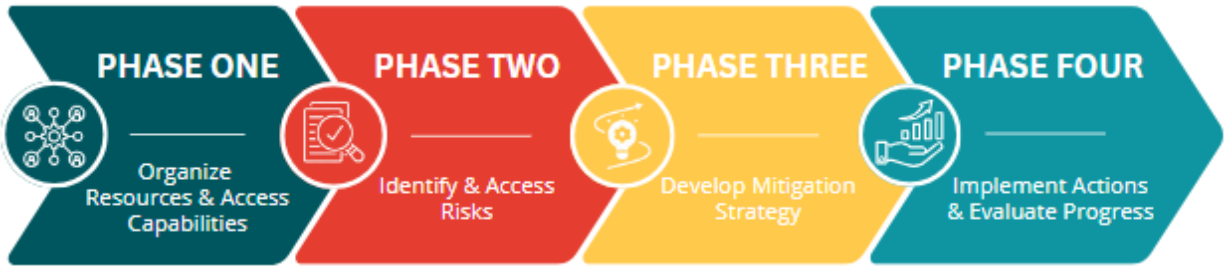
Hazard mitigation planning involves coordination with various constituents and stakeholders to develop a more disaster-resistant community. Section 2 provides an overview of the planning process including the identification of key steps and a detailed description of how stakeholders and the public were involved.

OVERVIEW OF THE PLAN

Santa Fe County hired H2O Partners, Inc. (Consultant Team), to provide technical support and oversee the development of the Santa Fe County Hazard Mitigation Action Plan Update 2025. The Consultant Team used the FEMA "Local Mitigation Planning Policy Guide" (April 2023), and the "Local Mitigation Planning Handbook" (May 2023) to develop the Plan Update. The overall planning process is shown in Figure 2-1 below.

SECTION 2: PLANNING PROCESS

Figure 2-1. Mitigation Planning Process



Santa Fe County and the Consultant Team met in January 2024 to begin organizing resources, identify Planning Team members, and conduct a Capability Assessment.

PLANNING TEAM

Key members of H2O Partners, Inc. developed the Plan Update in conjunction with the Planning Team. The Planning Team was established using a direct representation model. Some of the responsibilities of the Planning Team included: completing Capability Assessment surveys, providing input regarding the identification of hazards, identifying mitigation goals, and developing mitigation strategies. An Executive Planning Team consisting of key personnel involved in hazard mitigation activities from Santa Fe County's Office of Emergency Management and Fire Department, shown in Table 2-1, was formed to coordinate planning efforts and request input and participation in the planning process. Participation in this planning process is defined as being engaged in the process through attending meetings, providing data and related information, providing updates on previous actions, and reviewing and commenting on draft versions of the plan. Table 2-2 reflects the Advisory Planning Team, consisting of additional representatives from County departments participated throughout the planning process. All Executive and Advisory Planning Team members are involved in hazard mitigation activities; those with the authority to regulate development are identified with an asterisk next to their title.

Table 2-1. Executive Planning Team

DEPARTMENT	TITLE
Office of Emergency Management	Emergency Management Coordinator
Fire Department	Fire Chief

Table 2-2. Advisory Planning Team

DEPARTMENT	TITLE
Administrative Services Department	IT Administration
Building & Development Services	Supervisor of Conditional Use Permits, Overlay Zones, Wireless Communication Facilities, Commercial Development, DCIs, Community Solar*

DEPARTMENT	TITLE
Building & Development Services	Supervisor of Terrain Management, Flood zone Determinations, Variances, Appeals, Conceptual Plans, Conditional Use Permits*
Bureau of Elections	Chief Deputy
Clerk's Office	County Clerk
Community Development Department	Deputy Director*
Community Development Department	Economic Development Division Manager*
Community Development Department	Economic Development Division Specialist*
Community Development Department	Executive Director*
Community Development Department	Sustainability Division Manager*
Community Services	Health Services Division Director
County Attorney	Legal ACA II
County Commissioner	Constituent Services Liaison
County Commissioner	District 1 County Commissioner*
County Commissioner	District 2 County Commissioner*
County Commissioner	District 3 County Commissioner*
County Commissioner	District 4 County Commissioner*
County Commissioner	District 5 County Commissioner*
County Ethics Board	Home Occupations, Film Permits, Temporary Use Permits Specialist
County Manager's Office	County Manager
County Manager's Office	Office Administrator
County Manager's Office	Deputy County Manager
County Manager's Office	Operations Manager
County Manager's Office	Strategic Operational Planning Director
Fire Department	Assistant Fire Chief / Fire Marshal
Fire Department	Assistant Fire Chief of Operations
Fire Department	Battalion Chief & District Liaison
Fire Department	Deputy Fire Chief

DEPARTMENT	TITLE
Fire Department	Fire Prevention Specialist Urban Wildland
Fire Department	Hondo District Fire Chief
Fire Department	Wildland Captain
Fire Department	Turquoise Trail District Fire Chief
Growth Management Department	Deputy Director*
Growth Management Department	Director*
Growth Management Department	E-911 & GIS Administrative Assistant
Growth Management Department	GIS Manager
Growth Management Department	GIS Specialist
Growth Management Department	GIS Team Lead
Office of Emergency Management	Director of Emergency Management
Planning Division	Planning Manager*
Public Safety	Operations Manager
Public Safety	Regional Emergency Communications Center (RECC) Deputy Director
Public Safety	Regional Emergency Communications Center (RECC) Director
Public Works	Director
Senior Services	Senior Services Program Manager
Sheriff's Office	Computer Aided Dispatch Administrator
Sherrif's Office	County Sheriff
Sheriff's Office	Captain
Sheriff's Office	Undersheriff

Additionally, a Stakeholder Group was invited via email to participate in the planning process by attending meetings, commenting on draft versions of the plan, and/or by providing data to inform the planning process. The Consultant Team, Planning Teams, and Stakeholder Group coordinated to identify mitigation goals, and develop mitigation strategies and actions for the Plan Update. Appendix A provides a complete listing of all participating Planning Team members and stakeholders by organization and title. Stakeholder involvement is discussed further below.

Based on results of the completed Capability Assessment survey, the Santa Fe County described methods for achieving future hazard mitigation measures by expanding existing capabilities. For

example, Santa Fe County has an opportunity to establish Planning Team members with the authority to monitor the Plan and identify grant funding opportunities for expanding staff. Other options for improving capabilities include the following:

- Integrate risk information into future updates of Santa Fe County's Sustainable Growth Management Plan (SGMP), Climate Action Plan, and Community Wildfire Protection Plan (CWPP).
- Integrate risk information into Santa Fe County's Capital Improvement Plan and programming.
- Identify opportunities for cross-training or increase the technical expertise of staff by attending free training available through FEMA and the New Mexico Department of Homeland Security and Emergency Management (DHSEM), and monitoring classes and availability through preparingnewmexico.org.
- Review current floodplain ordinances for opportunities to increase resiliency, (above current standards) such as modifying permitting or building codes.
- Develop ordinances that will require all new developments to conform to the higher mitigation standards, exceeding current requirements.

Sample hazard mitigation actions developed with similar hazard risk were shared at the meetings. These important discussions resulted in the development of multiple mitigation actions that are included in the Plan Update to further mitigate risk from natural hazards in the future.

The Planning Team developed hazard mitigation actions for mitigating risk from all the identified hazards within this Plan Update; these actions include developing a plan to assist vulnerable populations during natural hazard events and reducing impacts from dam failure by enhancing monitoring and coordination. Several actions were also included to incorporate nature-based solutions into the mitigation strategy, such as creating a Green Stormwater Infrastructure (GSI) master plan, creating an incentive program for installing green stormwater infrastructure, and implementing a nature-based climate solutions program to reduce hazard impacts and increase soil health and biodiversity.

PLANNING PROCESS

The process used to prepare the Plan Update followed the four major steps included at Figure 2-1. After the Planning Team was organized, a capability assessment was developed and distributed at the Kick-Off Workshop. Hazards were identified and assessed, and results associated with each of the hazards were provided at the Risk Assessment Workshop. Based on Santa Fe County's identified vulnerabilities, specific mitigation strategies were discussed and developed at the Mitigation Strategy Workshop. Finally, Plan maintenance and implementation procedures were developed and are included in Section 27. Participation of Planning Team members, stakeholders, and the public at each of the workshops is documented in Appendix E.

At the Plan development workshops held throughout the planning process described herein, the following factors were taken into consideration:

- The nature and magnitude of risks currently affecting the community;
- Hazard mitigation goals to address current and expected conditions;
- Whether current resources will be sufficient for implementing the Plan Update;
- Implementation problems, such as technical, political, legal, and coordination issues that may hinder development;

- Anticipated outcomes; and
- How Santa Fe County, agencies, and partners will participate in implementing the Plan Update.

KICKOFF WORKSHOP

The Kickoff Workshop was held on January 18, 2024, at the Santa Fe County Public Safety Complex. The initial workshop informed County officials and key department personnel about how the planning process pertained to their distinct roles and responsibilities and engaged stakeholder groups that focus on vulnerable populations and underserved communities including, but not limited to tribal agencies, housing authorities, local medical partners, school districts, and surrounding communities. In addition to the kickoff presentation, participants received the following information:

- Project overview regarding the planning process;
- Public survey access information;
- Hazard Ranking form; and
- Capability Assessment survey for completion.

A risk ranking exercise was conducted at the Kickoff Workshop to get input from the Planning Team and stakeholders pertaining to various risks from a list of natural hazards affecting the planning area. Each participant at the Kickoff Workshop was provided a risk ranking sheet that asked participants to rank hazards in terms of the probability or frequency of occurrence, extent of spatial impact, and the magnitude of impact. The results of the ranking sheets identified unique perspectives on varied risks throughout the planning area. The assessments were also used to set priorities for hazard mitigation actions based on potential loss of lives and dollar losses.

HAZARD IDENTIFICATION

At the Kickoff Workshop, and through email and phone correspondence, the Planning Team conducted preliminary hazard identification. The Planning Team in coordination with the Consultant Team reviewed and considered a full range of natural hazards. Once identified, the teams narrowed the list to significant hazards by reviewing hazards affecting the area as a whole, the 2023 State of New Mexico Hazard Mitigation Plan, and initial study results from reputable sources such as federal and state agencies. Based on this initial analysis, the teams identified a total of 19 hazards, including natural and human-caused hazards, which pose a significant threat to the planning area.

RISK ASSESSMENT

An initial risk assessment for Santa Fe County was completed in February 2024 and results were presented to Planning Team members at the Risk Assessment Workshop held on February 15, 2024, at the Santa Fe County Public Safety Complex. At the workshop, the characteristics and consequences of each hazard were evaluated to determine the extent to which the planning area would be affected in terms of potential danger to property and citizens. During the workshop, Planning Team members also discussed the potential for cascading impacts of natural hazards.

Property and crop damages were estimated by gathering data from the National Centers for Environmental Information (NCEI) and National Oceanic and Atmospheric Administration (NOAA). The assessment also examined the impact of various hazards on the built environment, including general building stock, critical facilities, lifelines, and infrastructure. The resulting risk assessment profiled hazard events provided information on previous occurrences, estimated

probability of future events, and detailed the spatial extent and magnitude of impact on people and property. A hazard profile and vulnerability analysis for each of the hazards can be found in Sections 4 through 23.

MITIGATION REVIEW AND DEVELOPMENT

Developing the Mitigation Strategy for the Plan involved identifying mitigation goals and new mitigation actions. A Mitigation Strategy Workshop was held on March 7, 2024, at the Santa Fe County Public Safety Complex. In addition to the Planning Team, stakeholder groups were invited to attend the workshop. Regarding hazard mitigation actions, workshop participants emphasized the desire for wildfire projects. Additionally, the participants were proactive in identifying mitigation actions to lessen the risk of all the identified hazards included in the Plan Update.

An inclusive and structured process was used to develop and prioritize new hazard mitigation actions for the Plan Update. The prioritization method was based on FEMA's STAPLE+E criteria and included social, technical, administrative, political, legal, economic, and environmental considerations. As a result, each Planning Team Member assigned an overall priority to each hazard mitigation action. The overall priority of each action is reflected in the hazard mitigation actions found in Section 26.

Planning Team Members then developed action plans identifying proposed actions, costs and benefits, the responsible organization(s), effects on new and existing buildings, implementation schedules, priorities, and potential funding sources.

Specifically, the process involved:

- Listing optional hazard mitigation actions based on information collected from previous plan reviews, studies, and interviews with federal, state, and local officials. Workshop participants reviewed the optional mitigation actions and selected actions that were most applicable to their area of responsibility, cost-effective in reducing risk, easily implemented, and likely to receive institutional and community support.
- Workshop participants inventoried federal and state funding sources that could assist in implementing the proposed hazard mitigation actions. Information was collected, including the program name, authority, purpose of the program, types of assistance and eligible projects, conditions on funding, types of hazards covered, matching requirements, application deadlines, and a point of contact.
- Planning Team Members considered the benefits that would result from implementing the hazard mitigation actions compared to the cost of those projects. Although detailed cost-benefit analyses were beyond the scope of the Plan Update, Planning Team Members utilized economic evaluation as a determining factor between hazard mitigation actions.
- Planning Team Members then selected and prioritized mitigation actions.

Hazard mitigation actions identified in the process were made available to the Planning Team for review. The draft Plan Update was maintained on file by Santa Fe County and was made available to the general public for review.

REVIEW AND INCORPORATION OF EXISTING PLANS

REVIEW

Background information utilized during the planning process included various studies, plans, reports, and technical information from sources such as FEMA, the United States Army Corps of

Engineers (USACE), the U.S. Fire Administration, National Oceanic and Atmospheric Administration (NOAA), the New Mexico Bureau of Geology and Mining Resources, the Office of the State Engineer Dam Safety Bureau, the New Mexico Forestry Division, the New Mexico Department of Homeland Security and Emergency Management (NM DHSEM), and local hazard assessments and plans. Section 4 and the hazard-specific sections of the Plan (Sections 5-23) summarize the relevant background information.

Specific background documents, including those from FEMA, provided information on hazard risk, hazard mitigation actions currently being implemented, and potential mitigation actions. Previous hazard events, occurrences, and descriptions were identified through NOAA's National Centers for Environmental Information (NCEI) Storm Events Database. Results of past hazard events were found through searching the NCEI Database. The USACE studies were reviewed for their assessment of risk and potential projects in the region. Information from the University of New Mexico Geospatial and Population Studies Department was reviewed for population and other projections and included in Section 3 of the Plan. Data from the United States Forest Service was used to appropriately rank the wildfire hazard, and to help identify potential grant opportunities. Materials from FEMA and NM DHSEM were reviewed for guidance on Plan Update development requirements.

INCORPORATION OF EXISTING PLANS INTO THE HMAP PROCESS

A Capability Assessment was completed by key departments from Santa Fe County which provided information pertaining to existing plans, policies, ordinances, and regulations to be integrated into the goals and objectives of the Plan Update. The relevant information was included in a master Capability Assessment, Appendix F.

Existing projects and studies were utilized as a starting point for discussing hazard mitigation actions among Planning and Consultant Team members. For example, Santa Fe County has completed several projects, including enhancing geologic data in development zones, enhancing code enforcement activities, and updating the Wildland Urban Interface (WUI) ordinance. Other mitigation projects are currently in progress, including supporting drought-resilient land use planning by implementing the Sustainable Land Use Development Code, as well as enhancing earthquake monitoring activities, a project that is being led by the New Mexico Institute of Mining and Technology.

Additionally, policies and ordinances were reviewed as well as other County plans, such as the Climate Action Plan, Community Wildfire Protection Plan, and Comprehensive Plan, to identify any additional mitigation actions.

Finally, the 2023 State of New Mexico Hazard Mitigation Plan, developed by NM DHSEM, was discussed in the initial planning meeting in order to develop a specific group of hazards to address in the planning effort. The 2023 State Plan was also used as a guidance document, along with FEMA materials, in the development of the Santa Fe County Hazard Mitigation Action Plan Update 2025.

INCORPORATION OF THE HMAP INTO OTHER PLANNING MECHANISMS

Planning Team members will integrate implementation of the Plan Update with other planning mechanisms for Santa Fe County, such as the General Plan. Existing plans will be reviewed and incorporated into the Plan Update, as appropriate. This section discusses how the Plan will be

implemented by Santa Fe County. It also addresses how the Plan will be evaluated and improved over time, and how the public will continue to be involved in the hazard mitigation planning process.

Santa Fe County will be responsible for implementing hazard mitigation actions contained in Section 26. Each hazard mitigation action has been assigned to a specific County department that is responsible for tracking and implementing the action.

A funding source has been listed for each identified hazard mitigation action and may be utilized to implement the action. An implementation time period has also been assigned to each hazard mitigation action as an incentive and to determine whether actions are implemented on a timely basis.

Santa Fe County will integrate hazard mitigation actions contained in the Plan Update with existing planning mechanisms such as floodplain ordinances, Community Wildfire Protection Plan, and other local and area planning efforts. Santa Fe County will work closely with area organizations to coordinate implementation of hazard mitigation actions that benefit the planning area in terms of financial and economic impact.

Upon formal adoption of the Plan Update, Planning Team members will review existing plans along with building codes to guide development and ensure that hazard mitigation actions are implemented. Each of the County departments will be responsible for coordinating periodic review of the Plan Update with members of the Advisory Planning Team to ensure integration of hazard mitigation strategies into these planning mechanisms and codes. The Planning Team will also conduct periodic reviews of various existing planning mechanisms and analyze the need for any revisions or updates in light of the approved Plan Update. Santa Fe County will ensure that future long-term planning objectives will contribute to the goals of the Plan to reduce the long-term risk to life and property from moderate and high-risk hazards. Within one year of formal adoption of the Plan, existing planning mechanisms will be reviewed and analyzed as they pertain to the Plan Update.

Planning Team members will review and revise, as necessary, the long-range goals and objectives in its strategic plan and budgets to ensure that they are consistent with the Plan Update.

Furthermore, Santa Fe County will work with neighboring jurisdictions to advance the goals of the Plan Update as it applies to ongoing, long-range planning goals and actions for mitigating risk to natural hazards throughout the planning area.

Table 2-4 identifies types of planning mechanisms and examples of methods for incorporating the Plan into other planning efforts.

Table 2-4. Examples of Methods of Incorporation

PLANNING MECHANISM	INCORPORATION OF PLAN
Annual Budget Review	Various departments and key personnel that participated in the planning process for Santa Fe County will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.
Capital Improvement Plan	Prior to any revisions to the CIP, County departments will review the risk assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
General Plan	Since general plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of Santa Fe County's General Plan.
Floodplain Management Plan	Floodplain management plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 11 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when updating management plans or developing new plans.
Grant Applications	The Plan will be evaluated when grant funding is sought for mitigation projects. If a project is not in the Plan Update, a Plan Revision may be necessary to include the action in the Plan.
Regulatory Plans	Currently, Santa Fe County has regulatory plans in place, such as Emergency Management Plans, Land Use Plans, and Evacuation Plans. The Plan Update will be consulted when County departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.

Appendix F Capability Assessment provides an overview of the County's existing planning and regulatory capabilities. These existing capabilities provide the mechanisms to implement the mitigation strategy objectives. For example, the adoption of building codes and implementation of land use regulations have been demonstrated to help communities avoid losses from natural hazard events. The Santa Fe County Sustainable Land Development Code (SLDC), adopted in 2016, is the planning mechanism to implement the County's Sustainable Growth Management

Plan. The SLDC includes both building codes and land use regulation and acknowledges the County's risk to natural hazards through regulations that prevent future development in creating or increasing existing vulnerabilities to hazards. These include the 2021 IECC Residential and Commercial Building Codes, 2009 New Mexico Commercial and Residential Building Codes, the Santa Fe County Urban Wildland-Interface Code (7.2.15), flood prevention and flood control standards (7.18), special protection of riparian areas (7.25) and subdivision ordinances (Chapter 5).

It should be noted for the purposes of the Plan Update that the 2018 HMAP has been used as a reference when reviewing and updating all plans and ordinances for the entire planning area including the County's 2020 Climate Action Plan.

PLAN REVIEW AND PLAN UPDATE

As with the development of Plan Update, Santa Fe County will oversee the review and update process for relevance and if necessary, make adjustments. At the beginning of each fiscal year, Planning Team Members will meet to evaluate the Plan and review other planning mechanisms to ensure consistency with long-range planning efforts. In addition, planning participants will also meet once a year, by conference call or presentation, to re-evaluate prioritization of the hazard mitigation actions. The plan may be amended to include additional hazard mitigation actions as they are developed.

TIMELINE FOR IMPLEMENTING MITIGATION ACTIONS

Both the Executive Planning Team (Table 2-1) and the Advisory Planning Team (Table 2-2) will engage in discussions regarding a timeframe for how and when to implement each hazard mitigation action. Considerations include when the action will be started, how existing planning mechanisms' timelines affect implementation, and when the action should be fully implemented. Timeframes may be general, and there will be short, medium, and long-term goals for implementation based on prioritization of each action, as identified on individual Hazard Mitigation Action worksheets included in the Plan Update for Santa Fe County.

Both the Executive and Advisory Planning Team will evaluate and prioritize the most suitable hazard mitigation actions for the community to implement. The timeline for implementation of actions will partially be directed by the County's comprehensive planning process, budgetary constraints, and community needs. Santa Fe County is committed to addressing and implementing hazard mitigation actions that may be aligned with and integrated into the Plan Update.

Overall, the Planning Team is in agreement that goals and actions of the Plan Update shall be aligned with the timeframe for implementation of hazard mitigation actions with respect to annual review and updates of existing plans and policies.

PUBLIC AND STAKEHOLDER INVOLVEMENT

An important component of hazard mitigation planning is public participation and stakeholder involvement. Input from individual citizens and the community as a whole provides the Planning Team with a greater understanding of local concerns and increases the likelihood of successfully implemented hazard mitigation actions. If citizens and stakeholders, such as local businesses, non-profits, hospitals, and schools are involved, they are more likely to gain a greater appreciation

of the risks that hazards may present in their community and take steps to reduce or mitigate their impact.

The public was involved in the development of the Santa Fe County Hazard Mitigation Action Plan Update 2025 at different stages prior to official Plan approval and adoption. Public input was sought using three methods: (1) open public meetings; (2) electronic and printed survey instruments; and (3) making the draft Plan Update available for public review on the County's websites.

The draft Plan Update was made available to the general public for review and comment on Santa Fe County's website. The public was notified at the public meetings that the draft Plan Update would be available for review. Public feedback was received on the draft Plan Update and reviewed by Santa Fe County and consultants. All relevant information, as determined by the County, was incorporated into the Plan Update. Public input was utilized to assist in identifying hazards that were of most concern to the citizens of the County and what actions they felt should be included and prioritized.

The Plan Update will be advertised and posted on Santa Fe County's website upon approval from FEMA, and a copy will be kept at the Santa Fe County Courthouse.

UNDERSERVED COMMUNITIES/VULNERABLE POPULATIONS

One of the goals of the Planning Team was to build equity into the planning process. Including organizations that aid underserved communities and socially vulnerable populations to participate in the plan helps ensure equitable access to the planning process and the meaningful participation of all residents. In addition, these groups can make sure that the interests of vulnerable populations are accurately represented and act as a valuable resource to share information with those vulnerable populations.

The Planning Team worked to identify local agencies, organizations and community leaders that focus on reaching vulnerable populations and underserved communities. These organizations were included in the planning process as stakeholders and were invited to participate in the planning process via email. These agencies were encouraged to post public planning meetings as well as solicit feedback via the public survey.

All stakeholders and planning team members were invited to participate in the development of the Plan during this process, including all public meetings, and surveys. All stakeholders are listed in Table 2-5. Some stakeholders have been detailed below along with the agency's mission, including:

- United Way of North Central New Mexico (UWNCNM) – aims to tackle systemic problems hurting families and children in their five-county community through bold, long-term solutions. Included in UWNCNM's programs and services are their Family Advocacy Center offering free services to victims of violence; Diversity, Equity, and Inclusion (DEI) Initiative; free tax help; educational services; and 211 help line connecting those in crisis with needed resources.
- Homewise – provides homebuyer education, individualized financial coaching, real estate services, and mortgage lending services to help New Mexicans achieve their dream of homeownership. Homewise's goal is to create successful homeowners and strengthen neighborhoods to improve the long-term wellbeing of individuals and families.

- The Food Depot – distributes 10 million pounds of food each year across a nine-county service area in Northern New Mexico. With a focus on equity and accessibility, the food bank aims to end hunger and food instability in its region, which includes Santa Fe County.
- IndigenousWays – promotes living in balance for diverse communities through music, arts, outreach, and events. The IndigenousWays vision is to reach Indigenous and LGBTQIA2S+ communities through outreach and Indigenous Wisdom that creates and enhances survival and sustainability.
- Goodwill Industries of New Mexico – helps New Mexicans find jobs and gain access to specialized social services. The nonprofit offers a variety of services aiding unemployed New Mexicans, veterans, seniors, and those experiencing homelessness.

In addition, public notices were posted on public bulletin boards at numerous public facilities, as well as posted on Santa Fe County's website and social media. Additionally, the Executive Planning Team also went door to door informing tribal residents of the planning process and inviting them to public meetings. For a sample of these postings, please see Appendix E. In addition to public meetings, the Planning and Consultant Teams developed a public survey designed to solicit public input during the planning process from citizens and stakeholders and to obtain input and feedback on the mitigation plan. For each form of engagement, all efforts were made to reach Santa Fe County's underserved communities and vulnerable populations throughout the planning process. Additional survey information is provided at the end of this section.

STAKEHOLDER INVOLVEMENT

Stakeholder involvement is essential to hazard mitigation planning since a wide range of stakeholders can provide input on specific topics and from various points of view. Throughout the planning process, members of community groups, Tribal agencies, local businesses, neighboring jurisdictions, schools, and hospitals were invited to participate in development of the Plan Update. The Stakeholder Group (Table 2-5) included a broad range of representatives from both the public and private sector and served as a key component in Santa Fe County's outreach efforts for development of the Plan Update. Documentation of stakeholder meetings is found in Appendix E. A list of organizations invited to attend via email is found in Table 2-5. Those that participated in the public meetings are identified with a plus symbol (+) next to their stakeholder type and were involved in mitigation activities.

Table 2-5. Stakeholder Working Group

AGENCY	TITLE	STAKEHOLDER TYPE
Acequia Associations	Director of Operations	Utility Provider
Acequia Associations	Executive Director	Utility Provider
American Red Cross	Executive Director for Arizona and New Mexico Region	Community Organization / Non-Profit
Bernalillo County	Emergency Management	Neighboring Community
Bienvenidos Outreach	Assistant Director	Community Organization / Non-Profit

AGENCY	TITLE	STAKEHOLDER TYPE
City of Espanola	City Manager	Neighboring Community
City of Espanola	Fire Chief	Neighboring Community
City of Santa Fe	Assistant City Manager	Neighboring Community/HHPD Dam Owner
City of Santa Fe	City Manager	Neighboring Community/HHPD Dam Owner
City of Santa Fe	Emergency Manager	Neighboring Community/HHPD Dam Owner
Town of Edgewood	Town Manager	Neighboring Community+
Edgewood Police Department	Chief of Police	Community Organization
El Valle De La Cieneguilla Land Grant Association	Tribal Administrator for Government Affairs	Tribal Agency
Environmental Protection Agency, Region 6	Director of Emergency Management Division	Federal Agency
Environmental Protection Agency, Region 6	Regional Contact, Albuquerque	Federal Agency
Environmental Protection Agency, Region 6	Western Regional Contact	Federal Agency
Espanola Humane	President	Community Organization
Felines & Friends	Executive Director	Community Organization / Non-Profit
FEMA	Region 6	Federal Agency
The Food Depot	Media Representative	Community Organization / Non-Profit
Forest Stewards Guild	Forest Health Specialist for New Mexico State Forestry Division	State Agency
Forest Stewards Guild	Regional Representative	State Agency
Goodwill Industries of New Mexico	Director of Government Relations	Community Organization / Non-Profit
Goodwill Industries of New Mexico	President / CEO	Community Organization / Non-Profit
Habitat for Humanity	General Representative	Community Organization / Non-Profit
Homewise	Media Representative	Community Organization

AGENCY	TITLE	STAKEHOLDER TYPE
Indigenous Ways	President	Community Organization / Non-Profit
Institute of American Indian and Alaska Native Culture and Arts	Executive Assistant to the President	Academia
Institute of American Indian and Alaska Native Culture and Arts	Vice President of Operations	Academia
Interfaith Community Shelter at Pete's Faith	Executive Director	Community Organization / Non-Profit
Keep Santa Fe Beautiful	General Representative	Community Organization
Kitchen Angels	Director of Food Services	Community Organization / Non-Profit
Los Alamos County	Deputy Emergency Management	Neighboring Community
Los Alamos County	Emergency Management	Neighboring Community
Nambe Pueblo	Governor	Tribal Agency
The Nature Conservancy	Executive Director	Community Organization
New Mexico Aging and Long-Term Services	Cabinet Secretary	State Agency
New Mexico Bureau of Minerals and Geology	Director and State Geologist	State Agency
New Mexico Cattle Growers Association	President	State Agency
New Mexico Department of Agriculture	Co-Director for Southwest Board and Emergency Preparedness	State Agency+
New Mexico Department of Agriculture	County Extension Agent	State Agency+
New Mexico Department of Agriculture	Director for Southwest Board and Emergency Preparedness	State Agency
New Mexico Department of Agriculture	Southwest Board and Emergency Preparedness Representative	State Agency
New Mexico Department of African American Affairs	Communications and Marketing Coordinator	State Agency
New Mexico Department of African American Affairs	Deputy Director	State Agency

AGENCY	TITLE	STAKEHOLDER TYPE
New Mexico Department of Energy, Minerals, and Natural Resources	Cabinet Secretary	State Agency
New Mexico Department of Energy, Minerals, and Natural Resources	Public Information Officer	State Agency
New Mexico Department of Game and Fish	Director	State Agency
New Mexico Department of Health	Communications Coordinator	State Agency
New Mexico Department of Health	Public Information Officer	State Agency
New Mexico Department of Homeland Security and Emergency Management	Response, Recovery, and Mitigation Bureau Chief	State Agency
New Mexico Department of Homeland Security and Emergency Management	State Hazard Mitigation Officer	State Agency
New Mexico Department of Homeland Security and Emergency Management	State Planner (Contractor I)	State Agency
New Mexico Department of Homeland Security and Emergency Management	State Planner (Contractor II)	State Agency
New Mexico Department of Indian Affairs	Cabinet Secretary	State Agency
New Mexico Department of Transportation	Director of Communications	State Agency
New Mexico Environmental Department	Cabinet Secretary	State Agency
New Mexico Environmental Department	Chief Public Information Officer	State Agency
New Mexico Environmental Department	Director of Environmental Protection Division	State Agency
New Mexico Highlands University	Santa Fe Center Manager	Academia
New Mexico Livestock Bureau	Deputy Director	State Agency
New Mexico Livestock Bureau	Inspector	State Agency+
New Mexico Office of the State Engineer	District 6 Dam Safety	State Agency

AGENCY	TITLE	STAKEHOLDER TYPE
New Mexico School for the Deaf	Superintendent	Academia
New Mexico State University Agricultural Extension	Northern District Director	Academia
New Mexico State University Earth Data Analysis Center	Director	Academia
New Mexico Wildlife Center	Communications Specialist	Community Organization
Pojoaque	Director of Security	Academia
Pojoaque Pueblo	Governor	Tribal Agency
Pojoaque Valley Irrigation District / Santa Fe Pojoaque Soil Conservation District	District Manager	Utility Provider/HHPD Dam Owner
Pojoaque Valley Irrigation District / Santa Fe Pojoaque Soil Conservation District	Office Manager	Utility Provider/HHPD Dam Owner
Pojoaque Valley Irrigation District / Santa Fe Pojoaque Soil Conservation District	Treasurer/Board Member	Utility Provider/HHPD Dam Owner+
Quivira Coalition	Communications Director	Community Organization
Rio Arriba County	County Manager	Neighboring Community
Sandoval County	Emergency Management	Neighboring Community
San Ildefonso Pueblo	Governor	Tribal Agency
San Miguel County	Emergency Management	Neighboring Community
Santa Fe Animal Shelter	Director of Shelter Operations	Community Organization / Non-Profit
Santa Fe Community College	Director of Facilities	Academia
Santa Fe Community College	President	Academia
Santa Fe Community Foundations	Senior Director of Community Programs	Community Organization / Non-Profit
Santa Fe Community Housing Trust	Executive Director	Community Organization
Santa Fe Railyard Community Corporations	Executive Director	Community Organization
Santa Fe Railyard Community Corporations	Operations Manager	Community Organization
Santa Fe Public Schools	Superintendent	Academia
Santa Fe Watershed Association	Director of Stewardship and Community Outreach	Community Organization

AGENCY	TITLE	STAKEHOLDER TYPE
Santa Fe Watershed Association	Executive Director	Community Organization+
Santa Mario El Mirador	President / CEO	Healthcare Agency
Southwestern College	President	Academia
Stanley VFD	District Chief	Community Organization+
State Governor	Governor	State Agency
State Legislature	District 46 Representative	State Agency
State Senate	District 25 Representative	State Agency
St. John's College	President	Academia
Tesuque Pueblo	Governor	Tribal Agency
Torrance County	Emergency Management	Neighboring Community
United Ways	Santa Fe Area Director	Community Organization
U.S. Army Corps of Engineers	Southwest Region	Federal Agency
U.S. Fish & Wildfire	Southwest Region	Federal Agency
Water Engineers for the Americas (WEFTA)	Executive Director	Community Organization
WildEarth Guardians	Climate and Energy Advocate	Community Organization
WildEarth Guardians	Operations & Development Coordinator	Community Organization
YouthWorks	Chief of Operations	Community Organization
YouthWorks	Executive Director	Community Organization

Stakeholders and participants from neighboring communities that attended the Planning Team and public meetings played a key role in the planning process. For example, to address stakeholders biggest concerns of public education and emergency services the county included actions to promote early warning and communication, community education on mitigation efforts, and establishing partnerships to promote response efforts and extreme weather event.

PUBLIC MEETINGS

A series of public meetings were held throughout the planning area to collect public and stakeholder input. Topics of discussion included the purpose of hazard mitigation, discussion of the planning process, and types of natural hazards. Santa Fe County released information regarding the public meetings in their area to increase public participation in the Plan Update development process, through posting on their website, on social media sources including Facebook and Instagram, through the local media and radio, and posting the information on bulletin boards in public facilities. A sampling of these notices can be found in Appendix E, along

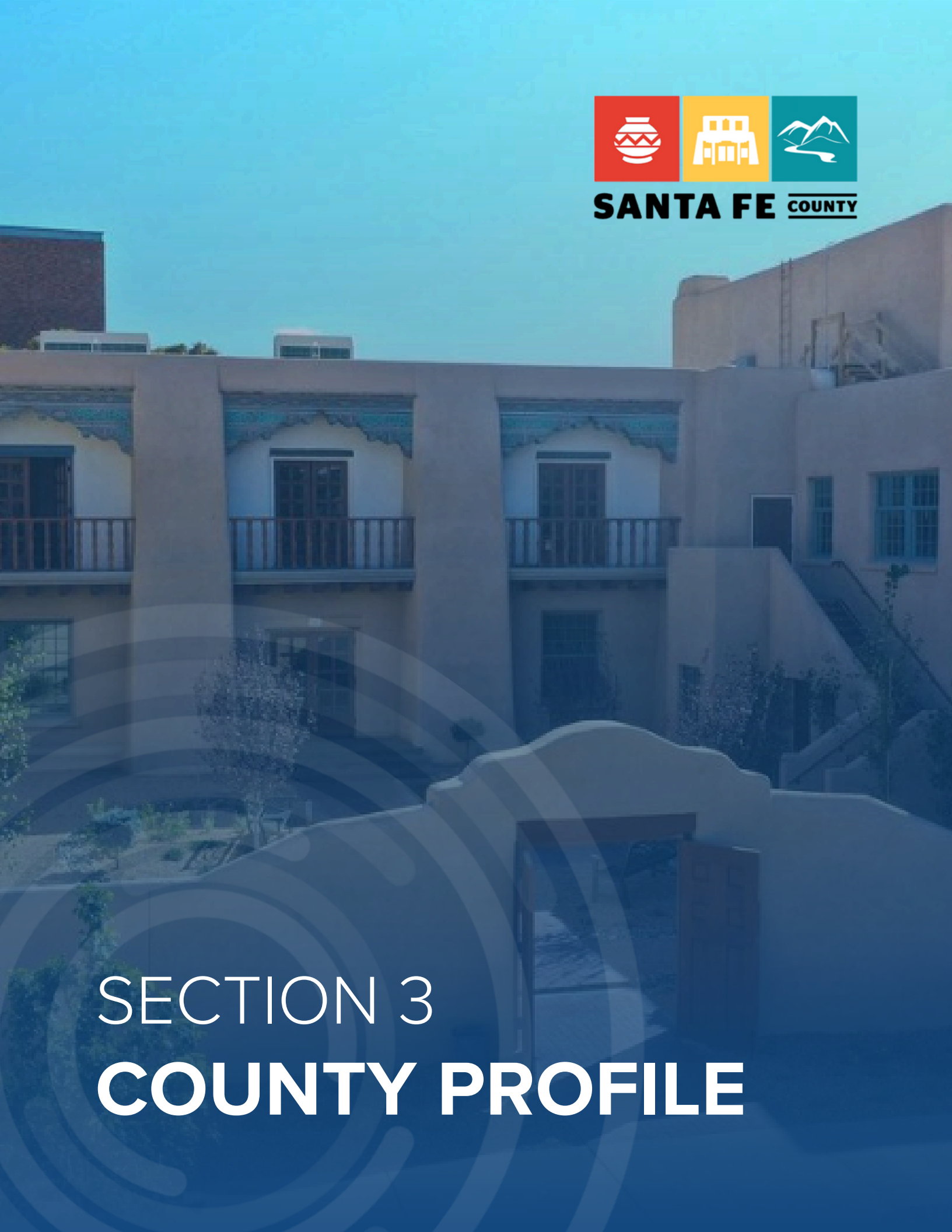
with the documentation on the public meetings. Representatives from area neighborhood associations and area residents were invited to participate. In an effort to engage the Pueblos in Santa Fe County, the Executive Planning Team met with Tribal leaders and went door to door to inform tribal residents about the planning process and invite them to attend the public meetings.

Public meetings were held on the following dates:

- January 18, 2024 - Rancho Viejo Fire Station, La Cienega District
- February 15, 2024 - Hondo Volunteer Fire Department Station 80
- March 6, 2024 – Santa Fe County Fire Station 70
- March 7, 2024 – Pojoaque District Fire Station
- March 15, 2024 – Held virtually via Zoom

PUBLIC PARTICIPATION SURVEY

In addition to public meetings, the Planning and Consultant Teams developed a public survey designed to solicit public input during the planning process from citizens and stakeholders and to obtain data regarding the identification of any potential hazard mitigation actions or problem areas. The survey was promoted by local officials and a link to the survey was posted on the County's website. A total of 261 surveys were completed online. The survey results are analyzed in Appendix B. Santa Fe County reviewed the input from the surveys and decided which information to incorporate into the Plan as hazard mitigation actions. For example, results indicate that wildfire is the hazard of highest concern for the public. The most desired types of mitigation actions included restricting or preventing development in hazard-prone areas, as well as informing property owners how to minimize damage to their properties. As a result, the Planning Team has included mitigation actions related to making mitigation-informed planning and development decisions and actions related to public education and outreach efforts to boost public awareness.



SANTA FE COUNTY

SECTION 3
COUNTY PROFILE

SECTION 3: COUNTY PROFILE

OVERVIEW

Santa Fe County comprises 1,911 square miles of north-central New Mexico, with approximately 1,909 square miles (99.8%) being land and the rest being water, making it the fifth smallest New Mexico county by size[1]. The City of Santa Fe, the county seat and state capital, sits roughly 60 miles northeast of the City of Albuquerque and roughly 40 miles west of the City of Las Vegas. Directly surrounding Santa Fe County are Rio Arriba County to the north, Mora County to the northeast, San Miguel County to the east, Torrance County to the south, Bernalillo County to the southwest, Sandoval County to the west, and Los Alamos County to the northwest.

The Rio Grande River crosses through the northwestern portion of Santa Fe County; the Rio Grande and its tributaries are the principal river system draining the region. Santa Fe County largely falls within the North Central New Mexico Valleys and Mesas ecoregion, with eastern and western portions of the county partly consisting of foothill woodlands, shrublands, and mid-elevation and subalpine forests.[2] Santa Fe County includes the southernmost portion of the Sangre de Cristo Mountains, the southernmost subrange of the Rocky Mountains. The average max temperature in the county is 87 degrees Fahrenheit (°F) in the summer, and the average low is 21°F in winter. On average, the county receives 11 inches of precipitation a year.[3]

The region that would become Santa Fe County was originally home to Pueblo Indian villages with founding dates between 1050 and 1150 AD; most archaeologists agree these sites were abandoned 200 years before the arrival of the Spanish. The “Kingdom of New Mexico” was first claimed for the Spanish Crown in 1540, but it would not be until 70 years later that New Mexico’s second Spanish Governor, Don Pedro de Peralta, would move the provincial capital to newly founded *La Villa Real de la Santa Fe de San Francisco de Asisi* (later shortened to Santa Fe).

During the majority of the 17th century, Spanish soldiers, officials, and Franciscan missionaries sought to subjugate and convert the nearly 100,000 Pueblo Indians in the region. This culminated in a revolt in 1680, in which the Pueblos drove out the Spanish colonists, killing 400 of them. The Pueblos burned most of Santa Fe and occupied what remained until 1692, when Don Diego de Vargas reconquered the region after a siege on Santa Fe. Over the next century, Spanish authorities formed an alliance with Pueblo Indians to promote peaceful coexistence during a time

[1] Source: www.santafecountynm.gov/userfiles/file/asd/FY2009/FY09-2-ALL.pdf
[2] Source: https://gaftp.epa.gov/EPADataCommons/ORD/Ecoregions/nm/nm_pg.pdf
[3] Source: https://www.ncei.noaa.gov/access/us-climate-normals/#dataset=normals-annualseasonal&timeframe=30&location=NM&station=USW00023049

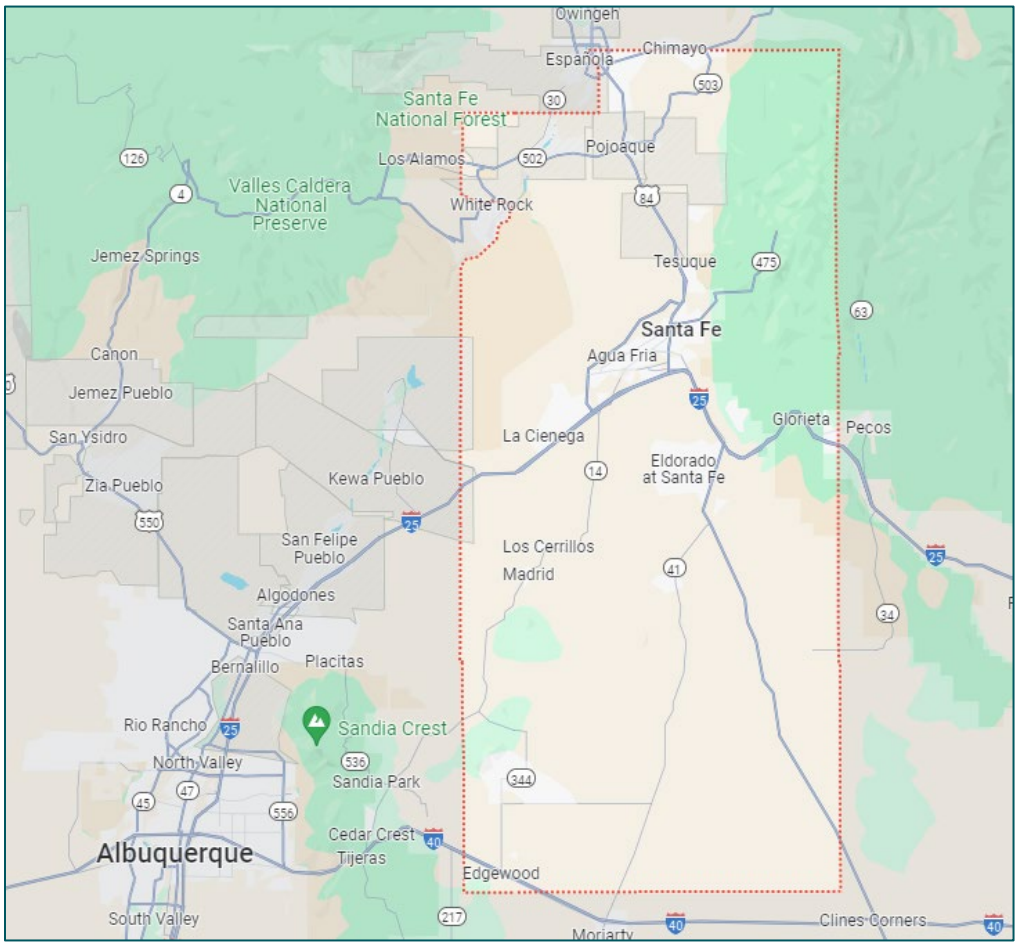
of bloody altercations with nomadic Native American tribes such as the Comanches, Apaches, and Navajos.

In 1821, Mexico gained its independence from Spain and the City of Santa Fe was made the capital of the Mexican province of New Mexico. Santa Fe County was then first established by Mexico in 1844. Following the Mexican-American War, the Treaty of Guadalupe Hidalgo, and the Compromise of 1850, New Mexico was ceded to the U.S. from Mexico and led to the creation of the U.S. territory of New Mexico as well as Santa Fe as a U.S. county in 1852. New Mexico gained full statehood in 1912.

The long and varied history of conquests and frontier violence, legacy of art and architecture, and its status as a regional hub of culture and civilization make it one of the most historically significant regions in the American West.[4] Today, Santa Fe County is the third most populous county in the State of New Mexico.

Figure 3-1 shows the general location of Santa Fe County along with the cities that are located within the county.

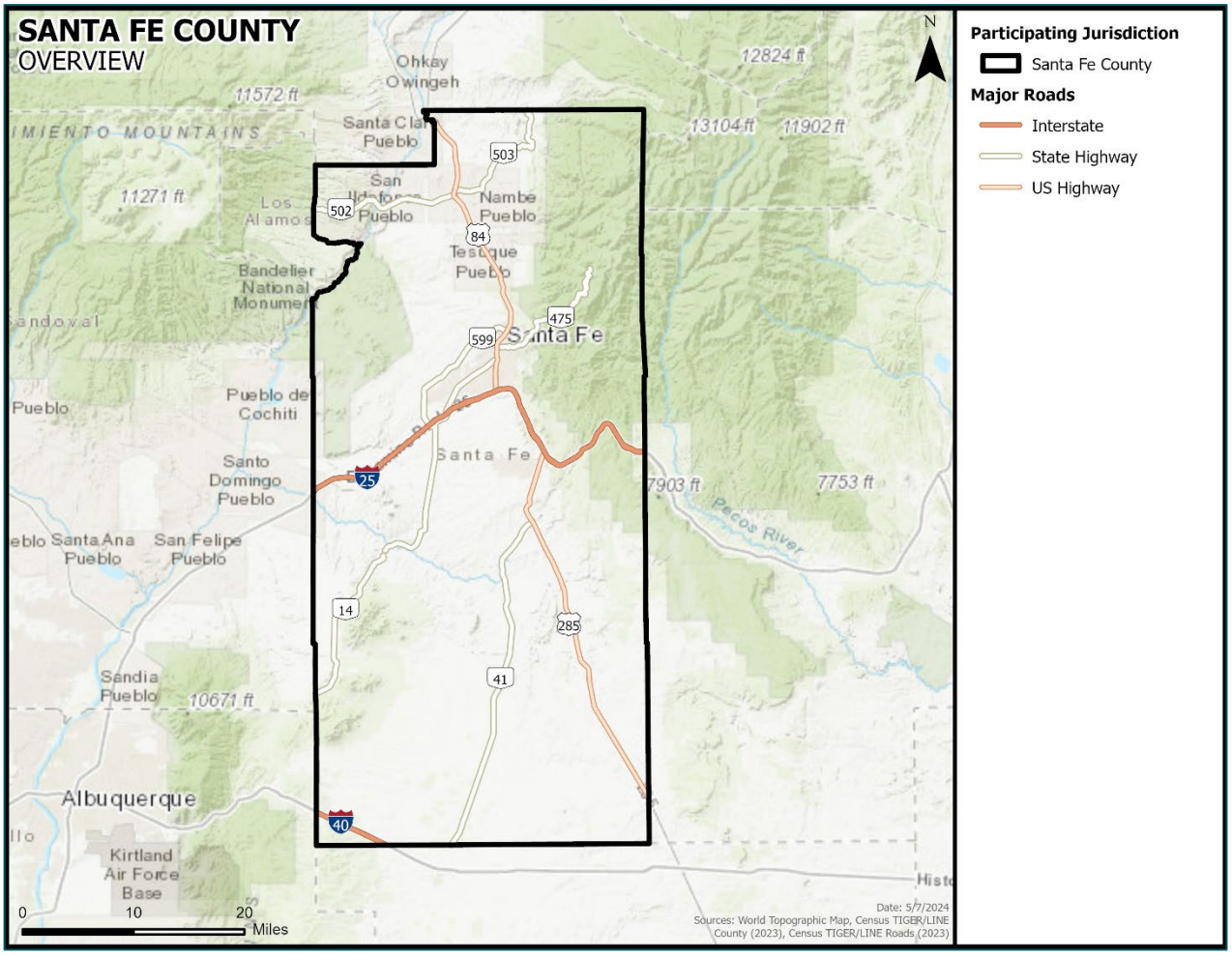
Figure 3-1. Location of Santa Fe County



[4] Source: https://www.santafe.org/visiting-santa-fe/about-santa-fe/history/#:~:text=Santa%20Fe%20is%20the%20oldest,de%20Peralta%20in%201609%2D1610.

Figure 3-2 shows the Santa Fe County jurisdictional lines that make up the planning area. The planning area refers to that which is covered in the risk assessment analysis of the Plan Update.

Figure 3-2. Santa Fe County Planning Area



POPULATION AND DEMOGRAPHICS

According to the 2020 Census population count, Santa Fe County has an official population of 154,823 residents, a 7 percent increase since the 2010 census. Table 3-1 summarizes select characteristics of vulnerable or sensitive populations in Santa Fe County using data from the U.S. Census Bureau 2022 American Community Survey (ACS) five-year estimates. Note that the 2022 ACS estimates may differ from the 2020 Census count; the ACS estimates are used throughout this section for consistency.[5]

Between official U.S. Census population counts, the estimate uses a formula based on new residential building permits and household size. It is simply an estimate and there are many variables involved in achieving an accurate estimation of people living in a given area at a given time.

[5] Source: https://demographics.texas.gov/Data/Decennial/2010/, https://www.census.gov/en.html and https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2021/

Table 3-1. Santa Fe County Vulnerable and Sensitive Populations, 2022

TOTAL 2022 POPULATION	ESTIMATED VULNERABLE OR SENSITIVE POPULATIONS[6]				
	Elderly (Over 65)	Youth (Under 5)	Disability	Below Poverty Level	Speaks Language Other Than English
154,481	40,005	5,990	21,458	19,043	48,054

In addition to the vulnerable population counts above in Table 3-1, there are various other examined key metrics that are useful to understand the social vulnerability within Santa Fe County. Table 3-2 lists the percentages of Santa Fe County's population that falls within select vulnerable populations. The table also lists Santa Fe County's rank in each category among all counties in New Mexico, with 1st being most vulnerable and 33rd being least vulnerable.

Table 3-2. Santa Fe County Vulnerable Population Percentages, 2022[7]

VULNERABLE OR SENSITIVE POPULATIONS	PERCENT OF TOTAL COUNTY POPULATION	STATEWIDE COUNTY RANKING
Children Under Age 18 Living in Poverty	17.4%	28th
People 65 Years or Older	24.3%	10th
Unable to Get Needed Medical Care Because of Cost	13.7%	8th
Adults Experiencing Frequent Mental Distress	21.4%	11th
High School Graduation Rate	29.1%	24th
Unemployment Rate	2.4%	28th
People With Disabilities	14.2%	30th
Housing Units That are Mobile Homes	14.6%	29th
Households With No Vehicle	3.9%	28th
Households Without Broadband Internet	18%	28th

POPULATION GROWTH

The official 2020 Santa Fe County population is 154,823. Overall, Santa Fe County experienced an increase in population between 1990 and 2020 of 57 percent, or an increase of 55,895 residents. Between 2010 and 2020, the county continued to experience population growth, seeing

[6] The Estimated Vulnerable or Sensitive Populations are based off the 2022 American Community Survey 5-Year Estimates Data Profiles.
[7] 2023 State of New Mexico Hazard Mitigation Plan

an increase of 7 percent (10,653 residents). Table 3-3 provides historic growth rates in Santa Fe County.

Table 3-3. Population Growth for Sante Fe County, 1990-2020[8]

1990	2000	2010	2020	POP CHANGE 1990-2020	PERCENT OF CHANGE	POP CHANGE 2010-2020	PERCENT OF CHANGE
98,928	129,292	144,170	154,823	55,895	57%	10,653	7%

ECONOMIC IMPACT

Building and maintaining infrastructure depends on the economy, and therefore, protecting infrastructure from risk due to natural hazards in the planning area is important to Santa Fe County. Whether it's expanding culverts under a road that washes out during flash flooding, shuttering a fire station, or flood-proofing a wastewater facility, infrastructure must be mitigated from natural hazards in order to continue providing essential utility and emergency response services in a fast-growing planning area.

Based on the American Community Survey 2022 estimates, 58 percent of the population 16 years and over is employed in the labor force. The per capita income is $45,402 and the median household income countywide is $70,522. It is estimated that 26.4 percent of families have incomes below $50,000. Families with incomes below the poverty level in 2022 made up 8.7 percent of all families. Of families that have children under 18 years old, 14 percent are below the poverty level.

Table 3-4 and Table 3-5 show the various occupations and industries within Santa Fe County, according to the 2022 estimates by the American Community Survey.

Table 3-4. Occupations of Employed Population in Santa Fe County[9]

OCCUPATION	ESTIMATE	PERCENT
Civilian employed population 16 years and over	74,407	-
Management, business, science, and arts occupations	34,631	47%
Sales and office occupations	14,851	20%
Service occupations	14,306	19%
Natural resources, construction, and maintenance occupations	7,002	9%
Production, transportation, and material moving occupations	3,617	5%

[8] U.S. Census Bureau
[9] 2022 American Community Survey 5-Year Estimates Data Profiles

Table 3-5. Industries of Employed Population in Santa Fe County[10]

INDUSTRY	ESTIMATE	PERCENT
Civilian employed population 16 years and over	74,407	-
Educational services, and health care and social assistance	15,706	21%
Professional, scientific, and management, and administrative and waste management services	11,881	16%
Arts, entertainment, and recreation, and accommodation and food services	9,380	13%
Retail trade	8,581	11%
Public administration	7,879	11%
Construction	6,282	8%
Other services, except public administration	4,381	6%
Finance and insurance, and real estate and rental and leasing	3,736	5%
Manufacturing	1,948	3%
Transportation and warehousing, and utilities	1,836	2%
Information	1619	2%
Agriculture, forestry, fishing and hunting, and mining	730	1%
Wholesale trade	448	1%

NATURAL, CULTURAL, AND HISTORIC RESOURCES

New Mexico has a long, rich history of Native American culture, tradition, and ways of life. There are 19 Pueblo tribes in New Mexico today, which have preserved their identity and way of life through multiple colonizing nations throughout the region's history. Each Pueblo is a sovereign nation with its own government, ways of life, and culture; each tribe has a unique relationship with the federal and state governments.[11] Of the 19 Pueblo tribes, several are located completely or partly within the boundary of Santa Fe County, including Tesuque Pueblo, San Ildefonso Pueblo, Pojoaque Pueblo, Nambé Pueblo, and Santa Clara Pueblo. New Mexico's pueblos are renowned for their unique and historic art forms, including polychrome pottery, mosaic inlay jewelry, weaving, drums. Pueblo communities hold celebrations and ceremonies throughout the year, and often welcome visitors to experience and learn about their culture and traditions.[12]

[10] 2022 American Community Survey 5-Year Estimates Data Profiles
[11] Source: https://www.iad.state.nm.us/about-us/history/#:~:text=The%20nineteen%20Pueblos%20are%20comprised,%2C%20Tesuque%2C%20Zuni%20and%20Zia.
[12] Source: https://indianpueblo.org/new-mexicos-19-pueblos/

SECTION 3: COUNTY PROFILE

Santa Fe County's territory is composed of 1,911 square miles of north-central New Mexico, with approximately 1,909 square miles (98%) of land and the rest being water. The Sangre de Cristo Mountains, the southernmost subrange of the Rocky Mountains, extend down the east side of Santa Fe County from the north. The mountain range is considered to be one of the most beautiful nature features of the state, and includes the planning area's highest point, Santa Fe Baldy peak (12,632 feet above sea level).

Santa Fe County's scenic landscape, including its proximity to the Sangre de Cristo Mountains, Santa Fe National Forest, and Valles Caldera National Preserve, fill the planning area with many recreation opportunities such as hiking, fishing, and hunting. In addition to these natural assets, cultural resources such as the pueblos or the historic downtown district of the City of Santa Fe make the planning area a very popular tourist destination.

Beyond recreation and tourism, the open landscapes in Santa Fe County promote agriculture, farming, and ranching, which make up a significant portion of the region's economic activity. According to 2017 U.S. Census data, there are roughly 639 farms within the planning area. Some common agricultural products in the region include cattle, sheep, and chile peppers.

Santa Fe County's Open Space, Trails and Parks Program sustainably manages and conserves a vibrant network of cultural, historical, recreational and natural community resources that inspire regional identity and stewardship among current and future generations. In total, the program manages 6,750 acres of open space, 18 parks, and 65 miles of trails. The Program's duties encompass planning, capital improvements, maintenance, and volunteer opportunities towards the management of these properties for the use and enjoyment of Santa Fe County residents and visitors. In addition to benefitting the planning area community and visitors, the Program also seeks to maintain the open spaces and trail networks to provide sustainable and resilient ecosystems that benefit plant and wildlife.[13]

Along the northern edge of the Santa Fe County planning area, the community of Chimayo is home to El Santuario de Chimayo, a Roman Catholic church which was built in 1816. Today, the church is a National Historic Landmark with over 300,000 visitors a year, making it the most visited church in New Mexico and one of the most visited religious sites in the U.S.[14] Each year, thousands of El Santuario de Chimayo's visitors travel by foot during the annual Holy Pilgrimage during the week preceding Easter Sunday. Visitors sometimes travel hundreds of miles to reach El Santuario de Chimayo, coming from all across the planning area, New Mexico, and the U.S. Particularly during the week of the Holy Pilgrimage, an influx of visitors will enter the Santa Fe County planning area and travel by foot along roadways and other paths north towards Chimayo.

To further understand natural resources that may be vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. A federally endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by federal law and any future hazard mitigation projects are

[13] Source; https://www.santafecountynm.gov/open_space_and_trails_program

[14] Archuletta, Phil T.; Holden, Sheryl S. (2003). Traveling New Mexico: A Guide to the Historical and State Park Markers. Sunstone Press. p. 336.

subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

According to the U.S. Fish and Wildlife Service, as of April 2024, there are 10 federally endangered, threatened, or candidate species in Santa Fe County, listed in Table 3-6.

Table 3-6. Endangered Species in Santa Fe County[15]

TYPE of SPECIES	COMMON NAME	SCIENTIFIC NAME	SPECIES STATUS
Mammals	Mexican wolf	Canis lupus baileyi	Endangered
Amphibians	Jemez Mountains salamander	Plethodon neomexicanus	Endangered
Mammals	New Mexico meadow jumping mouse	Zapus hudsonius luteus	Endangered
Birds	Southwestern willow flycatcher	Empidonax traillii extimus	Endangered
Insects	Silverspot	Speyeria nokomis nokomis	Threatened
Birds	Mexican spotted owl	Strix occidentalis lucida	Threatened
Birds	Yellow-billed Cuckoo	Coccyzus americanus	Threatened
Mammals	Tricolored bat	Perimyotis subflavus	Proposed Endangered
Insects	Monarch butterfly	Danaus plexippus	Candidate
Fishes	Rio Grande cutthroat trout	Oncorhynchus clarkii virginalis	Candidate

Santa Fe County has a rich history that is preserved through its designated historic buildings and sites. Throughout the county, there are 96 buildings and sites listed on the National Register of Historic Places. Additionally, there are 212 sites in the Sante Fe County planning area listed on the New Mexico State Register of Cultural Properties.[16] The State Register includes sites, buildings, features, or events that are of local significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value. Historic buildings are vulnerable to natural hazards as their construction pre-dates modern building codes. There are also historic preservation considerations and requirements for historic structures when they are included in mitigation or recovery projects.

[15] U.S. Fish and Wildlife Service, Environmental Conservation Online System https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=48183
[16] Source: https://www.nmhistoricpreservation.org/programs/registers.html

EXISTING LAND USE AND DEVELOPMENT TRENDS

Zoning ordinance sets forth regulations and standards related to the extent of uses of land and structures that are allowed in certain areas. A zoning map shows the areas within a community where the various zoning districts and standards are located and gives an overall picture of what types of development are located in a community and how a community intends to continue to grow.

The Santa Fe County Sustainable Land Development Code (SLDC), adopted in 2016, is the planning mechanism to implement land use and development goals as set forth in the County's Sustainable Growth Management Plan. All building and development in Santa Fe County (not including Pueblo lands or the incorporated areas of the Cities of Santa Fe, Edgewood, and Espanola) must comply with the SLDC and require a development permit issued by the County. The SLDC includes both building codes and land use regulations and acknowledges the County's risk to natural hazards through regulations that prevent future development in creating or increasing existing vulnerabilities to hazards.[17]

A review of building permits can also give a picture of the built environment and the number of buildings that are being constructed in Santa Fe County. Table 3-7 lists the number of residential buildings and total units authorized through a permit from the County, between 2000 and 2022. The data includes total buildings and total units permitted, as well as an estimate of the total value of construction costs to show the potential increase in vulnerability of structures to the various hazards assessed in the HMAP risk assessment. Permits are reported annually in September and the data includes that from 2000 through 2022 to demonstrate growth. Of the residential building permits issued in this period, over 98 percent (6,405 buildings) were for single-family buildings and 2 percent (115 buildings) for multi-family buildings. Housing type can also be an indication of an individual's ability to recover from a disaster.

Table 3-7. Building Permits in Santa Fe County, 2000-2022[18]

YEAR	TOTAL BUILDINGS	TOTAL UNITS	TOTAL VALUE
2000	359	395	$49,055,940
2001	477	537	$65,164,405
2002	586	604	$77,938,674
2003	561	561	$70,719,068
2004	561	561	$75,905,107
2005	580	580	$77,057,908
2006	417	417	$55,673,963
2007	277	277	$36,927,677
2008	140	140	$18,671,123

[17] Source: https://www.santafecountynm.gov/growth-management/building-development
[18] U.S. Census Bureau, Building Permit Survey, 1990-2022, https://www.census.gov/construction/bps/

YEAR	TOTAL BUILDINGS	TOTAL UNITS	TOTAL VALUE
2009	102	102	$13,602,361
2010	96	96	$12,802,414
2011	94	94	$12,535,651
2012	130	130	$17,336,552
2013	164	183	$32,740,110
2014	161	161	$37,091,786
2015	110	110	$26,627,073
2016	117	117	$29,198,079
2017	221	221	$50,801,383
2018	249	273	$65,953,564
2019	352	589	$108,721,473
2020	302	577	$117,590,935
2021	266	840	$133,831,446
2022	198	590	$134,135,412
Total	**6,520**	**8,155**	**$1,320,082,104**

Certain types of housing found in the Santa Fe County planning area are more vulnerable than typical site-built, newly constructed residential structures. This includes mobile or manufactured homes, of which there are 10,990 (14 percent of total housing stock) in the planning area. Additionally, single-family residences (SFR) built before 1980 are typically built to lower or less stringent construction standards than newer construction, making these homes more susceptible to damage during hazard events. These older homes make up 53 percent (approximately 40,547 structures) of housing stock in the planning area. Table 3-8 includes housing inventory data for Santa Fe County per the American Community Survey five-year estimates.

Table 3-8. Housing Inventory and Vulnerable Structures in Santa Fe County[19]

HOUSING TYPE	TOTAL HOUSING UNITS
Total Housing Units	76,714
Homes Built Prior to 1980	40,547
Mobile Homes	10,990

[19] The Housing Inventory and Vulnerable Structures are based off the 2022 American Community Survey 5-Year Estimates Data Profiles.

CHANGES IN VULNERABILITY

The Santa Fe County planning area has experienced an increase in overall population of 7 percent between 2010 and 2020. The American Community Survey estimates the 2022 total housing units for the planning area to be 76,714. The total building permits issued between 2018 and 2022 represent approximately 1.8 percent of the total housing units available in the planning area. The overall population increase, combined with the increase in housing units indicates a slight increase in vulnerability to all natural hazards in terms of populations and the built environment. Congestion, limited escape routes, dense infrastructure, and poverty add to the vulnerability.

Changes in vulnerability are typically applicable to all natural hazards except when discussing dam failure as vulnerability for this hazard is discussed in relation to changes in the estimated inundation areas for profiled dams. For the thirteen dams profiled in Section 5, there are no known changes in vulnerability in the estimated inundation areas in terms of populations and land use changes. Similarly, there are no known increases in vulnerability in areas susceptible to land slide and land subsidence in terms of population and land use trends.

While flood and wildfire hazards feature geographical boundaries, increases in population and building inventory can increase overall vulnerability for these hazards even when the trends occur outside of the known hazard boundary. Development decreases permeable surface areas and increases runoff, increasing flood risk. As population density increases, the Wildland Urban Interface (WUI) typically increases. WUI growth often results in more wildfire ignitions, which puts more houses and lives at risk.

FUTURE GROWTH AND DEVELOPMENT

To better understand how future growth and development in Santa Fe County might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. This section includes an analysis of the projected population change and economic impacts.

Population projections from 2010 to 2040 are listed in Table 3-9, as provided by University of New Mexico Geospatial and Population Studies Department. Population projections are based off of past decades' data and trends in population, birthrate, expected deaths, and net migration. This information is only available at the county level; however, the population projection shows an increase in population density for the county, which would mean overall growth for the county.

Table 3-9. Santa Fe County Population Projections[20]

LAND AREA (SQ MI)	2010		2020		2030		2040	
	Population							
	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)
1,910	144,170	75.5	150,319	78.7	162,782	85.2	175,242	91.7

Comprehensive Plans are guiding documents in a community that sets forth a vision, goals, policies, and guidelines to direct future physical, social and economic development that will occur within a jurisdiction. Comprehensive Plans are part of a continuous process to provide an environment for the citizens and to consider the general desire of the community to conserve, preserve, and protect the natural environment of their jurisdiction. These plans are used to guide county staff, decision-makers, and citizens in making decisions which affect the community with the understanding of the long-term effects.

The Santa Fe County Sustainable Growth Management Plan serves as the County's general or comprehensive plan. The plan, originally drafted in 2010 and updated in 2015, maps out challenges, goals, policies, and strategies to be used in Santa Fe County through 2030. Elements detailed in the plan include land use, economic development, agriculture and ranching, resource conservation, parks and recreation areas, renewable energy, sustainable green development, public safety, transportation, water / wastewater management, public facilities, housing, and governance. The Santa Fe County Sustainable Land Development Code is the mechanism to implement the County's Growth Management Plan. Refer to Appendix F Capability Assessment for a complete list of planning mechanisms and other capabilities for Santa Fe County.

[20] Sources: US Census Bureau, University of New Mexico Geospatial and Population Studies Group

SANTA FE COUNTY

SECTION 4
RISK OVERVIEW

SECTION 4: RISK OVERVIEW

HAZARD DESCRIPTION

Section 4 is the first phase of the Risk Assessment, providing background information for the hazard identification process and descriptions for the hazards identified. The Risk Assessment continues with Sections 5 through 23, which include hazard descriptions and vulnerability assessments.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, Santa Fe County identified 19 hazards, including natural and human-caused hazards, that are addressed in the Hazard Mitigation Action Plan Update and were identified as significant, as shown in Table 4-1. The hazards were identified through input from Planning Team members and a review of the current 2023 State of New Mexico Hazard Mitigation Plan (State Plan). Readily available online information from reputable sources such as federal and state agencies were also evaluated and utilized to supplement information as needed.

In general, there are five categories of hazards: atmospheric, geologic, hydrologic, technological, and human-caused. Atmospheric hazards are events or incidents associated with weather generated phenomenon. The following have been identified as significant for the planning area include extreme cold, extreme heat, hail, high wind, lightning, tornado, and winter storm (Table 4-1).

Hydrologic hazards are events or incidents associated with water-related damage and account for over 75 percent of federal disaster declarations in the United States. Hydrologic hazards identified as significant for the planning area include flood and drought.

Geologic hazards are events or incidents associated with the earth's crust. The geologic hazards identified as significant consist for the county are earthquake, landslide and rockfall, land subsidence, and volcano. The only geologic hazard that has been identified as significant for the county is landslide.

Technological hazards refer to the origins of incidents that can arise from human activities, such as the construction and maintenance of dams. They are distinct from natural hazards primarily because they originate from human activity. The risks presented by natural hazards may be increased or decreased as a result of human activity, however they are not inherently human-induced. Therefore, dam failure is classified as a quasi-technological hazard and referred to as "technological" in Table 4-1 for purposes of description.

For the Risk Assessment, earthquake, expansive soils, wildfire, and space weather hazards are considered "other," since these hazards are not considered atmospheric, hydrologic, nor technological.

Human-caused hazards are events or incidents caused by human intent, human error, or as a result of failed systems. These hazards can be caused or exacerbated by either accidental or

intentional human actions that result in the loss of life or property. The human-caused hazards identified as significant for the county include agriculture incident and hazardous materials.

Table 4-1. Hazard Descriptions

HAZARD	DESCRIPTION
ATMOSPHERIC	
Extreme Cold	Extreme cold refers to temperatures that are significantly lower than what is normal for a particular region or season. Extreme cold may also result in a freeze, which occurs when the temperature drops below 32°F for a significant period of time.
Extreme Heat	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period of time.
Hail	Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass.
High Wind	Wind is defined as the motion of air relative to the earth's surface, and the hazard of high wind is commonly associated with severe thunderstorm winds, tornadoes, hurricanes, and tropical storms. High winds can also occur in the absence of other definable hazard conditions, occurring in forms such as straight-line winds or microbursts.
Lightning	Lightning is a sudden electrostatic discharge that occurs during an electrical storm. This discharge occurs between electrically charged regions of a cloud, between two clouds, or between a cloud and the ground.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. The destruction caused by tornadoes ranges from light to catastrophic, depending on the location, intensity, size, and duration of the storm.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 mph, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads, and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.

HAZARD	DESCRIPTION
GEOLOGIC	
Earthquake	An earthquake is the sudden, rapid, shaking of the earth, caused by the breaking and shifting of subterranean rock as it releases strain that has accumulated over a long time. Initial mild shaking may strengthen and become extremely violent within seconds.
Landslide and Rockfall	A landslide is a geological phenomenon where there is down slope movement of mass rock, debris, or earth. A rockfall is a type of fast-moving landslide that happens when rock falls, bounces, or rolls from a cliff or down a very steep slope. They usually occur in conjunction with other natural hazards, such as earthquakes, volcanoes, wildfires, and floods. Landslides occur nationwide, causing $1-2 billion in damages with more than 25 fatalities on average each year.
Land Subsidence	Land subsidence occurs when land sinks into underground voids. These voids may occur naturally or through human-driven or technologically exacerbated circumstances. When the void can no longer support the weight of the earth above it, it collapses, causing a sinkhole depression in the landscape.
Volcano	A volcano is a vent through which molten rock escapes to the earth's surface. Unlike other mountains, which are pushed up from tectonic activity below, volcanoes grow through the surface accumulation of their eruptive products (such as lava, pyroclastic flows, and ash). Hazards associated with volcanic eruptions includes gases; lava and pyroclastic flows; airborne ash; landslides; earthquakes; and explosive eruptions.
HYDROLOGIC	
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality.
Flood	The accumulation of water within a body of water, which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, and shallow flooding.
OTHER	
Expansive Soils	Expansive soils are soils and soft rock that tend to swell or shrink due to changes in moisture content. Changes in soils volume present a hazard primarily to structures built on top of expansive soils.

HAZARD	DESCRIPTION
Wildfire	A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors.
Space Weather	Space weather includes solar wind, solar flares, coronal mass ejections, and any other condition or event in outer space that impacts technology on earth. Geomagnetic storms and Electromagnetic Pulse (EMP) events caused by these conditions have the potential to damage critical electronic equipment and infrastructure, such as high voltage transformers, power systems, radio communications, and GPS navigation.
TECHNOLOGICAL	
Dam Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam.
HUMAN-CAUSED	
Agriculture Incident	Agricultural incident refers to the naturally occurring infection of vegetation, crops, or livestock with insects, vermin, or diseases that render the crops or livestock unfit for consumption or use. Some level of agricultural infestation is normal, but sudden escalations in infestation level or new infestation threats can impose significant risks on agriculture and the communities it supports.
Hazardous Materials	Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. A hazardous material (HAZMAT) incident involves a substance outside normal safe containment in sufficient concentration to pose a threat to life, property, or the environment.

Hazards that were not considered significant and were not included in the Plan Update are located in Table 4-2, along with the evaluation process used for determining the significance of each of these hazards. Hazards not identified for inclusion at this time may be addressed during future evaluations and updates.

Table 4-2. Other Hazards Deferred

HAZARD CONSIDERED	REASON FOR DETERMINATION
Coastal Erosion	The planning area is not located on the coast, therefore coastal erosion does not pose a risk.
Hurricane Wind	The planning area is not located within 200 miles of the coast; therefore, direct hurricane wind impacts do not pose a risk. Any remnants of a hurricane or tropical storm system would only include secondary impacts such as thunderstorm winds and rainfall and would be covered under thunderstorm wind or flood mitigation measures.

DISASTER DECLARATION HISTORY

One method of understanding hazards that pose a risk to Santa Fe County is to identify past hazard events that triggered federal or state disaster declarations. Federal and state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. Table 4-3 lists state and federal disaster declarations received by Santa Fe County. Many of the disaster events were regional or statewide.

Between 1953 and 2023 Santa Fe County received 10 federal disaster declarations. Out of the 10 federally declared disasters, the highest numbers were related to fire and flooding, with three declarations for each disaster type, followed by declarations for biological (2), severe storm (1), and hurricane (1)[1].

In addition to the 10 federally declared disasters, there have been 28 U.S. Department of Agriculture (USDA) Secretarial disaster designations between 2012 and March 2024. The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county.[2] Of the 28 USDA designations for Santa Fe County, many listed multiple factors as having caused the disaster area designation. The leading cause was drought, which was included in all 28 designations. Other factors listed include excessive heat (12 designations), high wind (12), fire/wildfire (12), and insects (12).

Table 4-3. Disaster Declaration History in Santa Fe County, 1953-2023

YEAR	DECLARATION TITLE	HAZARD	DECLARATION TYPE	DISASTER No.
1973	Severe Storms, Snow Melt, Flooding	Flood	DR	DR-380
1979	Severe Storms, Snowmelt, Flooding	Flood	DR	DR-589

[1] Santa Fe County received a federal disaster declaration related to evacuations stemming from Hurricane Katrina; the planning area has not received any declarations due to direct effects or damages from a hurricane event.
[2] United States Department of Agriculture https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/FactSheets/emergency_disaster_designation_declaration_process-factsheet.pdf

YEAR	DECLARATION TITLE	HAZARD	DECLARATION TYPE	DISASTER No.
2000	New Mexico Fire	Fire	EM	EM-3154
2000	New Mexico Wildfire	Fire	DR	DR-1329
2002	Borrego Fire	Fire	FM	FM-2408
2005	Hurricane Katrina Evacuation	Hurricane	EM	EM-3229
2013	Severe Storms, Flooding, and Mudslides	Flood	DR	DR-4152
2014	Severe Storms and Flooding	Severe Storms	DR	DR-4199
2020	Covid-19	Biological	EM	EM-3460
2020	Covid-19 Pandemic	Biological	DR	DR-4529

NATURAL HAZARDS AND CLIMATE CHANGE

Climate change is defined as a long-term shift in temperature and weather patterns. These shifts can increase or decrease the risk of natural hazards. Global climate change is expected to exacerbate the risks of certain types of natural hazards impacted through rising sea levels, warmer ocean temperatures, higher humidity, the possibility of stronger storms, and an increase in wind and flood damages due to storm surges. New Mexico is considered particularly vulnerable to climate change as atmospheric warming and its cascading effects may result in greater severity and frequency of hazard events such as wildfires, extreme heat, and flooding.

Climate change is expected to lead to an increase in average temperatures as well as an increase in frequency, duration, and intensity of extreme heat events. With no reductions in emissions worldwide, the state of New Mexico is expected to experience an increase in average temperature by 5°F to 7°F over the next 50 years.

The New Mexico Bureau of Geology and Mineral Resources published *Climate Change in New Mexico Over the Next 50 Years: Impacts on Water Resources* in 2022, which identifies ongoing and likely future climate trends over the next 50 years in New Mexico based on historical observations and studies conducted at regional, national, and global scales. Table 4-4 highlights New Mexico's future trends in extreme weather from the report.

Table 4-4. Future Trends in Extreme Weather in New Mexico[3]

HAZARDS	EXPECTED TRENDS
Extreme Temperatures	• Over the next 50 years, statewide temperatures are projected to increase by 5°F to 7°F. • Climate warming will greatly increase the frequency of extreme temperature days and heat waves. • Forest stress and tree mortality will increase as atmospheric warming continues. • The coolest days of the summer are expected to continue becoming warmer. • The number of frost days per year are expected to decrease. • The coolest days of the summer are expected to continue becoming warmer.
Precipitation	• Across the state, models do not consistently project a significant change in average annual precipitation. However, some seasonal precipitations may emerge, such as more winter precipitation in the northern mountains, and drier seasons in the southern parts of New Mexico. • Spring precipitation, critical for snowmelt runoff and ecosystems, may decline. • Somewhat stronger monsoonal activity may result in more summer precipitation in southern New Mexico.
Drought	• Increasing temperatures and no clear increasing trend in precipitation lead to a projection of increasingly arid conditions, decreased soil moisture, stressed vegetation, and more severe droughts. • Substantial declines in snowpack and associated water runoff by 2070 will lead to diminished headwater streamflow, negatively impacting water supply. • Warmer temperatures will also lead to lower river flows due to increasing evaporation.
Flood	• A warming climate could increase the magnitude of future storms, leading to more extreme precipitation events that result in flooding. • Data suggests that the most severe storms New Mexico experiences may not increase beyond current estimated values, however less severe (but still high intensity) storms may occur more frequently. • Increases in the frequency and severity of wildfires may dramatically increase the probability and magnitude of flooding and debris flows.

[3] Dunbar, N.W., Gutzler, D.S., Pearthree, K.S., Phillips, F.M., Bauer, P.W., Allen, C.D., DuBois, D., Harvey, M.D., King, J.P., McFadden, L.D., Thomson, B.M., and Tillery, A.C., 2022, Climate change in New Mexico over the next 50 years: Impacts on water resources: New Mexico Bureau of Geology and Mineral Resources, Bulletin 164, 218 p. https://doi.org/10.58799/B-164

HAZARDS	EXPECTED TRENDS
Winter Weather	• As the climate warms, the likelihood of winter weather decreases. • Both extreme cold and snowfall either become less frequent or are expected to do so. • Widespread snowfall events in Texas such as the one that took place in February 2021 are extremely rare. • Fewer cold spells are projected to occur per year, but the length of cold spells will be longer when they do occur.
Thunderstorms (Wind, Hail, Lightning)	• Projection suggests little change in the frequency of extreme storm events over the next few decades, however an increase in summer storm events is predicted after 2050. • Though New Mexico may experience more thunderstorms in the future, it is not clear that they will result in an increased risk of flooding due, in part, to typically short storm durations. • Even less severe storms could result in and exacerbate debris flows following wildfires (which are expected to increase in frequency.). • Generally, there is a high level of scientific uncertainty with future extreme precipitation events, meaning continuing future research is needed to reveal potential trends.
Wildfire	• Weather and climate drivers of wildfire risk are projected to increase the burn area, severity, frequency, and overall risk of wildfires throughout the state. • Other climate trends that will exacerbate wildfire risk include warmer temperatures, decreased water supply, lower soil moisture levels, and a general trend toward more arid conditions. • Increased amounts of runoff from a greater number of wildfires may degrade water quality. • Plant communities stressed by higher temperatures and greater aridity will result in more extreme wildfires. • Coupled with a rise in rainfall intensities, post-wildfire erosion will increase and become more widespread.

OVERVIEW OF HAZARD ANALYSIS

The methodologies utilized to develop the Risk Assessment are a historical analysis and a statistical approach. Both methodologies provide an estimate of potential impact by using a common, systematic framework for evaluation.

Records retrieved from National Centers for Environmental Information (NCEI) and National Oceanic and Atmospheric Administration (NOAA) were reported for Santa Fe County. Remaining records identifying the occurrence of hazard events in the planning area and the maximum recorded magnitude of each event were also evaluated.

The use of geographic information system (GIS) technology to identify and assess risks for Santa Fe County and evaluate community assets and their vulnerability to the hazards.

The four general parameters that are described for each hazard in the Risk Assessment include frequency of return, approximate annualized losses, a description of general vulnerability, and a statement of the hazard's impact.

Frequency of return was calculated by dividing the number of events in the recorded time period for each hazard by the overall time period that the resource database was recording events. Frequency of return statements are defined in Table 4-5, and impact statements are defined in Table 4-6 below.

Table 4-5. Frequency of Return Statements

PROBABILITY	DESCRIPTION
Highly Likely	Event is probable in the next year.
Likely	Event is probable in the next three years.
Occasional	Event is probable in the next five years.
Unlikely	Event is probable in the next ten years.

Table 4-6. Impact Statements

POTENTIAL SEVERITY	DESCRIPTION
Substantial	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property destroyed or with major damage.
Major	Injuries and illnesses resulting in permanent disability. Complete shutdown of critical facilities between one and four weeks. More than 25 percent of property destroyed or with major damage.
Minor	Injuries and illnesses do not result in permanent disability. Complete shutdown of critical facilities for up to one week. More than 10 percent of property destroyed or with major damage.
Limited	Injuries and illnesses are treatable with first aid. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property destroyed or with major damage.

Each of the hazard profiles includes a description of a general Vulnerability Assessment. Vulnerability is the total of assets that are subject to damages from a hazard, based on historic recorded damages. Assets in the region were inventoried and defined in hazard zones where appropriate. The total amount of damages, including property and crop damages, for each hazard is divided by the total number of assets (building value totals) in that community to determine the percentage of damage that each hazard can cause to the community. Risk and consequences will be addressed and covered within each hazard profile under the Vulnerability and Impact section as well as under the Assessment of Impact sections, where applicable.

To better understand how future growth and development in the Santa Fe County region might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. Hazard vulnerability for Santa Fe County was reviewed based on recent development changes that occurred throughout the planning area. The population of Santa Fe County has grown by 7 percent between 2010 and 2020, according to the U.S. Census Bureau, therefore the vulnerability to the population, infrastructure, and buildings has increased for hazards that do not have a geographical boundary.

Once loss estimates and vulnerability were known, an impact statement was applied to relate the potential impact of the hazard on the assets within the area of impact.

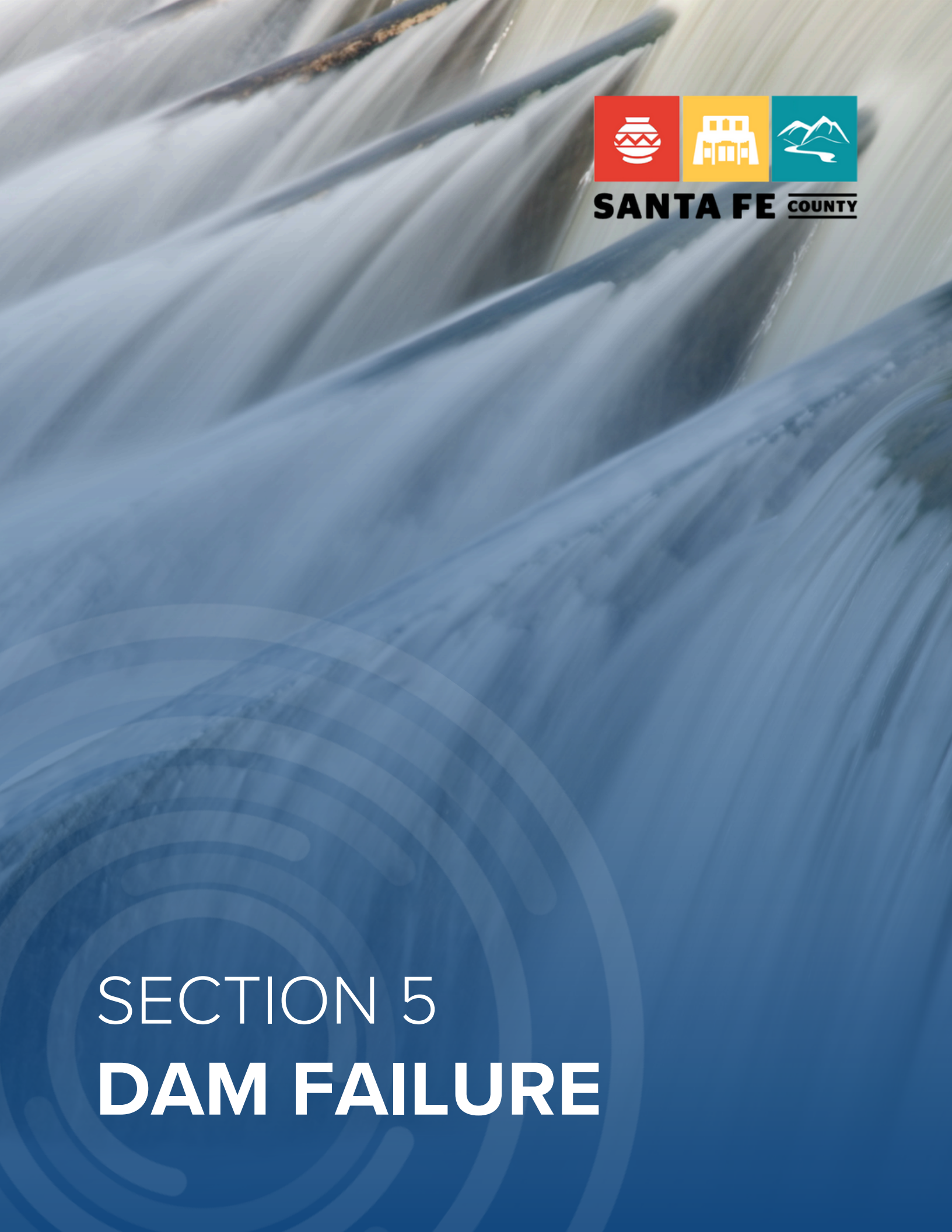
HAZARD RANKING

During the 2024 planning process, the Planning Team conducted a risk raking exercise to get input from the Planning Team and stakeholders. Table 4-7 portrays the results of the risk assessment analysis including the frequency of occurrence and potential severity and the Planning Team's self-assessment for hazard ranking, based on local knowledge of past hazard events and impacts for each of the identified hazards. The definitions for frequency of occurrence and potential severity can be found in Table 4-5 and Table 4-6.

Table 4-7. Hazard Risk Ranking

HAZARD	FREQUENCY OF OCCURRENCE	POTENTIAL SEVERITY	RANKING
Natural Hazards			
Drought	Highly Likely	Minor	High
Extreme Cold	Highly Likely	Limited	High
Extreme Heat	Highly Likely	Limited	High
Flood	Highly Likely	Substantial	High
Hail	Highly Likely	Limited	High
High Winds	Highly Likely	Minor	High
Lightning	Highly Likely	Substantial	High
Wildfire	Highly Likely	Substantial	High
Winter Storm	Highly Likely	Limited	High
Dam Failure	Unlikely	Limited	Moderate
Landslide and Rockfall	Unlikely	Limited	Moderate
Volcano	Unlikely	Substantial	Moderate
Earthquake	Unlikely	Substantial	Low

HAZARD	FREQUENCY OF OCCURRENCE	POTENTIAL SEVERITY	RANKING
Expansive Soils	Unlikely	Limited	Low
Land Subsidence	Unlikely	Limited	Low
Space Weather	Likely	Limited	Low
Tornado	Likely	Limited	Low
Human-Caused Hazards			
Hazardous Materials	Occasional	Limited	High
Agriculture Incident	Likely	Substantial	Low

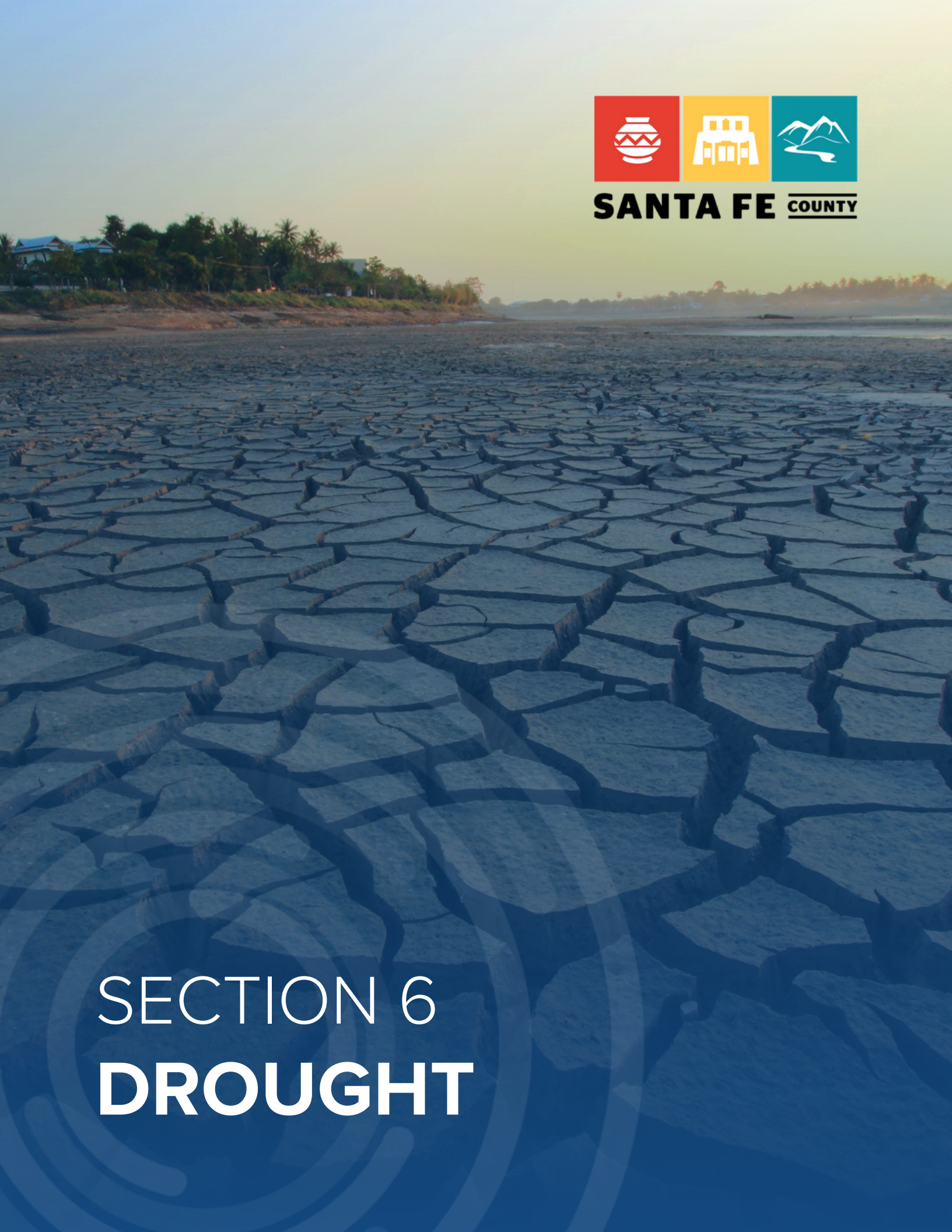


SANTA FE COUNTY

SECTION 5
DAM FAILURE

SECTION 5: DAM FAILURE

Portions of the Santa Fe County Hazard Mitigation Plan are considered confidential and not for release to the public. The information in this section is covered under Privacy Act of 1974 (5 U.S.C. Section 552a).



SANTA FE COUNTY

SECTION 6
DROUGHT

SECTION 6: DROUGHT

HAZARD DESCRIPTION

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 6-1 presents definitions for these different types of droughts.

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

Table 6-1. Drought Classification Definitions[1]

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

LOCATION

Droughts occur regularly throughout New Mexico and the Santa Fe County planning area and are considered a normal condition. However, they can vary greatly in their intensity and duration. The U.S. Drought Monitor, produced through a partnership between the National Drought Mitigation

[1] Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

Center at the University of Nebraska-Lincoln, U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration, shows the planning area is currently experiencing severe drought conditions (Figure 6-1) but has experienced a range of conditions from none to exceptional drought conditions over the last decade (Figure 6-2). There is no distinct geographic boundary to drought; therefore, it can occur anywhere throughout the Santa Fe County planning area.

Figure 6-1. U.S. Drought Monitor, April 2024

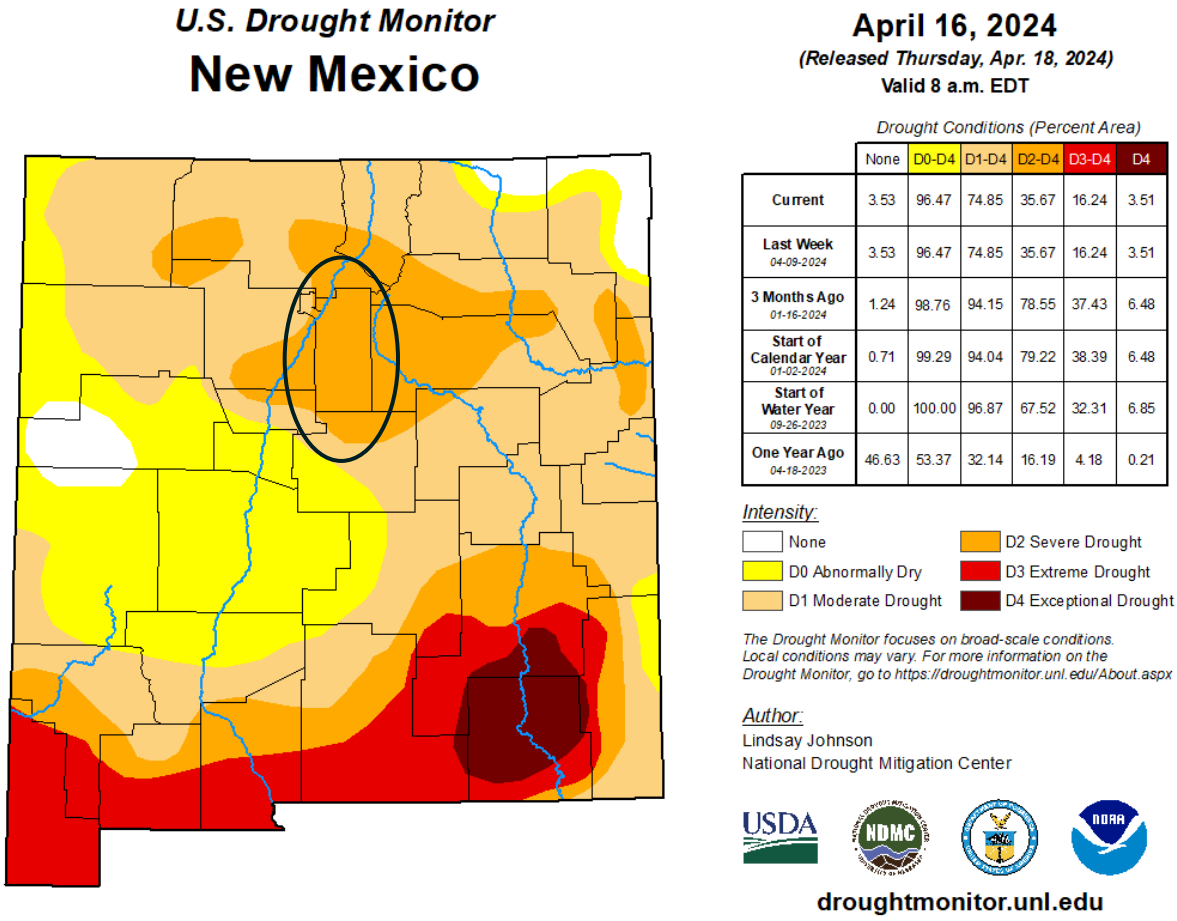
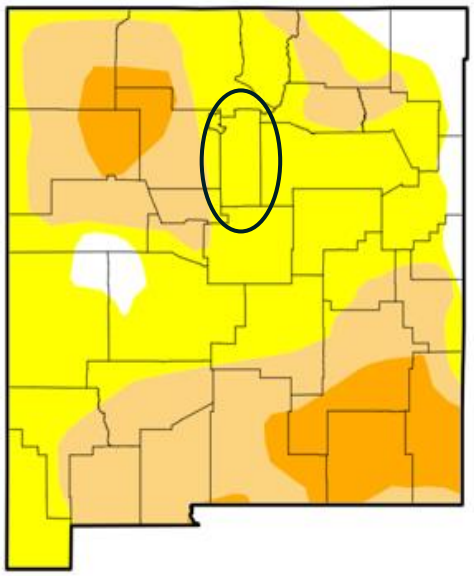
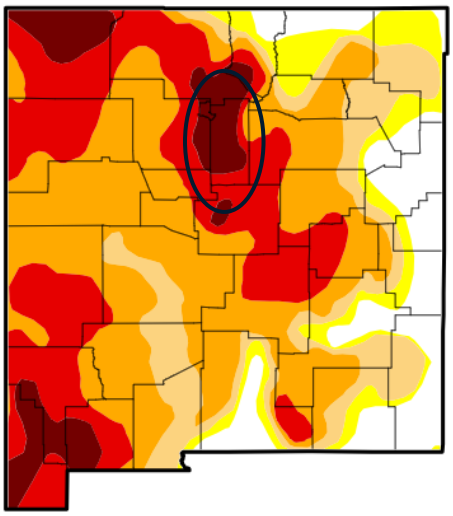


Figure 6-2. U.S. Drought Monitor, August 2011, August 2019, August 2021, August 2023

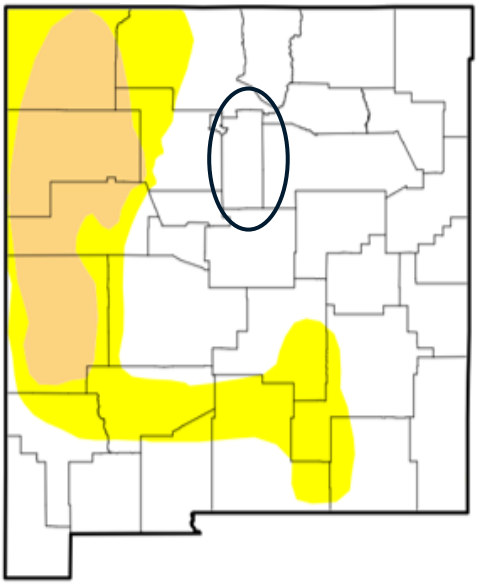
August 2023



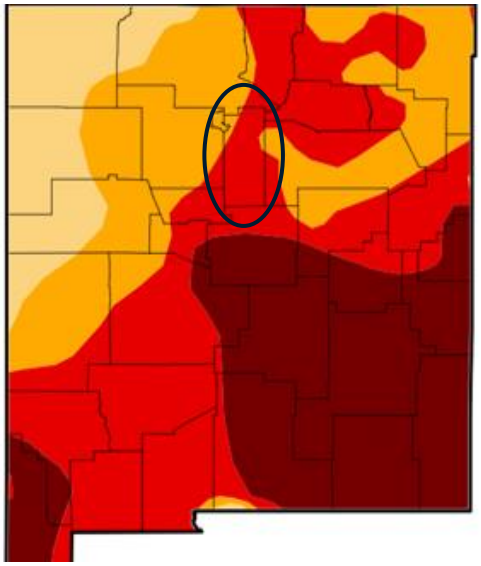
August 2021



August 2019



August 2011



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

EXTENT

The Palmer Drought Index is used to measure the extent of drought by measuring the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, with the intensity of drought during the current month dependent upon the current weather patterns plus the cumulative patterns of previous months. The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop. Table 6-2 depicts magnitude of drought, while Table 6-3 describes the classification descriptions.

Table 6-2. Palmer Drought Index

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

Table 6-3. Palmer Drought Category Descriptions[2]

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

[2] Source: National Drought Mitigation Center

SECTION 6: DROUGHT

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

Based on the historical occurrences for drought and the location of the Santa Fe County planning area, the area can anticipate the full range of drought from abnormally dry to exceptional drought, or D0 to D4, based on the Palmer Drought Category. The entire planning area has experienced exceptional drought conditions. This is the highest level of drought severity and the most extreme drought conditions the planning area can anticipate in the future.

HISTORICAL OCCURRENCES

The Santa Fe County planning area may experience an extreme drought in any given year. According to the U.S. Drought Monitor, between January 2000 and December 2023, the Santa Fe County planning area spent 1,055 weeks (84%) in some level of drought as defined as Abnormally Dry (D0) or worse conditions. Santa Fe County has received 28 USDA disaster declarations for drought from 2012 through 2023.

Figure 6-3. Santa Fe County Drought Intensity, 2000-2023[3]

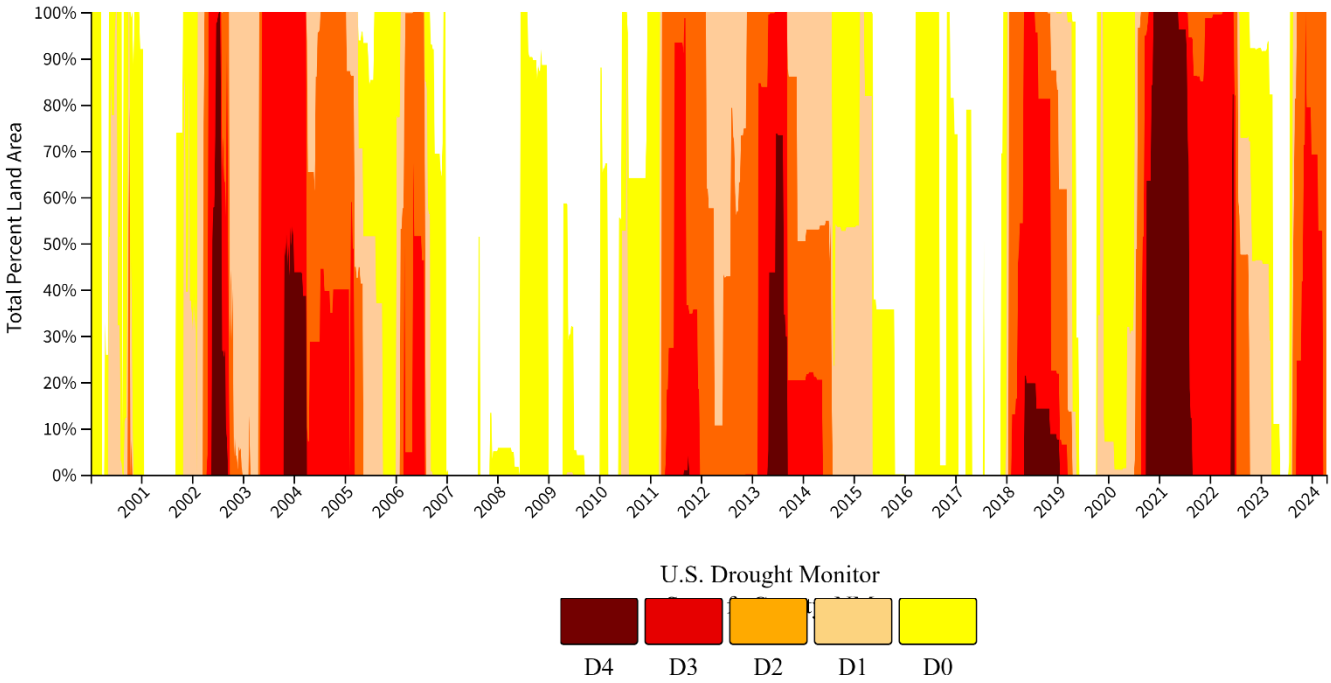


Table 6-4 provides a historical summary of the drought events that have occurred in Santa Fe County as reported in the National Centers for Environmental Information Storm Events Database (NCEI). A total of 200 drought events were reported in the NCEI over 12 unique drought periods

[3] U.S. Drought Monitor

impacting Santa Fe County from 2000 through 2023. There are no injuries, fatalities, or damages reported from drought in Santa Fe County.

Historical drought information shows drought activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Historical drought data is provided on a county-wide basis per the NCEI Storm Events database.

Table 6-4. Historical Drought Events Summary, 2000-2023[4]

JURISDICTION	DROUGHT EVENTS	INJURIES	DEATHS	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	200	0	0	$0	$0

Based on the historical drought events for the Santa Fe County planning area 46 drought events were reported during 3 drought periods since the 2018 Plan.

SIGNIFICANT EVENTS

March 2011 – November 2014

The NCEI database reports continuous drought conditions between May of 2011 and November of 2014. According to the National Oceanic and Atmospheric Administration (NOAA), this multiyear drought event was the second worst statewide drought, following a drought period in the early 1950's. This drought resulted in near record low levels of water in statewide and local reservoirs.[5]

July 2020 – October 2022

Santa Fe County experienced another long period of drought between 2020 and 2022. The peak of this drought event occurred in 2021 when the planning area was in an exceptional (D4) level of drought, as seen in Figure 6-1. The year of 2022 marked the worst fire season in New Mexico history, according to the National Weather Service (NWS), partially due to the extreme drought conditions. Again, total water storage levels decreased during this time.

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, there have been 200 reported drought events in the NCEI over 12 drought periods within a 24-year reporting period, which provides a probability of approximately one event every year. This frequency supports a "Highly Likely" probability of future events for the Santa Fe County planning area. The impact of climate change could produce longer, more severe droughts, exacerbating the current drought impacts. See additional information on climate change at the end of this section.

VULNERABILITY AND IMPACT

Loss estimates were based on 24 years of statistical data from the NCEI and the U.S. Drought Monitor. A drought event frequency-impact was then developed to determine an impact profile on

[4] A full list of events with dates and details is available upon request and can be found in the NCEI.

[5] National Oceanic and Atmospheric Administration/ State Climate Summaries, New Mexico. 2022. https://statesummaries.ncics.org/downloads/NewMexico-StateClimateSummary2022.pdf

agriculture products and estimate potential losses due to drought in the area. All existing and future buildings, facilities, and populations are exposed to this hazard and could potentially be impacted. However, drought impacts are mostly experienced in water shortages, breaks in water lines, or crop and livestock losses on agricultural lands and typically have minimal impact on buildings.

The Santa Fe County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by drought events. For a comprehensive list see Appendix C.

Table 6-5. Critical Facilities Vulnerable to Drought Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	• Increased law enforcement activities may be required to enforce water restrictions. • Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property. • Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	• Strain on staff as drought may cause health problems related to low water flows and poor water quality. • Water main breaks due to soil shrinking and swelling cycles could lead to facility closures. • Building foundations may crack due to soil shrinking and swelling cycles. • Operations dependent on water supply may be adversely impacted. • Economic disruptions due to cracked foundations and infrastructure damages as a result of soil shrinking and swelling cycles.
Commercial Suppliers (food, gas, etc.)	• Operations dependent on water supply may be adversely impacted. • Economic disruptions due to cracked foundations and infrastructure damages as a result of soil shrinking and swelling cycles.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding. • Water main breaks due to soil shrinking and swelling cycles could lead to facility closures. • Operations dependent on water supply may be adversely impacted.

SECTION 6: DROUGHT

New Mexico is no stranger to drought, and as part of the desert southwest, drought can have particularly severe impacts. New Mexico has the lowest water to land ratio than any other state in the nation and water shortages during drought periods is a huge concern.[6]

Most water in the state comes from ground water wells and surface waters. High demand can deplete these resources during extreme drought conditions. As resources are depleted, potable water is in short supply and overall water quality can suffer, elevating health concerns for all residents but especially vulnerable populations – typically children, the elderly, and the ill. In addition, potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities.

The average person will survive only a few days without water, and this timeframe can be drastically shortened for those people with more fragile health – typically children, the elderly, and people with disabilities. During summer drought, or hot and dry conditions, elderly persons, small children, infants, those with disabilities, or who do not have adequate cooling units in their homes may become more vulnerable to injury and/or death. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Santa Fe County planning area is estimated at 26 percent of the total population and children under the age of 5 are estimated at 4 percent. The population with a disability is estimated at 14 percent of the total population. An estimated 12 percent of the planning area population live below the poverty level and 31 percent of the populations speaks a language other than English (Table 6-6).

Table 6-6. Populations at Greater Risk to Drought Impacts

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The planning area is also vulnerable to food shortages when drought conditions exist, and potable water is in short supply. Potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities. All residents in the Santa Fe County planning area could be adversely affected by drought conditions, which could limit water supplies and present health threats.

The economic impact of droughts can be significant as they produce a complex web of impacts that spans many sectors of the economy and reach well beyond the area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services. If droughts extend over several years, the direct and indirect economic impact can be significant.

[6] New Mexico Environmental Public Health Tracking. Drought. https://nmtracking.doh.nm.gov/environment/climate/Drought.html

Crop production can also suffer greatly during extreme drought conditions, limiting fresh local food supplies, driving up costs, and negatively impacting the local economy. Drought conditions could adversely affect the agricultural industry throughout the Santa Fe County planning area. Within the county boundaries exists small vegetable and fruit farms as well as large commercial beef cattle and forage crop productions. The Hatch Valley Chile industry specifically is vulnerable to the impacts of drought and can have cascading impacts on the tourism economy in Santa Fe County and across the state. According to the Santa Fe County Extension Office with the New Mexico State University, there are 715 farms over 1,000 acres in size throughout Santa Fe County.

Drought can have severe impacts on the environment, leading to reduced water availability, potentially harming plants and animals, and resulting in habitat degradation. It also increases the risk of wildfires by drying out vegetation making it more flammable and prone to ignition. Wildfires destroy vegetation and burn the ground, meaning the soil is no longer able to absorb rainwater. The lack of natural vegetation and damage to the soil makes the area more susceptible to flooding and erosion. This creates a cascading impact where drought leads to wildfires, which then increases the risk of floods. Additionally, drought alone dries the ground, making the soil hard and less permeable, which reduces its ability to absorb water. When heavy rains follow a drought, the hardened soil leads to increased surface runoff, increasing the risk of flood events.

Impacts of past droughts experienced in the Santa Fe County planning area have not resulted injuries or fatalities supporting a “Minor” severity of impact meaning injuries and/or illnesses do not result in permanent disability, shutdown of facilities and services for possibly more than one week, and more than 10 percent of property is impacted.

ASSESSMENT OF IMPACTS

The Drought Impact Reporter was developed in 2005 by the University of Nebraska-Lincoln to provide a national database of drought impacts. Droughts can have an impact on agriculture; business and industry; energy; fire; plants and wildlife; relief, response, and restrictions; society and public health; tourism and recreation; and water supply and quality. The reports are submitted from individuals from Federal, State, and local agencies, as well as the general public. Table 6-7 lists the drought impacts to Santa Fe County from 2005 through 2023 based on reports received by the Drought Impact Reporter.

Table 6-7. Drought Impacts, 2005-2023

DROUGHT IMPACTS	
Agriculture	32
Business & Industry	7
Energy	0
Fire	39
Plants & Wildlife	45
Relief, Response & Restrictions	44
Society & Public Health	19

SECTION 6: DROUGHT

DROUGHT IMPACTS	
Tourism & Recreation	11
Water Supply & Quality	27

Droughts can have an impact on agriculture, business and industry; energy; fire; plants and wildlife; relief, response, and restrictions; society and public health; tourism and recreation; and water supply and quality. Drought has the potential to also impact people in the Santa Fe County planning area. While it is rare that drought, in and of itself, leads to a direct risk to the health and safety of people in the U.S., severe water shortages could result in inadequate supply for human needs. Population forecasts suggest that the population will continue increasing through 2030 in the Santa Fe County planning area.[7] This projected future growth can cause concern for the current water infrastructure and demand for the planning area.

Severe drought conditions can be frequently associated with a variety of impacts, including:

- Dry clay soil can lead to water main lines shifting and breaking. Often repair to water lines includes shutting off water to multiple homes at one time.
- The number of health-related low-flow issues (e.g., diminished sewage flows, increased pollution concentrations, reduced firefighting capacity, and cross-connection contamination) will increase as the drought intensifies.
- Public safety from forest / range / wildfires will increase as water availability and/or pressure decreases.
- Respiratory ailments may increase as the air quality decreases.
- There may be an increase in disease due to wildlife concentrations (e.g., rabies, Rocky Mountain spotted fever, Lyme disease).
- Residents may disagree with the County over water use/water rights, creating conflict.
- Political conflicts may increase between municipalities, counties, states, and regions.
- Water management conflicts may arise between competing interests.
- Increased law enforcement activities may be required to enforce water restrictions.
- Severe water shortages could result in inadequate supply for human needs as well as lower quality of water for consumption.
- Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property.
- During drought there is an increased risk for wildfires and dust storms.
- The community may need increased operational costs to enforce water restriction or rationing.
- Prolonged drought can lead to increases in illness and disease related to drought.
- Utility providers can see decreases in revenue as water supplies diminish.
- Utilities providers may cut back energy generation and service to their customers to prioritize critical service needs.

[7] The University of New Mexico. Population Estimates and Forecasts for County of Santa Fe. https://www.santafecountynm.gov/userfiles/SantaFePopulationGrowthReport.pdf.

- Hydroelectric power generation facilities and infrastructure would have significantly diminished generation capability. Dams simply cannot produce as much electricity from low water levels as they can from high water levels.
- Fish and wildlife food and habitat will be reduced or degraded over time during a drought and disease will increase, especially for aquatic life.
- Wildlife will move to more sustainable locations creating higher concentrations of wildlife in smaller areas, increasing vulnerability, and further depleting limited natural resources.
- There are 10 federally endangered, threatened or candidate species in Santa Fe County. Severe and prolonged drought can result in the reduction of a species or cause the extinction of a species altogether.
- Plant life will suffer from long-term drought. Wind and erosion will also pose a threat to plant life as soil quality will decline. The urban tree canopy, including county and city parks, are vulnerable to the impacts of prolonged drought.
- Dry and dead vegetation will increase the risk of wildfire.
- Drought poses a significant risk to annual and perennial crop production and overall crop quality leading to higher food costs.
- Drought-related declines in production may lead to an increase in unemployment.
- Drought may limit livestock grazing resulting in decreased livestock weight, potential increased livestock mortality, and increased cost for feed.
- Negatively impacted water suppliers may face increased costs resulting from the transport water or develop supplemental water resources.
- Long term drought may negatively impact future economic development.

The overall extent of damage caused by periods of drought is dependent on its extent and duration. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a drought event.

CLIMATE CHANGE CONSIDERATIONS

According to the Fifth National Climate Assessment, climate change is threatening water resources and compromising human health and safety in the Southwestern United States region through drought. Annual rainfall in New Mexico is more likely to decrease than increase, so periods without rain are likely to become longer, increasing drought risk and severity.[8] Warmer temperatures and less rainfall will increase the demand for water but also reduce the water supply, resulting in potential shortages. Increased drought risk due to climate change will also exacerbate impacts on local agriculture and increase wildfire risk.

The Santa Fe County planning area can anticipate an increased likelihood of droughts in the future due to an estimated increase in the number of dry days in the Santa Fe County area. Dry spells are periods of consecutive days without precipitation. Historically, the longest yearly dry spell in Santa Fe County averaged 25 days. With current climate change projections this can increase by another 3 days, making the average dry spell 28 days. In addition, it is projected that future changes to Santa Fe County will include increased temperatures, which according to the U.S. Climate Explorer, the conservative projections show the planning area may experience a

[8] Environmental Protection Agency. 2016. What Climate Change Means for New Mexico. https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-nm.pdf.

6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 90°F in Santa Fe County, but between 2035 and 2064 the average will be 96°F, increasing the severity and frequency of drought events. With the full range of projections average temperatures could increase up to 21°F but the severity is dependent on overall future emissions.

SANTA FE COUNTY

SECTION 7
EARTHQUAKE

SECTION 7: EARTHQUAKE

HAZARD DESCRIPTION

An earthquake is the sudden movement of the Earth's surface caused by the release of stress accumulated within or along the edge of the Earth's tectonic plates, volcanic eruption, or by a manmade explosion. The majority of earthquakes occur along faults; however, earthquakes can occur within plate interiors. Over geologic time, plates move and plate boundaries change, pushing weakened boundary regions to the interior part of the plates. These areas of weakness within the continents can cause earthquakes in response to stresses that originate at the edges of the plate or in the deeper crust.

Earthquake locations are described by the focal depth and geographic position of the epicenter. The focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter is the point on the Earth's surface directly above the hypocenter. Earthquakes usually occur without warning, with their effects impacting great distances away from the epicenter.

According to the U.S. Geological Society (USGS) Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may influence an individual's normal activities. Table 7-1 describes definition of examples.

Table 7-1. Definitions of Earthquake Hazards[1]

HAZARD	DESCRIPTION
Surface Faulting	Displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 kilometers.
Ground Motion (shaking)	The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
Landslide	A movement of surface material down a slope.
Liquefaction	A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking.

[1] Source: USGS, 2012

SECTION 7: EARTHQUAKE

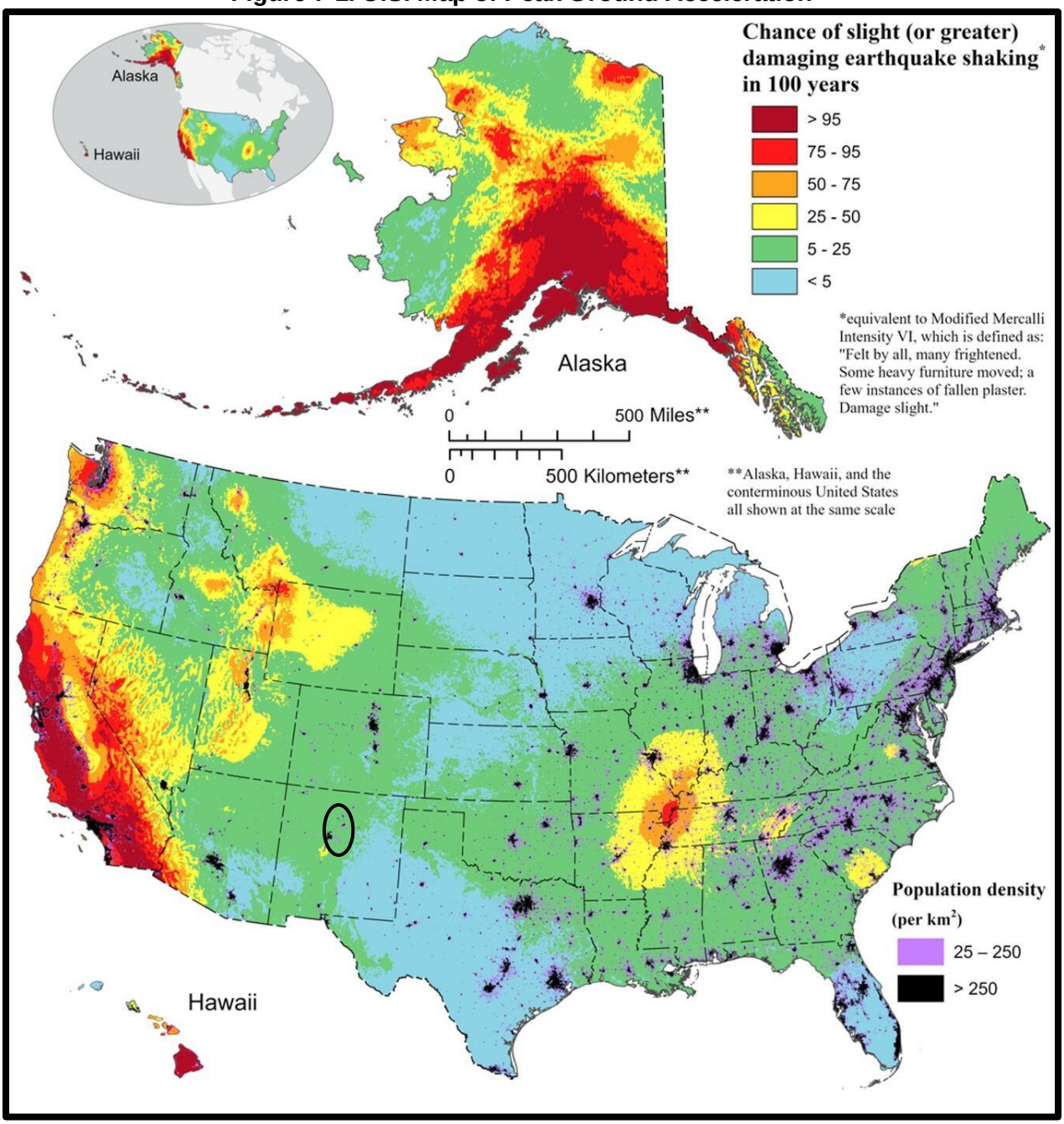
HAZARD	DESCRIPTION
Tectonic Deformation	A change in the original shape of a material due to stress and strain.
Tsunami	A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or exploding volcanic islands.
Seiche	The sloshing of a closed body of water from earthquake shaking.

LOCATION

Earthquake hazard areas are mapped by the USGS's National Seismic Hazard Model (NSHM). Figure 7-1 shows the most recent 2023 iteration of this USGS model. The NSHM defines the potential for earthquake ground shaking for various probability levels across the United States. The 2023 NSHM is an update to the previous 2018 version, and compiles data and findings from a number of sources including earthquake catalogs, geodetic- and geologic-based fault and deformation models, and ground motion models (GMMs), among others.[2] The map shows the percent chance that a given area will experience a category VI (or stronger) earthquake in 100 years, as defined by the Modified Mercalli Intensity (MMI) Scale (Table 7-3). The likelihood of a significant earthquake event is signified by the color-coding on the map. Densely populated areas are also highlighted on the map (purple and black dotting) to indicate areas of elevated vulnerability in relation to higher seismic risk. The Santa Fe County planning area, as identified in Figure 7-1, is located in a moderately low hazard area, with between a 5 and 25 percent chance of experiencing a strong earthquake every 100 years.

[2] A comprehensive overview of the modelling process can be found at the USGS website, https://www.usgs.gov/programs/earthquake-hazards/science/2023-50-state-long-term-national-seismic-hazard-model-0#overview

Figure 7-1. U.S. Map of Peak Ground Acceleration[3]

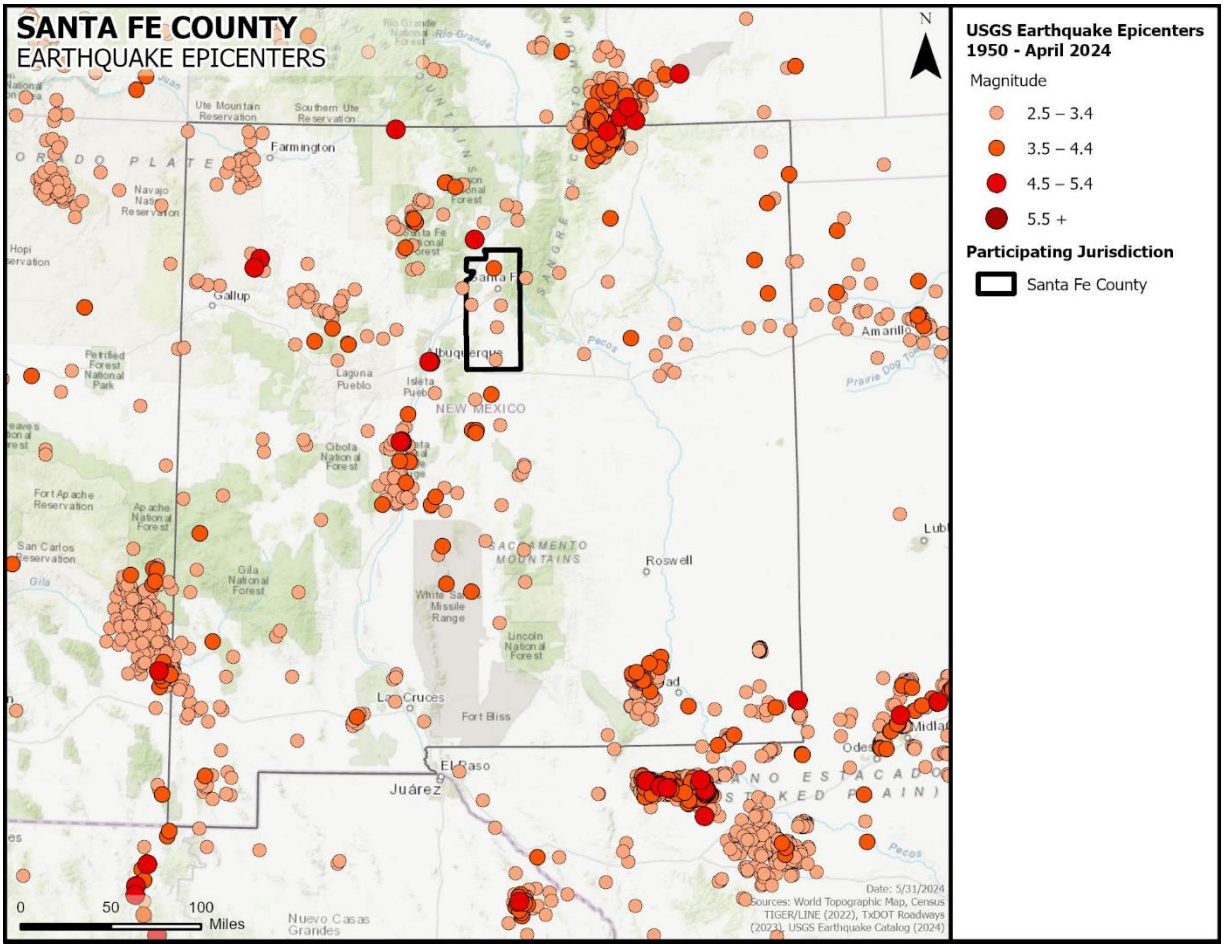


Figures 7-2 and 7-3 show historic earthquake events across New Mexico and Santa Fe County between 1950 and 2024, per data available in the USGS Earthquake Catalog database.[4]

[3] Santa Fe County is indicated by the black circle.

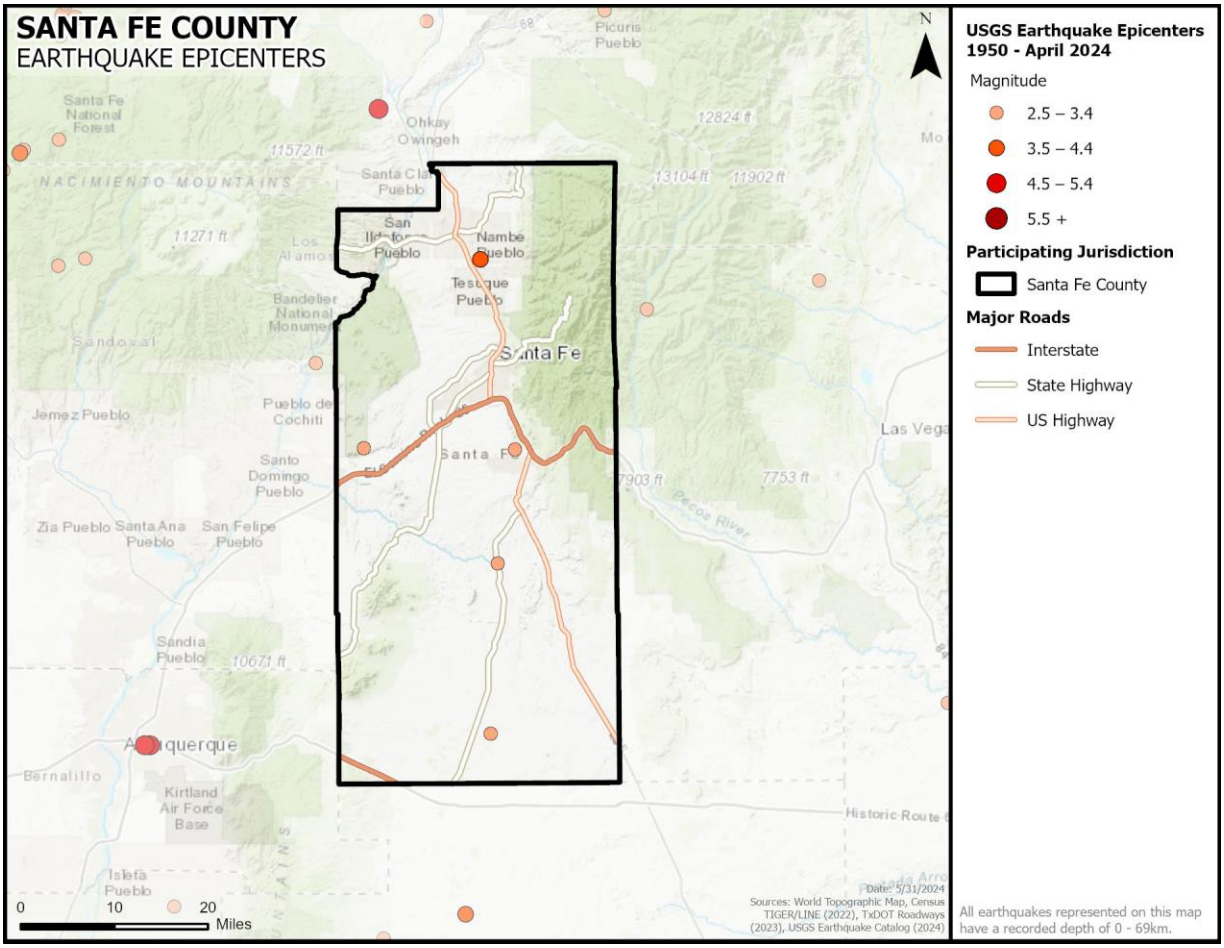
[4] Source: https://www.usgs.gov/programs/earthquake-hazards. Event data reported from January 1950 through April 2024.

Figure 7-2. Historic Earthquake Epicenters, New Mexico, 1950-2024[5]



[5] Approximate Santa Fe County planning area is indicated by the black rectangle.

Figure 7-3. Historic Earthquake Epicenters, Santa Fe County, 1950-2024



EXTENT

Earthquakes are measured in terms of magnitude and intensity. The prevalent magnitude measurement in use today is based on the Moment Magnitude Scale (MMS). MMS measures the movement of rock along the fault. It accurately measures larger earthquakes, which can last for minutes, affect a much larger area, and cause more damage. Magnitudes are based on a logarithmic scale (base 10), meaning that for each whole number you go up on the magnitude scale, the amplitude of the ground motion recorded by a seismograph goes up ten times. Using this scale, a magnitude 5 earthquake would result in ten times the level of ground shaking as a magnitude 4 earthquake (and about 32 times as much energy would be released).[6] The USGS reports earthquake magnitudes above 4.0 as “moment magnitude,” often described in the press as "Richter” magnitude. Table 7-2 shows the magnitude levels for the current Richter/Moment Magnitude scale.

[6] (n.d.). How Do We Measure Earthquake Magnitude? Michigan Tech. https://www.mtu.edu/geo/community/seismology/learn/earthquake-measure/#:~:text=The%20moment%20magnitude%20scale%20is,the%20earthquake%20at%20multiple%20stations.

Table 7-2. Richter / Moment Magnitude Scale[7]

MAGNITUDE	CATEGORY	DESCRIPTION OF EFFECTS	EVENTS PER YEAR
< 3.0	Micro	Usually not felt, but can be recorded by seismograph	+100,000
3.0 – 3.9	Minor	Often felt, but causes no damage	12,000 - 100,000
4.0 – 4.9	Light	Felt by all, minor breakage of objects	2,000 - 12,000
5.0 – 5.9	Moderate	Some damage to weak structures	200 – 2,000
6.0 – 6.9	Strong	Moderate damage in populated areas	20 – 200
7.0 – 7.9	Major	Serious damage over large areas with loss of life expected	3 – 20
> 7.9	Great	Severe destruction and loss of life over large areas	Less than 3

Earthquake Intensity measurement is an on-the-ground description. The measurement qualitatively explains the severity of earthquake shaking and its effects on people and their environment. Intensity measurements will differ depending on each location's proximity to the epicenter or point on the surface of the earth directly above the focus where the earthquake started. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and total destruction. There can be multiple intensity measurements associated with an earthquake as opposed to one magnitude measurement.[8] The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects actually experienced at a specific location. The scale provides the intensity of the earthquake in values ranging from I to X. Table 7-3 describes the typical effects and Intensities associated with earthquakes of various magnitudes. The intensity and effects depend on multiple factors (earthquake depth, epicenter location, site geology, population density, to name a few) and can vary widely.

Table 7-3. Magnitude and Modified Mercalli Intensity (MMI) Scale[9]

INTENSITY	CATEGORY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER MAGNITUDE
I	Not Felt	Not felt except by a very few under especially favorable conditions	< 2.0
I	Not Felt	Felt only by a few persons at rest, especially on upper floors of buildings.	2.0 – 2.9

[7] (n.d.). Earthquakes. Britannica. https://www.britannica.com/science/earthquake-geology
[8] Wood, H. O., and Neumann, Frank (1931). Modified Mercalli Intensity Scale of 1931: Seismological Society of America Bulletin, v. 21, no. 4, p. 277-283.
[9] Source: USGS

INTENSITY	CATEGORY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER MAGNITUDE
II – III	Weak	Felt quite noticeably by persons indoors, with shaking of indoor objects. Rarely causes damages.	3.0 – 3.9
IV – V	Light to Moderate	Noticeable shaking of indoor objects and rattling noises. Felt by most people in the affected area. Generally, no to minimal damage	4.0 – 4.9
VI – VII	Strong to Very Strong	Significant damages to poorly constructed buildings. Limited to moderate damages to well-built structures.	5.0 – 5.9
VIII – IX	Severe to Violent	Damage slight in specially designed structures; considerable damage in ordinary buildings with partial collapse. Damage great in poorly built structures.	6.0 – 6.9
VIII +	Severe to Extreme	Damage considerable in specially designed structures. Damage substantial to most buildings, with partial or complete collapse. Felt across great distances with major damage mostly limited to 250 km from Epicenter.	7.0 – 7.9
VIII – IX	Severe to Violent	Major damage to buildings, structures likely to be destroyed; will cause moderate to heavy damage to sturdy or earthquake-resistant buildings; damaging in large areas; felt in extremely large regions.	8.0 – 8.9
VIII +	Severe to Extreme	At or near total destruction. Severe damage or collapse to all buildings; heavy damage and shaking extends to distant locations and permanent changes in ground topography.	9.0+

Taking into consideration the possible extent of an earthquake for the area, by reviewing Tables 7-2 and 7-3 in conjunction with no significant previous occurrences, as depicted in Figure 7-2, the Santa Fe County planning area experiences on average less than 3.0 magnitude or Levels II-III (weak impact) on the Modified Mercalli intensity scale. The most significant past earthquake events that have occurred in close proximity to the planning area are two magnitude 4.5 (Levels IV-V on the Modified Mercalli scale), one in the City of Albuquerque and one just north of Santa Fe County.

Although previous earthquake events occurring in the planning area have been categorized as weak to moderate, the planning area's proximity to the Rio Grande rift, a narrow belt of basins that bisect New Mexico, increases the possibility of future significant events. In the middle Rio Grande Valley (from Santa Fe to Belen), there are a large number of geologically young faults. While the probability that an earthquake would occur in this region is moderate, the impact could potentially be severe (Level VIII or greater on the Modified Mercalli scale) if a quake did occur.[10] This is the greatest extent the entire planning area can anticipate in the future, based on historic records.

HISTORICAL OCCURRENCES

According to USGS, and the National Geophysical Data Center (NGDC), there are no "significant" earthquakes on record for the State of New Mexico and the entire Santa Fe County planning area from 2150 B.C. to present. A significant earthquake, as defined by NGDC, is one that has caused at least moderate damage (approximately $1 million or more), has resulted in 10 or more deaths, has registered as a magnitude 7.5 or greater, has registered as Modified Mercalli Intensity (MMI) Scale X or greater, or generated a tsunami. None of these criteria have been met by any seismic activity known to have impacted the planning area.

Although significant earthquakes are not known to have impacted the Santa Fe County planning area, less severe earthquake activity has occurred. In 1918, an earthquake in Santa Fe County exhibited strong local effects in the Village of Cerrillos, throwing residents off their feet and causing plaster to crack and fall. A more recent 3.5 magnitude earthquake occurred on October 17, 2011, between the cities of Santa Fe and Espanola, with an epicenter east of Interstate 25.

Additionally, moderate to severe earthquakes have occurred in the region historically, although these were not known to have impacted the planning area. According to the New Mexico Bureau of Geology and Mineral Resources, two of the largest historic earthquakes in New Mexico, estimated at magnitudes of 5.76 and 6.18, occurred near Socorro in 1906. Regionally, the largest earthquake was in Sonora, Mexico in 1887, which registered as a 7.4 magnitude earthquake that was felt as far away as Albuquerque and Santa Fe.[11] Table 7-4 includes a summary of historical earthquake events that have occurred in Santa Fe County as well as those within a 100-mile radius of the county.

Table 7-4. Historical Earthquake Event Summary, 1950-2024[12]

JURISDICTION	NUMBER OF EVENTS	MAXIMUM EXTENT	AVERAGE EXTENT	INJURIES & FATALITIES	PROPERTY & CROP DAMAGE
Santa Fe County	5	3.5	3.0	0	$0
100-Mile Radius	504	5.3	3.0	0	$0

[10] Source: https://geoinfo.nmt.edu/hazards/earthquakes/home.html#:~:text=Two%20of%20the%20largest%20historic,northeastern%20Sonora%2C%20Mexico%20in%201887

[11] Source: https://geoinfo.nmt.edu/hazards/earthquakes/home.html#:~:text=Two%20of%20the%20largest%20historic,northeastern%20Sonora%2C%20Mexico%20in%201887.

[12] NOAA, NCEI Storm Events Database

SECTION 7: EARTHQUAKE

PROBABILITY OF FUTURE EVENTS

Earthquake Hazard Maps show the distribution of earthquake shaking levels that have a certain probability of occurring over a given period. According to the USGS, the entire Santa Fe County planning area has between a 5 and 25 percent chance of a slightly damaging (or greater) earthquake within 100 years. With five events in the county over a 74 year reporting period, the probability of an earthquake affecting the planning area is considered "Unlikely", or an event probable in the next 10 years.

VULNERABILITY AND IMPACT

Little warning is usually associated with earthquakes and can impact areas a great distance away from the epicenter. The amount of damage depends on the density of population and buildings, and infrastructure construction in the affected area. Some places may be more vulnerable than others based on soil type, building age, and building codes in the Santa Fe County planning area.

The Santa Fe County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by earthquake events. For a comprehensive list see Appendix C.

Table 7-5. Critical Facilities Vulnerable to an Earthquake

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications. Impact can impede emergency response vehicle access to areas. • Power outages could disrupt communications, delaying emergency response times. • Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages or other associated damages to facilities. • Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and critical services may be significantly impacted due to power outages, damaged facilities, and/or loss of communications. Impact can impede emergency service vehicle access to areas. • Power outages could disrupt communications, delaying emergency response times further straining the capacity and resources of emergency service personnel.

While generally mild earthquake events have occurred in the Santa Fe County planning area, no known dollar losses of critical facilities and infrastructure, or injuries and fatalities, have been recorded for these events. Based solely on historical events in the planning area, the potential severity of impact would be considered limited. However, Santa Fe County's proximity to a large number of geologically young faults, as well as other seismic activity that has occurred elsewhere in the region, suggests the potential for a severe earthquake event to occur. Therefore, the potential severity of impact that can be anticipated is "Substantial," meaning multiple deaths, complete shutdown of facilities for 30 days or more, and more than 50 percent of property destroyed or with major damage.

CLIMATE CHANGE CONSIDERATIONS

Damaging earthquakes are rare within the State of New Mexico, including the Santa Fe County planning area. Changing conditions of weather patterns and climate change has not been established as having a direct impact on earthquake intensity or frequency.

According to the USGS, statistically there is an approximately equal distribution of earthquakes in all cold weather, hot weather, rainy weather, etc. Very large low-pressure changes associated with major storm systems, like typhoons and hurricanes, are known to trigger episodes of fault slip or slow earthquakes in the Earth's crust and may also play a role in triggering some damaging earthquakes. However, the numbers are small and are not statistically significant.[13] Climate change is assumed to have no impact on the probability or intensity of potential earthquakes in the planning area.

[13] (n.d.). *Natural Hazards*. United Stated Geological Survey. https://www.usgs.gov/faqs/there-earthquake-weather

SANTA FE COUNTY

SECTION 8
EXPANSIVE SOILS

SECTION 8: EXPANSIVE SOILS

HAZARD DESCRIPTION

Expansive soils, also locally called adobe or clay, are soils and soft rocks with a relatively high percentage of clay minerals that are subject to changes in volume as they swell and shrink with changing moisture conditions. Expansive soils contain minerals such as smectite clays that are capable of absorbing water. When these clays absorb water, they increase in volume and expand. The change in soil volume and resulting expansion can exert enough force on a building or other structure to cause damage.

Expansive soils will also lose volume and shrink when they dry. Drought conditions can cause soils to contract in response to a loss of soil moisture. A reduction in soil volume can affect the support to buildings or other structures and result in damage. Fissures in the soil can also develop and facilitate the deep penetration of water when moist conditions or runoff occurs. This produces a cycle of shrinkage and swelling that place repetitive stress on structures. The effect of expansive soil is most prevalent in regions prone to prolonged periods of drought followed by periods of moderate to high precipitation.

LOCATION

Expansive soils are found throughout the United States, with the highest concentrations being in Texas, Colorado, Virginia, North Dakota, Oklahoma, and Montana. Some of the most expansive soils, known locally as adobe or clay, are found in New Mexico. In the Santa Fe County planning area, the problems associated with expansive soil typically occur during drought periods. Expansive soils (such as bentonite, smectite, or other reactive clays) expand when the soil particles attract water and can shrink when the clay dries.

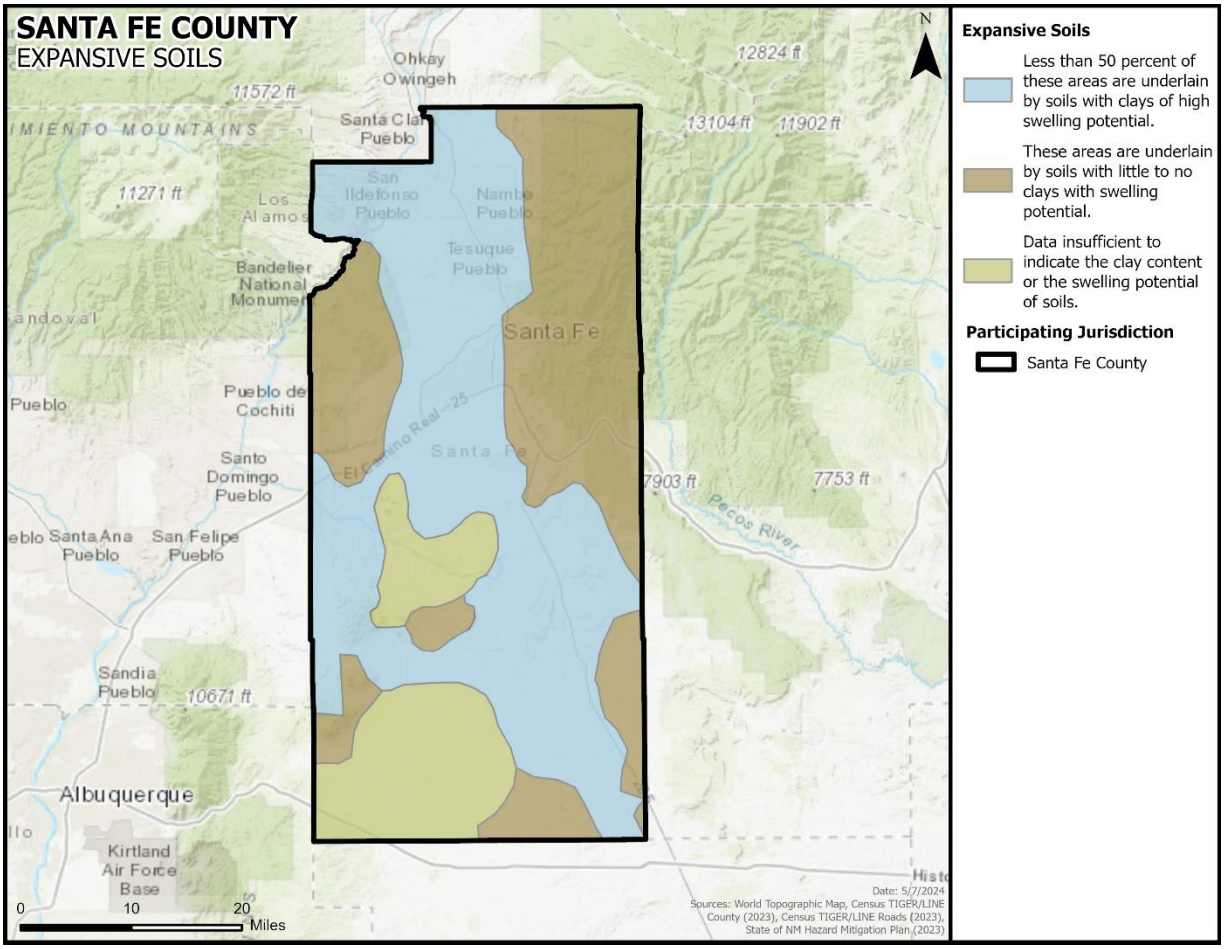
New Mexico's soils are quite varied, ranging from almost pure sand to heavy clay. According to the New Mexico Bureau of Geology and Mineral Resources, the landscape of New Mexico can be divided into six distinct provinces: Basin and Range, Colorado Plateau, Mogollon-Datil Volcanic Field, Rio Grande Rift, Southern High Plains, and Southern Rocky Mountains.[1] Santa Fe County largely falls within the Rio Grande Rift, a region that is mostly characterized by low to moderate susceptibility to expansive soils. New Mexico's most abundant areas of clay with high swelling potential are generally found outside of the Santa Fe County planning area, largely in the

[1] Source: https://geoinfo.nmt.edu/tour/home.cfml?show=provinces

northeast portion of the state in the Southern High Plains region. This area of high swelling clay falls within Taos and Colfax counties.

Figure 8-1 shows areas of expansive soil in Santa Fe County. Most of the planning area is underlain by soils that consist of less than 50 percent clay with high swelling potential, indicated in blue. The southern part of the county falls within the low-risk area, indicated in yellow, while the western edge falls within the limited-risk area, indicated in green.

Figure 8-1. Location of Expansive Soils in Santa Fe County



EXTENT

Expansive soils risk is measured by the degree to which soils may shrink or swell. Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent, moderate if 3 to 6 percent, high if 6 to 9 percent, and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures.[2]

[2] (2009). *Soil Reports*. Natural Resources Conservation Service. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_016186.pdf

Figure 8-2. NRCS Soil Linear Extensibility Risk Categories

Potential Category	Linear Extensibility %	Clay %
Low	< 3%	< 25%
Moderate	3% - 6%	25% - 35%
High	6% - 9%	35% - 45%
Very High	> 9%	> 45%

A soil survey was developed by the USDA Soils Conservation Service and contains information that can be applied in determining the suitability of soils in the planning area when selecting sites for roads, structures, and infrastructure. Typical soil depths with the ability to affect the built environment are between 0 and 60 inches deep. Based on Soil Survey data, roughly 59 percent of the Santa Fe County planning area is subject to moderate (3-6%) linear extensibility and moderate frequency of expansive soils (Figure 8-1). The next most common linear extensibility category is low (<3%), found in 38 percent of the planning area, followed by roughly 3 percent subject to high (6-9%) linear extensibility. Only 0.2 percent of the planning area falls within the very high (>9%) linear extensibility category.[3]

It is worth noting that portions of the Santa Fe County planning area are not included in the Santa Fe County soil survey but were analyzed separately in a survey of the Santa Fe National Forest area. This survey area includes land along the east and west edges of the northern portion of Santa Fe County. However, only 25 percent of soils in this area contain 3% or greater linear extensibility, therefore the effects of expansive soils in these areas can be anticipated to be infrequent and negligible.

HISTORICAL OCCURRENCES

Expansive soil is a condition that is native to New Mexico soil characteristics and cannot be documented as a time-specific event, except when it leads to structural and infrastructure damage. In these instances, damages are typically cumulative over time rather than instantaneous. Due to their slow-building nature, damages may go unreported. Extreme conditions can damage roads, structures, and infrastructure, including projects still under construction. Damages from expansive soils are typically associated with droughts, previous occurrences for expansive soils can be correlated with previous occurrences of drought, which are typically negligible. Santa Fe County has no known recorded events of damaging expansive soils. Refer to the Drought profile (Section 6) of this plan for more information on the impacts of past drought events.

[3] Source: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

PROBABILITY OF FUTURE EVENTS

New Mexico's state building codes follow the requirements laid out by the International Building Code of 2021 (IBC 2021) for geotechnical investigations when building new structures (found in Section 1803 of IBC 2021). These requirements include investigating for soil classification, soil strength, adequacy of load-bearing soils, the effect of moisture variation, and other soil attributes which may affect structures. In areas likely to have expansive soil, soil tests are required to determine where such soils exist.[4]

These measures significantly reduce the probability of expansive soil impacts on newer and future development. It is considered "Unlikely" that the high-risk areas in the Santa Fe County planning area will experience expansive soil impacts such as problems with foundations, roadways, sidewalks and other structures and infrastructure in the future, especially during times of drought. Older structures will be impacted with greater frequency due to the soil testing and stabilization requirements for newer structures. See additional information on climate change at the end of this section.

VULNERABILITY AND IMPACT

The effects of expansive soils are most prevalent when periods of moderate to high precipitation are followed by drought and then again by periods of rainfall. Other cases of damage result from increases in moisture volume from such sources as broken or leaking water and sewer lines. Dry clays are capable of absorbing water and will increase in volume in an amount proportional to the amount of water absorbed. Soils capable of changes in volume present a hazard to structures built over them and to the pipelines buried in them. Houses and one-story commercial buildings are more apt to be damaged by the expansion of swelling clays than are multi-story buildings, which are usually heavy enough to counter swelling pressures. However, if constructed on wet clay, multi-story buildings may also be damaged by clay shrinkage when moisture levels are substantially reduced.

Cracked foundations and floors, jammed windows and doors, and ruptured pipelines are typical types of damage resulting from swelling soils. Damage to the upper floors of larger buildings can occur when motion in the structure is significant. While all infrastructure within the planning area is minimally vulnerable, slab on grade structures are more likely to suffer damages from expansive soils. In addition, older structures built to less stringent building codes may also be more susceptible to damage than new construction.

While the number of slabs on grade structures is not available, the U.S. Census data indicates approximately 40,547 of the housing units (53 percent of all housing units) in the planning area were built before 1980 and may be more susceptible to damages.

[4] 2021 New Mexico Building Codes; https://www.rld.nm.gov/construction-industries/rules-laws-and-building-codes/

SECTION 8: EXPANSIVE SOILS

Table 8-1. Residential Structures More Vulnerable to Expansive Soils

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980
Santa Fe County	40,547

The Santa Fe County Planning Team identified the following critical facilities (Table 8-2) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by expansive soils. For a comprehensive list see Appendix C.

Table 8-2. Critical Facilities Vulnerable to Expansive Soils

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Uneven settling and shifting cause cracks in building foundations impacting the integrity of critical facility structures and lead to doors being unable to open or close properly. • Damages and cracks in streets and highway infrastructure may lead to emergency vehicles being unable to access areas increasing the need for emergency operations. • Ruptured water pipes can lead to loss of function or water pressure impacting drinking water availability and firefighting capabilities.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Uneven settling and shifting cause cracks in building foundations impacting the integrity of critical facility structures and lead to doors being unable to open or close properly. • Damages and cracks in streets and highway infrastructure may lead to emergency vehicles being unable to access areas increasing the need for emergency operations.
Commercial Supplier (food, fuel, etc.)	• Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Wastewater and drinking water facilities and infrastructure may be damaged or destroyed resulting in services disruption or outage for multiple days or weeks. • Disruptions and outrages impact public welfare as safe drinking water is critical. • A break in essential and effective wastewater collection and treatment is a health concern, potentially spreading disease. • Exposure to untreated wastewater is harmful to people and the environment.

The impact of expansive soils experienced in Santa Fe County has resulted in no injuries and fatalities, supporting a “Limited” severity of impact meaning injuries and illnesses are treatable with first aid, shutdown of critical facilities and services for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

SECTION 8: EXPANSIVE SOILS

ASSESSMENT OF IMPACTS

Expansive soils are generally influenced by how wet or dry reactive clay types of soils become, so the climate of an area, and more specifically the seasonal precipitation-drought cycle associated with arid or semi-arid regions, influences the occurrence and severity of these hazards. Problems associated with expansive soils in Santa Fe County typically occur during extended periods of drought.

Expansive soils present a hazard to lightweight buildings and other infrastructure. Uneven settling and shifting in such structures may occur, causing cracks in foundations, walls, streets, driveways, and sidewalks; ruptured pipes; and windows and doors that do not open and close properly. Special provisions are necessary in the construction of footings and slabs resting on expansive soils to minimize damages due to the expansiveness. Homeowners and public agencies that assume they cannot afford preventative measures such as more costly foundations and floor systems, often incur the largest percentage of damage and costly repairs from expanding soil. No figures are available for the total damage to homes in the planning area from expansive clays. The greatest damage occurs when structures are constructed when clays are dry (such as during a drought) and then subsequent soaking rains swell the clay.

Infrastructure such as pipelines can be damaged, causing increased maintenance and repairs, replacement, or damage to the point of failure. Sewer and water lines are also affected by shrinking and swelling soils. The movement of the soil can snap water and sewer lines, producing a minimum of temporary discomfort, and a maximum of serious health and welfare risk. Field monitoring and testing should be conducted on a regular basis, especially during extended drought periods, to avoid loss of function or water pressure, which could impact drinking water and firefighting capabilities. In addition, highways (Highway 84/285, Highway 599, Interstate 25, Interstate 40) can be affected by expansive soils and could hinder evacuations if deemed not usable during disasters.

Unlike many other environmental hazards, the effects of expansive soil are deceptive in that they are not revealed suddenly or caused by a single event, but rather become increasingly evident and destructive over time. As such, the vast majority of expansive soil impacts are relatively benign in terms of emergency management and emergency response.

Expansive soil can directly impact infrastructure and, as a result, indirectly create impacts on residents. The impact of climate change could produce more severe expansive soils events, exacerbating the current expansive soils impacts. The following are a summary of impacts frequently associated with expansive soils:

- Expansive soils are influenced by the seasonal precipitation-drought cycle. Most impacts on Santa Fe County typically occur during extended periods of drought.
- Impacts to lightweight buildings and other infrastructure are most likely to occur. Impacts include uneven settling and shifting in structures; cracks in foundations, walls, streets, driveways, and sidewalks; ruptured pipes; and windows and doors that do not open and close properly.
- An estimated 53 percent of homes in Santa Fe County were built before 1980 leading them to be more susceptible to damages from expansive soils. In addition, 96 buildings and sites in Santa Fe County are on the National Register of Historic Places, many of which pre-date modern building codes, along with 212 that are listed on the New Mexico State Register of Cultural Properties.

- Highways (Highway 84/285, Highway 599, Interstate 25, Interstate 40) can be affected by expansive soils.
- Economic impacts are limited to uninsured damages.
- Impacts on people are indirect, with impacts related to disruption in services such as water and sewer.
- As population grows and development increases in the county, the potential risk to expansive soils will also increase.
- Limited impact is anticipated to the natural environment other than changes in soil characteristics.

CLIMATE CHANGE CONSIDERATIONS

Expansive soils are directly connected to drought and flood conditions as they literally swell and shrink with changing moisture conditions. Impacts of climate change on drought and flood events indicate similar changes to expansive soil frequency and impacts. Refer to Probability of Future Events section in Section 6 (Drought) and Section 11 (Flood) for more information on those hazards.

SANTA FE COUNTY

SECTION 9
EXTREME COLD

SECTION 9: EXTREME COLD

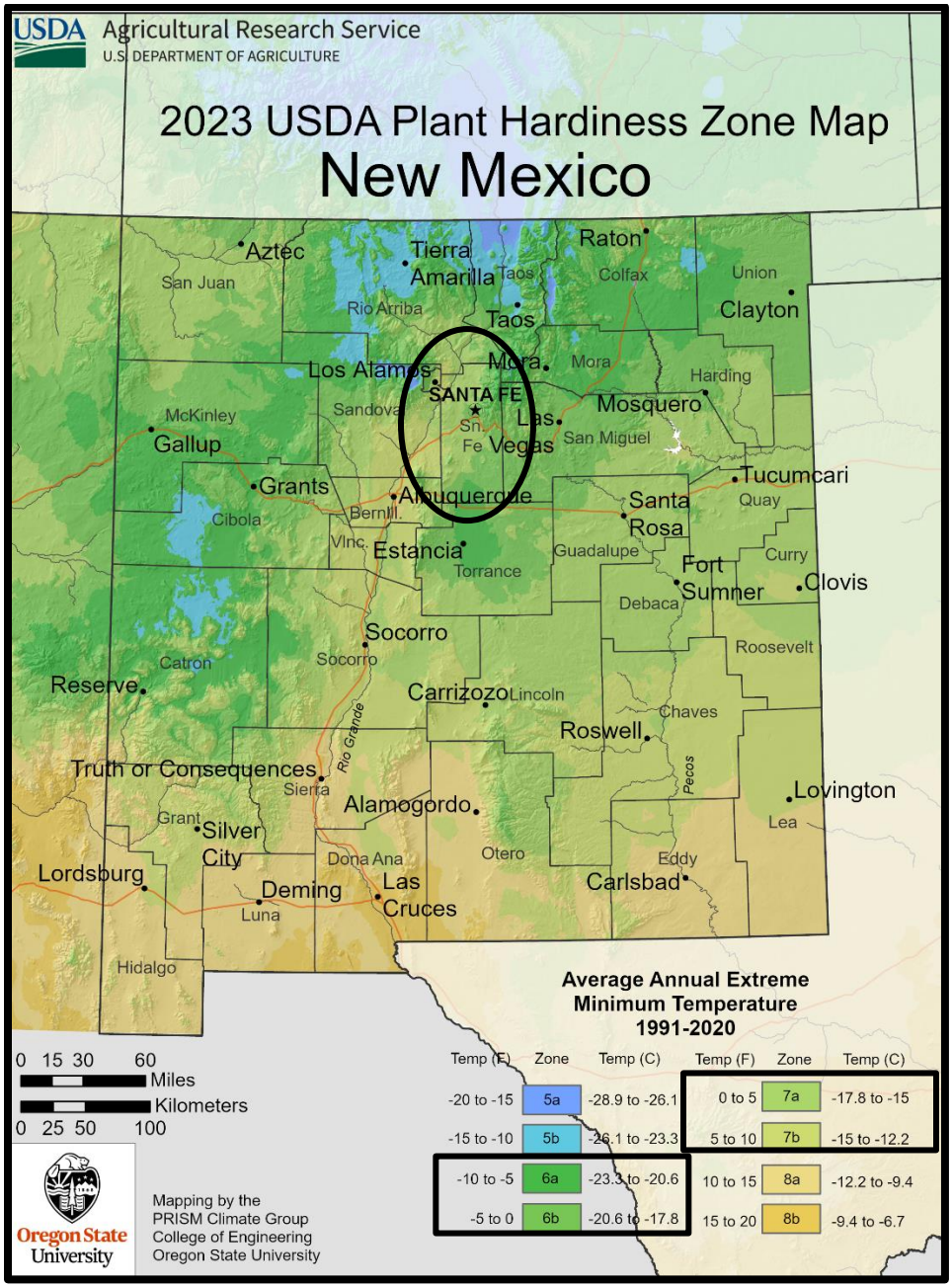
HAZARD DESCRIPTION

Extreme cold refers to temperatures that are significantly lower than what is normal for a particular region or season. Extreme cold temperatures occur every winter in at least part of the country and affects millions of people across the United States. The arctic air can be dangerous and when combined with brisk winds, the planning area may experience dangerously cold wind chill values. Extreme cold may also result in a freeze, which according to the National Weather Service, occurs when the temperature drops below 32°F for a significant period of time.

People exposed to extreme cold are susceptible to frostbite and can succumb to hypothermia in a matter of minutes. Extreme Cold temperatures can also affect crops. In late spring or early fall, cold air outbreaks can damage or kill produce for farmers, as well as residential plants and flowers. Freezes and their effects are significant during the growing season. Extreme cold may also impact or damage roads, bridges, buildings, and critical infrastructure.

As indicated in Figure 9-1, the Santa Fe County planning area is in USDA Hardiness Zones 6a, 6b, 7a and 7b, with annual minimum temperatures between -10°F and 10°F.

Figure 9-1. Annual Minimum Temperature[1]



LOCATION

Extreme cold events are not confined to specific geographic boundaries. Therefore, the entire Santa Fe County planning area is exposed to extreme cold temperatures and may be impacted.

[1] Source: USDA

EXTENT

The extent of extreme cold is measured by wind chill, which is the temperature of the atmosphere in relation to wind speed. Wind Chill describes what the air temperature *feels* like to the human skin. In simple terms, the colder the air temperature and the higher the wind speeds the colder it will feel on your skin if you're outside. So even if it remains the same temperature, but the wind speed increases, it will actually feel colder to your skin. This is because as wind blows across our bodies it takes our heat and blows it away. The faster the wind speeds, the faster our body heat is taken away and the colder it feels. It is important to understand the full extent of extreme cold temperatures because it can cause significant effects on the human body.

Figure 9-2 presents the National Weather Service Wind Chill Temperature Index. This chart represents wind chill based on the temperature and wind speed. The colors represent a frostbite indicator, showing the points where temperature, wind speed and exposure time will cause frostbite on an individual exposed to the elements. For example, a temperature of 20°F and a wind speed of 10mph will produce a wind chill temperature of 9°F. Under these conditions, exposed skin can freeze in 30 minutes.

Figure 9-2. Wind Chill Temperature Index

Wind Chill Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

As described in Figure 9-1, the Santa Fe County planning area has an average annual minimum cold temperature of -10°F to 10°F. The NCEI Storm Events Database provides historical records of extreme cold, frost, and freeze events in Santa Fe County since 1996. The coldest reported temperatures in the Santa Fe County planning area range from -35°F and -50°F when accounting for wind chill. It is expected that the planning area will experience a similar extent in the future.

HISTORICAL OCCURRENCES

According to historical records there are 11 extreme cold events reported in the Santa Fe County planning area between 1996 and 2023. It is important to note that the NCEI Storm Events Database only has records dating back to 1996 for Santa Fe County and while it aims to capture the best available data, it may not account for every event. Table 9-1 shows historical incident information for the planning area. There are no reports of deaths or injuries due to extreme cold events. Extreme cold event data for the planning area is provided on a County-wide basis only in the NCEI database.

Table 9-1. Historical Extreme Cold Events, 1996-2023[2]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	2/2/2011	0	0	$0	$0
Santa Fe County	2/2/2011	0	0	$0	$0
Santa Fe County	2/2/2011	0	0	$0	$0
Santa Fe County	2/2/2011	0	0	$0	$0
Santa Fe County	2/2/2011	0	0	$0	$0
Santa Fe County	2/2/2011	0	0	$0	$0
Santa Fe County	12/8/2013	0	0	$65,800	$0
Santa Fe County	1/7/2017	0	0	$0	$0
Santa Fe County	2/15/2021	0	0	$0	$0
Santa Fe County	2/3/2022	0	0	$0	$0
Santa Fe County	2/3/2022	0	0	$0	$0
Total		**0**	**0**	**$65,800**	

Table 9-2. Historical Extreme Cold Events Summary, 1996-2023

JURISDICTION	NUMBER of EVENTS	DEATHS	INJURIES	PROPERTY DAMAGES	CROP DAMAGES
Santa Fe County	11	0	0	$65,800	$0

Based on the list of historical extreme cold events for the Santa Fe County planning area, four of the events have occurred since the 2018 Plan. According to the best available data, $65,800 (2023 dollars) in property damage has been reported within the planning area due to extreme cold.

[2] Values are in 2023 dollars. Database was searched for events between 1996 and December 2023. No events were reported for the Santa Fe County planning area in the database until 2011. This data includes cold/wind chill, extreme cold/wind chill, and frost/freeze events from the NCEI Storm Events Database.

SECTION 9: EXTREME COLD

SIGNIFICANT EVENTS

February 2, 2011

A powerful storm and arctic cold front combined to bring fresh snow cover to nearly all of northern and central New Mexico on February 1 and February 2, as well as extremely cold, record-setting minimum temperatures. This resulted in dangerously low wind chill values over many areas. In total, the Santa Fe County planning area received six different event reports for this storm event. When accounting for windchill, low temperatures across the region ranged from -25°F to -50°F, with the coldest temperatures being reported in the Southern Sangre de Cristo Mountains above elevations of 9,500 feet. No injuries, fatalities, or damages were reported in the planning area for this extreme cold event.

December 8, 2013

A bitter cold air mass in the region following an existing winter storm created plumbing problems for facilities at the Coyote Ranger District office. In the morning, temperatures across the area fell into the single digits below zero. Frozen pipes burst and flooded the station, saturating the building with over 40,000 gallons of water. Approximate property damages due to this incident are estimated at $65,800 (2023 dollars).

February 3, 2022

A strong winter storm system deepened over the Rockies before tracking southward into New Mexico on February 1, 2022, and continuing into February 2. Accompanying this system was a backdoor cold front that brought in very cold arctic air into northern and central New Mexico. This blast of cold air combined with the slow-moving system set the stage for widespread snow and winter weather impacts. The highest snow totals were measured across the northern high terrain of New Mexico where numerous SNOTELs and ski sites received two to three feet of new snow. Portions of the Santa Fe metro area received snow totals near eight inches. Very cold temperatures exacerbated severe travel conditions caused by heavy snow; multiple automobile accidents and injuries were reported in the Albuquerque area. Four fatalities from automobile accidents occurred across the state: two at Sandia Peak, one in Los Lunas, and one near Santa Rosa. No fatalities, injuries, or damages were reported in the Santa Fe County planning area.

PROBABILITY OF FUTURE EVENTS

According to historical records and annual low temperatures, the Santa Fe County planning area is expected to experience approximately one extreme cold event every one to two years. The probability of a future extreme cold event affecting the Santa Fe County planning area is considered “Highly Likely”, with an extreme cold event likely to occur within the next year. The end of this section addresses climate change and its impacts on future extreme cold events in the planning area.

VULNERABILITY AND IMPACT

Extreme cold can be very dangerous and may cause fatalities, especially for people experiencing homelessness or for those who live below the poverty level and are unable to pay for heating systems or utility bills. Power outages are common during extreme cold events which can also lead to the inability to heat homes safely. This can lead to people using unsafe practices such as running a generator or gas stove inside their home.

SECTION 9: EXTREME COLD

During periods of extreme cold, aging critical infrastructure and utility systems, such as electrical and water systems, may fail. Freezing temperatures can cause water pipes to freeze and crack. In addition, ice may gather along electrical lines which can impact the electrical infrastructure and cause widespread outages for potentially long periods of time.

Santa Fe County is a rich and diverse agricultural area. With more than 630 farms and ranches, dairy, beef, sheep, poultry, swine, chiles, onions, pecans, and other agriculture products are all a vital part of the food and agricultural industry in the planning area. Santa Fe County's agriculture revenue in 2021, the most recent data available, is estimated at $36,000,000.[3] Extreme cold events may severely damage crops and may even cause low crop yields by restricting stem growth. The most dangerous time for an extreme cold event to occur is during the spring months, when crops are the most vulnerable to damage. An extreme cold event in the planning area may impact the County's agricultural assets causing severe economic loss.

The Santa Fe County Planning Team identified the following critical facilities (Table 9-3) as assets that are considered the most important to the planning area and susceptible to a range of impacts caused by extreme cold events. For a comprehensive list see Appendix C.

Table 9-3. Critical Facilities Vulnerable to Extreme Cold Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Departments (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Exposure to extreme cold can cause injury in first responders if exposed for a period of time. • Roads may become impassable due to snow and/or ice impacting response times by emergency services. • Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged. • Increased number of patients due to exposure to cold temperatures could lead to a strain on staff. • Water pipes can freeze and burst leading to flooding within facilities. • Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations. • Exposure risks to outdoor workers.

[3] USDA 2022 New Mexico Annual Bulletin

CRITICAL FACILITIES	POTENTIAL IMPACTS
Commercial Supplier (food, gas/fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Roads may become impassable due to snow and/or ice impacting response times by emergency services. • Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged. • Water pipes can freeze and burst leading to flooding within facilities.

People and animals are subject to health risks from extended exposure to cold air. Elderly people are at greater risk of death from hypothermia during these events, especially in the neighborhoods with older housing stock. According to the U.S. Center for Disease Control, every year hypothermia kills about 600 Americans, half of whom are 65 years of age or older.[4] In addition, populations living below the poverty level may not be able to afford to run heat on a regular basis or an extended period of time.

The population over 65 and under the age of 5 in the Santa Fe County planning area is estimated at 30 percent of the total population or an estimated total of 45,995 potentially vulnerable residents in the planning area based on age. An estimated 12 percent of the planning area population live below the poverty level. Table 9-4 lists population data for several vulnerable population categories throughout the Santa Fe County planning area.

Another segment of the population at risk is those who are experiencing homelessness. While reliable data at the county-level is limited, estimates show that 19,000-20,000 individuals experienced homelessness statewide throughout the year in 2022. HUD's Annual Homeless Assessment Report estimated 2,560 people were homeless one night in January in 2022.[5]

Table 9-4. Populations at Greater Risk of Extreme Cold Events[6]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Santa Fe County	40,005	5,990	21,458	19,043	48,054

Older homes tend to be more vulnerable to the impacts of extreme cold events. Approximately 40,547 housing units (53 percent) in the planning area were built before 1980 (Table 9-5).

[4] Data USA, Santa Fe County, New Mexico, 2021
[5] 2023 New Mexico Affordable Housing Needs Assessment, July 7, 2023
[6] U.S. Census Bureau, American Community Survey, 2022

Table 9-5. Structures at Greater Risk of Extreme Cold Events[7]

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980
Santa Fe County	40,547

Extreme cold events have been known to cause injury and fatality to humans. Overall, the total loss estimate of property and crops in the planning area is estimated at $65,800 with an average annualized loss of $2,400. Based on historic loss and damages, the impact of extreme cold damages on the Santa Fe County planning area can be considered "Limited" severity of impact, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Table 9-6. Average Annualized Losses, 1996-2023

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
Santa Fe County	$65,800	$2,400

ASSESSMENT OF IMPACTS

The greatest risk from an extreme cold event is to public health and safety. The impact of climate change could produce more frequent and intense extreme cold events, exacerbating the current winter storm impacts. Extreme cold conditions are associated with a variety of impacts, including:

- Vulnerable populations, particularly the elderly (26 percent of total population) and children under 5 (4 percent of total population), can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite.
- Loss of electric power or other heat source can result in increased potential for fire injuries or hazardous gas inhalation because residents burn candles for light or use fires or generators to stay warm.
- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders, are subject to injury resulting from exposure to extreme cold temperatures.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents and potential contact with downed power lines.
- Operations or service delivery may experience impacts from electricity blackouts due to ice and extreme cold related damages.
- Power outages are possible throughout the planning area due to downed trees and power lines and/or rolling blackouts. Outages are also possible due to an increase in electricity usage and demand when using electric heating systems.
- Critical facilities without emergency backup power may not be operational during power outages.
- Severe cold could significantly damage vegetation and crops.

[7] U.S. Census Bureau, American Community Survey, 2022

- Exposed water pipes may freeze and break when exposed to extreme cold temperatures, both residential and commercial structures are vulnerable, causing significant damages.

The economic and financial impacts of extreme cold events on the community will depend on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of an extreme cold event.

CLIMATE CHANGE CONSIDERATIONS

Climate change may slightly decrease the risk of extreme cold events in the planning area. According to the New Mexico Bureau of Geology and Mineral Resources, both extreme cold and snowfall are expected to become less frequent in the coming decades. By the middle of this century, winters are projected to be milder, with fewer cold extremes, with fewer frost days per year. This will likely result in a shorter and less pronounced cold season. Fewer cold spells are projected to occur per year, but the length of cold spells will be longer when they do occur.[8]

While this assessment states that New Mexico will experience fewer cold extremes, data on future impacts is limited and these projections are subject to change as the research evolves.

[8] Dunbar, N.W., Gutzler, D.S., Pearthree, K.S., Phillips, F.M., Bauer, P.W., Allen, C.D., DuBois, D., Harvey, M.D., King, J.P., McFadden, L.D., Thomson, B.M., and Tillery, A.C., 2022, Climate change in New Mexico over the next 50 years: Impacts on water resources: New Mexico Bureau of Geology and Mineral Resources, Bulletin 164, 218 p. https://doi.org/10.58799/B-164

SANTA FE COUNTY

SECTION 10
EXTREME HEAT

SECTION 10: EXTREME HEAT

HAZARD DESCRIPTION

Extreme heat is a prolonged period of excessively high temperatures and exceptionally humid conditions. Extreme heat during the summer months is a common occurrence throughout the State of New Mexico, and the Santa Fe County planning area is no exception. The County typically experiences extended heat waves or an extended period of extreme heat and is often accompanied by high humidity.

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

Critical infrastructure can also be damaged or impacted by extreme heat. High temperatures may cause a rise in electricity consumption as homes, schools, and businesses try to regulate the temperature. This may lead to energy shortages and possible blackouts.

LOCATION

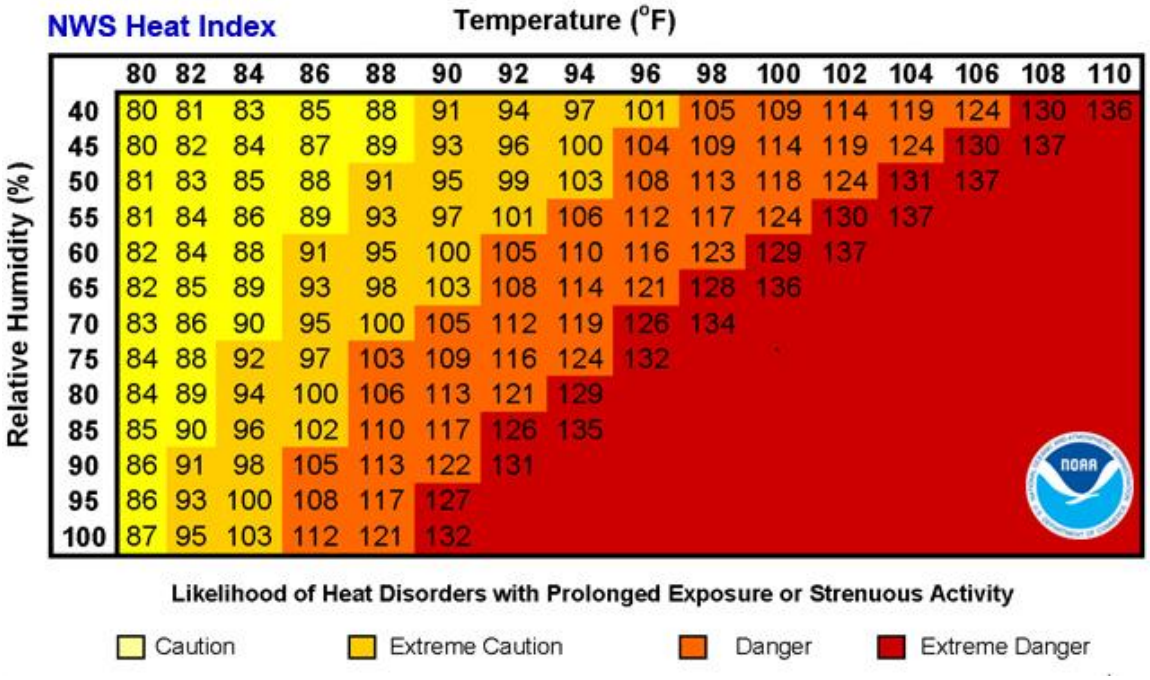
Extreme heat events can occur throughout the Santa Fe County planning area as there is no specific geographic scope to the extreme heat hazard. Extreme heat could occur anywhere within the Santa Fe County planning area.

EXTENT

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric

Administration (NOAA), this relationship is referred to as the "Heat Index" and is depicted in Figure 10-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

Figure 10-1. Extent Scale for Extreme Heat[1]



The index in Figure 10-1 displays varying categories of caution depending on the relative humidity combined with the temperature. For example, when the temperature is at 90 degrees Fahrenheit (°F) or lower, caution should be exercised if the humidity level is at or above 40 percent.

The shaded zones on the chart indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. "Caution" is the first category of intensity, and it indicates when fatigue due to heat exposure is possible. "Extreme Caution" indicates that sunstroke, muscle cramps, or heat exhaustion are possible, and a "Danger" level means that these symptoms are likely. "Extreme Danger" indicates that heat stroke is likely. The National Weather Service (NWS) initiates alerts based on the Heat Index as shown in Table 10-1.

Table 10-1. Heat Index and Warnings

CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING TYPE
Extreme Danger	125°F and higher	Heat stroke or sun stroke likely.	An Excessive Heat Warning is issued if the Heat Index rises above 105°F at least 3 hours during the day or above 80°F at night.
Danger	103 – 124°F	Sunstroke, muscle cramps, and/or heat exhaustion are likely. Heatstroke possible with	An Excessive Heat Warning is issued if the Heat Index rises above 105°F at least 3 hours during the day or above 80°F at night.

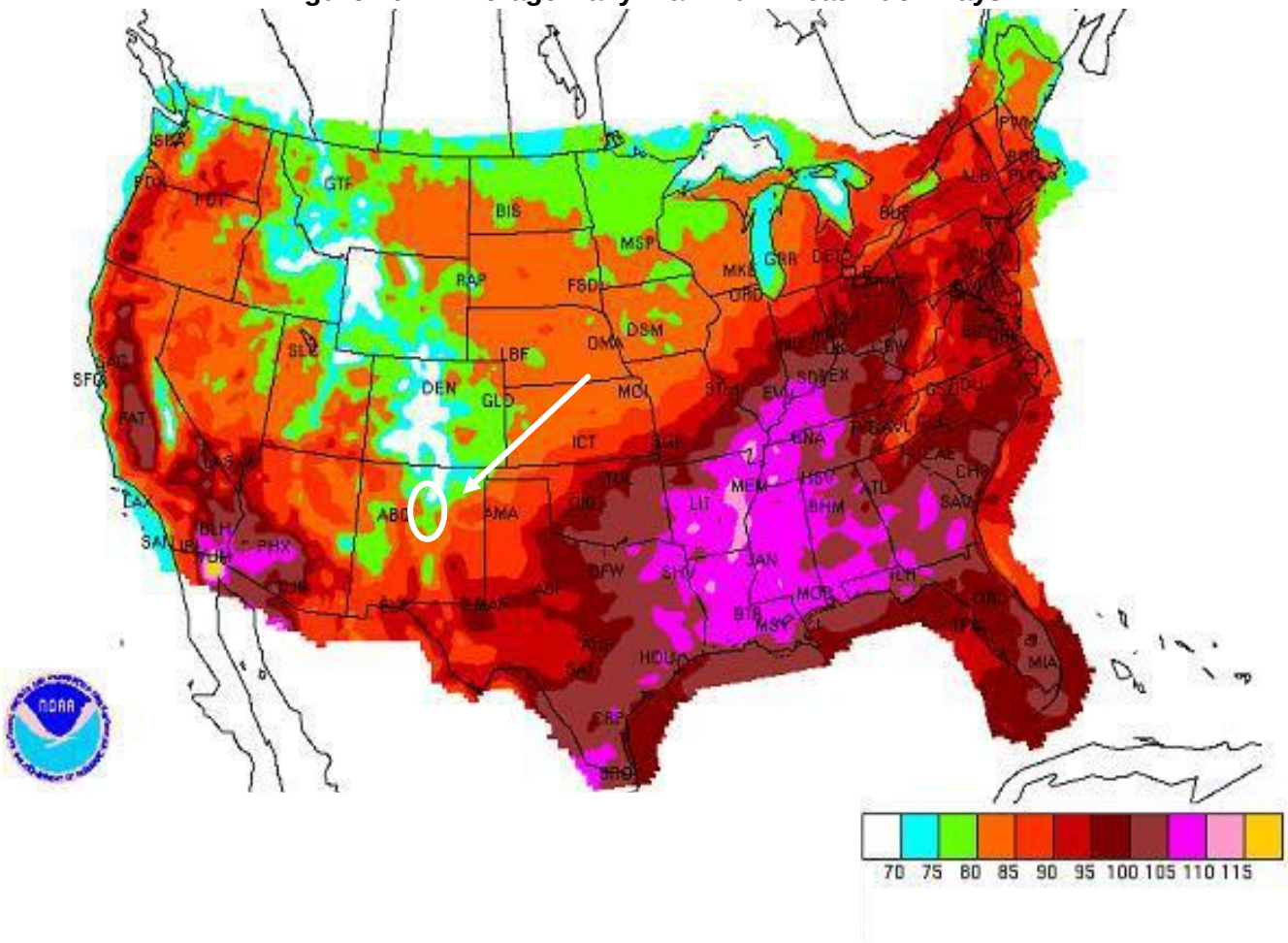
[1] Source: NOAA

CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING TYPE
		prolonged exposure and/or physical activity.	
Extreme Caution	90 – 103°F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.	A Heat Advisory will be issued to warn that the Heat Index may exceed 105°F.
Caution	80 – 90°F	Fatigue is possible with prolonged exposure and/or physical activity.	A Heat Advisory will be issued to warn that the Heat Index may exceed 105°F.

Santa Fe County lies within the Sangre de Cristo range of the Southern Rocky Mountains and is home to grassy plains, forest land, and several mountains like the Santa Fe Baldy. Due to its geography and its dry, arid, and sunny climate, the Santa Fe County planning area can expect an extreme heat event each summer. Citizens, especially children and the elderly should exercise caution by staying out of the heat for prolonged periods when a heat advisory or excessive heat warning is issued. In addition, those working or remaining outdoors for extended periods of time are at greater risk.

Figure 10-2 displays the daily maximum heat index as derived from NOAA based on data compiled from 1838 to 2015. The white circle shows the Santa Fe County planning area. The planning area is represented in dark red across the County. The dark red color indicates an average daily heat index of between 80°F to 90°F. Therefore, Santa Fe County could experience dangerous heat from 90°F or more and should mitigate to the extent of “Extreme Caution” which can include sunstroke, muscle cramps, heat exhaustion and potential heat stroke. This is the average maximum temperature the planning area can anticipate based on historical events.

Figure 10-2. Average Daily Maximum Heat Index Days[2]



HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCEI is the largest archive available for historic storm events data. Previous occurrences for extreme heat are derived from the NCEI database, which identifies extreme heat events at the county level for each event. According to heat related incidents located solely within Santa Fe County, there have been 16 extreme heat events on record for the planning area (Table 10-2). Historical extreme heat information, as provided by the NCEI, shows extreme heat activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event.

[2] NRDC and the white circle indicates the Santa Fe County planning area.

SECTION 10: EXTREME HEAT

Historical extreme heat data for the Santa Fe County planning area is provided on the NCEI database from 1996 through 2023. No deaths, injuries, or damages were reported. Only extreme heat events that have been reported have been factored into this Risk Assessment. It is highly likely additional extreme heat occurrences have gone unreported before and during the recording period. Due to the limited number of reported events, average high temperatures have been analyzed in order to determine the probability of future events.

Table 10-2. Historical Extreme Heat Events, 1996-2023[3]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	6/20/1998	0	0	$0	$0
Santa Fe County	6/20/1998	0	0	$0	$0
Santa Fe County	6/20/1998	0	0	$0	$0
Santa Fe County	6/20/1998	0	0	$0	$0
Santa Fe County	6/20/1998	0	0	$0	$0
Santa Fe County	5/24/2000	0	0	$0	$0
Santa Fe County	5/24/2000	0	0	$0	$0
Santa Fe County	5/24/2000	0	0	$0	$0
Santa Fe County	5/24/2000	0	0	$0	$0
Santa Fe County	5/24/2000	0	0	$0	$0
Santa Fe County	5/29/2000	0	0	$0	$0
Santa Fe County	5/29/2000	0	0	$0	$0
Santa Fe County	5/29/2000	0	0	$0	$0
Santa Fe County	5/29/2000	0	0	$0	$0
Santa Fe County	5/29/2000	0	0	$0	$0
Santa Fe County	6/20/2017	0	0	$0	$0
TOTALS		**0**	**0**	**$0**	**$0**

Based on the list of historical extreme heat events for the Santa Fe County planning area, no events have been reported to the NCEI since the 2018 Plan.

SIGNIFICANT EVENTS

June 20, 2017

A strong dome of high pressure centered over the southwestern United States along with exceptionally dry air. This set the stage for a brutal heatwave over New Mexico that lasted several

[3] NOAA, NCEI Storm Events Database

days. High temperatures ranged from 100°F to 110°F over nearly the entire state while relative humidity values fell to as low as one percent in some areas. Dozens of record high maximum and record high minimum temperatures were set across the region. A wildfire started in a county east of Santa Fe County that resulted in fatalities during this extreme heat event but there were no reported damages or injuries for the planning area.

PROBABILITY OF FUTURE EVENTS

According to historical records, the Santa Fe County planning area has experienced 16 events in a 28-year reporting period. Although there are no records of events between the year 2000 and 2017 for the planning area, it can be assumed that events have gone unreported due to the average daily temperatures throughout the summer. Historical records in combination with an analysis of maximum average temperatures provides a probability of at least one event every year. This frequency supports a "Highly Likely" probability of future events. See additional information on the impacts of climate change at the end of this section.

VULNERABILITY AND IMPACT

While the entirety of the Santa Fe County planning area is exposed to extreme temperatures, existing buildings, infrastructure, and critical facilities are not likely to sustain significant damage from extreme heat events. Therefore, any estimated property losses associated with the extreme heat hazard are anticipated to be minimal across the area.

Every summer, the hazard of heat-related illness becomes a significant public health issue throughout much of the United States. Mortality rates increase during heat waves, and excessive heat is an important contributing factor to deaths from other causes, particularly among the elderly. Extreme temperatures present a significant threat to life and safety for the population of the County as a whole. Heat casualties, for example, are typically caused by a lack of adequate air-conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirmed who frequently live on fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well-being. Children may also be more vulnerable if left unattended in vehicles. Populations living below the poverty level are often unable to run air-conditioning on a regular basis and are limited in their ability to seek medical treatment.

The population over 65 in the Santa Fe County planning area is estimated at 26 percent of the total population and children under the age of 5 are estimated at 4 percent, and the population with a disability is estimated at 14 percent of the total population. In addition, an estimated 12 percent of the planning area population live below the poverty level and 31 percent of the populations speaks a language other than English (Table 10-3).

Vulnerable and underserved populations are disproportionately impacted by extreme heat events as they may be more susceptible to health risks. The population below the poverty level are less likely to be able to afford air conditioning during the hot summer months as well as less likely to have access to medical care. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. This results in an estimated total of 134,550 potentially vulnerable residents in the planning area.

Table 10-3. Populations at Greatest Risk to Extreme Heat

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

Extremely high temperatures can have significant secondary impacts, leading to droughts, water shortages, increased fire danger, and prompt excessive demands for energy. The possibility of water shortages and power outages increases with unseasonably high temperatures in what is a normally mild month with low power demands. Typically, more than 12 hours of warning time would be given before the onset of an extreme heat event.

In terms of vulnerability to structures, the impact from extreme heat is considered negligible. It is possible that critical facilities and infrastructure could be shut down for 24 hours if cooling units are running constantly, leading to a temporary power outage (Table 10-4). Less than ten percent of residential and commercial property could be damaged if extreme heat events lead to structure fires. Based on historical records, annualized property and crop losses for the Santa Fe County planning area are negligible. The number of historical injuries and fatalities also indicates a "Limited" level of impact.

The Santa Fe County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by extreme heat events. The following critical facilities would be vulnerable to extreme heat events in the Santa Fe County planning area. For a comprehensive list see Appendix C.

Table 10-4. Critical Facilities Vulnerable to Extreme Heat Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Exposure to heat can cause heat illnesses in first responders, especially for those in heavy equipment. • Roads may become impassable due to excessive heat causing asphalt roads to soften and concrete roads to shift or buckle impacting response times by emergency services. • Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters,	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, breaks in water main lines or other associated damage to facilities.

CRITICAL FACILITIES	POTENTIAL IMPACTS
Governmental Facilities	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations.
Commercial Suppliers (food, gas, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Roads may become impassable due to excessive heat causing asphalt roads to soften and concrete roads to shift or buckle impacting response times by emergency services. • Breaks in water main lines or other associated damage to facilities.

ASSESSMENT OF IMPACTS

The greatest risk from extreme heat is to public health and safety. Extreme heat conditions can be frequently associated with a variety of impacts, including:

- Vulnerable populations, particularly the elderly (26 percent of total population), children under 5 (4 percent of total population), and those with a disability (14 percent of total population) can face serious or life-threatening health problems from exposure to extreme heat including hyperthermia, heat cramps, heat exhaustion, and heat stroke (or sunstroke).
- Response personnel, including utility workers, public works personnel, and any other professions where individuals are required to work outside, are more subject to extreme heat related illnesses since their exposure would typically be greater.
- High energy demand periods can outpace the supply of energy, potentially creating the need for rolling brownouts which would elevate the risk of illness to vulnerable residents.
- Highways and roads may be damaged by excessive heat causing asphalt roads to soften and concrete roads to shift or buckle.
- Vehicle engines and cooling systems typically run harder during extreme heat events resulting in increases in mechanical failures.
- Extreme heat events during times of drought can exacerbate the environmental impacts associated with drought, decreasing water and air quality and further degrading wildlife habitat.
- Extreme heat increases ground-level ozone (smog), increasing the risk of respiratory illnesses.
- Negatively impacted water suppliers may face increased costs resulting from the transport of water resources or development of supplemental water resources.

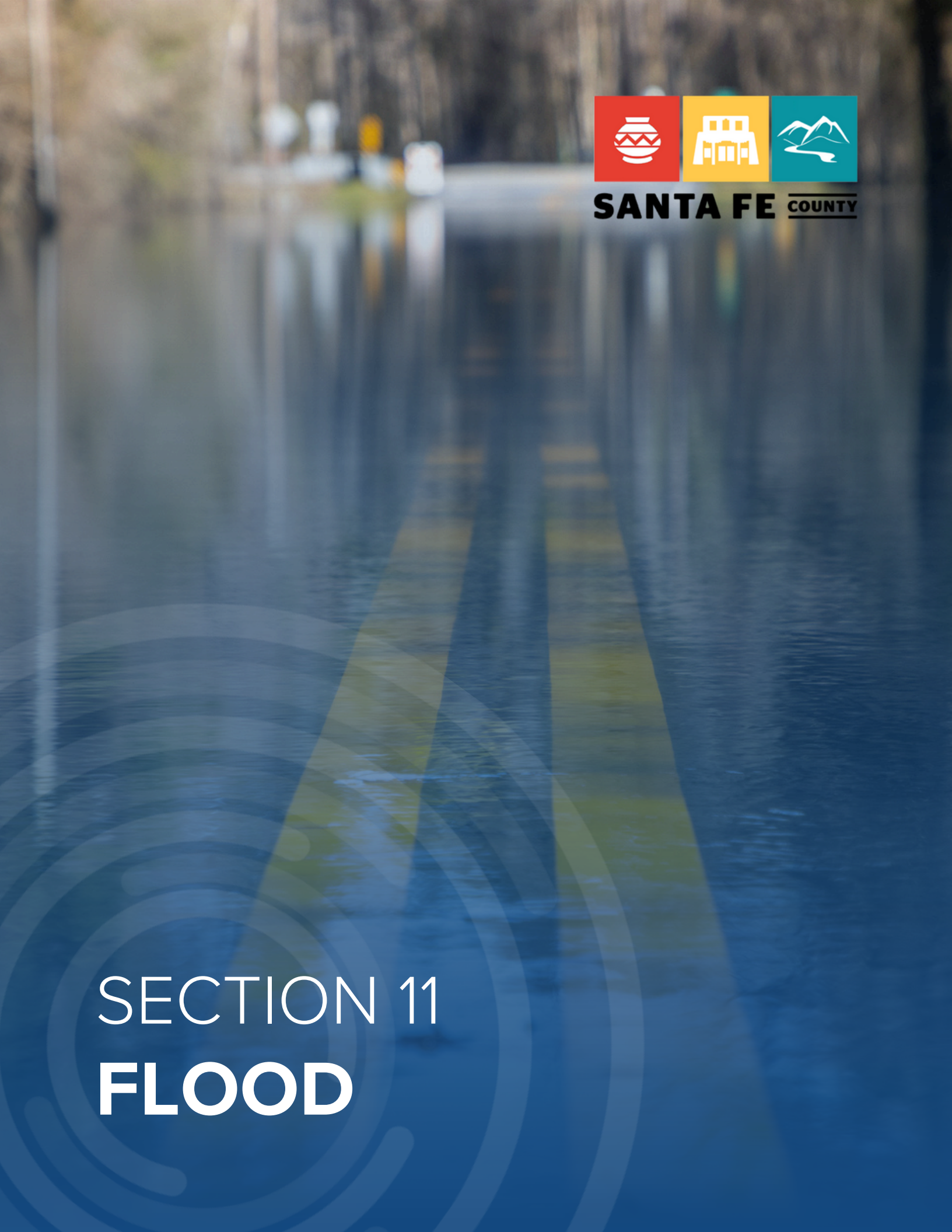
- Tourism and recreational activities at places may be negatively impacted during extreme heat events, reducing seasonal revenue.
- Outdoor activities may see an increase in school injury or illness during extreme heat events.

The economic and financial impacts of extreme heat on the community will depend on the duration of the event, demand for energy, drought associated with extreme heat, and many other factors. The level of preparedness and the amount of planning done by the community, local businesses, and citizens will impact the overall economic and financial conditions before, during, and after an extreme heat event.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to lead to an increase in average temperatures as well as an increase in frequency, duration, and intensity of extreme heat events. The Fifth National Climate Assessment states that increasing temperatures are leading to hotter extreme heat events that will increase animal and ecosystem stress, reduce crop quality and yield, and increase wildfire risk across the southwestern United States.

It is projected that future changes to Santa Fe County will include increased temperatures, which according to the U.S. Climate Explorer, the conservative projections show the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 90°F in Santa Fe County, but between 2035 and 2064 the average will be 96°F, increasing the severity and frequency of drought events. With the full range of projections average temperatures could increase up to 21°F, which would have detrimental consequences, but the severity is dependent on overall future emissions.



SANTA FE COUNTY

SECTION 11
FLOOD

SECTION 11: FLOOD

HAZARD DESCRIPTION

Floods generally result from excessive precipitation. The severity of a flood event is determined by a combination of several major factors, including stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surfaces. Typically, floods are long-term events that may last for several days.

Inland or riverine flooding is a result of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Inland or riverine flooding is overbank flooding of rivers and streams, typically resulting from large-scale weather systems that generate prolonged rainfall over a wide geographic area. Therefore, it is a naturally occurring and inevitable event. Some river floods occur seasonally when winter or spring rainfalls fill river basins with too much water, too quickly.

Flash flooding is the result of excessive rainfall in a short period of time, usually within three to six hours of rainfall. Flash flooding is most commonly caused by heavy rainfall from thunderstorms but can also occur due to dam breaks or debris flow. Urban areas are more prone to flash flooding as impervious surfaces in these areas do not allow water to infiltrate the ground and soil. The varied terrain of New Mexico can carry water into areas that did not receive rain, also causing flash flooding. Storms that produce large amounts of runoff typically occur during monsoon season which begins in June and ends in October. In addition, Santa Fe County has several arroyos, which is a water-carved gully or a normally dry creek bed. These arroyos can fill with fast moving water very quickly during flash flood events and become very dangerous.

SECTION 11: FLOOD

The Santa Fe County planning area is subject to extreme rainfall events, often in short durations, leading to dangerous flash flooding events. Historically, portions of Santa Fe County have always been at risk of flooding because of monsoon rainfall, topography, and the location of development adjacent to flood-prone areas. Flooding events generally occur countywide and have caused significant damage in the populated areas of the County. Flooding has occurred both within mapped floodplains and in other localized areas. Floods are a natural and recurrent event and can take place any time of the year.

Additionally, wildfire events can have long-term cascading impacts and can create an increased risk of flooding for many years after an event occurs. A burn scar is the barren or destroyed part of land after a wildfire, where extreme soil damage occurs, creating hydrophobic, or water repellent, soil. Rainfall that would normally be absorbed by the landscape will instead quickly run off, and because of this, much less rainfall is required to produce a flash flood. Santa Fe County faces an increased risk of flooding due to damaged and burned landscapes.

LOCATION

The Flood Insurance Rate Maps (FIRMs) prepared by FEMA provide an overview of flood risk but can also be used to identify the areas of the County that are vulnerable to flooding. FIRMs are used to regulate new development and to control the substantial improvement and repair of substantially damaged buildings. Flood Insurance Studies (FIS) are often developed in conjunction with FIRMs. The FIS typically contains a narrative of the flood history of a community and discusses the engineering methods used to develop the FIRMs. The FIS also contains flood profiles for studying flooding sources and can be used to determine Base Flood Elevations (BFEs) for some areas.

The FIS for Santa Fe County is dated December 4, 2012. This FIS investigates the existence and severity of flood hazards in the geographic area of the Santa Fe County planning area including incorporated and unincorporated areas. This study indicates that the principal flood problems are due to intense rainfall during monsoon season in between the months of June and October. Over 70 percent of the average precipitation is received during this time.

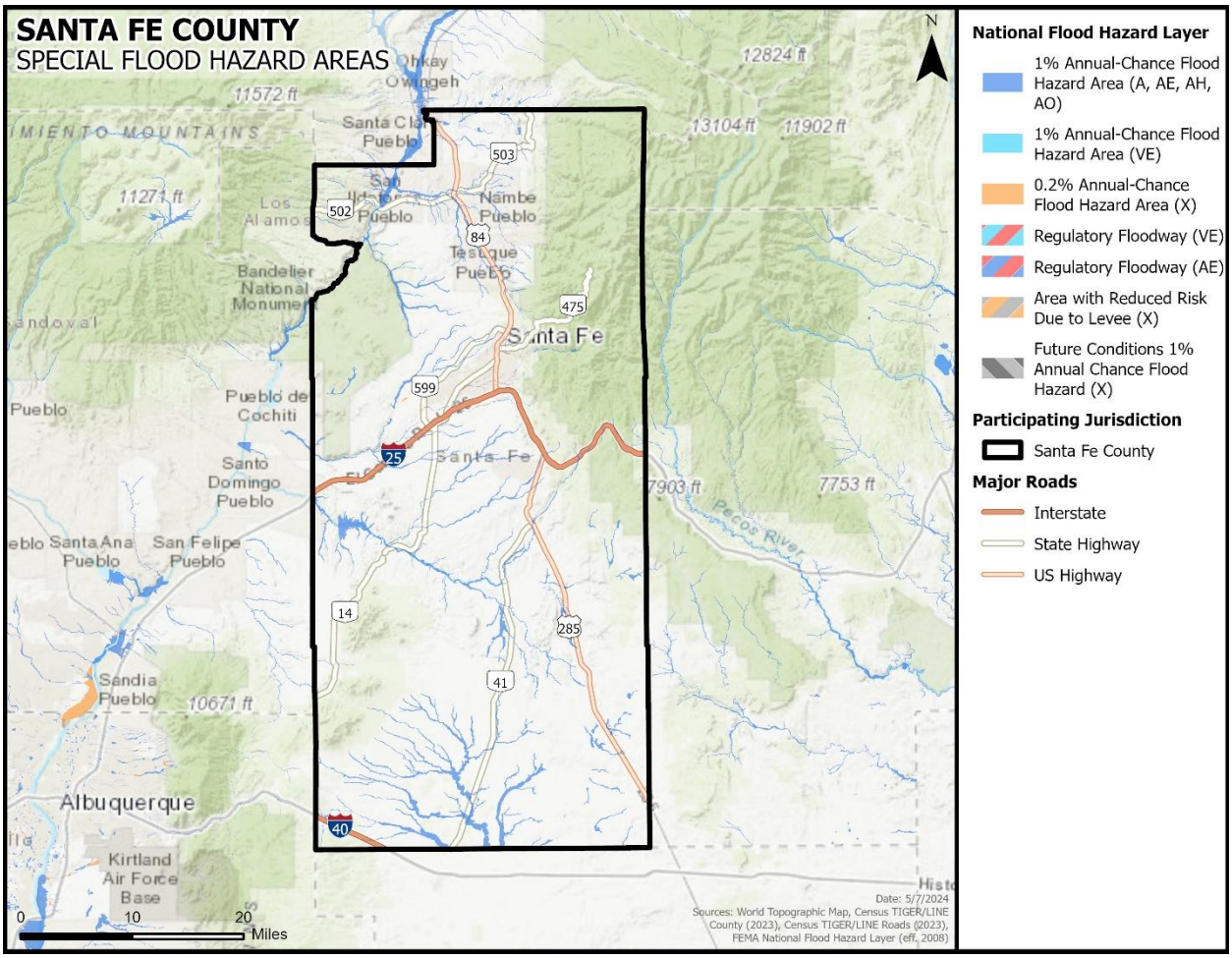
The Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for Santa Fe County shows the following flood hazard areas:

- Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance requirements and floodplain management standards apply.
- Zone AE: Areas subject to inundation by 1-percent-annual-chance shallow flooding. It is the base floodplain where BFEs are provided. AE zones are now used on new format FIRMs instead of A1-30 zones.
- Zone AO: Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone.
- Zone X: Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square

mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones.

The county has adopted the latest effective FIRMs dated December 4, 2012. Locations of flood zones in Santa Fe County based on the Digital Flood Insurance Rate Map (DFIRM) from FEMA are illustrated in Figure 11-1.

Figure 11-1. Estimated Flood Zones in Santa Fe County



It is also important to note that areas that are downhill or downstream from burn scars are highly susceptible to localized flash flooding, especially near deep terrain. Some areas in the Santa Fe County planning area at higher risk of flash flooding from heavy rains are along the Las Conchas and Medio Wildfire burn scar areas.

EXTENT

The severity of a flood event is determined by a combination of several major factors, including stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surfaces. Typically, floods are long-term events that may last for several days.

SECTION 11: FLOOD

Determining the intensity and magnitude of a flood event is dependent upon the flood zone and location of the flood hazard area in addition to the depths of flood waters. The extent of flood damages can be expected to be more damaging in the areas that will convey a base flood. FEMA categorizes areas on the terrain according to how the area will convey flood water. Flood zones are the categories that are mapped on FIRMs. Table 11-1 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm. Flood Zones A, AE, AO and X are the hazard areas mapped in the region. Figure 11-1 should be read in conjunction with the extent for flooding in Tables 11-1 and 11-2 to determine the intensity of a potential flood event.

Table 11-1. Flood Zones

INTENSITY	ZONE	DESCRIPTION
HIGH	ZONE A	Areas with a 1-percent-annual-chance of flooding and a 26 percent chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
	ZONE A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a Base Flood Elevation (BFE) (old format).
	ZONE AE	The base floodplain where BFEs are provided. AE Zones are now used on the new format FIRMs instead of A1-A30 Zones.
	ZONE AO	River or stream flood hazard areas and areas with a 1-percent-annual-chance or greater of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26 percent chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
	ZONE AH	Areas with a 1-percent-annual-chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26 percent chance of flooding over the life of a 30-year mortgage. BFEs derived from detailed analyses are shown at selected intervals within these zones.
	ZONE A99	Areas with a 1-percent-annual-chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or BFEs are shown within these zones.
	ZONE AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
MODERATE to LOW	ZONE X 500	An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with

INTENSITY	ZONE	DESCRIPTION
		drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.

Zone A is interchangeably referred to as the 100-year flood, the 1-percent-annual-chance flood, the Special Flood Hazard Area (SFHA), or more commonly, the base flood. This is the area that will convey the base flood and constitutes a threat to the planning area. The impact from a flood event can be more damaging in areas that will convey a base flood.

Structures built in the SFHA are subject to damage by rising waters and floating debris. Moving flood water exerts pressure on everything in its path and causes erosion of soil and solid objects. If not elevated above Base Flood Elevation, utility systems, such as heating, ventilation, air conditioning, fuel, electrical systems, sewage maintenance systems and water systems, may also be damaged.

The intensity and magnitude of a flood event is also determined by the depth of flood water. Table 11-2 describes the stream gauge data provided by the United States Geological Survey (USGS). Peak flood data at the locations available in the planning area indicate a peak flood depth range of 0.6 to 7 feet above average peak flows.

Table 11-2. Extent for Santa Fe County[1]

SITE NAME[2]	PEAK FLOOD EVENT
Rio Grande Abv Buckman Diversion, Nr White Rock	The Rio Grande ABV Buckman Diversion, near White Rock, New Mexico reached an overflow elevation of 11 feet in 2019. The average peak flow for the Rio Grande is 7 feet at this site. This indicates a maximum flood depth of 4 feet above the average peak flow at this site.
Rio Grande At Otowi Bridge	The Rio Grande at Otowi Bridge, New Mexico reached an overflow elevation of 14.5 feet in 1904. The average peak flow for the Rio Grande is 7.5 feet at this site. This indicates a maximum flood depth of 7 feet above the average peak flow at this site.
Rio Nambe Below Nambe Falls Dam Near Nambe	The Nambe Falls Reservoir near Nambe, New Mexico reached an overflow elevation of 2 feet in 1979. The average peak flow of Nambe Falls Reservoir is 1.4 feet at this site. This indicates a maximum flood depth of 0.6 feet above the average peak flow at this site.
Tesuque Creek Above Diversions Near Santa Fe	Tesuque Creek above Diversions near Santa Fe, New Mexico reached an overflow elevation of 11 feet in 2018. The average peak flow for Tesuque Creek is 4 feet at this site. This indicates a maximum flood

[1] Severity estimated by averaging floods at certain stage level over the history of flood events. Severity and peak events are based on USGS data.
[2] Severity is provided where peak data was provided throughout for the County

SITE NAME[2]	PEAK FLOOD EVENT
	depth of 7 feet above the average peak flow at this site.
Rio Nambe Above Nambe Falls Dam Near Nambe	Rio Nambe Above Nambe Falls Dame near Nambe, New Mexico reached an overflow elevation of 9 feet in 2011. The average peak flow for Rio Nambe is 3 feet at this site. This indicates a maximum flood depth of 6 feet above the average peak flow at this site.
Santa Fe River Near Santa Fe	The Santa Fe River near Santa Fe, New Mexico reached an overflow elevation of 5 feet in 1921. The average peak flow for the Santa Fe River is 2 feet at this site. This indicates a maximum flood depth of 3 feet above the average peak flow at this site.
Santa Fe River Above McClure Res, Nr Santa Fe	The Santa Fe River above McClure Res near Santa Fe New Mexico reached on overflow elevation of 2 feet in 2018. The average peak flow for the Santa Fe River is 1.3 feet at this site. This indicates a maximum flood depth of 0.7 feet above the average peak flow at this site.

The range of flood intensity that the planning area can experience is high, or Zone A. Based on historical occurrences, the planning area could expect to experience approximately 3 to 6 inches of rain within a 1-hour period, resulting in flash flooding.

The data described in Tables 11-1 and 11-2, together with Figure 11-1, and historical occurrences for the area, provides an estimated potential magnitude and severity for the Santa Fe County planning area.

HISTORICAL OCCURRENCES

Historical evidence indicates that areas within the planning area are susceptible to flooding, especially in the form of flash flooding. It is important to note that only flood events that have been reported have been factored into this risk assessment, therefore it is likely that additional flood occurrences have gone unreported before and during the recording period. Table 11-3 identifies historical flood events that resulted in damages, injuries, or fatalities within the Santa Fe County planning area. Historical Data is provided by the Storm Prediction Center (NOAA), National Centers for Environmental Information (NCEI) database. There have been 91 total recorded flood events in the Santa Fe County planning area.

Table 11-3. Historical Flood Events, 1996-2023[3]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	7/9/1996	0	0	$117,300	$19,600

[3] Values are in 2023 dollars.

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	8/25/1996	0	0	$175,600	$0
Santa Fe County	6/7/1997	0	0	$382,800	$0
Santa Fe County	8/6/1997	0	0	$477,000	$0
Santa Fe County	7/23/1998	0	1	$0	$0
Santa Fe County	8/15/2004	0	0	$81,000	$0
Santa Fe County	7/19/2007	0	0	$103,100	$0
Santa Fe County	7/21/2007	0	0	$7,400	$0
Santa Fe County	6/29/2008	0	0	$7,100	$0
Santa Fe County	6/30/2008	0	0	$7,100	$0
Santa Fe County	7/14/2008	1	0	$34,900	$0
Santa Fe County	7/15/2008	0	0	$14,000	$0
Santa Fe County	8/4/2008	0	0	$1,500	$0
Santa Fe County	8/9/2008	0	0	$2,900	$0
Santa Fe County	7/4/2009	0	0	$2,900	$0
Santa Fe County	7/1/2010	0	0	$1,500	$0
Santa Fe County	7/3/2010	0	0	$7,100	$0
Santa Fe County	7/31/2010	0	0	$800	$0
Santa Fe County	7/31/2010	0	0	$7,100	$0
Santa Fe County	8/15/2010	0	0	$7,100	$0
Santa Fe County	8/21/2011	0	0	$67,800	$0
Santa Fe County	9/1/2011	0	0	$3,400	$200
Santa Fe County	7/26/2012	0	0	$13,400	$0
Santa Fe County	8/12/2012	0	0	$26,700	$0
Santa Fe County	8/16/2012	0	0	$6,700	$0
Santa Fe County	8/26/2012	0	0	$2,700	$0
Santa Fe County	7/8/2013	1	0	$0	$0
Santa Fe County	7/19/2013	0	0	$1,400	$0

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	9/1/2013	0	0	$6,600	$0
Santa Fe County	9/13/2013	0	0	$6,600	$0
Santa Fe County	9/13/2013	0	0	$65,600	$0
Santa Fe County	9/15/2013	0	0	$655,100	$0
Santa Fe County	7/15/2014	0	0	$19,400	$0
Santa Fe County	7/15/2014	0	0	$643,800	$0
Santa Fe County	7/27/2014	0	0	$6,500	$0
Santa Fe County	8/2/2014	0	0	$64,500	$0
Santa Fe County	9/22/2014	1	0	$0	$0
Santa Fe County	9/22/2014	0	0	$25,800	$0
Santa Fe County	7/8/2015	0	0	$1,300	$0
Santa Fe County	7/31/2015	0	0	$6,500	$0
Santa Fe County	8/1/2015	0	0	$6,500	$0
Santa Fe County	6/4/2016	0	0	$127,300	$0
Santa Fe County	6/4/2016	0	0	$12,800	$0
Santa Fe County	8/2/2016	0	2	$0	$0
Santa Fe County	8/2/2016	0	0	$127,400	$0
Santa Fe County	10/4/2017	0	0	$6,300	$0
Santa Fe County	7/23/2018	0	0	$1,217,300	$0
Santa Fe County	8/2/2018	0	0	$12,200	$0
Santa Fe County	8/6/2019	0	0	$119,600	$0
Santa Fe County	7/26/2020	0	0	$118,400	$0
Santa Fe County	7/14/2021	0	0	$11,300	$0
Santa Fe County	7/20/2021	0	0	$9,000	$0
Santa Fe County	7/31/2021	0	0	$11,300	$0
Santa Fe County	6/25/2022	1	0	$0	$0
Santa Fe County	7/1/2022	0	0	$77,700	$0

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	7/26/2022	0	0	$51,800	$0
Santa Fe County	7/26/2022	0	0	$155,400	$0
Santa Fe County	7/30/2022	0	0	$20,800	$0
Santa Fe County	8/4/2022	0	0	$581,100[4]	$0
Total Losses		**4**	**3**	**$5,748,000**	

Based on the list of historical flood events for the Santa Fe County planning area, 20 events have occurred since the 2018 Plan.

SIGNIFICANT EVENTS

Flash Flood on July 14, 2008

A storm system brought excessive rainfall to the Santa Fe County planning area resulting in flash flooding on the northeast side of Santa Fe. Locations affected include Morales Bridge, Circle Drive, Lorenzo Road, and Cerro Gordo Road. Major street flooding ensued in some locations, especially along Lorenzo Road which saw mud deposited two feet deep. One fatality occurred in this flash flood. This event caused $34,900 in damage (2023 dollars).

Flash Flood on July 8, 2013

Slow-moving storms with significant moisture causing flash flooding in areas of central New Mexico. Storms initially developed across the northern high terrain and drifted slowly east onto the adjacent plains and highlands. One fatality was discovered in an arroyo on the south side of Santa Fe during the late evening hours. Additionally, one to two feet of water was reported along roads in the same area. The arroyos were reported to be filled with about 8 feet of fast-moving water at the peak of the flooding.

Flash Flood on September 15, 2013 – Santa Fe County (DR-4152-NM)

A stationary upper-level low pressure system that settled into the Great Basin around September 10th provided a steady stream of near record subtropical atmospheric moisture over New Mexico. At least 4 back-to-back upper-level disturbances pushed north and east across the region and interacted with the monsoon moisture plume through the 14th to produce widespread historic rainfall amounts. Significant flooding impacted the state as rainfall amounts over this 5-day period averaged 3 to 6 inches and in some areas just over 10 inches. Several river gauges reported records to near record crests and in a couple of cases gauges were completely destroyed. Emergency management reported disastrous impacts to residential, commercial, and transportation infrastructure. A total of 14 counties, 4 cities and town, 5 pueblos, and the Navajo Nation were included in a statewide and Presidential disaster declaration. The New Mexico State EOC was staffed at Level 2 operations for several days. Santa Fe County had $655,100 (2023 dollars) in damages. Ten businesses in Madrid were flooded with the most significant damage done to the Mine Shaft Tavern and nearby museums. There was mud and coal damage to most

[4] Damage estimates provided by the NCEI Database and the Planning Team

structures. Gold Mine Road, Rogersville Road, and Puebla Road 76 were cleared of flooding debris.

Flash Flooding on September 22, 2014

An upper-level system moved very slowly northeast over New Mexico after multiple days of heavy rainfall and flash flooding. The most serious flash flooding occurred around Santa Fe as a slow-moving thunderstorm dropped more than 2 inches of rainfall. One fatality was reported when an individual in the Santa Fe River was washed away and drowned by flood waters. Damage to three classrooms, the gym, and an office was reported from flash flooding at the E.J. Martinez Elementary School.

Flash Flooding on August 6, 2019

A deep plume of monsoon moisture centered over New Mexico and interacted with a surface boundary moving westward across the eastern plains. Thunderstorms erupted and the area between Santa Fe, Cochiti, and Rio Rancho were impacted the most with localized rainfall amounts of two inches of water in one hour. Torrential rainfall impacted Los Cerrillos where many roads were washed out with rocks, mud, and debris. Rio Rancho also experienced flash flooding with many roads on the far west side of town inundated by water and mud. Galisteo Creek at Galisteo Dam rose 5.5 feet in one hour. Many dirt roads were flooded and washed out with rocks, mud, and debris. This event caused $119,600 in damage (2023 dollars).

Flash Flooding on June 25, 2022

Heavy rain in the City of Santa Fe area caused minor flash flooding. The arroyos quickly filled up with water, and this resulted in one fatality in the Cerrillos and Rodeo area.

Flash Flooding on August 4, 2022

An active monsoon pattern caused numerous thunderstorms which impacted much of northern and central New Mexico with heavy rains. Santa Fe County experienced significant flooding along the Medio burn scar, which only intensified the flooding. A large utility truck was found destroyed from the flood, and large boulders and trees were moved and found in a streambed. A propane tank was carried by floodwaters and found a few feet from a downstream home, in addition, long steel beams dislodged from upstream properties were discovered twisted in the backyard of a nearby home. This event resulted in significant debris cleanup that cost tens of thousands of dollars for 22 impacted properties. This event caused an estimated $581,100 (2023 dollars) in property damages.

Figure 11-2. Flash Flooding on August 4, 2022

SECTION 11: FLOOD

Figure 11-3. Flash Flooding on August 4, 2022

PROBABILITY OF FUTURE EVENTS

Based on 91 recorded historical occurrences within a 28-year reporting period within the Santa Fe County planning area, flooding is considered “Highly Likely,” meaning an event is probable within the next year.

VULNERABILITY AND IMPACT

Santa Fe County is at an increased level of flood risk due to the cascading impacts of wildfire events. The loss of vegetation, such as trees, shrubs, and soil, increases the speed and volume of stormwater runoff. Santa Fe County may experience more extreme flooding with greater impacts to the safety of people, structures, and the environment. A recent example of flood damage in a burn scar area includes the flash flooding in August of 2022 in the Medino burn scar area which caused significant property damages.

A property’s vulnerability to a flood depends on its location and proximity to the floodplain. Structures that lie along banks of a waterway are the most vulnerable and are often repetitive loss structures. Santa Fe County encourages development outside of the floodplain. The impact for flood for the Santa Fe County planning area is considered limited in terms of structure and infrastructure damages with facilities and services potentially shut down for 24 hours or less, and less than ten percent of properties destroyed or with major damage. However, with three injuries and four fatalities reported from historical flood events, the flood impact for the Santa Fe County planning area would be considered “Substantial”, with multiple deaths and injuries possible depending on the size of the event.

Table 11-4 includes the critical facilities identified by the planning team that were considered the most important to the planning area and are susceptible to a range of impacts from flooding. Table

11-4 includes only those facilities located in the regulatory floodplain. For a comprehensive list see Appendix C.

Table 11-4. Critical Facilities in the Floodplain

CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Emergency Response Departments (EOC, Fire, Police, EMS), Hospitals	N/A	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by rising flood waters. • Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way. • Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Washed out roads and bridges can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, contaminated and unusual debris, hazardous materials, and generally unsafe conditions. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	1 School	• Structures can be damaged by rising flood waters. • Power outages could disrupt critical care. • Backup power sources could be damaged, inundated or otherwise inoperable. • Critical staff may be impacted and unable to report for duty, limiting response capabilities. • Evacuations may be necessary due to extended power outages, gas line ruptures, or inundation of facilities. • Additional emergency responders and critical aid workers may not be able to reach the area for days. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations.

CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
		• Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Suppliers (food, gas, etc.)	N/A	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	2 Dams	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency service vehicles can be damaged by rising flood waters. • Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing emergency service workers in harm's way. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • Service responders are exposed to downed power lines, contaminated and unusual debris, hazardous materials, and generally unsafe conditions. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Historic loss estimates due to flood are presented in Table 11-5 below. Considering 91 flood events over a 28-year period, frequency is approximately three events every year.

Table 11-5. Average Annualized Losses, 1996-2023

JURISDICTION	NUMBER OF EVENTS	PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Santa Fe County	91	$5,748,000	$205,300

While all citizens are at risk of the impacts of a flood, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. In addition, due to factors like limited mobility, communication difficulties, medical needs, reliance on support services, transportation challenges, housing accessibility issues, and possible shortages in emergency shelter accommodations, the elderly, children, and people with disabilities are also disproportionately affected by flooding events. People who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Santa Fe County planning area is estimated at 26 percent of the total population and children under the age of 5 are estimated at 4 percent. The population with a disability is estimated at 14 percent of the total population. An estimated 12 percent of the planning area population live below the poverty level and 31 percent of the populations speaks a language other than English.

Table 11-6. Populations at Greatest Risk to Flood Events[5]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Santa Fe County	40,005	5,990	21,458	19,043	48,054

ASSESSMENT OF IMPACTS

Flooding is the deadliest natural disaster that occurs in the U.S. each year, and it poses a constant and significant threat to the health and safety of the people in the Santa Fe County planning area. Impacts to the planning area can include:

- Flood-related rescues may be necessary at swift water and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way.
- Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents.
- Health risks and threats to residents are elevated after the flood waters have receded due to contaminated flood waters (untreated sewage and hazardous chemicals) and mold growth typical in flooded buildings and homes.
- Significant flood events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Floods can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders are exposed to downed power lines, contaminated and potentially unstable debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities.
- Significant flooding can result in the inability of emergency response vehicles to access areas of the community.

[5] U.S. Census Bureau Five-Year estimates

- Critical staff may suffer personal losses or otherwise be impacted by a flood event and be unable to report for duty, limiting response capabilities.
- County departments may be flooded, delaying response and recovery efforts for the entire community.
- Private sector entities that the planning area and its residents rely on, such as utility providers, financial institutions, and medical care providers, may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the flood may be negatively impacted while utilities are being restored or water recedes, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures substantially damaged by a flood may not be rebuilt for years and uninsured or underinsured residential structures may never be rebuilt, reducing the tax base for the community.
- Large floods may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable, and tourism can be unappealing for years following a large flood event, devastating directly related local businesses and negatively impacting economic recovery.
- Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.
- The psychosocial effects on flood victims and their families can traumatize them for long periods of time, creating long term increases in medical treatment and services.
- Extensive or repetitive flooding can lead to decreases in property value for the affected community.
- Flood poses a potential catastrophic risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- Flood related declines in production may lead to an increase in unemployment.
- Large floods may result in loss of livestock, potential increased livestock mortality due to stress and water borne disease, and increased cost for feed.

The overall extent of damage caused by floods is dependent on the extent, depth, and duration of flooding, in addition to the velocities of flows in the flooded areas. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a flood event.

CLIMATE CHANGE CONSIDERATIONS

According to FEMA, flooding is the most common and costly disaster in the Unites States and this risk is constantly increasing due to increased wildfire risk and changes in precipitation patterns.

Even though the southwestern Unites States region is becoming more arid and annual rainfall is more likely to decrease than increase, precipitation events may actually increase in severity, when they do occur. This means that rain may fall faster in shorter periods of time, contributing to flash flood risk. Due to climate change, snowmelt-driven flooding is expected to occur earlier in the year.[6] When rain falls on snow, it can result in more intense runoff and greater flood conditions during the spring months.

Wildfire risk is also expected to increase with climate change which can directly increase the risk of flooding in areas that have been burned. Wildfires destroy vegetation and burn the ground, meaning the soil is no longer able to absorb rainwater. It can take years for vegetation to be restored, increasing long term flood risk.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP) PARTICIPATION

Flood insurance offered through the National Flood Insurance Program (NFIP) is the best way for home and business owners to protect themselves financially against the flood hazard. Santa Fe County is participating in the NFIP and is in good standing.

As an additional indicator of floodplain management responsibility, communities may choose to participate in FEMA's Community Rating System (CRS). This is an incentive-based program that allows communities to undertake flood mitigation activities that go beyond NFIP requirements. Currently Santa Fe County does not participate in the CRS.

Santa Fe County currently has standard flood damage prevention ordinances in place which include minimum NFIP standards for new construction and substantial Improvements of structures. Santa Fe County is considering adopting higher regulatory NFIP standards to limit or further regulate floodplain development.

The flood hazard areas throughout Santa Fe County are subject to periodic inundation, which may adversely affect public safety, resulting in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief. Flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, flood-proofed, or otherwise protected from flood damage. Mitigation actions are included to address flood maintenance issues as well, including routinely clearing debris from roadside ditches and bridges, and expanding drainage culverts and storm water structures to convey flood water more adequately.

It is the purpose of Santa Fe County to continue to promote public health, safety, and general welfare by minimizing public and private losses due to flood conditions in specific areas. Santa

[6] Fifth National Climate Assessment. Southwest. https://nca2023.globalchange.gov/chapter/28/.

Fe County is guided by their local Flood Damage Prevention Ordinance. The planning area will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping requirements for new and substantially developed construction. Further, the NFIP program promotes sound development in floodplain areas and includes provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in floodplains;
- Help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas; and
- Ensure that potential buyers are notified that property is in a flood area.

In order to accomplish these tasks, Santa Fe County seeks to observe the following guidelines in order to achieve flood mitigation:

- Restrict or prohibit uses that are dangerous to health, safety, or property in times of flood, such as filling or dumping, that may cause excessive increases in flood heights or velocities;
- Require that uses vulnerable to floods, including facilities, which serve such uses, be protected against flood damage at the time of initial construction, as a method of reducing flood losses;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;
- Control filling, grading, dredging, and other development, which may increase flood damage; and
- Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

NFIP COMPLIANCE AND MAINTENANCE

Santa Fe County has developed mitigation actions that relate to either NFIP maintenance or compliance. Compliance and maintenance actions can be found in Section 26.

Flooding was identified as a high-risk hazard during hazard ranking activities at the Risk Assessment Workshop by the vast majority of the planning team. As such, many of the mitigation actions were developed with flood mitigation in mind. A majority of these flood actions address compliance with the NFIP and implementing flood awareness programs. The planning area recognizes the need and are working towards adopting higher NFIP regulatory standards to further minimize flood risk in their community. In addition, the county is focusing on public flood awareness activities. This includes promoting the availability of flood insurance by placing NFIP brochures and flyers in public libraries or public meeting places.

Santa Fe County has a designated floodplain administrator. The floodplain administrator will continue to maintain compliance with the NFIP, including continued floodplain administration,

zoning ordinances, and development regulation. The floodplain ordinance adopted by Santa Fe County outlines the minimum requirements for development in Special Flood Hazard Areas.

Santa Fe County has a permitting process in place and the local floodplain administrator is responsible for coordinating inspections of damaged homes located in the floodplain. Following a flood event, local officials inspect damaged homes to make a substantial damage determination. Substantially damaged homes must be brought into compliance. Similarly, proposed improvements to homes located in the floodplain are reviewed by local building officials to determine if a substantial improvement is proposed. The floodplain administrator oversees permitted repairs and improvements to ensure compliance during the rebuilding or improvement process.

REPETITIVE LOSS

The Flood Mitigation Assistance (FMA) Grant Program under FEMA provides federal funding to assist states and communities in implementing mitigation measures to reduce or eliminate the long-term risk of flood damage to buildings that are insured under the National Flood Insurance Program. The New Mexico Department of Homeland Security and Emergency Management administers the FMA grant program for the State of New Mexico. One of the goals of the FMA program is to reduce the burden of repetitive loss and severe repetitive loss properties on the NFIP through mitigation activities that significantly reduce or eliminate the threat of future flood damages.

Repetitive Loss properties are defined as structures that are:

- Any insurable building for which 2 or more claims of more than $1,000 each, paid by the National Flood Insurance Program (NFIP) within any 9-year period, since 1978;
- May or may not be currently insured under the NFIP.

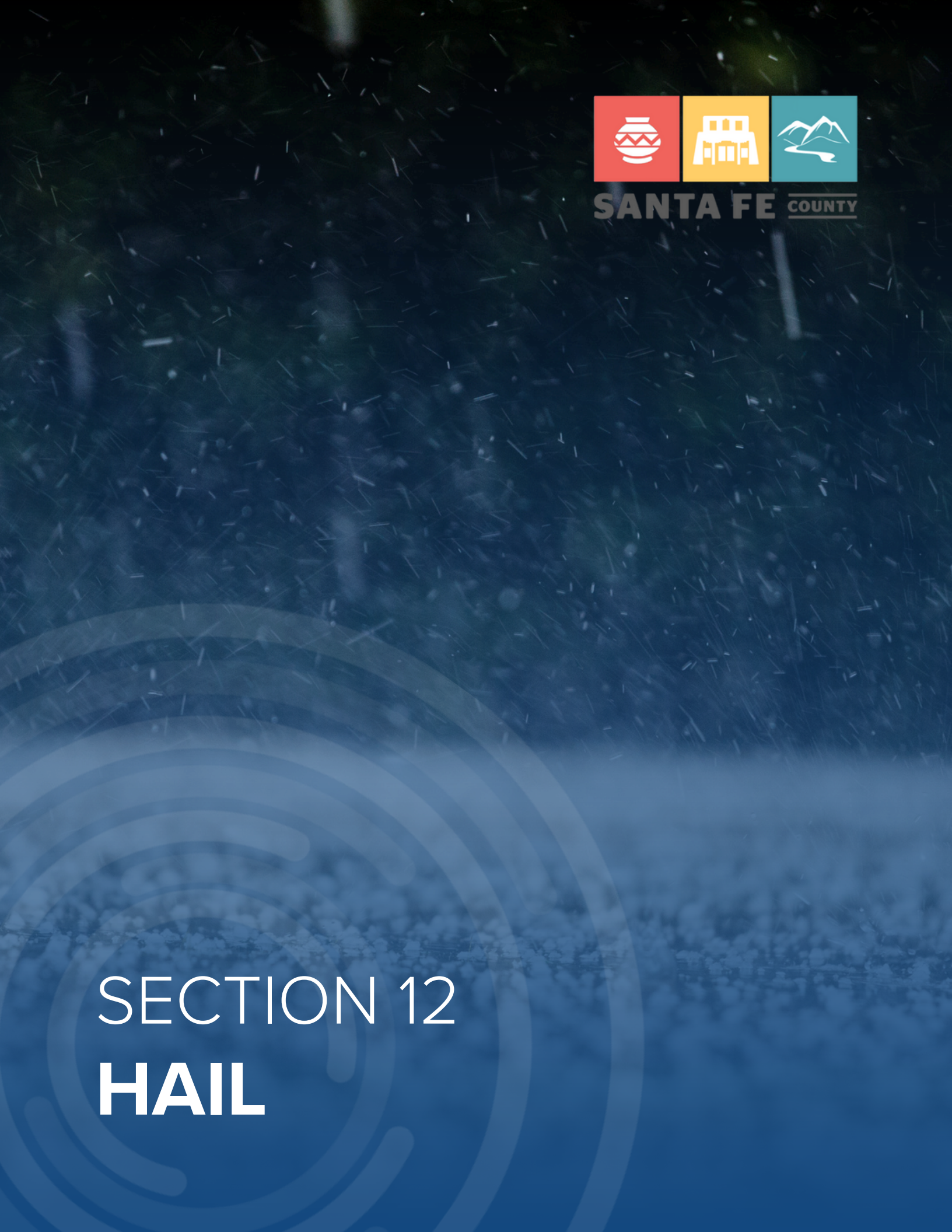
Severe Repetitive Loss properties are defined as structures that are:

- Covered under the NFIP and have at least 4 flood related damage claim payments (building and contents) over $5,000.00 each, and the cumulative amount of such claims payments exceed $20,000; or
- At least 2 separate claim payments (building payments only) have been made, with the cumulative amount of the building portion of such claims exceeding the market value of the building.

Table 11-7 shows repetitive loss and severe repetitive loss properties for the Santa Fe County planning area.

Table 11-7. Repetitive Loss and Severe Repetitive Loss Properties

JURISDICTION	BUILDING TYPE	NUMBER OF STRUCTURES	NUMBER OF LOSSES
Santa Fe County	Single Family Residential	1	2



SANTA FE COUNTY

SECTION 12
HAIL

SECTION 12: HAIL

HAZARD DESCRIPTION

Hail is precipitation in the form of round masses and irregular lumps consisting of layers of ice and compact snow. Hail is formed inside of thunderstorm updrafts and can be particularly damaging to the built environment and infrastructure.

During the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere, and the subsequent cooling of the air mass. Frozen droplets gradually accumulate into ice crystals until they fall as precipitation that is round or irregularly shaped masses of ice typically greater than 0.75 inches in diameter. The size of hailstones is a direct result of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a by-product of heating on the Earth's surface. Higher temperature gradients above Earth's surface result in increased suspension time and hailstone size.

Hail falls when it becomes heavy enough to overcome the strength of the thunderstorm updraft and is pulled toward the earth by gravity. Smaller hailstones can be blown away from the updraft by horizontal winds, so larger hail typically falls closer to the updraft than smaller hail. If the winds near the surface are strong enough, hail can fall at an angle or even nearly sideways. Wind-driven hail can tear up siding on houses, break windows and blow into houses, break side windows on cars, and cause severe injury or death to people and animals.

There is no clear distinction between storms that do and do not produce hailstones. Nearly all severe thunderstorms probably produce hail aloft, though it may melt before reaching the ground. In all cases, the hail falls when the thunderstorm's updraft can no longer support the weight of the ice. The stronger the updraft, the larger the hailstone can grow, and the greater the potential for loss or damage. [1]

[1] National Oceanic and Atmospheric Administration, National Severe Storms Laboratory, Severe Weather 101.

SECTION 12: HAIL

LOCATION

Hailstorms are an extension of severe thunderstorms that could potentially cause severe damage. In New Mexico, hail most commonly occurs during monsoon season between June and the end of September. Hail events are not confined to any specific geographic location and can vary greatly in size, location, intensity, and duration. Therefore, the entire Santa Fe County planning area is equally at risk to the hazard of hail. Refer to Figure 12-1 for the location of past hail events in the planning area.

EXTENT

The National Weather Service (NWS) classifies a storm as "severe" if there is hail three-quarters of an inch in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The intensity category of a hailstorm depends on hail size and the potential damage it could cause, as depicted in the National Centers for Environmental Information (NCEI) Intensity Scale in Table 12-1.

Table 12-1. Hail Intensity and Magnitude[2]

SIZE CODE	INTENSITY CATEGORY	SIZE (Diameter Inches)	DESCRIPTIVE TERM	TYPICAL DAMAGE
H0	Hard Hail	Up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33 – 0.60	Marble	Slight damage to plants and crops
H2	Potentially Damaging	0.60 – 0.80	Dime	Significant damage to plants and crops
H3	Severe	0.80 – 1.20	Nickel	Severe damage to plants and crops
H4	Severe	1.2 – 1.6	Quarter	Widespread glass and auto damage
H5	Destructive	1.6 – 2.0	Half Dollar	Widespread destruction of glass, roofs, and risk of injuries
H6	Destructive	2.0 – 2.4	Ping Pong Ball	Aircraft bodywork dented and brick walls pitted
H7	Very Destructive	2.4 – 3.0	Golf Ball	Severe roof damage and risk of serious injuries
H8	Very Destructive	3.0 – 3.5	Hen Egg	Severe damage to all structures
H9	Super Hailstorms	3.5 – 4.0	Tennis Ball	Extensive structural damage, could cause fatal injuries
H10	Super Hailstorms	4.0 +	Baseball	Extensive structural damage, could cause fatal injuries

[2] NCEI Intensity Scale, based on the TORRO Hailstorm Intensity Scale.

The intensity scale in Table 12-1 ranges from H0 to H10, with increments of intensity or damage potential in relation to hail size (distribution and maximum), texture, fall speed, speed of storm translation, and strength of the accompanying wind. Based on the best available data regarding the previous occurrences for the area, the Santa Fe County planning area may experience hailstorms ranging from an H0 (pea size) to an H7 (golf ball size). The largest size hail to be reported was 2.5 inches in diameter, or a H7, which is considered a very destructive hailstorm that can cause severe roof damage to structures and serious injuries. This event occurred on June 26, 2017. Refer to the Historical Occurrences section below for more details on this event. This is likely the greatest extent the planning area can anticipate in the future.

HISTORICAL OCCURRENCES

Historical evidence shown in Figure 12-1 demonstrates that the planning area is vulnerable to hail events overall. Historical events with reported damages, injuries, or fatalities are shown in Table 12-2. A total of 136 reported historical hail events impacted the Santa Fe County planning area between 1960 and 2023; these events were reported to NCEI and NOAA databases and may not represent all hail events to have occurred during the past 64 years. Only those events for the Santa Fe County planning area with latitude and longitude available were plotted (Figure 12-1).

Figure 12-1. Spatial Historical Hail Events, 1960-2023

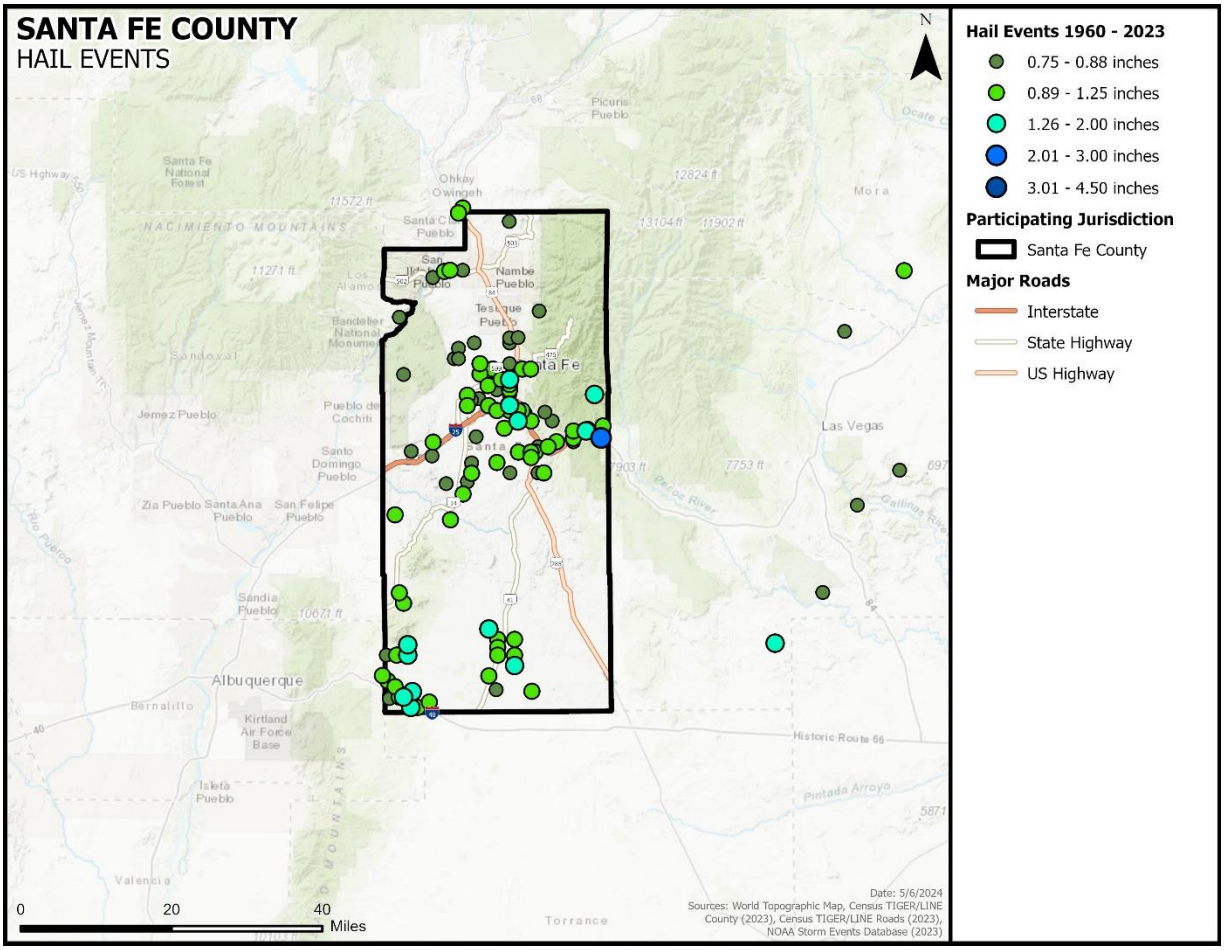


Table 12-2. Historical Hail Events, 1960-2023[3]

JURISDICTION	DATE	MAGNITUDE (Inches)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	5/9/2017	1	0	0	$125,400	$0
Santa Fe County	6/26/2017	2.5	0	0	$1,252,300	$0
Santa Fe County	5/22/2018	0.75	0	0	$146,400	$0
Santa Fe County	8/29/2020	1	0	0	$2,400	$0
Santa Fe County	5/17/2021	1	0	0	$2,900	$0
Santa Fe County	5/22/2021	0.75	0	0	$11,400	$0
Santa Fe County	5/22/2021	1.5	0	0	$17,100	$0
TOTALS		**(Max Extent)**	**0**	**0**	**$1,557,900**	**$0**

Based on the list of historical hail events for the Santa Fe County planning area (listed above), 33 of the events have occurred since 2018 Plan according to reports in the NCEI database. The most significant event in relation to damage occurred on June 26, 2017, also the largest hail event, with just over $1.2 million in damages (2023 dollars) with hail reported 2.5 inches in diameter.

SIGNIFICANT EVENTS

June 26, 2017

Thunderstorms developed over the southern Sangre De Cristo Mountains and moved south through the Glorieta, an incorporated area of Santa Fe County, and Pecos areas producing tennis ball size hail. There are reports of damaged structures and homes with broken windows and skylights. Many vehicles sustained damages as well. Property damage was reported to be $1,252,300 (2023 dollars).

May 22, 2018

A thunderstorm developed and moved across Interstate 25 southeast of Santa Fe and produced hail. Slick travel conditions resulted in at least 12 motor vehicle crashes between mile markers 286 and 288. Photos from local media indicated several vehicles were totaled, however extent of injuries was unknown. There were no reported facilities. Property damage amounts were an estimated $146,400 (2023 dollars).

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, 136 events in a 64-year reporting period for Santa Fe County provides an average annual occurrence of approximately two events or more per year. This frequency supports a “Highly Likely” probability of future events for the Santa Fe County planning area. See additional information on climate change at the end of this section.

[3] Only recorded events with damages are listed. No reports of injuries or fatalities were recorded in the NCEI database.

VULNERABILITY AND IMPACT

Santa Fe County has a vast, historically, and culturally significant agriculture industry. It began with the first establishments of native cultures and the migration of Spanish farmers. Within the county boundaries exists small vegetable and fruit farms as well as large commercial beef cattle and forage crop productions. According to the Santa Fe County Extension Office with the New Mexico State University, there are 715 farms over 1,000 acres in size throughout Santa Fe County. While NCEI reported damages are limited, historically much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Impacts to crops such as chile can also have effects on the local economy. All farms throughout the county may face extreme impacts and be more susceptible to hail damages.

Vehicles and the roofs of buildings and homes are often damaged by hail. Utility systems on roofs of buildings and critical facilities would be vulnerable and could be damaged. Hail could cause a significant threat to people, as they could be struck by hail and falling trees and branches. Outdoor activities and events may elevate the risk to residents and visitors when a hailstorm strikes with little warning. Portable buildings typically utilized by schools and commercial sites such as construction areas would be more vulnerable to hail events than the typical site-built structures.

The Santa Fe County planning area features mobile or manufactured home parks throughout the planning area. These parks are typically more vulnerable to hail events than typical site-built structures. In addition, manufactured homes are located sporadically throughout the planning area including all participating jurisdictions which would also be more vulnerable. The U.S. Census data indicates a total of 10,990 (14 percent of total housing stock) manufactured homes located in the Santa Fe County planning area. In addition, 53 percent (approximately 40,547 structures) of the housing structures in the Santa Fe County planning area were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant wind events.

Table 12-3. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Santa Fe County	40,547	10,990

While all citizens are at risk of the impacts of hail, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 12 percent of the planning area population live below the poverty level (Table 12-4). While warning times for this type of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Table 12-4. Populations at Greatest Risk by Jurisdiction[4]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The Santa Fe County Planning Team identified the following critical facilities (Table 12-5) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by hail events. For a comprehensive list see Appendix C.

Table 12-5. Critical Facilities Vulnerable to Hail

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by hailstones. • Power outages could disrupt communications, delaying emergency response times. • Accumulated hail on the streets may impede emergency response vehicle access to areas. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by hailstones. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damage to facilities. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Power outages could disrupt communications, delaying emergency response times. • Accumulated hail on the streets may impede service response vehicle access to areas.

[4] US Census Bureau 2022 data for Santa Fe County

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
	• Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Hail has been known to cause injury to humans and occasionally has been fatal. Overall, the total loss estimate of property and crops in the planning area is estimated at $1,577,900 with an average annualized loss of $24,700. Based on historic loss and damages, the impact of hail on the Santa Fe County planning area can be considered "Limited" severity of impact, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Table 12-6. Estimated Annualized Losses

JURISDICTION	TOTAL PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
Santa Fe County	$1,577,900	$24,700

ASSESSMENT OF IMPACTS

Hail events have the potential to pose a significant risk to people and can create dangerous situations Hail conditions can be frequently associated with a variety of impacts, including:

- Hail may create hazardous road conditions during and immediately following an event, potentially delaying critical staff from reporting for duty as well as delaying first responders from providing for or preserving public health and safety and.
- Individuals and first responders who are exposed to the storm may be struck by hail, falling branches, or downed trees resulting in injuries or possible fatalities.
- Large hail events will likely cause extensive roof damage to residential structures along with siding damage and broken windows, creating a spike in insurance claims and a rise in premiums, and potentially result in physical harm to occupants.
- Automobile damage may be extensive depending on the size of the hail and length of the storm.
- Hail events can result in power outages over widespread areas increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- First responders are exposed to downed power lines, damaged structures, hazardous spills, and debris that often accompany hail events, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Some businesses not directly damaged by the hail event may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.

- Depending on the severity and scale of damage caused by large hail events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- A significant hail event could significantly damage agricultural crops, resulting in extensive economic losses for the community and surrounding area.
- Hail events may injure or kill livestock and wildlife or destroy wildlife habitat
- A large hail event could impact the accessibility of recreational areas and parks due to extended power outages or debris clogged access roads.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are 96 historical sites listed on the National Register of Historic Places for Santa Fe County and 212 listed on the New Mexico State Register of Cultural Properties.

The economic and financial impacts of hail will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning conducted by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of any hail event.

CLIMATE CHANGE CONSIDERATIONS

Although the impact of climate change on the frequency and severity of hail events is uncertain, some climate studies attempt to give insight on the future conditions of hailstorms. As ocean temperatures rise due to climate change, more moisture is evaporating into the atmosphere. The warm and moist air masses that fuel severe weather may become more unstable on average, which could favor the increased development of thunderstorms and hail. However, it is also suggested that in a warming climate, the average melting level will rise in thunderstorms, meaning small hailstones will have more of a chance to melt as they fall to the ground. Therefore, hail may become less frequent, but large hail can be expected when it does occur, leading to the possibility of increased damages.[5]

[5] Yale Climate Connections, Hailstorms and Climate Change, March 17, 2022.

SANTA FE COUNTY

SECTION 13
HIGH WIND

SECTION 13: HIGH WIND

HAZARD DESCRIPTION

Wind is the horizontal motion of the air past a given point, beginning with differences in air pressures. Pressure that is higher at one place than another sets up a force pushing from high toward low pressure: the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air accelerates.

High wind events, those that sustain speeds of 40 mph or greater according to the National Weather Service (NWS), are often associated with severe thunderstorms. These wind events can cause significant property and crop damages. Winds in Santa Fe County are typically straight-line winds, which are generally any thunderstorm wind that is not associated with rotation or tornados. Straight line winds are responsible for most high wind damages. One type of straight-line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado and make air travel extremely hazardous. In addition, these strong winds and thunderstorm winds can sometimes blow large amounts of dust and debris, creating dust storms.

High winds can also occur in the absence of other definable hazard conditions creating "windstorms." According to the NWS, high winds not associated with thunderstorms are often referred to as gradient winds. They are usually the result of tight pressure gradients between strong areas of low pressure and high pressure. These strong winds can be just as strong as thunderstorm wind gusts, but cover a much larger area, and can result in widespread damage.

Due to the geography in New Mexico, the planning area may also experience mountain-gap winds. This occurs when the wind is forced through a narrow gap, over mountain passes or ridgelines, it accelerates. High winds are typically stronger at narrow canyon openings. Spillover winds are also common in the area, which happens when wind approaches a mountain, and it is forced to rise to pass over. This upward movement creates an area of lower pressure on the windward side of the mountain. As a result, the wind speeds up to fill this area of lower pressure, which can lead to increased wind speeds on the windward slope of the mountain.

SECTION 13: HIGH WIND

LOCATION

High wind events can develop in any geographic location and are considered a common occurrence across the State of New Mexico. Therefore, a high wind event could occur at any location within the Santa Fe County planning area. These storms develop randomly and are not confined to any geographic area within the County. It is assumed that the entire Santa Fe County planning area is uniformly exposed to the threat of high winds.

EXTENT

The extent or magnitude of a high wind event is measured by the Beaufort Wind Scale. Table 13-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

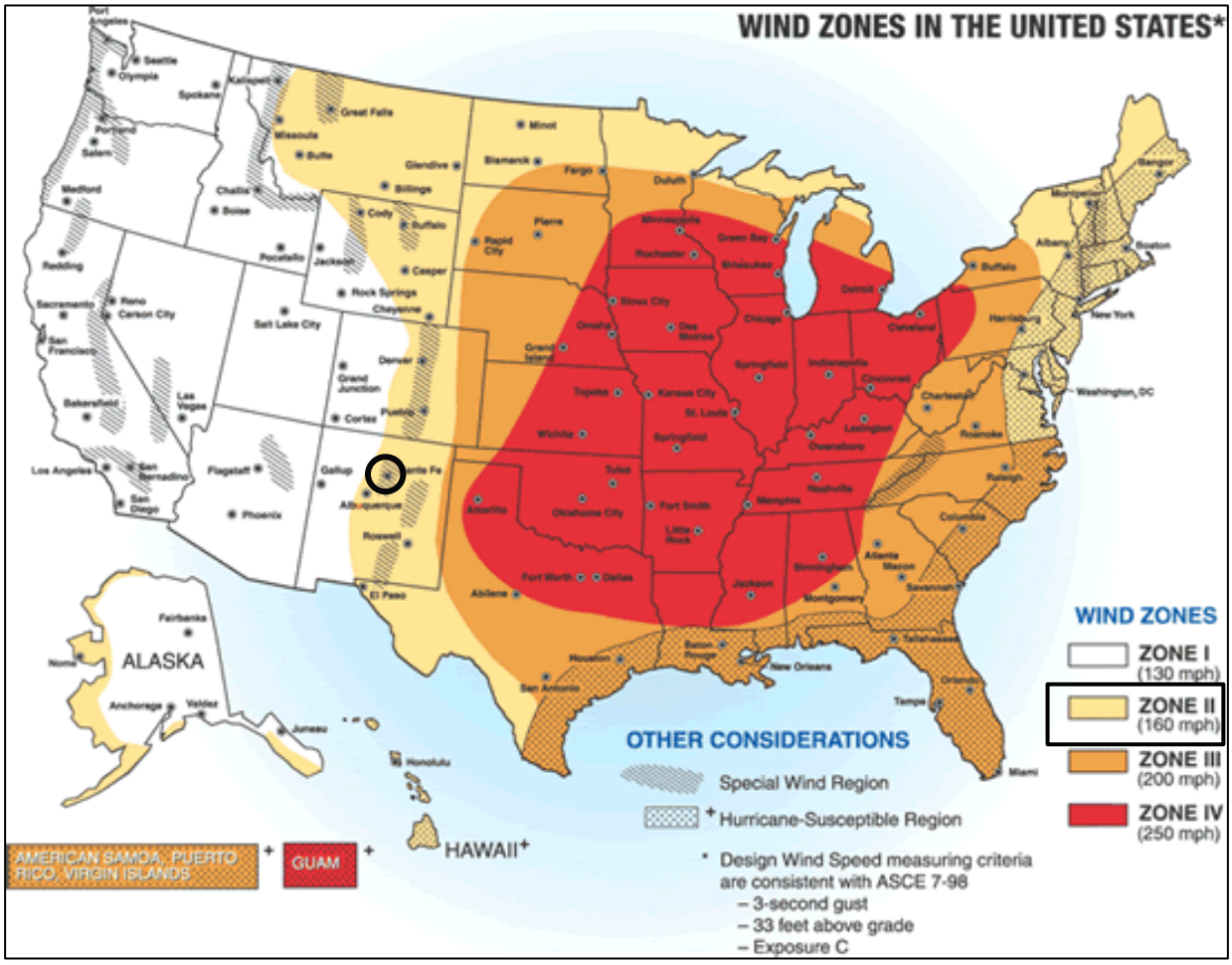
Table 13-1. Beaufort Wind Scale[1]

FORCE	WIND SPEED		WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
	(MPH)	(Knots)		
0	Less than 1	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-18	11-16	Moderate Breeze	Dust, leaves and loose paper lifted, small tree branches move
5	111-24	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	32-38	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	311-46	34-40	Gale	Whole trees in motion, resistance felt walking against wind
9	47-54	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	55-63	48-55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	64-72	56-63	Violent Storm	If experienced on land, widespread damage
12	72-83	64-71	Hurricane	Violence and destruction

Figure 13-1 displays the wind zones as derived from NOAA.

[1] Source: World Meteorological Organization

Figure 13-1. Wind Zones in the United States[2]



On average, the planning area experiences approximately 15 wind events every year. The Santa Fe County planning area is located within Wind Zone II, meaning it can experience winds up to 160 mph. The Santa Fe County planning area has experienced a significant wind event, or an event with winds in the range of "Force 12" on the Beaufort Wind Scale with winds above 90 mph. This is the worst to be anticipated for the entire planning area based on historic events.

Based on a search of past events from 1996 through 2023, the strongest event reported in the planning area occurred in Santa Fe County in November of 2016 with reported wind speeds of 82 knots, or 94 mph. The most damaging event in the planning area was reported in Santa Fe County in December of 2021 and caused an estimated $2,200,500 in damages.

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration. The NCEI is the largest archive available for historic storm events data; however, it is important to note that only incidents recorded in the NCEI have been factored into this risk assessment unless otherwise

[2] Santa Fe County planning area is indicated by the black circle.

noted. It is likely that a high number of occurrences have gone unreported over the past 28 years. Tables 13-2, 13-3, and 13-4 depict historical occurrences of high wind events for the Santa Fe County planning area according to the NCEI database.

Since 1996, 435 high wind events are known to have occurred in the Santa Fe County planning area. Table 13-4 presents information on known historical events impacting the Santa Fe County planning area, resulting in damages, injuries, or fatalities. It is important to note that high wind events associated with tornadoes are not accounted for in this section. Property damage estimates are not always available. Where an estimate has been provided in a table for losses, the dollar amounts have been modified for inflation to indicate the damage in 2023 dollars.

Table 13-2. Historical High wind Speeds, 1996-2023

MAXIMUM WIND SPEED RECORDED (KNOTS)	NUMBER OF REPORTED EVENTS
0-30	0
31-40	60
41-50	85
51-60	242
61-70	35
71-80	7
81-90	1
91-100+	0
Unknown	5

Table 13-3. Historical Wind Event Types as Reported in the NCEI

TYPE	NUMBER OF REPORTED EVENTS
Dust Storm	1
High Wind	387
Strong Wind	9
Thunderstorm Wind	38

Table 13-4. Historical High wind Events, 2009-2023[3]

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	6/10/1996	Unknown	0	0	$9,800	$0
Santa Fe County	7/23/1998	Unknown	0	1	$1,900	$0
Santa Fe County	6/2/2000	Unknown	0	0	$53,400	$0
Santa Fe County	7/16/2005	49	0	1	$0	$0
Santa Fe County	12/1/2007	70	0	0	$146,100	$0
Santa Fe County	5/28/2008	52	0	0	$1,500	$0
Santa Fe County	4/25/2010	43	0	0	$700	$0
Santa Fe County	4/29/2010	48	0	0	$2,100	$0
Santa Fe County	5/10/2010	56	0	0	$700	$0
Santa Fe County	6/12/2010	43	0	0	$2,800	$0
Santa Fe County	8/5/2010	35	0	0	$100	$0
Santa Fe County	10/25/2010	56	0	0	$1,400	$0
Santa Fe County	4/3/2011	45	0	0	$40,900	$0
Santa Fe County	3/18/2012	57	0	0	$6,700	$700
Santa Fe County	4/26/2012	39	0	0	$13,300	$0
Santa Fe County	4/14/2013	52	0	0	$700	$0
Santa Fe County	2/19/2014	72	0	0	$3,900	$0
Santa Fe County	11/2/2014	45	0	0	$1,300	$0
Santa Fe County	11/17/2016	54	0	0	$1,300	$0
Santa Fe County	5/9/2017	57	0	0	$12,600	$0
Santa Fe County	8/11/2017	65	0	0	$93,800	$0
Santa Fe County	2/18/2018	62	0	0	$61,600	$0
Santa Fe County	4/19/2018	50	0	0	$122,400	$0
Santa Fe County	3/13/2019	56	0	0	$6,000	$0
Santa Fe County	4/10/2019	65	0	0	$60,000	$0

[3] Only recorded events with fatalities, injuries or damages are listed. Magnitude is listed when available.

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	1/14/2021	55	0	0	$17,600	$0
Santa Fe County	6/15/2021	50	0	0	$5,700	$0
Santa Fe County	12/15/2021	43	0	0	$16,500	$0
Santa Fe County	12/15/2021	59	0	0	$11,000	$0
Santa Fe County	12/15/2021	61	0	0	$2,200,500	$0
Santa Fe County	12/26/2021	52	0	0	$5,500	$0
Santa Fe County	4/22/2022		0	0	$106,100	$0
Santa Fe County	4/22/2022	52	0	0	$26,500	$0
Santa Fe County	7/20/2022	43	0	0	$20,700	$0
Santa Fe County	2/22/2023	43	0	0	$2,000	$0
Santa Fe County	2/22/2023	58	0	0	$1,019,600	$0
Santa Fe County	2/26/2023	74	0	0	$2,000	$0
Santa Fe County	2/26/2023	74	0	0	$10,200	$0
Santa Fe County	2/26/2023	52	0	0	$5,100	$0
Santa Fe County	3/30/2023	50	0	0	$5,100	$0
Santa Fe County	3/30/2023	52	0	0	$10,200	$0
TOTALS		**(MAX EXTENT)**	**0**	**2**	**$4,109,300**	**$700**

Based on the list of historical high wind events for the Santa Fe County planning area, 227 of the events have occurred since the 2018 Plan that have caused impacts to the planning area.

SIGNIFICANT EVENTS

July 23, 1998

A brief and heavy thunderstorm produced small hail and strong winds in the Santa Fe County planning area. The estimated windspeeds for this event remain unknown. However, one injury was reported when strong winds blew a large tree on top of a truck.

July 16, 2005

A thunderstorm moved into south central Santa Fe County and brought strong outflow winds. Several utility trailers and one large recreational vehicle were overturned at a moto-cross park east of Edgewood. Maximum wind speeds for this event were estimated to be 56 mph. One injury was reported during this event.

November 17, 2016

The first significant storm system of the fall season moved across the New Mexico, bringing high winds, blowing dust, and cold temperatures. The strongest winds impacted eastern New Mexico

where wind gusts of 60 to 70 mph were common. The Rio Grande Valley also experienced strong winds with some minor damage reported around Santa Fe and Albuquerque. This strong storm system brought an end to the fifth longest growing season with the third latest freeze on record. Wind speeds were reported to be 94 mph, which is the strongest wind event reported for the planning area. Property damages in the Santa Fe metro area were an estimated $1,300 (2023 dollars) from this event.

December 15, 2021

An abnormally strong storm system, more typical of spring rather than early winter, strengthened over the western United States in December of 2021. The defining characteristic for this system were the strong winds well over 100 knots. As this system continued to deepen into the southwestern United States, these winds mixed down to the surface, resulting in a widespread historic windstorm for much of northern and central New Mexico. This snow squall resulted in a peak wind gust of 70 mph at the Santa Fe airport. These high winds caused significant damage to parked aircraft with one lightweight aircraft flipping over and five others damaged. One hangar door was ripped off which collided with another hangar door, and four other hangar doors were damaged. Two hangars suffered roof damage, and many bushes were ripped from the ground and strewn across the runway. These winds were responsible for downed trees at the Santa Fe State Capitol building as well as a 56-foot tree outside of St. Francis Cathedral. There are other local reports of damages to homes, roofs, and powerlines. Property damages for this event were reported to be $2,200,500 (2023 dollars), making this the most expensive wind event to occur in the planning area.

Figure 13-2. Overturned Plane Due to High Winds at Santa Fe Regional Airport[4]

[4] KRQE. PHOTOS: Storm leaves downed trees, flipped aircraft, damage across New Mexico. December 15, 2021. https://www.krqe.com/photo-galleries/photos-downed-trees-damage-across-new-mexico-following-strong-winds/

February 22, 2023
A series of powerful storm systems moved across the western United States during the second half of February 2023. The first system impacted New Mexico on the 22nd with a widespread snow squall event accompanied by damaging winds, heavy snow, hazardous blowing dust, low visibility, and dramatically colder temperatures. Peak wind gusts of 70 to 80 mph were common across the region along with damage to trees, power lines, homes, and light weight structures. Peak gusts consistently exceeded 70 mph, with the Santa Fe Airport registering a peak wind gust of 85 mph. This event was particularly damaging and caused $1,019,600 in property damages in Santa Fe County.

PROBABILITY OF FUTURE EVENTS

Most high winds occur during the spring, with April and May being the windiest month for New Mexico, with March and June following. Based on available records of historic events, there have been a total of 435 events in a 28-year reporting period, which provides a probability of approximately 15 events every year. Even though the intensity of high wind events is not always damaging for the Santa Fe County planning area, the frequency of occurrence for a high wind event is “Highly Likely”. This means that an event is probable within the next year for the Santa Fe County planning area. See additional information on climate change at the end of this section.

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since high wind events can occur at different strength levels, in random locations, and can create relatively narrow paths of destruction. Due to the randomness of these events, all existing and future structures, and facilities within the Santa Fe County planning area, could potentially be impacted and remain vulnerable to possible injury and property loss from strong winds.

Trees, power lines and poles, signage, manufactured housing, radio towers, concrete block walls, storage barns, windows, garbage recepticles, brick facades, and vehicles, unless reinforced, are vulnerable to high wind events. More severe damage involves windborne debris; in some instances, patio furniture and other lawn items have been reported to have been blown around by wind and, very commonly, debris from damaged structures in turn have caused damage to other buildings not directly impacted by the event. In numerous instances roofs have been reported as having been torn off of buildings. The portable buildings typically used at schools and construction sites would be more vulnerable to high wind events than typical site-built structures and could potentially pose a greater risk for wind-blown debris.

According to the American Community Survey (ACS) five-year estimates for 2022, a total of 10,990 manufactured homes are located in the Santa Fe County planning area (14 percent of total housing stock). In addition, approximately 40,547 structures (53 percent of total housing stock) of the housing units were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant wind events.

Table 13-5. Structures at Greater Risk to High Wind Events

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Santa Fe County	40,547	10,990

While all citizens are vulnerable to the impacts of high wind, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 12 percent of the planning area population live below the poverty level (Table 13-6). While warning times for these types of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Table 13-6. Populations at Greatest Risk[5]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The Santa Fe County Planning Team identified the following critical facilities (Table 13-7) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by high wind events. The critical infrastructure with the greatest vulnerability to thunderstorms are power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on electricity as a medical necessity. For a comprehensive list see Appendix C.

[5] US Census Bureau 2022 data for Santa Fe County

Table 13-7. Critical Facilities Vulnerable to High Wind Event

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris / downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by falling trees or flying debris. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damage to facilities. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages and fires negatively impact airport services as well as area businesses reliant on airport operations.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities.

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
	• Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel.

A high wind event can also result in traffic disruptions, injuries and in rare cases, fatalities. There have been two reported injuries but no reported fatalities due to high wind events in the Santa Fe County planning area. Based on historic loss and damages, the impact of high wind on the Santa Fe County planning area can be considered "Minor" severity, meaning Injuries and illnesses do not result in permanent disability, critical facilities and services shut down for up to one week, and more than 10 percent of property destroyed or with major damage. Overall, in the past 28 years there has been an estimated total of $4,110,000 damages (in 2023 dollars) in the Santa Fe County planning area due to high wind events. The estimated average annual loss from a high wind event is $146,800.

Table 13-8. Estimated Annualized Losses by Participating Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
Santa Fe County	$4,110,000	$146,800

ASSESSMENT OF IMPACTS

High wind events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. High wind conditions can be frequently associated with a variety of impacts, including:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- High wind events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Critical staff may be unable to report for duty, limiting response capabilities.
- Private sector entities that residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.

- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by high wind events may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures, specifically those built before 1980 (53 percent of the planning area), were built to less stringent building codes may suffer greater damage as they are typically more vulnerable to high winds.
- Recreational areas such as community parks and green spaces may be damaged or inaccessible due to downed trees or debris, causing temporary impacts to associated businesses in the area.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are 96 historical sites listed on the National Register of Historic Places for Santa Fe County and 212 listed on the New Mexico State Register of Cultural Properties.

The economic and financial impacts of high winds on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any high wind event.

CLIMATE CHANGE CONSIDERATIONS

The impacts on the frequency and severity of severe wind events due to climate change are unclear. However, as ocean temperatures rise due to climate change, more moisture is evaporating into the atmosphere. The warm and moist air masses that fuel severe weather may become more unstable on average, which could favor the increased development of thunderstorms and wind related events. It is suspected that an increase in thunderstorms would mean an increase in damaging winds, but there is limited data available to understand the full scope of future climate change impacts at this time.

SANTA FE COUNTY

SECTION 14

LANDSLIDE AND ROCKFALL

SECTION 14: LANDSLIDE AND ROCKFALL

HAZARD DESCRIPTION

The United States Geological Survey (USGS) defines a landslide as any movement of rock, earth, or debris at a downward slope. There are five types of movement associated with landslides including falls, topples, slides, spreads, and flows. There are also several types of landslides, and each one is associated with a specific movement type.

Two common types of landslides in the Santa Fe County planning area include rockfall and debris flow. Debris flow is the hazardous flows of rock, mud, sediment, and water down mountain slopes and often occurs after intense rainfall. A rockfall is the descent of loose and free-falling rocks, which can range from small pebbles to very large boulders.

Landslides occur in all 50 states but primarily in coastal and mountainous areas of the western United States, in the mountainous regions of the eastern United States, and in Hawaii and Alaska. Landslides in the United States cause billions of dollars in damages every year and kills between 25 and 50 people annually. These fatalities are usually caused by caused by rockfalls, rockslides, and debris flows.[1]

The landscape in the State of New Mexico makes it prone to landslide events. Debris flow poses the greatest risk to communities in New Mexico due to their association with burned landscapes from widespread wildfires. Rockfalls have also caused deaths within the state and often cause tens of thousands of dollars in damage each year. The greatest concern for rockfall is along highways, which often need to be shutdown due to debris or rocks blocking roads.[2]

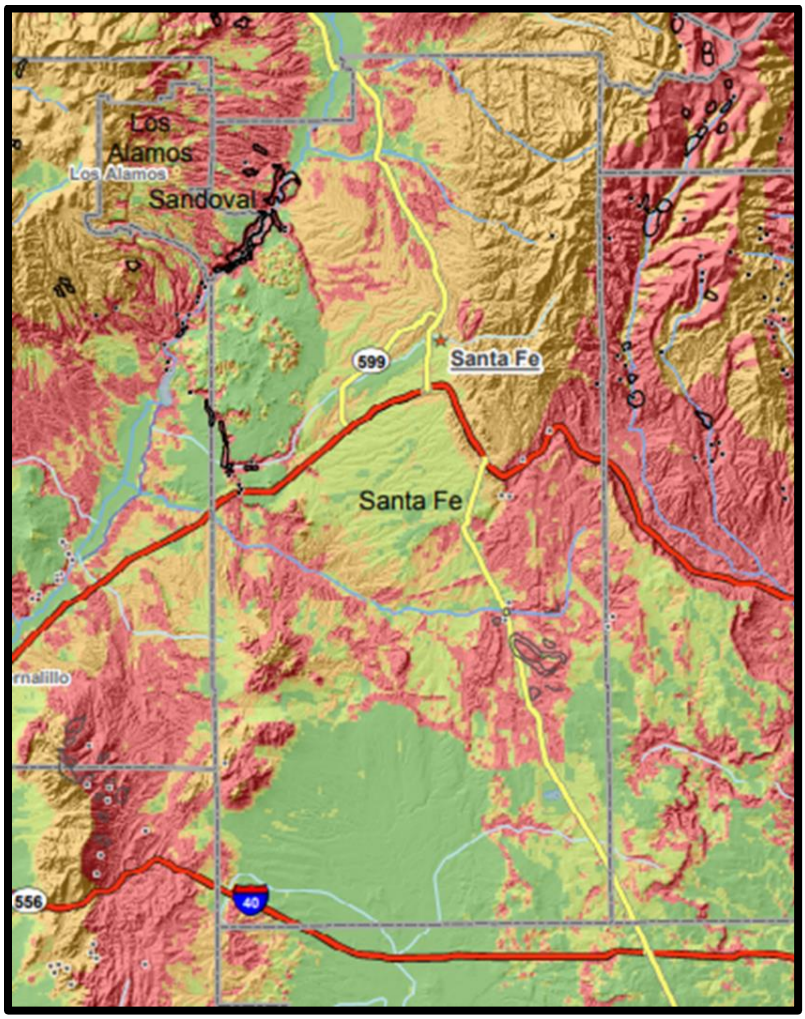
LOCATION

The New Mexico Bureau of Geology created statewide maps depicting the susceptibility of communities to landslides and rockfalls. The susceptibility of the Santa Fe County planning area is described in Figure 14-1. While the entire planning area is at some risk of landslides, the map

[1] USGS. Landslide Types and Processes. https://pubs.usgs.gov/fs/2004/3072/fs-2004-3072.html.
[2] New Mexico Bureau of Geology and Mineral Resources. Dangers of Steep Slopes: Landslides, Rockfalls, and Debris Flows in New Mexico. https://geoinfo.nmt.edu/publications/periodicals/earthmatters/20/n1/em_v20_n1.pdf .

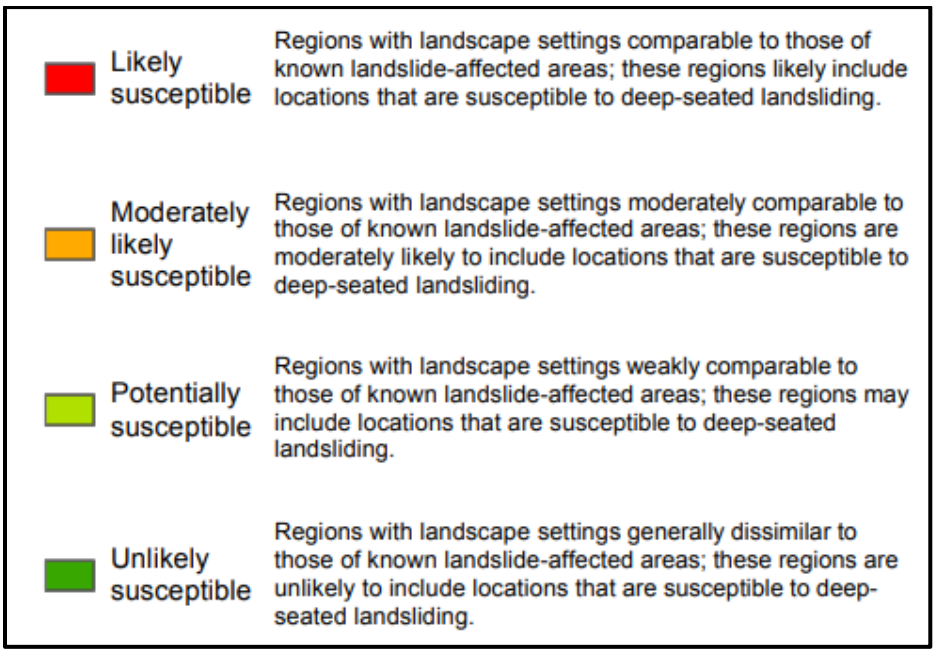
conveys where a landslide event is most likely to occur ranging from unlikely (green) to likely (red), as described in Figure 14-2. A large portion of the planning area ranges from "low" to "likely" susceptibility, especially in the northern and eastern parts of the county, along parts of Interstate 25 which is highlighted in red, and U.S. Route 84 which is highlighted in yellow.

Figure 14-1. Areas Susceptible to Landslide[3]



[3] New Mexico Bureau of Geology and Mineral Resources. Deep-Seated Landslide Susceptibility Map of New Mexico. https://geoinfo.nmt.edu/publications/openfile/downloads/500-599/594/Plate1/Plate1_LandslideSusceptibilityMap_PlotSize.pdf

Figure 14-2. Susceptibility Classes



EXTENT

Severe landslides, rockfall, or debris flow events can impact widespread areas, move long distances, and exert considerable force, leading to infrastructure damage and loss of life. Landslides can be classified by using the Alexander Scale (Table 14-1) which measures intensity based on structural damage caused by landslides. It is possible that the planning area experiences the full extent, especially in the "likely susceptible" areas described in Figure 14-1.

Table 14-1. Alexander Scale for Landslide Damage to Buildings

CLASSIFICATION	DAMAGE LEVEL	DESCRIPTION
1	Negligible	Hairline cracks in walls or structural members; no distortion of structure or detachment of external architectural details.
2	Light	Buildings continue to be habitable, repair not urgent. Settlement of foundations, distortion of structure, and inclination of walls are not sufficient to compromise overall stability.
3	Moderate	Walls out of perpendicular by one or two degrees, or there has been substantial cracking in structural members, or the foundations have settled during differential subsidence of at least 6 inches; building requires evacuation and rapid attention to ensure its continued life.
4	Serious	Walls out of perpendicular by several degrees; open cracks in walls; fracture of structural members; fragmentation of masonry; differential settlement of at least 10 inches compromising foundations; floors may be inclined by one or

CLASSIFICATION	DAMAGE LEVEL	DESCRIPTION
		two degrees or ruined by heave. Internal partition walls will need to be replaced; door and window frames are too distorted to use; occupants must be evacuated, and major repairs carried out.
5	Very Serious	Walls out of plumb by five or six degrees; structure grossly distorted; differential settlement has seriously cracked floors and walls or caused major rotation or slewing of the building. Partition walls and brick infill will have at least partly collapsed; roofs may have partially collapsed; outhouses, porches, and patios may have been damaged more seriously than the principal structure itself. Occupants will need to be re-housed on a long-term basis, and rehabilitation of the building will probably not be feasible.
6	Partial Collapse	Requires immediate evacuation of the occupants and cordoning off the site to prevent accidents with falling masonry.
7	Total Collapse	Requires clearance of the site.

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) reports no debris flow events for the Santa Fe County planning area and there is limited data available regarding previous landslides and rockfall events. However, there has been one major disaster declaration issued for the Santa Fe County planning area. The following section provides a description of this event. It is likely that similar events have occurred in the past but have not been reported.

SIGNIFICANT EVENTS

October 29, 2013

A Major Disaster Declaration was issued on October 29, 2013. The severe storms, flooding, and mudslides occurred September 9 through September 13, 2013, damaging public facilities and roads in 14 New Mexico counties. Local news reports that the State Department of Transportation had to remove mud and rocks from N.M. 30 and N.M. 502 north of the City of Santa Fe.[4] In addition, the community of Madrid suffered mudslide, debris flow and flood issues, some associated runoff from abandoned mines during this event. There is no estimated potential dollar loss from this event for the Santa Fe County planning area.

Table 14-2. Disaster Declarations for Mudslides, 2013

YEAR	DECLARATION TITLE	DECLARATION TYPE	DISASTER NO.
2013	Severe Storms, Flooding, and Mudslides in New Mexico	DR	DR-4152-NM

[4] Santa Fe Reporter. Rainfall leads to local flooding. https://www.sfreporter.com/news/2013/09/13/rainfall-leads-to-local-flooding/

PROBABILITY OF FUTURE EVENTS

With limited reports of landslide events, it can be difficult to calculate the probability of future events. Based on available historical data, future landslide events are considered "Unlikely" with an event probable in the next ten years. Please see additional information on climate change at the end of this section.

VULNERABILITY AND IMPACT

The greatest threat to the Santa Fe County planning area is considered landslide and rockfall debris over roads and major highways. Falling rocks and debris can damage roads and bridges, requiring extensive and costly repairs. Debris can also block roads, highways, and transportation routes, disrupting emergency services and travel. Landslides can also damage buildings and other infrastructure, potentially leading to full collapse depending on the severity of the event. While it is less common, people can be injured or killed if they are caught in the path of falling debris. It is also possible that a rockfall or landslide could impact the environment by affecting one of the rivers running through the area, possibly causing blockages and backwater flooding. The amount of monetary damage associated with previous events is unknown, but costs related to property damage can be expected in the future.

While many structures in the planning area are at some risk of damage from a landslide (or cascading impacts such as backwater flooding), those located in the highest susceptibility areas are at greatest risk. Older and manufactured homes can also be more vulnerable due to construction materials and/or non-compliant construction practices in place today. Structures with older or lightweight foundations are more susceptible to collapse and ground movement. Older homes may be located in areas with higher landslide or rockfall risk, such as areas with steep slopes or areas prone to erosion, due to historical land use practices. According to the American Community Survey (ACS) five-year estimates for 2022, a total of 10,990 manufactured homes are located in the Santa Fe County planning area (14 percent of total housing stock). In addition, approximately 40,547 structures (53 percent of total housing stock) of the housing units were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during landslide events.

Table 14-3. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Santa Fe County	40,547	10,990

While all citizens are vulnerable to the impacts of subsidence, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 12 percent of the planning area population live below the poverty level (Table 14-4). The elderly, children, and people with a disability may have trouble evacuating if needed, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information regarding safety measures.

Table 14-4. Populations at Greatest Risk by Jurisdiction[5]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The Santa Fe County Planning Team identified the following critical facilities (Table 14-5) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by landslide and rockfall events. The critical infrastructure with the greatest vulnerability are transportation structures and municipal infrastructure. Failures of these facilities can result in a loss of service and cascading impacts. For a comprehensive list see Appendix C.

Table 14-5. Critical Facilities Vulnerable to Landslide and Rockfall

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities. • Damaged roads or transportation structures can impede emergency response vehicle access to areas. • Fire stations, police stations, and hospitals may suffer structural damage, affecting their ability to function effectively during emergencies. • Landslide and rockfall related emergencies may require the deployment of additional resources and personnel to impacted areas, and personnel may be exposed to unsafe conditions.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures and homes can be damaged and may potentially collapse, leading to higher operating levels at evacuation shelters. • Blocked roads and damaged transportation infrastructure could disrupt critical care. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Evacuations may be necessary due to structural damage to facilities. • Infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable.

[5] US Census Bureau 2022 data for Santa Fe County.

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
	• Essential supplies like medicines, water, food, and equipment deliveries may be delayed, especially with blocked or damaged roads. • Economic disruption due to infrastructure damage negatively impact commercial services and distribution.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities. • Damaged roads or transportation structures can impede emergency response vehicle access to areas. • Fire stations, police stations, and hospitals may suffer structural damage, affecting their ability to function effectively during emergencies. • Landslide and rockfall related emergencies may require the deployment of additional resources and personnel to impacted areas, and personnel may be exposed to unsafe conditions.

The impact of landslides and rockfalls in the Santa Fe County planning area are considered limited based on historical events. The Santa Fe County planning area is predominantly at low to moderate risk for landslides and rockfall. Future vulnerability is not expected to be substantial but could be significant if roadways and/or structures are impacted. The impact of landslides and rockfalls experienced in the Santa Fe County planning area has resulted in no injuries and fatalities, supporting a "Limited" severity of impact meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10 percent of property is destroyed or with major damage.

ASSESSMENT OF IMPACTS

Landslide and rockfall events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Landslides and rockfalls can be associated with a variety of impacts, including:

- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders, are subject to injury or illness.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents and damaged roads.
- Power and water outages are possible throughout the planning area due to damaged power lines, underground water pipes, and other damaged utility infrastructure.
- Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, or obstructed.
- Depending on the severity and scale of damage caused by landslides, damage to critical infrastructure can require weeks to repair.
- Buildings, homes, and other structures can collapse, potentially trapping residents.
- Significant rock and debris can result in emergency response vehicles being unable to access areas of the community.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.

- Private sector entities such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Some businesses not directly damaged by landslides and rockfalls may be negatively impacted while roads are restored, further slowing economic recovery.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to impacts of landslides and rockfalls.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are 95 historical sites listed on the National Register of Historic Places for Santa Fe County and 212 listed on the New Mexico State Register of Cultural Properties.

The economic and financial impacts of landslides and rockfalls on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any landslide and rockfall event.

CLIMATE CHANGE CONSIDERATIONS

While total rainfall is expected to remain the same or decrease in the Southwest region, the rainfall events that do occur will increase in severity. This increase in severe precipitation events has the potential to cause more debris flows and landslides. In addition, wildfire intensity and frequency are expected to increase. Wildfires destroy natural vegetation meaning the ground is no longer able to soak up rainfall, which can be particularly dangerous in severe rainfall events. This will cause an increase in post-fire debris flow which is particularly hazardous because they can occur with little warning, can exert great impulsive loads on objects in their paths, can strip vegetation, block drainage ways, damage structures, and endanger human life.[6]

[6] USGS. What should I know about wildfires and debris flows? https://www.usgs.gov/faqs/what-should-i-know-about-wildfires-and-debris-flows

SANTA FE COUNTY

SECTION 15
LAND SUBSIDENCE

SECTION 15: LAND SUBSIDENCE

HAZARD DESCRIPTION

Land subsidence is often described as the gradual or sudden sinking of the Earth's surface. Land subsidence typically happens slowly and goes unnoticed unless it reaches extreme levels, as seen in rare catastrophic sinkhole events. According to the United States Geological Survey (USGS), subsidence is a global problem, and in the United States more than 17,000 square miles in 45 States have been directly affected by subsidence.

Most subsidence is caused by human behavior such as mining, oil and gas extraction, and groundwater pumping from major and minor aquifer systems. The excessive removal of groundwater from aquifers that possess soluble or compressible layers may undergo an increase in erosion, compaction, and subsurface collapse. Even if the groundwater is returned to their average levels, most of land subsidence consequences are irreversible.

More than 80 percent of land subsidence in the United States is a caused by groundwater use. Subsidence is an often-overlooked environmental consequence of land and water-use practices.[1] New Mexico heavily relies on groundwater sources, and they account for an estimated 87 percent of the state's public water supply.[2] Increased development and population growth in Santa Fe County increases the demand for groundwater, and therefore, can increase land subsidence risk.

LOCATION

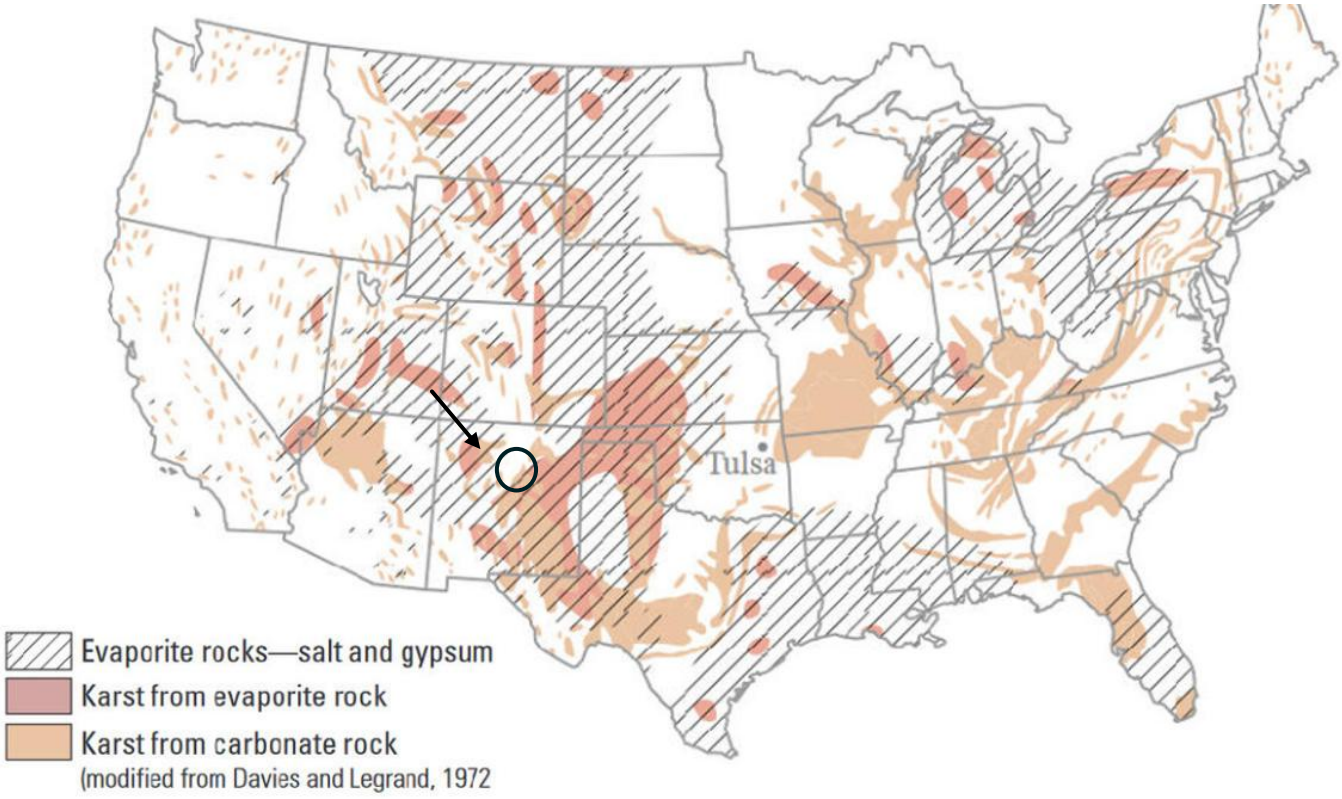
Land subsidence can be widespread and impact entire states, or it can be small and localized. The entire Santa Fe County planning area is at risk, but it was previously noted that ground water withdrawal in the eastern Pojoaque Valley, near the Nambe Dam, is a particular area of concern. While land subsidence is commonly caused by groundwater pumping, collapse features, like sinkholes, tend to be associated with different rock types such as evaporites (salt, gypsum, and

[1] United States Geological Survey (USGS). Land Subsidence. https://www.usgs.gov/mission-areas/water-resources/science/land-subsidence

[2] Environmental Protection Agency (EPA). Saving Water in New Mexico. https://www.epa.gov/sites/default/files/2017-02/documents/ws-ourwater-new-mexico-state-fact-sheet.pdf

anhydrite) and carbonates (limestone and dolomite). Evaporite rocks make up an estimated 40 percent of the United States and are more susceptible to dissolution. The map below shows prominent areas of the United States made up of these rock types. Land subsidence can occur anywhere, but these areas are at higher risk of larger underground cavities and sinkholes.

Figure 15-1. Areas Prone to Collapse[3]



EXTENT

In some rare cases, extreme land subsidence can lead to sinkholes when the subsurface land cannot support the surface land any longer. A sinkhole is described as a portion of the ground that possesses no natural external surface drainage, typically draining water into the subsurface[4]. In general the development of sinkholes can range from slow to a dramatic collapse which may result in property damage or injury and loss of life. These events can differ in size from a few feet to many acres with equal variety in depth depending on the location and conditions contributing to the event.

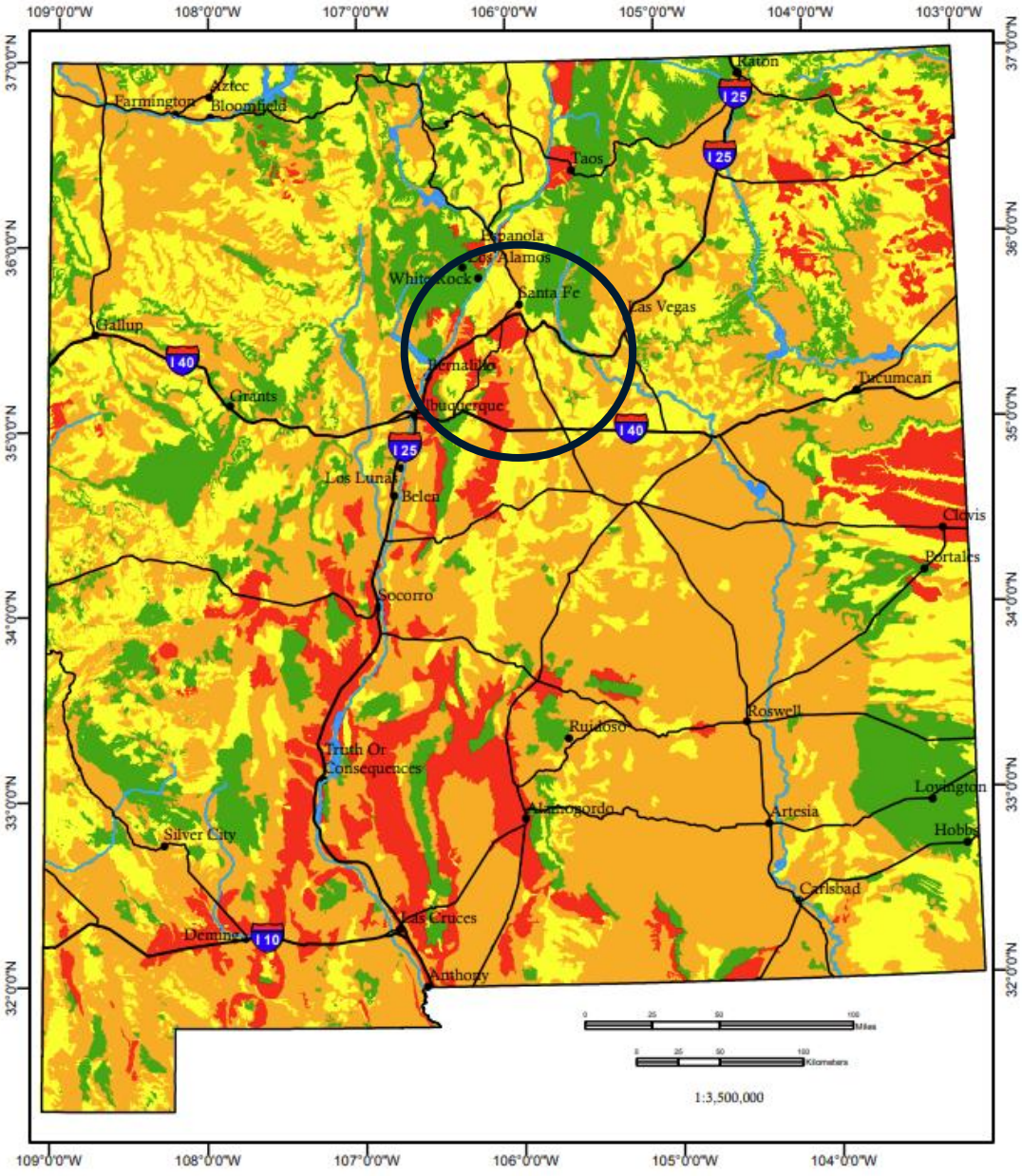
The New Mexico Bureau of Geology and Mineral Resources (NMBGMR) created a soil susceptibility map for New Mexico in 2017. These maps are meant to inform communities of their risk to soil subsidence. The map of collapsible soil total susceptibility is provided below. According

[3] United States Geological Survey (USGS). Land Subsidence in the United States. https://water.usgs.gov/ogw/pubs/fs00165/

[4] United States Geological Survey (USGS). Water Science School (2018). Sinkholes. https://www.usgs.gov/special-topics/water-science-school/science/sinkholes

to Figure 15-2 and Table 15-1, the Santa Fe County planning area can anticipate the full range of soil susceptibility (low to extreme) to collapsable soils.

Figure 15-2. NMBGMR Collapsible Soil Total Susceptibility[5]



[5] New Mexico Bureau of Geology and Mineral Resources (NMBGMR). Collapsible Soil Susceptibility Map for New Mexico. 2017. https://geoinfo.nmt.edu/publications/openfile/downloads/500-599/593/OFR-593_Report.pdf

Table 15-1. Soil Susceptibility

SUSCEPTIBILITY	SUSCEPTIBILITY RANGE	SUSCEPTIBILITY CATEGORY
	0.0 1.5	Low
	1.5 – 2.5	Moderate
	2.5 – 3.0	High
	3.0 – 3.7	Extreme

HISTORICAL OCCURRENCES

Multiple instances of subsidence have been reported in Santa Fe County, however, data on these occurrences is limited. There is no comprehensive database available to provide information on the extent and magnitude of land subsidence events. Information about known subsidence events primarily depends on local knowledge and local news sources. The following section provides descriptions of these events, though it's probable that many instances remain unreported.

SIGNIFICANT EVENTS

December 1984

Parts of northern Santa Fe County were declared disaster areas in December of 1984 when several homes east of Española were condemned due to damage caused by hydrocompactive soils.[6]

October 8, 2013

A water main break caused a sinkhole in western Santa Fe. The sinkhole was about 20 feet in diameter and an estimated 50-100 homes in the city were temporarily left without water.[7]

February 18, 2022

The area near Juniper Drive in Santa Fe was impacted by a sinkhole. City officials stated that the sinkhole was due to erosion and a water main break. It is stated that the eroded landscape was an estimated 60 yards in length.[8]

October 4, 2023

A sinkhole appeared on Guadalupe Street in the City of Santa Fe in the downtown area. The sinkhole was 10 feet deep and about 15 inches wide. Officials were alerted when a motorcyclist nearly crashed after hitting the opening, which soon increased in size. Officials stated the sinkhole was most likely caused by erosion of a waterline under the roadway.

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[6] New Mexico Bureau of Mines and Mineral Resources. Geologic Hazards in New Mexico. https://geoinfo.nmt.edu/publications/periodicals/nmg/14/n2/nmg_v14_n2_p34.pdf

[7] Santa Fe New Mexican. Water main break opens sinkhole on west side. https://www.santafenewmexican.com/news/local_news/water-main-break-opens-sinkhole-on-west-side/image_9bc0176d-6144-5943-b551-299ad9ec51c3.html

[8] Santa Fe New Mexican. North-side waterline break creates sinkhole. https://www.santafenewmexican.com/news/local_news/north-side-waterline-break-creates-sinkhole/article_84039124-74c4-11ec-a03f-db0ce977320e.html

Figure 15-3. Sinkhole on October 4, 2023[9]

PROBABILITY OF FUTURE EVENTS

With limited reporting of subsidence, it can be difficult to calculate the probability of future events. However, land subsidence may continue to develop from below-ground withdrawals or from natural or man-made forces. Additionally, increasing population trends in the planning area will lead to increasing groundwater withdrawals from surface aquifers, and this can lead to more incidences of land subsidence/sinkholes. Major occurrences of future land subsidence events are considered "Unlikely" with an event probable in the next 10 years.

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since land subsidence events can occur at any time, in random locations, and soil conditions can be very difficult and costly to monitor. Due to the randomness of these events, all existing and future structures, and facilities within the Santa Fe County planning area, could potentially be impacted and remain vulnerable to possible damage and property loss. The amount of monetary damage associated with previous events is unknown, but costs related to property damage can be expected in the future.

Damage is likely to occur to underground utility systems including water, sewage, and electrical which can lead to water and power outages, disrupting critical services. Land subsidence can also cause significant damage to roads, buildings, houses, and any other standing structure. Historically in the Santa Fe County planning area, damage has occurred to homes and transportation infrastructure. While all structures in the planning may be susceptible, those

[9] Santa Fe New Mexican. Sinkhole opens, lanes close on Guadalupe Street. https://www.santafenewmexican.com/news/local_news/sinkhole-opens-lanes-close-on-guadalupe-street/article_a90b9e1a-27d6-11ed-8c9e-d35acf8808c7.html

structures built above major aquifers or otherwise closest to groundwater removal sites may be at highest risk.

Land subsidence typically poses limited risk to people. While all citizens are vulnerable to the impacts of subsidence, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 12 percent of the planning area population live below the poverty level (Table 15-2). The elderly, children, and people with a disability may have trouble evacuating if needed, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information regarding safety measures.

Table 15-2. Populations at Greatest Risk by Jurisdiction[10]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The Santa Fe County Planning Team identified the following critical facilities (Table 15-3) as assets that are considered the most important to the planning area and are potentially susceptible to land subsidence. The critical infrastructure with the greatest vulnerability are utility services, transportation structures, and municipal infrastructure. Failures of these facilities can result in a loss of service and cascading impacts. For a comprehensive list see Appendix C.

Table 15-3. Critical Facilities Vulnerable to Land Subsidence

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities. • Damaged roads or transportation structures can impede emergency response vehicle access to areas. • Fire stations, police stations, and hospitals may suffer structural damage, affecting their ability to function effectively during emergencies. • Subsidence related emergencies may require the deployment of additional resources and personnel to impacted areas, and personnel may be exposed to unsafe conditions.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/	• Structures can be damaged by the shifting of the Earth. • Power outages could disrupt critical care. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Evacuations may be necessary due to structural damage to facilities.

[10] US Census Bureau 2022 data for Santa Fe County.

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Assisted Living Facilities	• Infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to infrastructure damage negatively impact commercial services and distribution.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Damage to underground utility systems including water, sewage, and electrical can lead to a disruption of essential services. • Emergency operations and services may be significantly impacted due to damaged facilities. • Damaged roads or transportation structures can impede emergency response vehicle access to areas. • Subsidence related emergencies may require the deployment of additional resources and personnel to impacted areas, and personnel may be exposed to unsafe conditions.

There are no reported damages, injuries, or fatalities from land subsidence events in Santa Fe County. The impact on the planning area is considered “Limited” severity, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

ASSESSMENT OF IMPACTS

Land subsidence has the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Land subsidence can be associated with a variety of impacts, including:

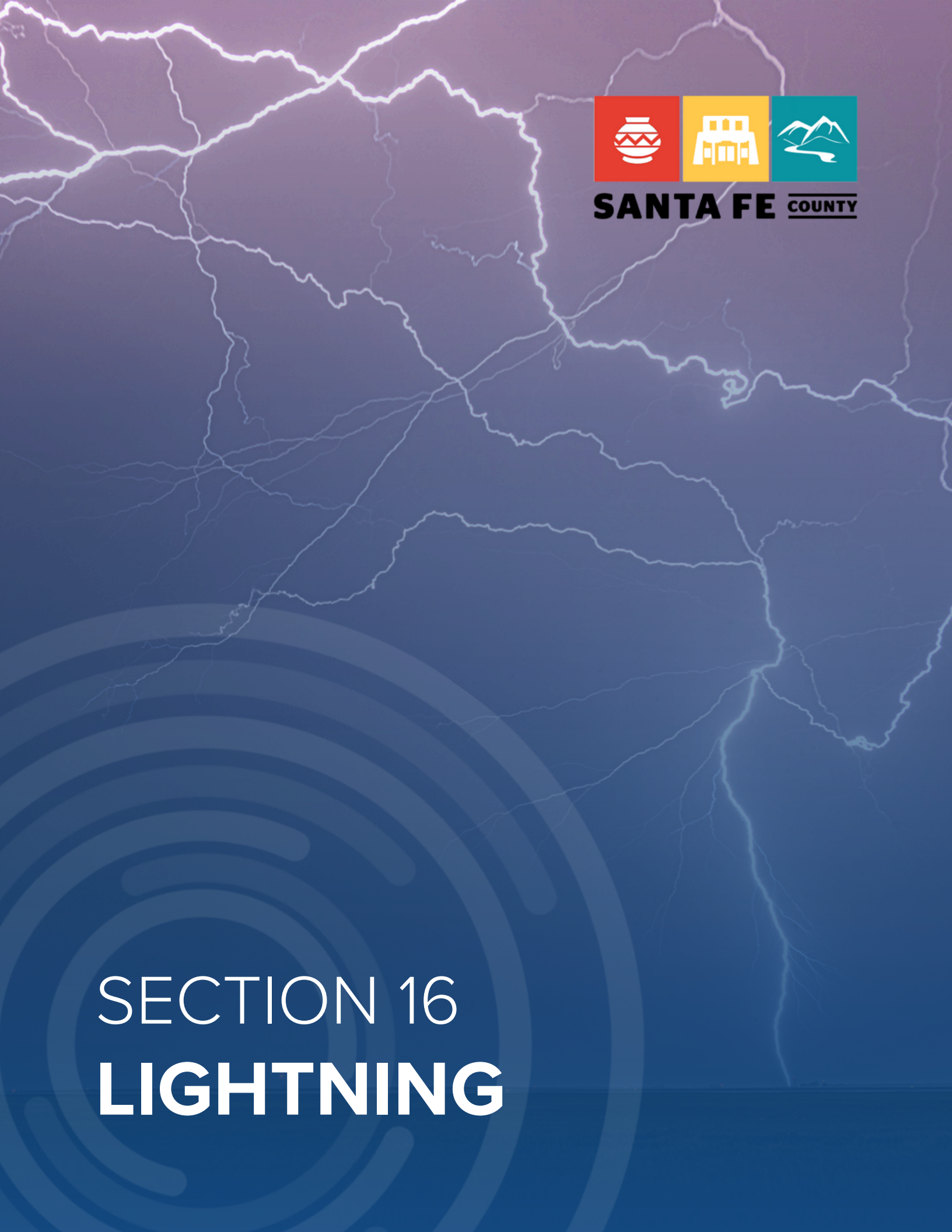
- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders, are subject to injury or illness.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents and potential contact with downed power lines.
- Power and water outages are possible throughout the planning area due to damaged power lines, underground water pipes, and other damaged utility infrastructure.
- Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, or obstructed.
- Depending on the severity and scale of damage caused by ground movement, damage to critical infrastructure can require weeks to repair.

- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to impacts of subsidence. Similarly, historic buildings and sites are placed at a higher risk of impact due to materials used and lack of fortification.
- Buildings, homes, and other structures can collapse or sink, potentially trapping residents.
- Significant subsidence can result in emergency response vehicles being unable to access areas of the community.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.
- Private sector entities such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Some businesses not directly damaged by subsidence may be negatively impacted while roads are restored, further slowing economic recovery.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are 95 historical sites listed on the National Register of Historic Places for Santa Fe County and 212 listed on the New Mexico State Register of Cultural Properties.

The economic and financial impacts of land subsidence on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any land subsidence event.

CLIMATE CHANGE CONSIDERATIONS

While data regarding the direct impact of climate change on land subsidence in non-coastal areas is limited, certain climate change conditions can increase land subsidence risk. As climate change causes higher temperatures, more severe drought, and changes in overall precipitation, the demand for water increases. In communities where groundwater is the main water source, like in Santa Fe County, the increase in groundwater pumping directly increases the risk of land subsidence.



SANTA FE COUNTY

SECTION 16
LIGHTNING

SECTION 16: LIGHTNING

HAZARD DESCRIPTION

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 often strikes outside of heavy rain and might occur as far as 10 miles away from any rainfall.

According to the National Weather Service (NWS), the 10-year (2012–2021) average for fatalities is 23 people with an average of 300 injuries in the United States each year by lightning. Lightning can occur as cloud to ground flashes or as intra-cloud lightning flashes. Direct lightning strikes can cause significant damage to buildings, critical facilities, infrastructure, and communication equipment affecting emergency response. Lightning is also responsible for igniting wildfires that can result in widespread damages to property before firefighters have the ability to contain and suppress the resultant fire.

LOCATION

Lightning can strike in any geographic location and is considered a common occurrence in New Mexico, particularly between the months of April and August.[1] The Santa Fe County planning area is in a region of the country that is moderately susceptible to a lightning strike. Therefore, lightning could occur at any location within the entire planning area. It is assumed that the entire Santa Fe County planning area is uniformly exposed to the threat of lightning.

EXTENT

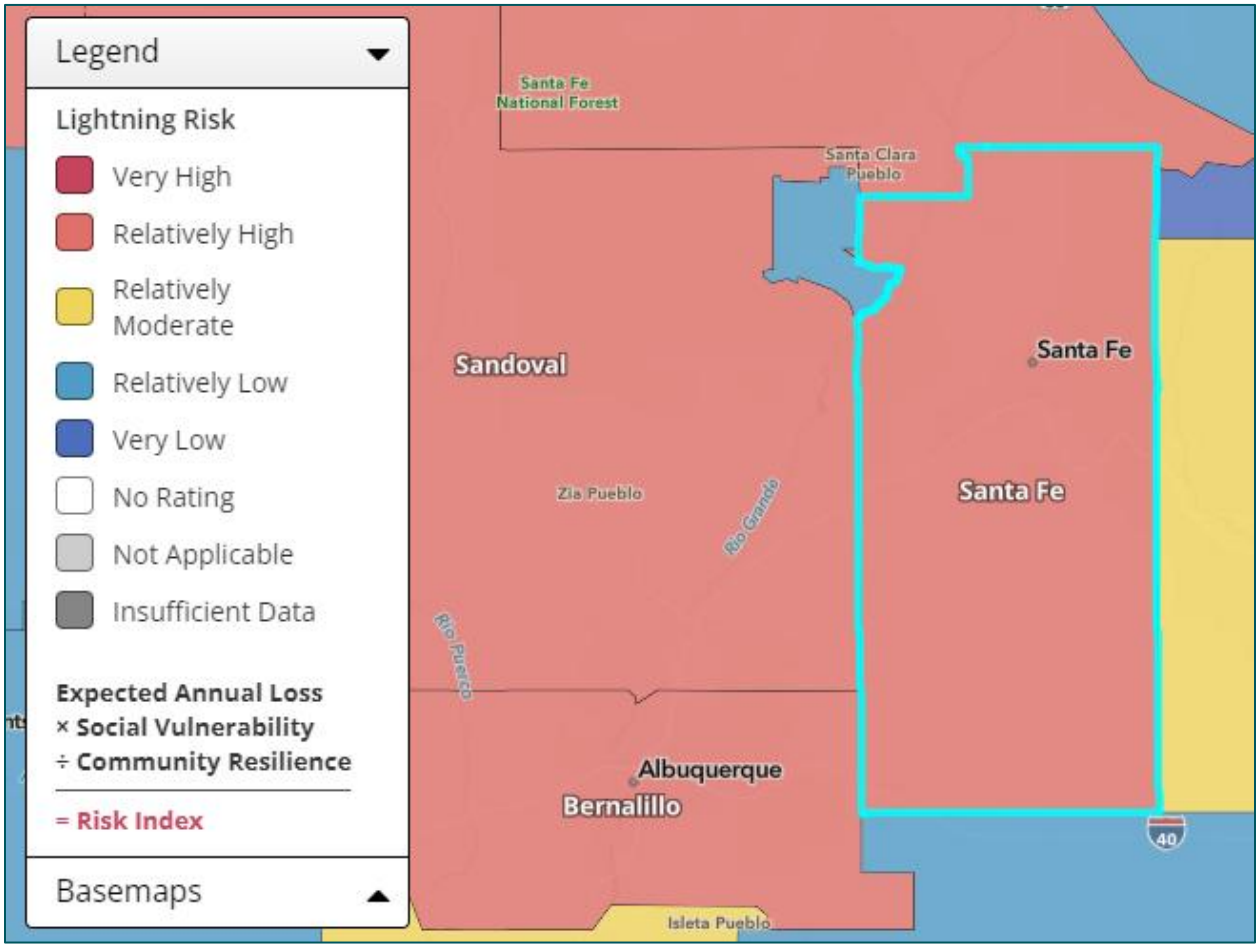
According to the 2023 Annual Lightning Report by Vaisala, the State of New Mexico ranks 27th among all states in the U.S. for lightning strike density with an average of 39.6 flashes per square

[1] Source: https://www.weather.gov/abq/prephazards#:~:text=All%2033%20counties%20in%20New,eastern%20areas%20of%20the%20state.

mile.[2] Vaisala's U.S. National Lightning Detection Network lightning flash density map shows an average of 26.7 lightning events per square mile per year for the Santa Fe County planning area.[3] This rate equates to approximately 51,000 flashes per year across the entire planning area, or one to two lightning flashes per fifteen minute interval during events.

FEMA's National Risk Index includes an analysis of the planning area's expected annual loss and the community's risk factor which incorporates social vulnerability as well as community resilience to determine the lightning risk for the area, compared to the rest of the United States. Santa Fe County is located in an area where the extent is largely classified as relatively high (Figure 16-1).

Figure 16-1. Santa Fe County Lightning Risk, National Risk Index, April 2024[4]



HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) database indicates 11 recorded lightning events for the Santa Fe County planning area. It is highly likely multiple lightning occurrences have gone unreported before and during the recording period. The NCEI is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA) and

[2] Source: https://www.xweather.com/annual-lightning-report
[3] Source: https://interactive-lightning-map.vaisala.com/
[4] Source: Map | National Risk Index, https://hazards.fema.gov/nri/map

considered a reliable resource for hazards. However, the flash density for the planning area along with input from local team members indicates regular lightning occurrences that simply have not been reported.

Table 16-1. Historical Lightning Events, 1996-2023[5]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	7/9/1996	0	0	$117,300	$0
Santa Fe County	8/3/1997	1	2	$0	$0
Santa Fe County	8/12/1998	0	1	$0	$0
Santa Fe County	8/30/1998	0	1	$0	$0
Santa Fe County	8/17/2006	0	2	$0	$0
Santa Fe County	7/24/2007	0	0	$3,000	$0
Santa Fe County	7/2/2010	0	0	$21,200	$0
Santa Fe County	7/12/2013	0	0	$0	$0
Santa Fe County	8/4/2014	0	0	$1,300	$0
Santa Fe County	8/7/2016	0	0	$0	$0
Santa Fe County	7/6/2021	0	0	$28,100	$0
TOTALS		**1**	**6**	**$170,900**	

Based on the list of historical lightning events for the Santa Fe County planning area, there has been 1 reported event since the 2018 Plan.

SIGNIFICANT EVENTS

July 9, 1997

In early July, lightning activity in the region developed late in the night between 8:30 PM and 11:00 PM. Lightning struck a house causing a fire that destroyed the home. An 80-year-old woman living in the home suffered smoke inhalation, but ultimately recovered. Total property damage from the event is estimated at $117,300 (2023 dollars).

August 3, 1997

In early August, a thunderstorm in the region led to lightning activity in the southern Sangre de Cristo Mountains around 11:30 AM in the northeastern portion of Santa Fe County. A lightning strike near the summit of Santa Fe Baldy Peak, a prominent summit, led to the death of 41-year-old hiker. The hiker's 12-year-old son, as well as another hiker, were knocked down by the lightning strike but were only slightly injured.

July 2, 2010

[5] Values are in 2023 dollars. Database was searched for events between 1996 and 2023.

Abundant moisture in the Santa Fe County area during the evening hours of July 2 into the morning of July 3 led to storms with heavy rains and prolific lightning activity. Two consecutive nights of heavy rain to led to flooding of many roadways. During the storms, lightning struck the satellite dish on top of a home southwest of the Pueblo of Tesuque. The electric current traveled down a PVC pipe into the house and blew out a 1 by 2-foot area of sheet rock. Total property damage for the event is estimated at $21,200 (2023 dollars).

July 6, 2021

An area of high pressure that had been centered over the Four Corners shifted slightly westward on July 6, 2021. Meanwhile, low level return flow continued which aided in keeping moisture values high across New Mexico. With sufficient instability and shear, another crop of thunderstorms developed first across the high terrain before becoming more widespread across lower elevations. Numerous flash floods were reported across the area with the most significant flash flooding occurring in the Belen area and farther south into Socorro County. A State of Emergency was declared in Valencia County due to the flooding. During the storms, a lightning strike resulted in a structure fire in Edgewood during the early morning hours of July 6th. The fire destroyed a shed, a porch, and a fifth wheel RV. Total property damage for the event related to lightning is estimated at $28,100 (2023 dollars).

PROBABILITY OF FUTURE EVENTS

Based on historical records and input from the planning team the probability of occurrence for future lightning events in the Santa Fe County planning area is considered “Highly Likely”, or an event probable in the next year. The planning team stated that lightning occurs regularly in the area. According to the 2023 Annual Lightning Report by Vaisala, the Santa Fe County planning area experiences approximately 26.7 lightning flashes per square mile per year (approximately 51,000 total flashes per year). Given this estimated probability of events, it can be expected that future lightning events will continue to threaten life and cause minor property damage throughout the planning area. Impacts of climate change are not expected to increase the average frequency of lightning events but may lead to an increase in the intensity of events when they do occur. See additional information on climate change at the end of this section.

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since lightning events can occur at different strength levels, in random locations, and can create a broad range of damage depending on the strike location. Due to the randomness of these events, all existing and future structures and facilities in the Santa Fe County planning area could potentially be impacted and remain vulnerable to possible injury and property loss from lightning strikes.

The direct and indirect losses associated with these events include injury and loss of life, damage to structures and infrastructure, agricultural losses, utility failure (power outages), and stress on community resources. The entire population of the Santa Fe County planning area is considered exposed to the lightning hazard. The peak lightning season in the State of New Mexico is from July to August; with storms also peaking in the spring (April through June) in the eastern areas of the state. Fatalities occur most often when people are outdoors and/or participating in some form of recreation. Populations located outdoors during a lightning event is considered at risk and more

vulnerable to a lightning strike compared to those inside a structure. Moving to a lower risk location will decrease a person's vulnerability.

The entire general building stock and all infrastructure of the Santa Fe County planning area, are considered exposed to the lightning hazard. Lightning can be responsible for damages to buildings, cause electrical, forest and/or wildfires, and damage infrastructure such as power transmission lines and communication towers.

While all citizens are at risk to the impacts of lightning, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 12 percent of the planning area population live below the poverty level and 26 percent of the total population is 65 years and older. In addition, people who speak a language other than English (31 percent of planning area population) may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. Persons with disabilities (14 percent of the total population) may also need additional assistance during an event and in recovery. Power outages as a result of lightning event also pose a greater risk to individuals that are dependent on electricity to live independently in their homes.

Table 16-2. Populations at Greatest Risk to Lightning Events[6]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The Santa Fe County Planning Team identified the following critical facilities (Table 16-3) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by lightning events. For a comprehensive list see Appendix C.

Table 16-3. Critical Facilities Vulnerable to Lightning Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications as a result of lightning strikes. • Emergency vehicles, including critical equipment, can be damaged by lightning strikes or by falling trees damaged by lightning. • Power outages could disrupt communications, delaying emergency response times. • Downed trees due to lightning strikes can impede emergency response vehicle access to areas.

[6] US Census Bureau, American Community Survey Five-Year Estimates, 2022

CRITICAL FACILITIES	POTENTIAL IMPACTS
	• Lightning strikes can be associated with structure fires and wildfires, further straining the capacity and resources of emergency personnel. • Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by falling trees damaged by lightning. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, fires, or other associated damages to facilities.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages and fires negatively impact airport services as well as area businesses reliant on airport operations.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and critical services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications as a result of lightning strikes. • Emergency vehicles, including critical equipment, can be damaged by lightning strikes or by falling trees damaged by lightning. • Power outages could disrupt communications, delaying emergency response times. • Downed trees due to lightning strikes can impede emergency response vehicle access to areas. • Lightning strikes can be associated with structure fires and wildfires, further straining the capacity and resources of emergency personnel. • Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

There is one recorded fatality and six recorded injuries within the Santa Fe County planning area due to lightning events.The Santa Fe County planning area has experienced relatively limited historical losses and damages as a result of lightning events based on available records, which in terms of structural damages, would indicate a limited impact, with minimal quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed. However, with one recorded fatality and six recorded injuries due to lightning, the severity of impact on the Santa Fe County planning area is considered “Substantial” with multiple injuries and fatalities possible depending on the severity and frequency of events.Overall, the total

loss estimate for the planning area (in 2023 dollars) is $170,900 with an average annualized loss of $6,100 (Table 16-4).

Table 16-4. Potential Annualized Losses in Santa Fe County[7]

JURISDICTION	TOTAL PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATE
Santa Fe County	$170,900	$6,100

ASSESSMENT OF IMPACTS

Lightning events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Additional impacts to the planning area can include:

- The Santa Fe County planning area features developed parks and green spaces. Lightning events could impact recreational activities, placing residents and visitors in imminent danger, potentially requiring emergency services or park evacuation.
- Older structures built to less stringent building codes may suffer greater damage from a lightning strike as they are typically built with less fire-resistant materials and often lack any fire mitigation measures such as sprinkler systems. 53 percent of homes in the county were built before 1980. Similarly, historic buildings may lack fire mitigation materials or measures due to their historic status. Currently, 96 sites and districts in the Santa Fe County planning area are listed on the National Register of Historic Places and 212 are listed on the New Mexico State Register of Cultural Properties.
- Vegetation in urban parks may be destroyed by lightning caused brush fires and result in poor air quality impacting public health.
- Individuals exposed to the storm can be directly struck, posing significant health risks and potential death.
- Structures can be damaged or crushed by falling trees damaged by lightning, which can result in physical harm to the occupants.
- Lightning strikes can result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Lightning strikes can be associated with structure fires and wildfires, creating additional risk to residents and first responders.
- Emergency operations and services may be significantly impacted due to power outages and/or loss of communications.
- County departments may be damaged, delaying response and recovery efforts for the entire community.
- Economic disruption due to power outages and fires negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.

- Some businesses not directly damaged by lightning events may be negatively impacted while utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.

The economic and financial impacts of lightning on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any significant lightning event.

CLIMATE CHANGE CONSIDERATIONS

As CO_2 increases and the land surface warms, stronger updrafts are more likely to produce lightning. In a climate with double the amount of CO_2, we may see fewer lightning storms overall, but 25 percent stronger storms, with a 5 percent increase in lightning. Lightning damage is also likely to increase because of its role in igniting forest fires, where dry vegetation, also caused by rising temperatures, creates more 'fuel' for fires, so even a small climate change may have huge consequences. While the impact climate change will have on our weather still remains uncertain, researchers agree that implementing simple measures like lightning detection systems and installing grounding systems in buildings could go a long way in avoiding deaths and injuries.[8]

Lightning events have the potential to pose a significant risk to people and property throughout the planning area. The economic and financial impacts of lightning on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. While no increase in the number of hazard events is anticipated, the impact of the hazard may see an increase in losses. As populations grow and urban development continues to rise, the overall vulnerability and impact are expected to increase in the next five years.

[8] Environmental Journal, Nathan Neal, January 11, 2021.

SANTA FE COUNTY

SECTION 17
TORNADO

SECTION 17: TORNADO

HAZARD DESCRIPTION

Tornadoes are among the most violent storms on the planet. A tornado is a rapidly rotating column of air extending between, and in contact with, a cloud and the surface of the earth. The most violent tornadoes are capable of tremendous destruction and have wind speeds of 250 miles per hour (mph) or more. In extreme cases, winds may approach 300 mph. Damage paths can be in excess of one mile wide and 50 miles long.

The most powerful tornadoes are produced by "Supercell Thunderstorms." These thunderstorms are created when horizontal wind shears (winds moving in different directions at different altitudes) begin to rotate the storm. This horizontal rotation can be tilted vertically by violent updrafts, and the rotation radius can shrink, forming a vertical column of very quickly swirling air. This rotating air can eventually reach the ground, forming a tornado**.**

Table 17-1. Variations among Tornadoes

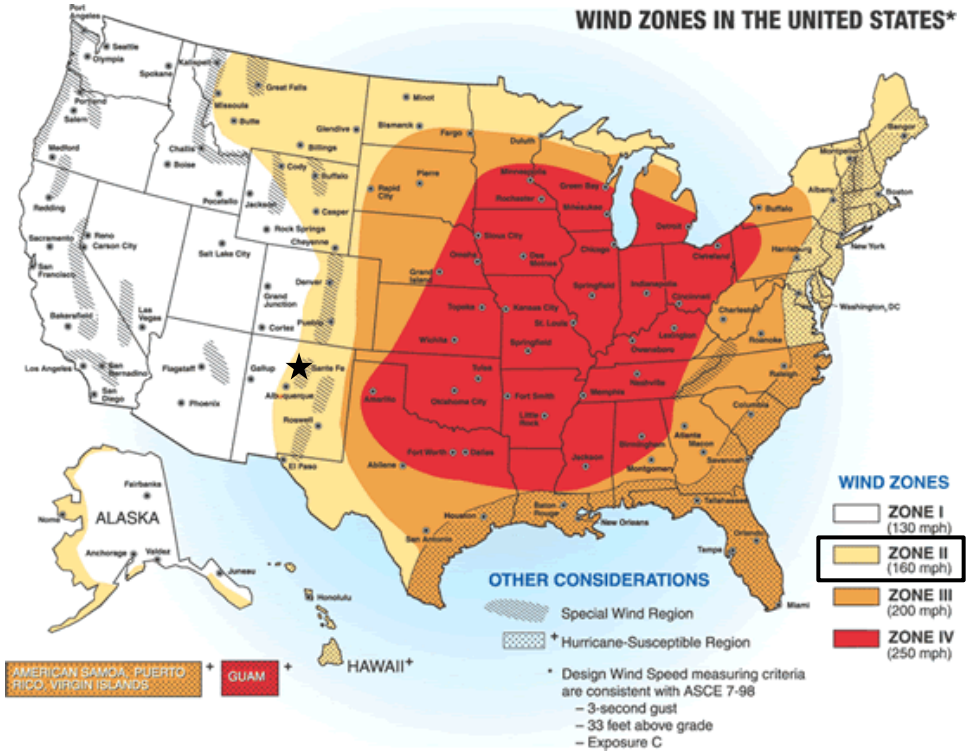
WEAK TORNADOES	STRONG TORNADOES	VIOLENT TORNADOES
• 69% of all tornadoes • Less than 5% of tornado deaths • Lifetime 1-10+ minutes • Winds less than 110 mph	• 29% of all tornadoes • Nearly 30% of all tornado deaths • May last 20 minutes or longer • Winds 110 – 205 mph	• 2% of all tornadoes • 70% of all tornado deaths • Lifetime can exceed one hour • Winds greater than 205 mph

LOCATION

Tornadoes do not have any specific geographic boundary and can occur throughout the county uniformly. It is assumed that the entire Santa Fe County planning area is uniformly exposed to

tornado activity. The entire Santa Fe County planning area is in Wind Zone II (Figure 17-1), where tornado winds can be as high as 160 mph.

Figure 17-1. FEMA Wind Zones in the United States[1]



EXTENT

The destruction caused by tornadoes ranges from light to inconceivable, depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, such as residential homes (particularly mobile homes).

Tornado magnitudes prior to 2007 were determined using the traditional version of the Fujita Scale, which estimated tornado wind speeds based on the damage caused by an event. Since February 2007, the Enhanced Fujita Scale has been utilized to classify tornadoes, which included improvements to the original scale. The original Fujita scale had limitations, such as a lack of damage indicators, no account for construction quality and variability, and no definitive correlation between damage and wind speed. These limitations led to some tornadoes being rated in an inconsistent manner and, in some cases, an overestimate of tornado wind speeds. The Enhanced Fujita scale retains the same basic design and six strength categories as the previous scale. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures. Table 17-2 includes both scales for reference when analyzing historical tornados since tornado events prior to 2007 will follow the original Fujita Scale.

[1] Santa Fe County is indicated by the star.

Table 17-2. The Fujita and Enhanced Fujita Tornado Scale[2]

Enhanced Fujita Scale				Fujita Scale			
Category	**Wind Speed**	**Damage Level**	**Damage**	**Category**	**Wind Speed**	**Intensity**	**Damage**
EF0	65-85 MPH	Gale	The environment sustained minor damage: tree branches are broken, some shallow-rooted trees are uprooted, and some chimneys are damaged.	**F0**	45-78 MPH	Gale	Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
EF1	86-110 MPH	Weak	The environment sustained moderate damage: mobile homes are tipped over, windows are broken, roof tiles may be blown off, and some tree trunks have snapped.	**F1**	79-117 MPH	Moderate	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
EF2	111-135 MPH	Strong	The environment sustained considerable damage: mobile homes are destroyed, roofs are damaged, debris flies in the air, and large trees are snapped or uprooted.	**F2**	118-161 MPH	Significant	Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165 MPH	Severe	The environment sustained severe damage: roofs and walls are ripped off buildings, small buildings are destroyed, and most trees are uprooted.	**F3**	162-209 MPH	Severe	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
EF4	166-200 MPH	Devastating	The environment sustained devastating damage: well-built homes are destroyed, buildings are lifted off their foundations, cars are blown away, and large debris flies in the air.	**F4**	210-261 MPH	Devastating	Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated.
EF5	200+ MPH	Incredible	The environment sustained incredible damage: well-built homes are lifted from their foundations, reinforced concrete buildings are damaged, the bark is stripped from trees, and car-sized debris flies through the air.	**F5**	262-317 MPH	Incredible	Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

[2] Source: http://www.tornadoproject.com/fscale/fscale.htm

Both the Fujita Scale and Enhanced Fujita Scale should be referenced in reviewing previous occurrences since tornado events that occurred before 2007 will follow the original Fujita Scale. The greatest magnitude reported within the planning area is an F1 (an EF0 to EF2 when converted to the on the Enhanced Fujita Scale, depending on exact wind speed), a weak tornado. Based on the planning area's location in Wind Zone II, the planning area has the potential to experience anywhere from an EF0 to an EF4 depending on the wind speed. Previous tornado events in the Santa Fe County planning area (converted from the Fujita Scale) have been between EF0 and EF2 (Figure 17-2).

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCEI is the largest archive available for historic storm events data; however, it is important to note that only incidents recorded in the NCEI have been factored into this risk assessment unless otherwise noted. It is likely that a number of occurrences have gone unreported over time.

Figure 17-2 identifies the locations of previous occurrences in the Santa Fe County planning area from 1956 through 2023. A total of 27 events have been recorded by NOAA's Storm Prediction Center and National Centers for Environmental Information (NCEI) databases for the Santa Fe County planning area. The strongest event reported in the planning area was an F1 tornado, which occurred on several different occasions. In terms of injuries and fatalities, the most significant event occurred in Santa Fe County on July 7, 2015, and included 1 injury and accounted for more than $120,000 in damages (2023 dollars).

Figure 17-2. Spatial Historical Tornado Events, 1956-2023[3]

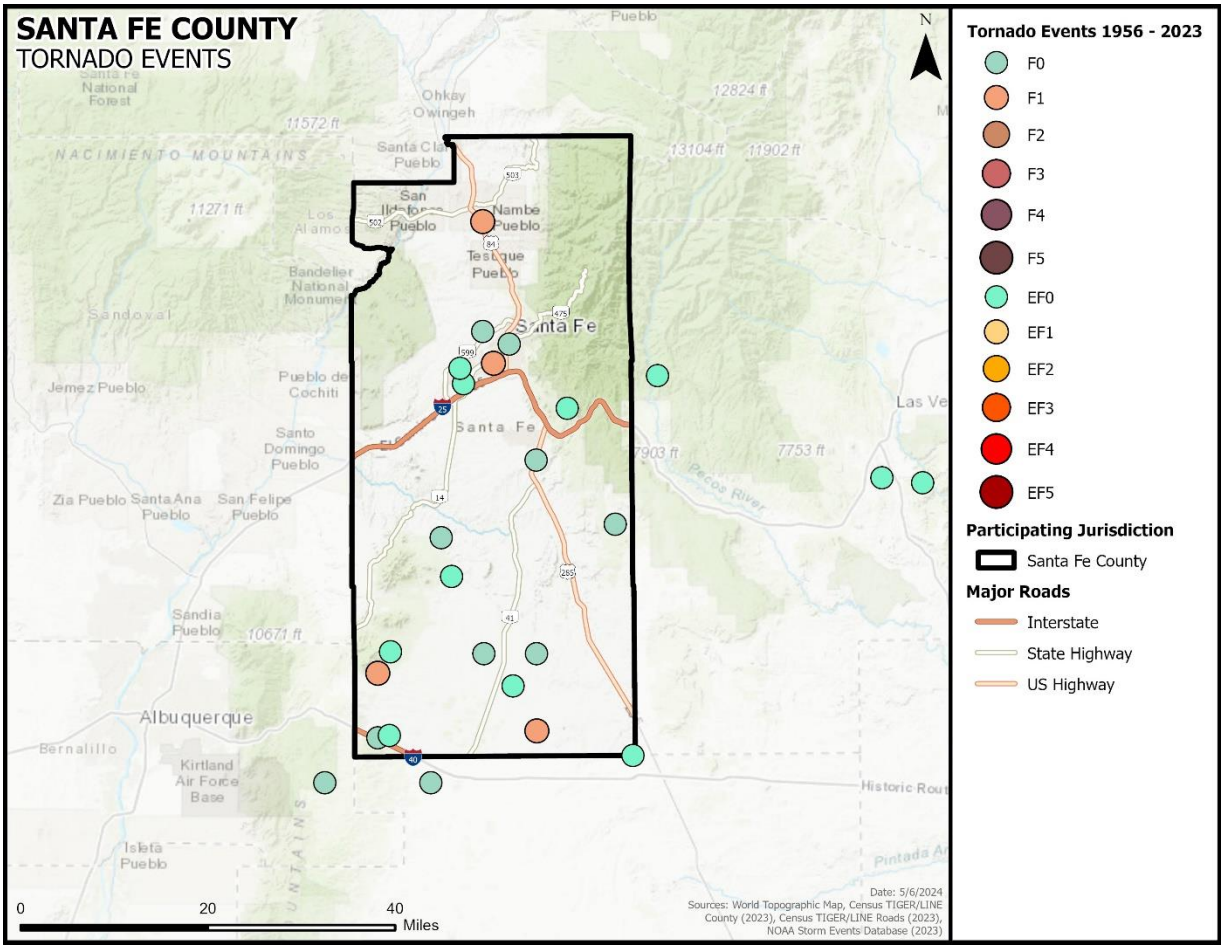


Table 17-3. Historical Tornado Events, 1956-2023[4]

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	5/25/1956	F0	0	0	$0	$0
Santa Fe County	8/20/1956	F1	0	0	$28,100	$0
Santa Fe County	5/30/1957	F0	0	0	$400	$0
Santa Fe County	5/9/1959	F0	0	0	$0	$0
Santa Fe County	5/9/1959	F0	0	0	$0	$0
Santa Fe County	5/15/1959	F0	0	0	$0	$0
Santa Fe County	9/30/1960	F0	0	0	$0	$0

[3] Source: NOAA Storm Prediction Center
[4] Only recorded events with fatalities, injuries or damages are listed. Magnitude is listed when available. Damage values are in 2023 dollars.

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	8/16/1961	F0	0	0	$0	$0
Santa Fe County	5/26/1966	F0	0	0	$2,400	$0
Santa Fe County	12/26/1966	F1	0	0	$2,330,900	$0
Santa Fe County	4/15/1971	F1	0	0	$191,300	$0
Santa Fe County	6/15/1972	F0	0	0	$0	$0
Santa Fe County	6/8/1989	F0	0	0	$0	$0
Santa Fe County	6/8/1989	F1	0	0	$0	$0
Santa Fe County	8/15/1990	F0	0	0	$0	$0
Santa Fe County	6/29/1991	F0	0	0	$5,700	$0
Santa Fe County	6/9/2007	EF0	0	0	$0	$0
Santa Fe County	6/9/2007	EF0	0	0	$0	$0
Santa Fe County	8/17/2008	EF0	0	0	$0	$0
Santa Fe County	10/11/2008	EF0	0	0	$17,000	$0
Santa Fe County	7/18/2009	EF0	0	0	$0	$0
Santa Fe County	7/24/2012	EF0	0	0	$0	$0
Santa Fe County	10/12/2012	EF0	0	0	$66,400	$0
Santa Fe County	7/7/2015	EF0	0	1	$128,600	$0
Santa Fe County	5/9/2017	EF0	0	0	$0	$0
Santa Fe County	5/9/2017	EF0	0	0	$0	$0
Santa Fe County	7/13/2021	EF0	0	0	$0	$0
TOTALS		**(MAX EXTENT)**	**0**	**1**	**$2,770,800**	**$0**

Based on the list of historical tornado events for the Santa Fe County planning area there has been one recorded event since the 2018 Plan.

SIGNIFICANT EVENTS

December 26, 1966

A tornado touched down southeast of Pojoaque in Santa Fe County. This tornado was an F1 and there are reports of lots of blowing sand, rocks, and damaged cars, according to the National Weather Service. This is the costliest reported tornado event for the Santa Fe County planning area, which caused $2,330,900 (2023 dollars) in property damages. There were no reported injuries or fatalities.

July 7, 2015
A thunderstorm moved southeast along two colliding outflow boundaries near Edgewood in Santa Fe County. This thunderstorm produced a brief EF0 tornado. According to reports, a 30'x20' metal hay barn was tossed a quarter mile away from its original location and crashed into a nearby home. One resident in this home was injured. Property damages for this event were reported to be $128,600 (2023 dollars).

PROBABILITY OF FUTURE EVENTS

Tornadoes can occur at any time of year and at any time of day, but they are typically more common in the spring months during the late afternoon and evening hours. A smaller, high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. With 27 historical events over a 68-year reporting period, Santa Fe County can anticipate a tornado touchdown approximately once every two to three years. This frequency supports an "Likely" probability of future events for the Santa Fe County planning area.

VULNERABILITY AND IMPACT

Because tornadoes often cross jurisdictional boundaries, all existing and future buildings, facilities, and populations in the entire Santa Fe County planning area are considered to be exposed to this hazard and could potentially be impacted. The damage caused by a tornado is typically a result of high wind velocity, wind-blown debris, lightning, and large hail.

The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. Consequently, vulnerability of humans and property is difficult to evaluate since tornadoes form at different strengths, in random locations, and create relatively narrow paths of destruction. Although tornadoes strike at random, making all buildings vulnerable, three types of structures are more likely to suffer damage:

- Manufactured Homes;
- Homes built of peer and beam construction (more susceptible to lift); and
- Buildings with large spans, such as shopping malls, gymnasiums, and factories.

Tornadoes can cause a significant threat to people as they could be struck by flying debris, falling trees / branches, utility lines, and poles. Blocked roads could prevent first responders from responding to calls. Tornadoes commonly cause power outages which could cause health and safety risks to residents and visitors, as well as to patients in hospitals.

The Santa Fe County planning area features mobile or manufactured home parks throughout the planning area. These parks are typically more vulnerable to tornado events than typical site-built structures. In addition, manufactured homes are located sporadically throughout the planning area, which would also be more vulnerable. The U.S. Census data indicates a total of 10,990 (14 percent of total housing stock) manufactured homes located in the Santa Fe County planning area. In addition, 53 percent (approximately 40,547 structures) of the single family residential (SFR) structures in the entire planning area were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant wind events (Table 17-4).

Table 17-4. Structures at Greatest Risk to Tornado Events

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Santa Fe County	40,547	10,990

While all citizens are at risk to the impacts of a tornado, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. The elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. The population over 65 in the Santa Fe County planning area is estimated at 26 percent of the total population and children under the age of 5 are estimated at 4 percent, and the population with a disability is estimated at 14 percent of the total population. In addition, an estimated 12 percent of the planning area population live below the poverty level and 31 percent of the populations speaks a language other than English (Table 17-5).

Table 17-5. Populations Vulnerable to Tornado Events[5]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The Santa Fe County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by tornado events (Table 17-6). The critical infrastructure with the greatest vulnerability to tornadoes are power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on electricity as a medical necessity. For a comprehensive list see Appendix C.

[5] U.S. Census Bureau 2022 data for Santa Fe County

Table 17-6. Critical Facilities Vulnerable to Tornado Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by falling trees damaged by lightning. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, fires, or other associated damage to facilities. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. • Additional emergency responders and critical aid workers may not be able to reach the area for days.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas.

CRITICAL FACILITIES	POTENTIAL IMPACTS
	• Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

The total loss estimate due to tornado events is $2,770,800 (2023 dollars), having an approximate annual loss estimate of $40,700. Based on historic damages and best available data the impact of a tornado event on the Santa Fe County planning area would be considered "Limited", with injuries and illnesses treatable with first aid, critical facilities and services shutdown for 24-hours or less and less than 10 percent of properties destroyed or with major damage.

Table 17-8. Estimated Average Annual Losses

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Santa Fe County	$2,770,800	$40,700

ASSESSMENT OF IMPACTS

Tornadoes have the potential to pose a significant risk to the population and can create dangerous situations. Often, providing and preserving public health and safety is difficult. The impact of climate change could produce larger, more severe tornado events, exacerbating the current tornado impacts. More destructive tornado conditions can be frequently associated with a variety of impacts, including:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Manufactured homes may suffer substantial damage as they would be more vulnerable than typical site-built structures.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Tornadoes often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Tornadoes can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.

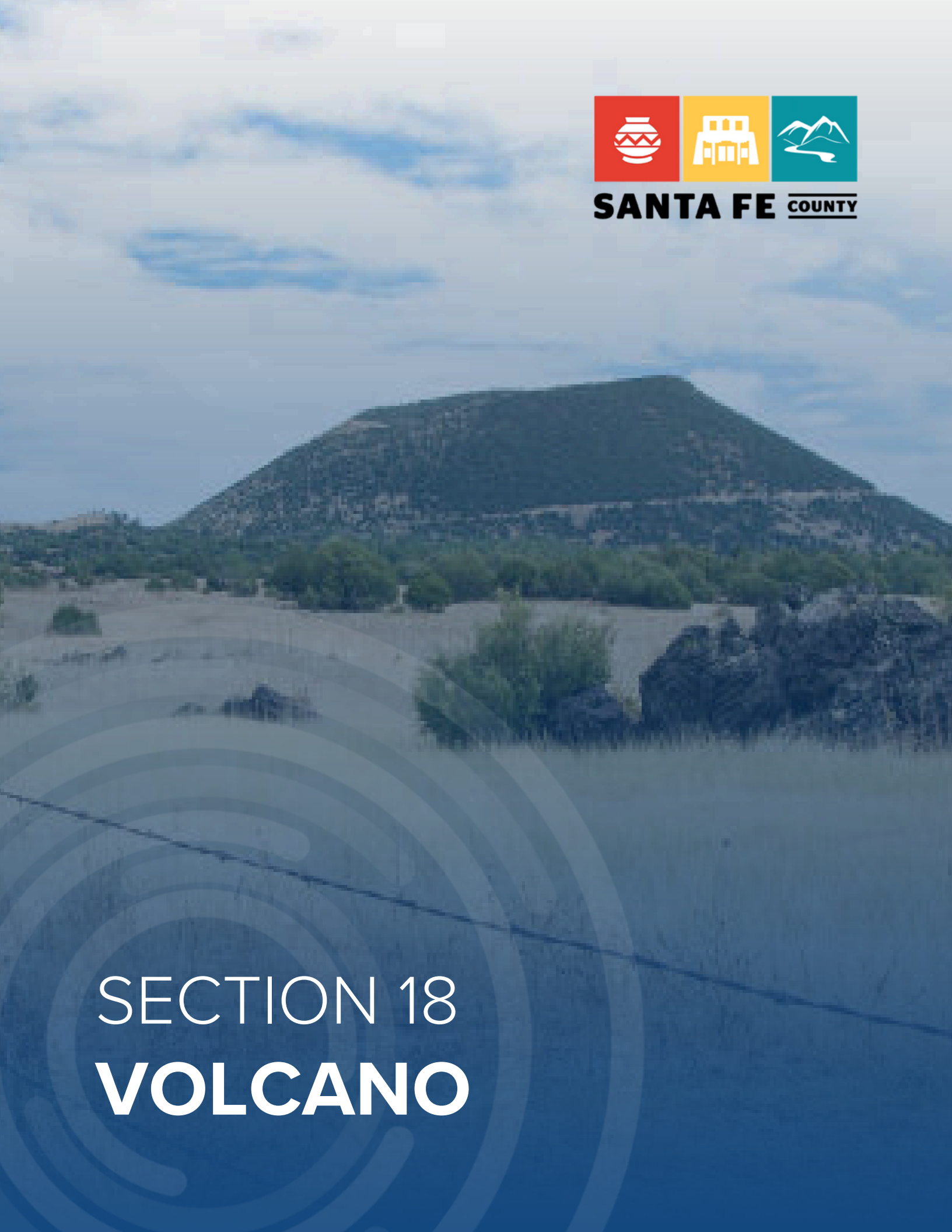
- First responders must enter the damage area shortly after the tornado passes to begin rescue operations and to organize cleanup and assessments efforts, therefore they are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.
- Private sector entities such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue, especially if damage is sustained to major employers within the planning area.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, and normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures destroyed by a tornado may not be rebuilt for years, reducing the tax base for the community.
- Large or intense tornadoes may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable, and tourism can be unappealing for years following a large tornado, devastating directly related local businesses.
- Tornadoes may destroy or degrade endangered species habitat
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. The Santa Fe County planning area has 96 historical properties listed on the National Register of Historic Places and 212 listed on the New Mexico State Register of Cultural Properties.

The economic and financial impacts of a tornado event on the community will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a tornado event.

CLIMATE CHANGE CONSIDERATIONS

According to the National Oceanic and Atmospheric Administration (NOAA), the average annual number of EF1+ tornadoes is stable and has not shown a significant increase or decrease so far. However, tornado outbreaks, events with 16 or more EF1+ tornadoes, are increasing. There is also some evidence that suggests a shift in when we might experience tornadoes, due to climate change. According to the NOAA, the number of EF-1+ tornadoes is decreasing in the spring and summer but increasing in the fall and winter. This suggests a greater risk of more off-season tornadoes in the future warmer climate. This could mean more tornado events at a time of year when people are not expecting it. The impacts on the frequency and severity of tornado events due to climate change can be hard to understand and results are generally inconclusive for tornado frequency during the traditional severe weather season.[6]

[6] National Oceanic and Atmospheric Administration. Tornadoes and Climate Change. https://www.noaa.gov/sites/default/files/2023-10/Tornadoes_Climate_OnePager_July2023.pdf



SANTA FE COUNTY

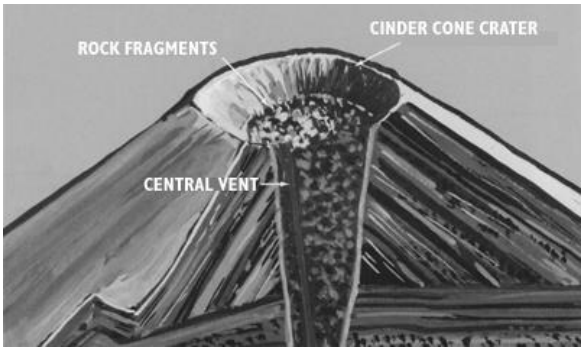
SECTION 18
VOLCANO

SECTION 18: VOLCANO

HAZARD DESCRIPTION

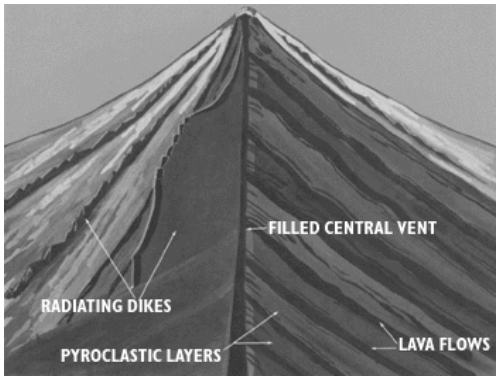
Volcanoes are openings in the Earth's surface where lava, tephra (small rocks), and steam erupt onto the surface. A volcanic eruption is the expulsion of these materials onto the Earth's surface or into the atmosphere. Volcanic eruptions can range from small, only consisting of gas emissions, to large scale, with cataclysmic explosions. They can last days, months, or even years.

According to the United States Geological Survey (USGS), there are many different types of volcanoes. The four primary types include cinder cones, composite volcanos (stratovolcano), shield volcanoes, and lava domes.[1] Each type of volcano can be found in the state of New Mexico.

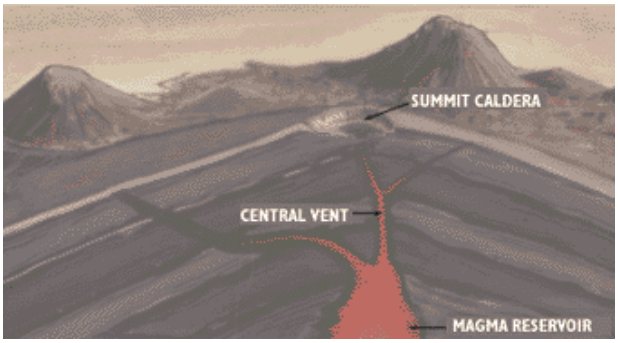


Cinder Cones are the simplest type of volcano. They develop as cinder (solid lava) erupts from a vent (the opening in the Earth's crust). As gas-charged lava is blown into the air, it solidifies around the vent to form a cone. Most cinder cones have a crater at the center where the vent is located. Cinder cones are common in western North America and in other volcanic areas around the world.

Composite volcanos, or stratovolcanoes, make up some of the Earth's largest and grandest mountains. They are usually steep, symmetrical cones that are made from different layers of lava, ash, and cinder. Composite volcanos notoriously have large pools of magma deep under the mountain, in the Earth's crust. The volcano increases in size as this material erupts and cools.

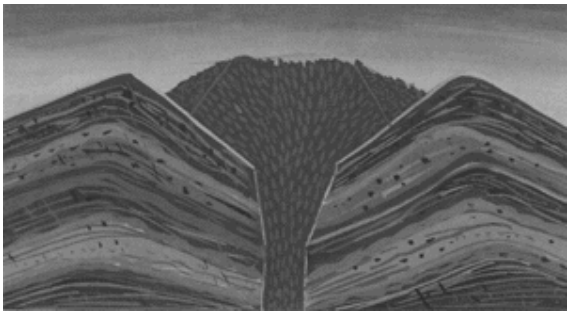


[1] United States Geological Survey (USGS). Principal Types of Volcanoes. https://pubs.usgs.gov/gip/volc/types.html



Shield volcanoes are made entirely of fluid lava flows. Flow after flow pours out of the vent in all directions, building a flat cone with a dome shape. It resembles a warrior's shield. Lava commonly erupts from vents along fractures that develop on the cone. Some of the largest volcanoes in the world are shield volcanoes. These types can typically be found in the western United States.

Lava domes are made of lava that is too thick to flow a far distance. This lava will pile up over and around its vent, which forms a dome shape. Lava domes are dangerous because they grow from within. As fresh lava fills the inside, the cooler, dried outer surface will shatter and spill hot rock and gases down the mountain. Lava domes commonly form within the craters of composite volcanoes.



One additional volcano type is the caldera, which is closest to the Santa Fe County planning area. Calderas are both its own type and a landform as part of other volcanoes. Calderas are referred to as inverse volcanoes because they are collapse features that form during large volcanic eruptions when the magma chamber is only partially emptied and the ground above it subsides into it.[2]

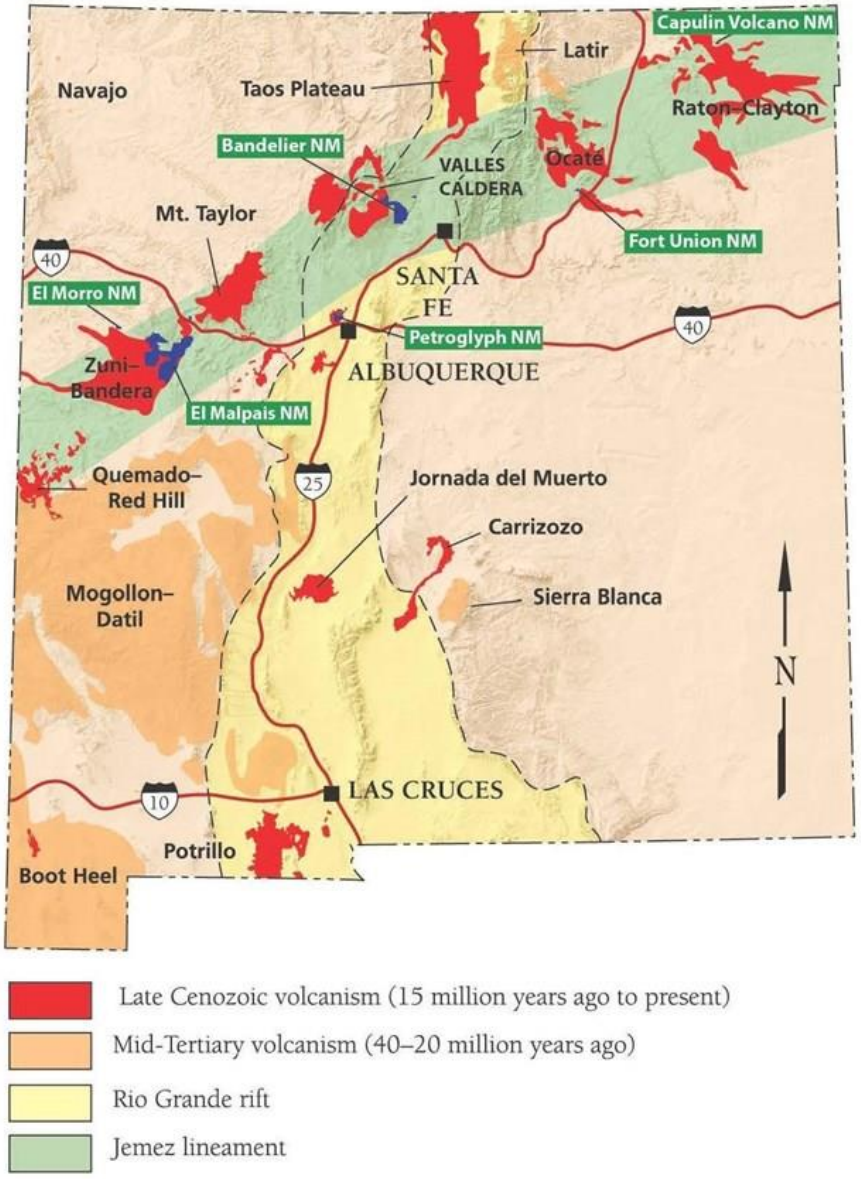
LOCATION

According to the USGS, there are an estimated 1,350 potentially active volcanoes worldwide and about 500 of these volcanoes have erupted in the last 100 years. USGS scientists monitor 160 active and potentially active volcanoes in the United States. These volcanoes are located in Alaska, Hawaii, and the western states, including New Mexico.

New Mexico has one of the greatest concentrations of young volcanoes in North America. Santa Fe County is near the intersection of two major fault systems, including the Rio Grande Rift and the Jemez Lineament, as shown in Figure 18-1. The Jemez Mountains, along the western Rio Grande rift, are home to a volcanic field. The Jemez volcanic field formed 14 million years ago with a series of eruptions. The most recent event, about 1.2 million years ago, caused the earth to collapse, creating the 15-mile-wide Valles Caldera. Today, Valles Caldera is dormant, but not extinct, and it still displays signs of activity with hot springs and boiling sulfuric acid. If the volcano reawakens there would be signs, like small earthquakes.[3]

[2] National Park Service. Calderas. https://www.nps.gov/articles/000/calderas.htm
[3] National Park Service. Valles Caldera. https://www.nps.gov/vall/learn/nature/geology.htm#:~:text=The%20Jemez%20volcanic%20field%20started,years%20ago)%20formed%20Valles%20Caldera.

Figure 18-1. Map of Volcanic National Park Sites[4]



Valles Caldera is just northwest of Santa Fe County; therefore, the entire Santa Fe County planning area is at some risk of geothermal activity or potential volcanic activity.

[4] National Park Service. Valles Caldera. https://www.nps.gov/vall/learn/nature/geology.htm#:~:text=The%20Jemez%20volcanic%20field%20started,years%20ago)%20formed%20Valles%20Caldera.

Figure 18-2. Image of Valles Caldera[5]

EXTENT

The destruction caused by volcanoes range from light to devastating, depending on the intensity, length of eruption, and type of volcano. The Volcanic Explosivity Index (VEI) is a scale that measures the extent of a volcanic eruption based on magnitude and intensity. The scale has numerical intervals from 0 to 8, with effusive Hawaiian-style eruptions rated 0 on the index, and super volcano eruptions such as Yellowstone at an 8. The scale is based on the volume of magma erupted, which represents magnitude, and the height of the eruption column, which represents intensity. The VEI also includes a qualitative description for each value, ranging from "effusive" to "apocalyptic" as shown in Table 18-1.[6] Since the Valles Caldera is dormant and has not been active in a very long time, it can be difficult to estimate the full extent of a potential eruption. However, based on the volcano type provided in the VEI, Santa Fe County could experience a maximum VEI of 7.

[5] USGS. Volcano Hazards Program. https://www.usgs.gov/natural-hazards/volcano-hazards/

[6] National Park Service. VEI. https://www.nps.gov/subjects/volcanoes/volcanic-explosivity-index.htm#:~:text=The%20Volcanic%20Explosivity%20Index%20(VEI,for%20the%20size%20of%20earthquakes.

Table 18-1. Volcanic Explosivity Index (VEI)

VEI	DESCRIPTION	EJECTA VOLUME (km3)	COLUMN HEIGHT (km)	VOLCANO TYPES
0	Effusive	<0.00001	<0.1	Many Shield Volcanoes
1	Severe	0.001	1	Many Shield Volcanoes; Many Cinder Cones
2	Explosive	0.01	5	Most Cinder Cones
3	Catastrophic	0.1	15	Most Cinder Cones
4	Cataclysmic	1	25	Few Cinder Cones; Composite Volcanoes
5	Paroxysmal	10	>25	Composite Volcanoes
6	Colossal	100	>25	Calderas
7	Mega-colossal	1,000	>25	Calderas
8	Apocalyptic	>1,000	>25	Super Volcanoes

HISTORICAL OCCURRENCES

According to the New Mexico Bureau of Geology and Mineral Resources, there have been 700 volcanic eruptions across the state in the last 5 million years. The most recent volcanic eruption to occur in the state of New Mexico occurred about 3,900 years ago, and this was outside of the planning area.

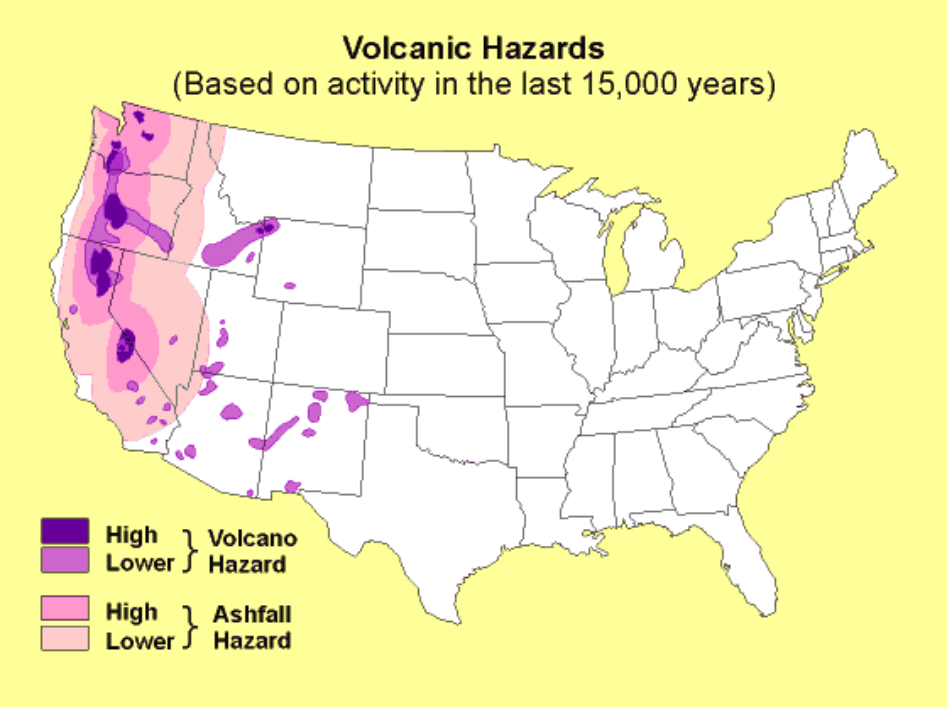
According to the USGS, the Valles Caldera is one of the most noteworthy volcanic areas in the state, and it lies just northwest of the Santa Fe County planning area. The Valles Caldera was formed about 1.2 million years ago, and the last eruption to occur at this caldera was 68,000 years ago. Since that eruption, the Valles Caldera has been dormant.[7]

PROBABILITY OF FUTURE EVENTS

Figure 18-3 below shows the volcanic hazard areas for the United States based on volcanic history over the last 15,000 years. All activity has occurred within the western United States, including New Mexico. The six areas identified in New Mexico are considered lower risk areas in relation to other sites in the U.S.

[7] USGS. The Geological Story of the Valles Caldera. https://www.usgs.gov/observatories/yvo/news/new-mexicos-answer-yellowstone-geological-story-valles-caldera#:~:text=New%20Mexico%20is%20a%20volcanic,Grants%E2%80%94the%20McCarty's%20lava%20flow.

Figure 18-3. Volcanic Hazards Across the United States[8]



The Valles Caldera has a noteworthy hydrothermal area, called Sulphur Springs. The Valles Caldera has a partially molten region between 3 to 12 miles under the surface. However, seismic activity at the caldera is rare and there is no evidence for significant changes to ground deformation or activity.[9] As mentioned previously, the last time this caldera erupted was 68,000 years ago, and since, the caldera has remained dormant.

One study conducted by the New Mexico Institute of Mining and Technology concluded that there is a 1% chance that some 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.[10] With little to no activity in over thousands of years, and with no evidence to support an increase in future volcanic activity, the frequency of a volcanic eruption impacting the Santa Fe County planning area is considered "Unlikely", or an event probable in the next ten or more years.

VULNERABILITY AND IMPACT

Volcanic eruptions are low probability high impact events. This means that while the risk of an eruption occurring is unlikely, the impacts could be detrimental. All existing and future buildings, facilities, and populations in the entire Santa Fe County planning area are considered to be

[8] 2023 New Mexico State Hazard Mitigation Plan
[9] USGS. The Geological Story of the Valles Caldera. https://www.usgs.gov/observatories/yvo/news/new-mexicos-answer-yellowstone-geological-story-valles-caldera#:~:text=New%20Mexico%20is%20a%20volcanic,Grants%E2%80%94the%20McCarty's%20lava%20flow.
[10] New Mexico Bureau of Geology and Mineral Resources. About New Mexico Volcanoes. https://geoinfo.nmt.edu/faq/volcanoes/

exposed to this hazard and could potentially be impacted. The damage caused by a volcano is typically a result of lava flows, lahars (debris flow), ash, tephra (rock), and volcanic gas.

Powerful eruptions can drastically alter the land miles around a volcano and can cause damage to widespread areas. Volcanic eruptions often force people living near volcanoes to evacuate their land and homes. People and structures located further away from the volcano are likely to avoid complete destruction and injury, however, homes, critical facilities, crops, transportation systems, and electrical grids can still be damaged by tephra, ash, lahars, and flooding.

Lava flows are streams of molten rock. They are very slow moving that people can usually avoid. However, lava flow will ignite or damage any structure within its path. This magma can also release toxic gases that can be harmful to human health and the environment including carbon dioxide, sulfur dioxide, hydrogen sulfide, and hydrogen halides. Ashfall can become heavy when it accumulates and cause damage to buildings, utilities, agriculture, water supplies, and when ingested, can harm the respiratory systems of humans and animals.

Volcanoes often exhibit signs, like earthquakes, that when detected, allow forewarning. While all citizens are at risk to the impacts of a volcano, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to evacuate, afford a long-term stay away from home, and to rebuild or repair their homes. The elderly, children, and people with a disability may have trouble evacuating due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. The population over 65 in the Santa Fe County planning area is estimated at 26 percent of the total population and children under the age of 5 are estimated at 4 percent. The population with a disability is estimated at 14 percent of the total population. An estimated 12 percent of the planning area population live below the poverty level and 31 percent of the populations speaks a language other than English (Table 18-2).

Table 18-2. Populations at Greater Risk by Participating Jurisdiction[11]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The Santa Fe County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by a potential volcano event (Table 18-3). Failures of these facilities and structures can result in a loss of service and cascading impacts. For a comprehensive list see Appendix C.

[11] U.S. Census Bureau 2022 data for Santa Fe County

Table 18-3. Critical Facilities Vulnerable to Volcano Event

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling rock or ash. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured, trapped, or otherwise unable to report for duty, limiting response capabilities. • Debris and ash can impede emergency response vehicle access to areas. • Increased number of structure fires due to lava flow, further straining the capacity and resources of emergency personnel. • First responders are exposed to ash inhalation, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by ash, tephra, or lava flow. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary in areas closest to the volcano. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Ashfall can block visibility and impact all transportation systems, including aviation systems. • Damaged or destroyed highway infrastructure may substantially disrupt evacuations and operations.
Commercial Supplier (Food, fuel, etc.)	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. • Additional emergency responders and critical aid workers may not be able to reach the area for days.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling rock or ash. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured, trapped, or otherwise unable to report for duty, limiting response capabilities. • Debris and ash can impede emergency response vehicle access to areas. • Increased number of structure fires due to lava flow, further straining the capacity and resources of emergency personnel. • First responders are exposed to ash inhalation, unstable and unusual debris, hazardous materials, and generally unsafe conditions.

SECTION 18: VOLCANO

While the probability of a volcanic eruption is extremely low, the impact severity of any potential event would likely be devastating, indicating a "Substantial" impact, with more than 50 percent of property expected to be destroyed, multiple deaths and injuries, and a complete shutdown of critical facilities of 30 days or longer depending on the location and severity of the event.

ASSESSMENT OF IMPACTS

Volcanoes have the potential to pose a significant risk to the population and can create dangerous situations. Often, providing and preserving public health and safety is difficult. While the likelihood of an eruption is low, volcanoes can be frequently associated with a variety of impacts, including:

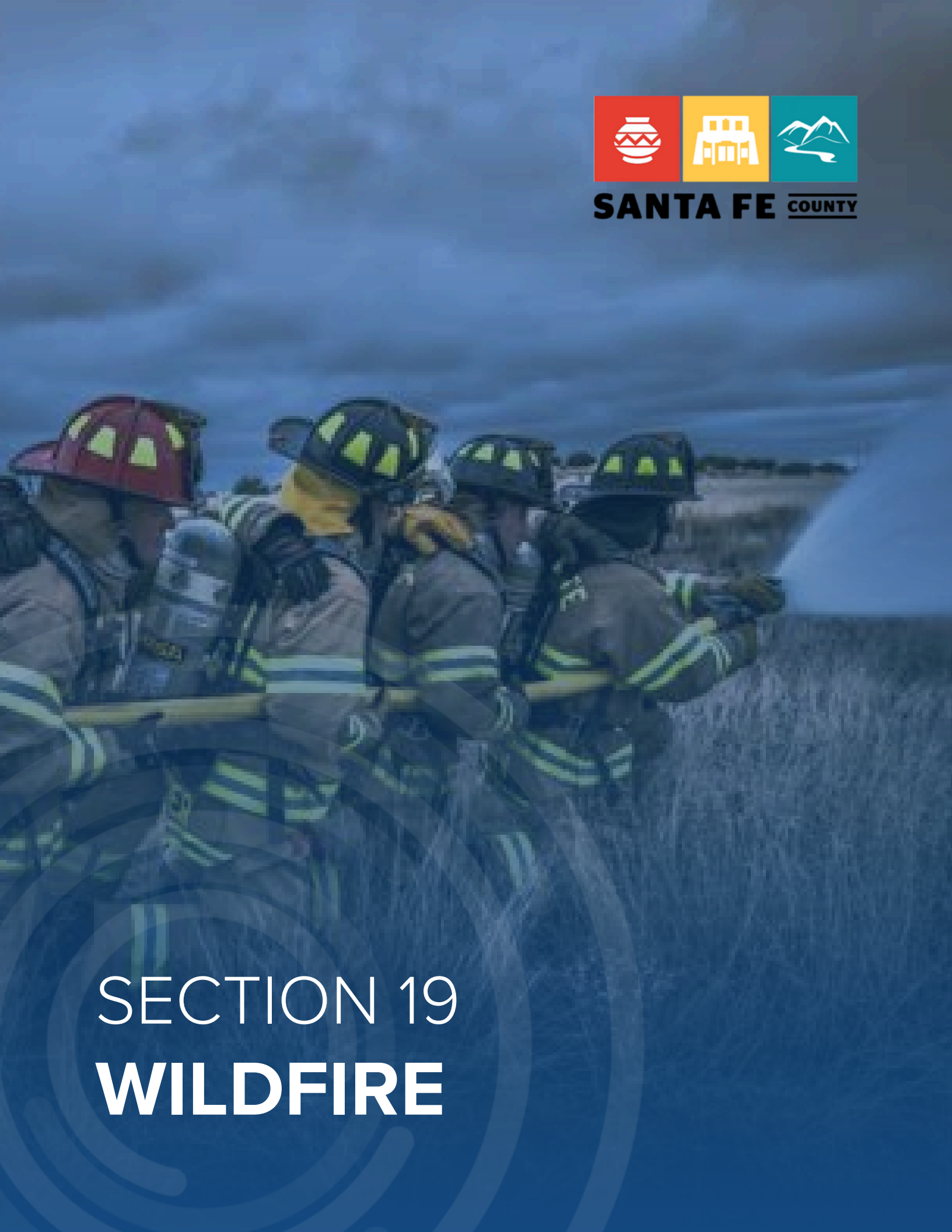
- Individuals closest to the volcano may be subject to injury, especially if there is little warning time or if they have trouble evacuating.
- Exposure to ash can cause respiratory and health issues, especially for those with preexisting health conditions.
- Structures can be damaged by earthquakes, flying rocks and debris, lava flow, and ashfall.
- Significant debris and ash can result in emergency response vehicles being unable to access areas of the community.
- Damaged buildings, downed power lines, and fires may result in roadways being unsafe for use, which may impact first responder rescue operations.
- Volcanoes can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents.
- First responders must enter the damage area to begin rescue operations and to organize cleanup and assessments efforts, therefore they are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.
- Private sector entities such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue, especially if damage is sustained to major employers within the planning area.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, and normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Eruptions may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Recreation activities may be unavailable, and tourism can be unappealing for years, devastating local businesses.
- An eruption may destroy or degrade endangered species habitat on the BCP and National Wildlife Refuge.

- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. The Santa Fe County planning area has 96 historical properties on the National Register of Historic Places and 212 listed on the New Mexico State Register of Cultural Properties.
- The geography of the land and water may be permanently altered by the eruption.
- Volcanic eruptions can have detrimental environmental impacts. Air quality, water quality, and soil health can be impacted, leading to a loss of vegetation and wildlife.

The economic and financial impacts of a volcano event on the community will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a volcano event.

CLIMATE CHANGE CONSIDERATIONS

Currently there is very limited research on how climate change will impact the occurrence of geologic hazards, including volcanoes. Some research, according to the United Nations Office of Disaster Risk Reduction, suggests that sea level rise may redistribute the amount of pressure on certain fault lines, however, this seems to impact undersea volcanoes the most. Therefore, at this time, climate change is not expected to impact volcano risk in the Santa Fe County planning area for the foreseeable future.



SANTA FE COUNTY

SECTION 19
WILDFIRE

SECTION 19: WILDFIRE

HAZARD DESCRIPTION

Wildfire is an unplanned fire burning in natural or wildland areas such as forests, shrub lands, grasslands, or prairies. [1] Wildfires can start from both human and natural causes, such as lightning. New Mexico is prone to large wildfires, with the second most acres burned among all states in 2022.[2]

Wildfire risk is highest in the Wildland Urban Interface (WUI). The WUI is described as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels. Population growth and development within the WUI substantially increases the risk of wildfire. According to the Santa Fe County Community Wildfire Protection Plan (CWPP), most fires in the county have occurred in populated areas and along roadways. In comparison, the Santa Fe National Forest and the Greater Santa Fe Fireshed have experienced a low number of fires over the last century. The Santa Fe County WUI is presented in Figure 19-1 below.

Wildfires have the potential to spread quickly given the right environmental conditions, particularly within the wildland urban interface. Most ignition sources for wildfires are a result of human activities, such as an electrical line sparking dry grasses, an improperly discarded cigarette, burning debris, or arson. Human caused fires account for 84% of the wildfires in the Santa Fe County planning area since 1996.[3]

[1] Source: FEMA: https://hazards.fema.gov/nri/wildfire
[2] Source: National Interagency Fire Center. https://www.iii.org/table-archive/23870
[3] Santa Fe County Community Wildfire Protection Plan. https://www.santafecountynm.gov/media/files/CWPP%20Online%20Version%20with%20signatures.pdf

The Santa Fe County population is expected to increase over time following population trends over the last few decades. Projections estimate a steady increase in population through 2040.[4] Continued housing development in the WUI will put more people at a greater risk of catastrophic wildfire and put more pressure on land managers and fire department personnel to mitigate fire risk.

Additionally, the area is experiencing hotter, drier climatic conditions. These factors combine to make the planning area at risk from wildfires. While Santa Fe County is continually at some risk for wildfires, that risk is elevated during the summer and fall seasons.

Wildfires spread based on the type and quantity of fuel that surrounds it. Fuel can include everything from trees, underbrush and dry grassy fields to homes. The amount of flammable material that surrounds a fire is referred to as the fuel load. Conditions in the weather and environment, such as drought, winds, and extreme heat, can cause a fire to spread more quickly.[5] A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees, and homes on fire. For example, a wildfire may be started by a campfire that was not doused properly, a tossed cigarette, burning debris, or arson. Wildland fires are fueled almost exclusively by natural vegetation, while interface or intermix fires are urban / wildland fires in which vegetation and the built environment provide the fuel.

LOCATION

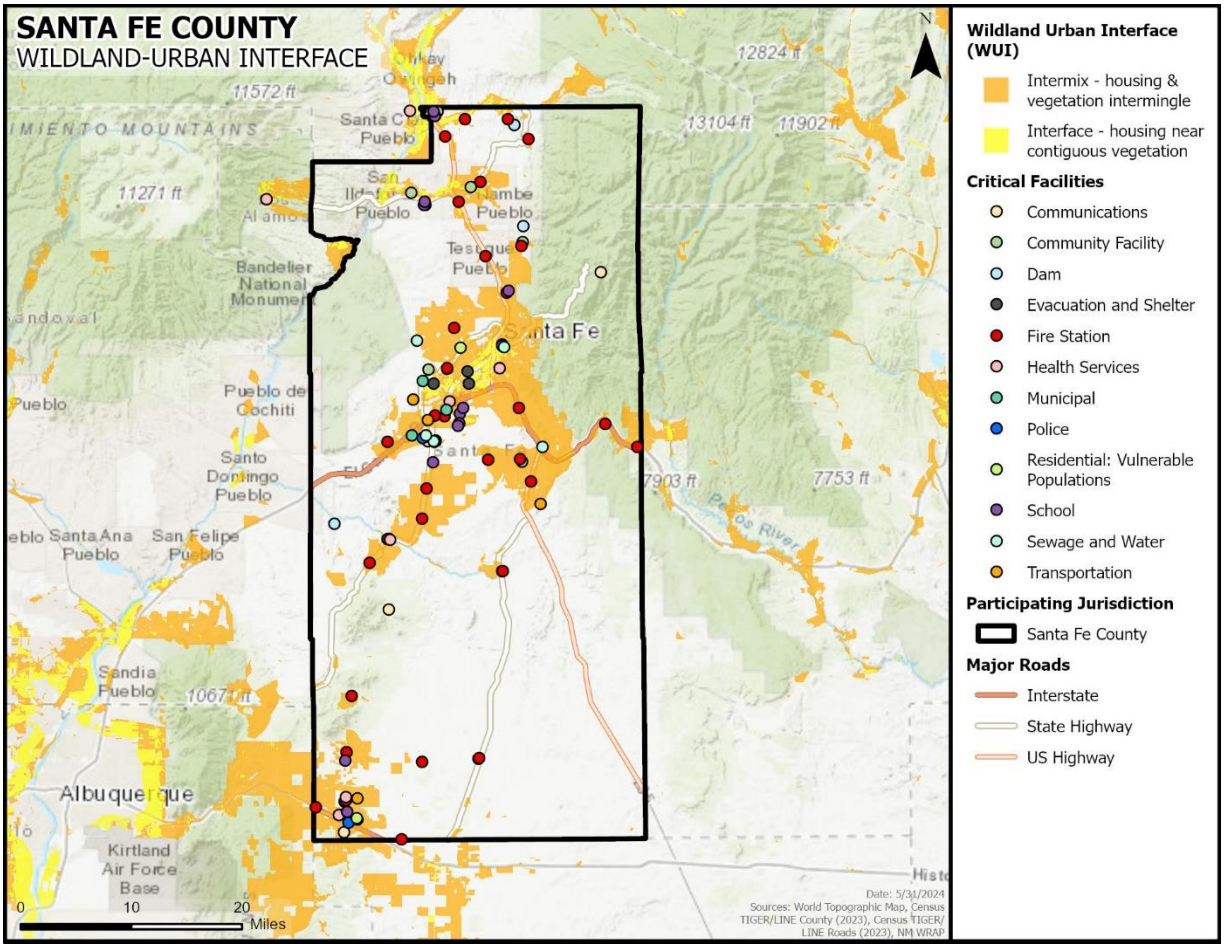
A wildfire incident can face devastating consequences due to human activities, drought conditions, lightning, or wind event, if the conditions allow. Wildfires can vary greatly in terms of size, location, intensity, and duration. While wildfires are not confined to any specific geographic location, they are most likely to occur in open grasslands.

The New Mexico Wildfire Risk Assessment Portal (NMWRAP) provides historical wildfire data for New Mexico counties along with mapping resources that includes data layers on the WUI for communities throughout the Santa Fe County planning area, along with multiple tips, recommendations and mitigation solutions for communities and residents. The NMWRAP portal was utilized to produce the maps found in this profile.

The threat to people and property from a wildfire event is greater in fringe areas where developed areas meet open grass lands, such as the Wildland Urban Interface (WUI) (Figure 19-1).

[4] University of New Mexico Geospatial and Population Studies Department, https://gps.unm.edu/pop/population-projections.html
[5] NOAA Weather Forecasting: https://scijinks.gov/wildfires/

Figure 19-1. Wildland Urban Interface Map

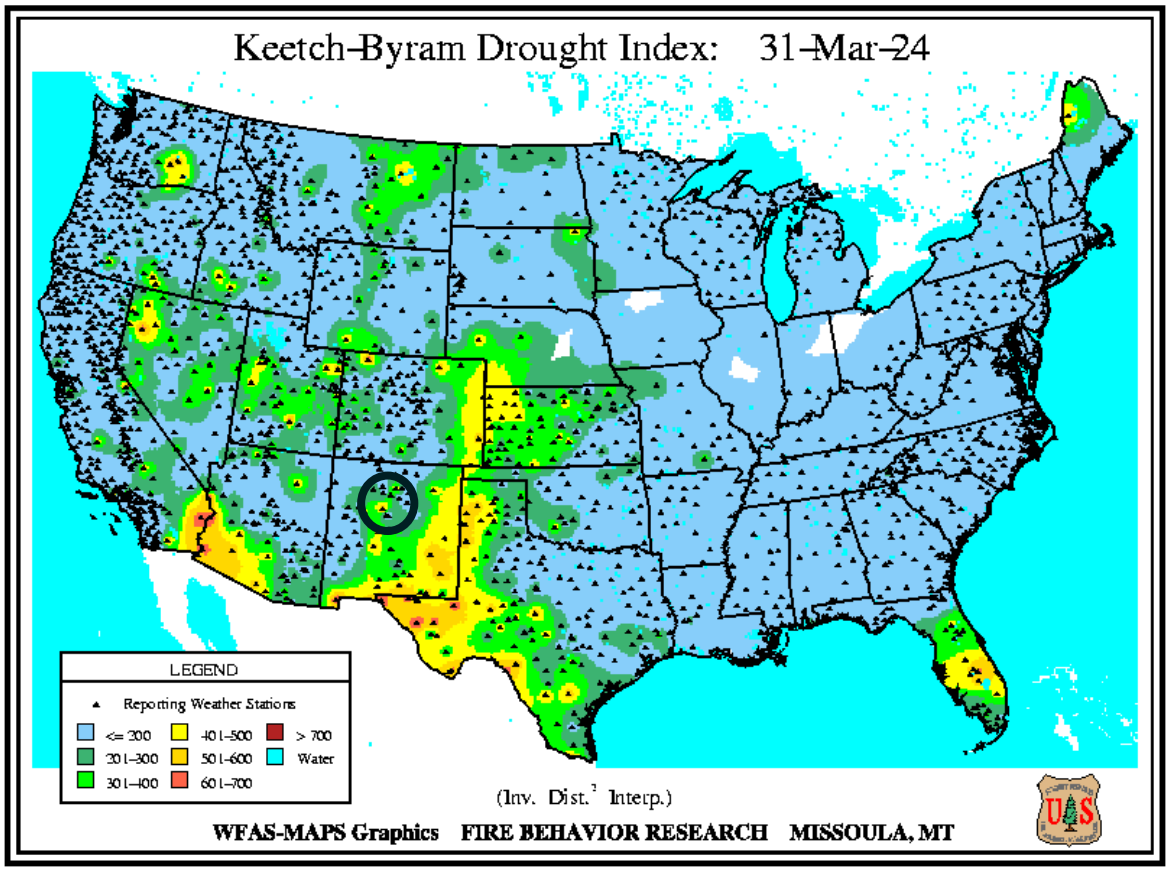


EXTENT

Risk for a wildfire event is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. The KBDI determines forest fire potential based on a daily water balance, derived by balancing a drought factor with precipitation and soil moisture (assumed to have a maximum storage capacity of eight inches), and is expressed in hundredths of an inch of soil moisture depletion.

Each color in Figure 19-2 represents the drought index at that location, by date. The drought index ranges from 0 to 800. A drought index of 0 represents no moisture depletion, and a drought index of 800 represents absolutely dry conditions. The most current available data shows the planning area is currently experiencing low moisture depletion with a KBDI between 100 and 300. However, the planning area has been subject to drier conditions historically and can expect a maximum KBDI range of 800.

Figure 19-2. Keetch-Byram Drought Index (KBDI), March 2024[6]



Fire behavior can be categorized at four distinct levels on the KBDI:

- **0 -200:** Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.
- **200 -400:** Fires more readily burn and will carry across an area with no gaps. Heavier fuels will not readily ignite and burn. Expect smoldering and the resulting smoke to carry into and possibly through the night.
- **400 -600:** Fires intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.
- **600 -800:** Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

The KBDI is a good measure of the readiness of fuels for a wildfire event. It should be referenced as the area experiences changes in precipitation and soil moisture, while caution should be exercised in dryer, hotter conditions.

[6] Santa Fe County planning area is located within the black circle.

Based on historical occurrences and readily available fuel, the planning area can anticipate the full KBDI range of 0 to 800. At the high end of this range fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

Fire conditions change daily, which is why the National Wildfire Coordinating Group created the National Fire Danger Rating System. Fire danger ratings describe conditions that reflect the potential, over a large area, for a fire to ignite, spread and require suppression action. There are five color coded levels that express the current risk level and potential fire extent. The Santa Fe County planning area can anticipate the full extent, or an extreme level, of fire danger. The rating system in provided in Table 19-1.[7]

Table 19-1. National Fire Danager Rating System

RATING	DESCRIPTION	FULL EXTENT
Low (Green)	Fuels do not ignite easily	Fuels do not ignite easily from small embers, but a more intense heat source, such as lightning, may start fires in duff or dry rotten wood. Fires in open, dry grasslands may burn easily a few hours after a rain, but most wood fires will spread slowly, creeping or smoldering. Control of fires is generally easy.
Moderate (Blue)	Fires can start easily and spread at a moderate rate	Fires can start from most accidental causes, but the number of fire starts is usually pretty low. If a fire does start in an open, dry grassland, it will burn and spread quickly on windy days. Most wood fires will spread slowly to moderately. Average fire intensity will be moderate except in heavy concentrations of fuel, which may burn hot. Fires are still not likely to become serious and are often easy to control.
High (Yellow)	Fires can start easily and spread at a rapid rate	Fires can start easily from most causes and small fuels (such as grasses and needles) will ignite readily. Unattended campfires and brush fires are likely to escape. Fires will spread easily, with some areas of high intensity burning on slopes or concentrated fuels. Fires can become serious and difficult to control unless they are put out while they are still small.
Very High (Orange)	Fires start very easily and spread at a very fast rate	Fires will start easily from most causes. The fires will spread rapidly and have a quick increase in intensity, right after ignition. Small fires can quickly become large fires and exhibit extreme

[7] United States Forest Service. National Fire Danger Rating System. https://www.fs.usda.gov/detail/r5/fire-aviation/?cid=FSEPRD604105

RATING	DESCRIPTION	FULL EXTENT
		fire intensity, such as long-distance spotting and fire whirls. These fires can be difficult to control and will often become much larger and longer-lasting fires.
Extreme (Red)	Fire situation is intense and can result in significant property damage	Fires of all types start quickly and burn intensely. All fires are potentially serious and can spread very quickly with intense burning. Small fires become big fires much faster than at the "very high" level. Spot fires are probable, with long-distance spotting likely. These fires are very difficult to fight and may become very dangerous and often last for several days.

HISTORICAL OCCURRENCES

The United States Forest Service (USFS) reported 504 wildfire events for the Santa Fe County planning area between 1970 and 2022. The NCEI Storm Events Database includes only one record of wildfire from 1996 through 2023. This event took place in 2011 and resulted in an estimated $271,500 in damages. Many fire events may be unreported, but the National USFS Fire Occurrence Point Data provides the best available historical wildfire data. Tables 19-2 and 19-3 identify the number of wildfires and total acreage burned each year within the county boundaries. Figure 19-3 below shows approximate locations of historic wildfires and statistical causes.

Table 19-2. Historical Wildfire Events Summary, 1970 - 2022[8]

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED
Santa Fe County	504	49,847

Table 19-3. Historical Wildfire Events and Acreage Burned by Year

YEAR	NUMBER OF EVENTS	ACRES BURNED
	6	2,627
	13	14
	7	107
	5	4
	17	4,316
	11	12

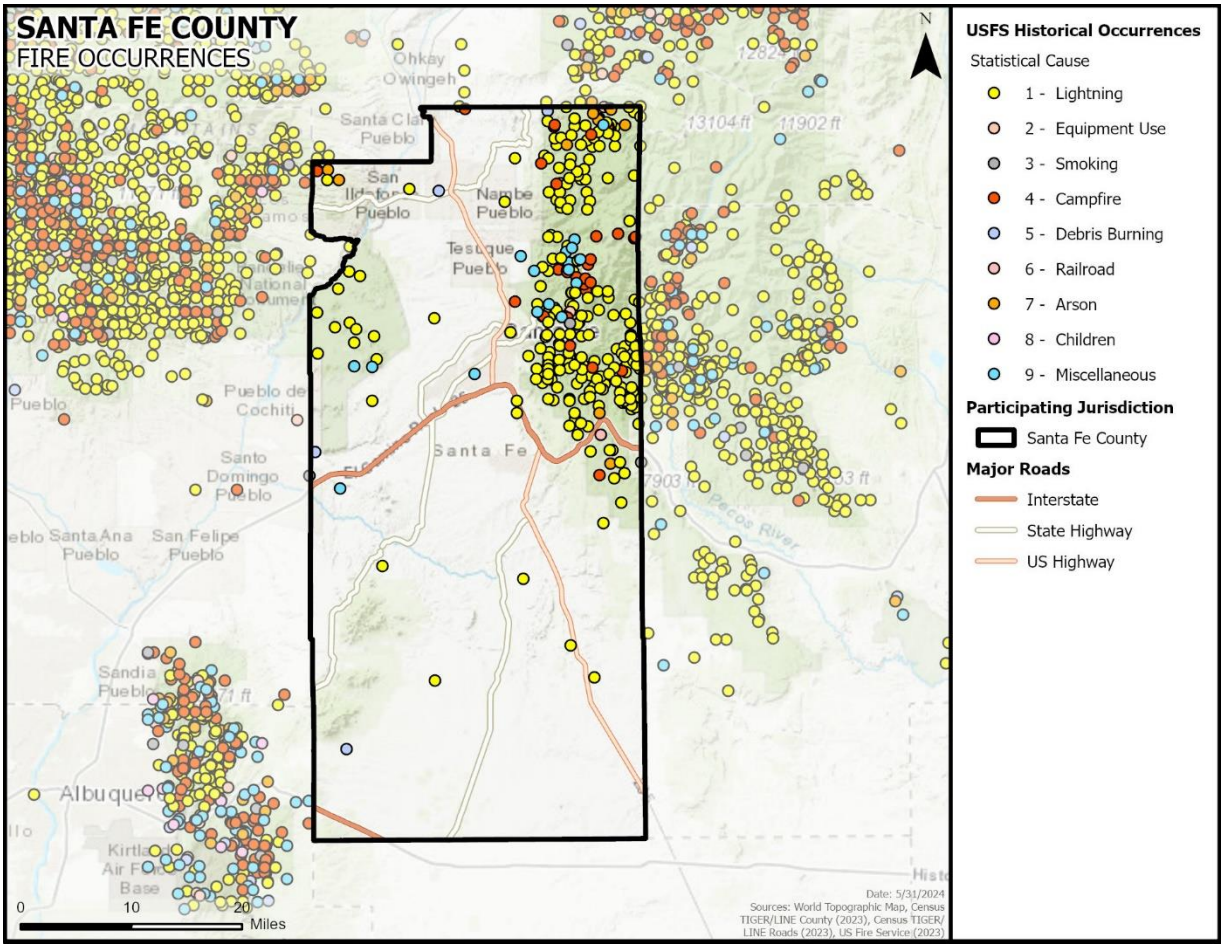
[8] Source: United States Forest Service

YEAR	NUMBER OF EVENTS	ACRES BURNED
	9	3
	10	198
	11	44
	12	16
	19	32
	14	75
	16	81
	3	4
	7	2
	10	3
	4	6
	4	2
	3	0
	12	244
	5	4
	3	37
	5	4
	19	68
	7	174
	2	1
	9	1
	15	2
	17	11
	5	2
	22	2
	13	4
	11	905
	18	11,151

YEAR	NUMBER OF EVENTS	ACRES BURNED
	10	1
	15	6,532
	12	10,113
	9	0
	3	0
	6	0
	6	0
	14	13,005
	8	0
	11	4
	4	0
	9	1
	6	0
	5	0
	17	6
	7	24
	5	0
	8	1
	5	4
Total	**504**	**49,847**

Based on the list of historical wildfire events for the Santa Fe County planning area, 25 events have occurred since the 2018 plan.

Figure 19-3. Location and Historic Wildfire Events in Santa Fe County



SIGNIFICANT EVENTS

There have been 3 declared disasters related to wildfire in Santa Fe County between 1953 and 2024 (Table 19-4). Additional details on certain wildfire events are described below.

Table 19-4. Disaster Declarations for Wildfire, 1953-2024

YEAR	DECLARATION TITLE	DECLARATION TYPE	DISASTER NO.
2002	New Mexico Borrego Fire	FSA	FSA-2408-NM
2000	New Mexico Wildfire	DR	DR-1392-NM
2000	New Mexico Fire	EM	EM-3154-NM

April 25, 1996 (Dome Fire)

The Dome Fire began when an abandoned campfire in the Santa Fe National Forest flared up and then spread through the Forest to the Bandelier National Monument. Conditions with strong

winds, low humidity, and drought conditions caused the fire to spread quickly. The wildfire was contained 10 days later and burned more than 16,000 acres.[9]

May 10, 2000 (Cerro Grande Fire) – EM-3154-NM and DR-1392-NM
On May 4, 2000, a prescribed fire was set at Bandelier National Monument to clear brush and dead vegetation to prevent a larger wildfire. Unfortunately, due to high winds and extremely dry conditions, the prescribed fire quickly raged out of control, and by May 10, the blaze had spread into the nearby town of Los Alamos. Reports indicate more than 20,000 people were evacuated from their homes and more than 200 houses were destroyed as the flames consumed about 48,000 acres in and around the Los Alamos area.[10]

Figure 19-4. Cerro Grande Fire[11]

May 31, 2000 (Viveash Fire)
Hikers, campers, and ranchers were evacuated from the Santa Fe National Forest as 90-degree temperatures, low humidity and the continuing drought caused an aggressive wildfire. The destructive Cerro Grande Fire was just contained a week before the Viveash Fire event. This fire burned more than 29,000 acres.

[9] National Park Service. Wildfire and Archeology in the Jemez Mountains. https://www.nps.gov/articles/000/wildfire-and-archeology-in-the-jemez-mountains.htm#:~:text=Dome%20Fire%20%2D%201996,the%20fire%20to%20spread%20quickly.
[10] NASA. Los Alamos Before and After the Fire. https://earthobservatory.nasa.gov/images/701/los-alamos-before-and-after-the-fire
[11] Santa Fe New Mexican. Cerro Grande Fire remains burned into New Mexico's memory 20 years later. https://www.santafenewmexican.com/news/local_news/cerro-grande-fire-remains-burned-into-new-mexicos-memory-20-years-later/article_190f6252-896c-11ea-8ab4-e78b330ac4e3.html

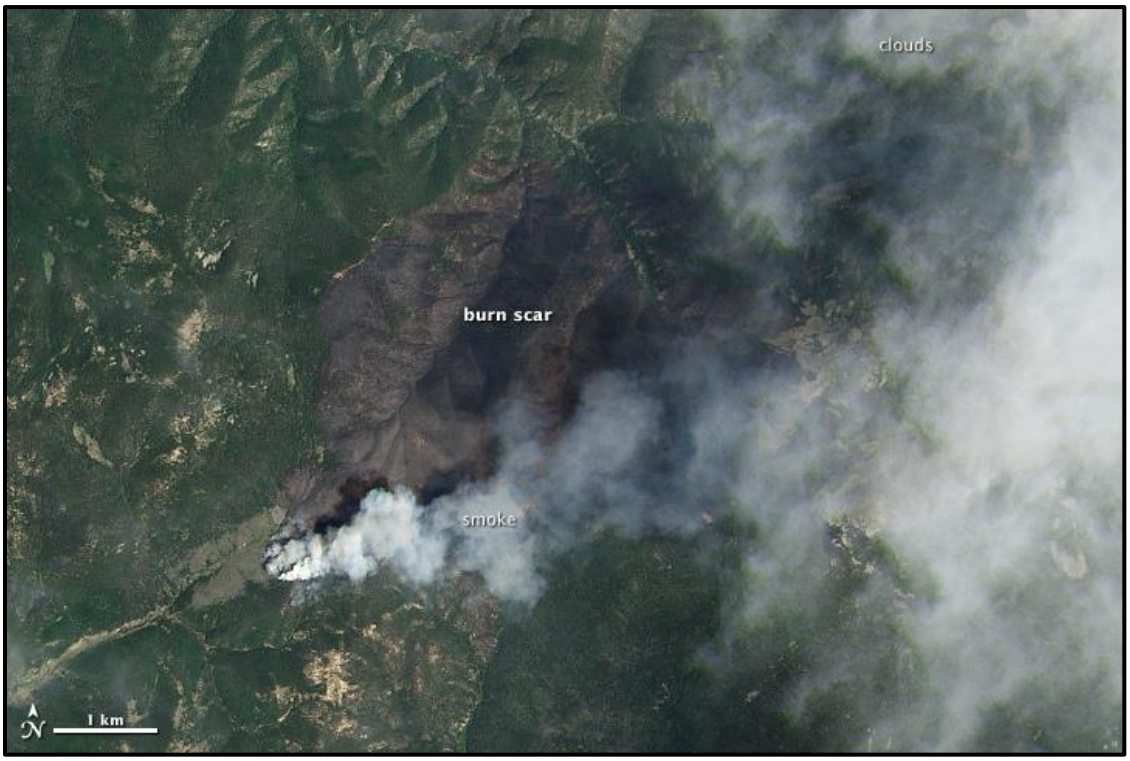
May 22, 2002 (Borrego Fire) – FSA-2408-NM
This fire began on May 22, 2002, and quickly spread from a few hundred to several thousand acres in a 24-hour period. It was fueled by an unseasonably dry mix of conifer and aspen forest.

May 8, 2011
A wildfire caused by overheated vehicle breaks started near the City of Santa Fe, which spread along Old Las Vegas, forcing temporary evacuations. This fire destroyed one home before fire crews contained the blaze. A total of 14 acres were burned along the Old Las Vegas Highway. Property damages reported by the NCEI account for an estimated $271,500 (2023 dollars).

June 26, 2011 (Las Conchas Fire)
The Las Conchas Fire began just west of the Bandelier National Monument. The fire started with a tree falling onto a power line. Once it began the extremely flammable vegetation from a record-breaking dry year allowed the fire to grow quickly, pushed by strong winds toward the east and into the park. This fire burned over 156,000 acres and became the largest wildfire in New Mexico history.[12]

June 22, 2013 (Jaroso Fire)
Lightning ignited a wildfire northeast of Santa Fe, and it burned through more than 11,000 acres. Smoke from the wildfire impacted the planning area and there were concerns for respiratory health.

Figure 19-4. Jaroso Fire, New Mexico[13]



[12] National Park Service. The Las Conchas Fire. https://www.nps.gov/band/learn/nature/lasconchas.htm
[13] NASA. Joroso Fire, New Mexico. https://earthobservatory.nasa.gov/images/81469/jaroso-fire-new-mexico

August 17, 2020 (Medio Fire)
A lightning strike upstream of the Nambe Pueblo sparked a wildfire in the Rio Nambe drainage of the Santa Fe National Forest. The hot summer and weak monsoon season created favorable fire conditions that primed the mountains to burn. This fire grew over 1,500 acres and was pushed by strong winds.

PROBABILITY OF FUTURE EVENTS

Wildfires can occur at any time of the year. As Santa Fe County communities move into wildland, the potential area of occurrence of wildfire increases. With 504 events in a 53-year period, an event within the Santa Fe County planning area is “Highly Likely”, meaning an event is probable within the next year. According to NOAA, research shows that changes in climate create warmer, drier conditions, leading to longer and more active fire seasons, indicating an increase in the frequency and severity of events in the planning area going forward. See additional information on climate change at the end of this section.

VULNERABILITY AND IMPACT

Periods of drought, dry conditions, high temperatures, and low humidity are factors that contribute to the occurrence of a wildfire event. Less developed areas, such as along interstates or in more remote areas where fuels are more prevalent have an increased risk of being affected by wildfire.

The more heavily populated areas of the planning area are not highly likely to experience large, sweeping fires. Unoccupied buildings and open spaces that have not been maintained have the greatest vulnerability to wildfire. The overall level of concern for wildfires is located across the county where wildland and urban areas interface. Wildfires can devastate infrastructure by damaging roads, bridges, power lines, and communication networks, hindering emergency response efforts and disrupting daily life for impacted communities. People face immediate threats to their health and safety from flames, smoke inhalation, and evacuation challenges, leading to potential injuries and fatalities.

While all citizens are vulnerable to the impacts of wildfire, forced relocation and disaster recovery drastically impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 12 percent of the planning area population live below the poverty level (Table 19-5). While evacuation times for these types of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Table 19-5. Populations at Greatest Risk by Jurisdiction[14]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

Underserved communities or groups of people that are socioeconomically challenged, are also especially vulnerable to wildfire. One study in particular presents that Native Americans are six times more likely than other groups to live in areas most prone to wildfire.[15] In combination with other socioeconomic barriers, it can be hard for these communities to recover after a large event. While Santa Fe County does not have jurisdiction in these communities, there are five pueblos located in the planning area including the Tesuque Pueblo, San Ildefonso Pueblo, Pojoaque Pueblo, and Nambe Pueblo.

The Santa Fe County Planning Team identified the following critical facilities (Table 19-6) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by wildfire events. For a comprehensive list see Appendix C.

Table 19-6. Critical Facilities/Critical Services Vulnerable to Wildfire Events

CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	20 Fire Stations, 6 Health Services, 2 Police Stations	• Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty. • First responders are at greater risk of injury when in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area. • Critical city departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted. • Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility, slowing or preventing access for emergency response vehicles. • Fire suppression costs can be substantial, exhausting the financial resources of the community. • First responders can experience heart disease, respiratory problems, and other long-term related

[14] US Census Bureau 2022 data for Santa Fe County.

[15] I. Davies, R. Haugo, J. Robertson, P. Levin. 2018. The Unequal Vulnerability of Communities of Color to Wildfire. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0205825

CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
		illnesses from prolonged exposure to smoke, chemicals, and heat. • Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Power outages could disrupt communications, delaying emergency response times. • Structures can be damaged or destroyed in the path of the wildfire. • Power outages could disrupt critical care. • Backup power sources could be damaged or destroyed. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	9 Community Facilities, 2 Evacuation Shelters, 3 Municipal, 1 Residential (Vulnerable Populations), 6 Schools, 2 Transportation	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. • Additional emergency responders and critical aid workers may not be able to reach the area for days. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations.
Commercial Supplier (food, fuel, etc.)	N/A	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages and fires negatively impact services as well as area businesses reliant on commercial suppliers.
Utility Services and Infrastructure (electric, water, wastewater, communications)	3 Communications, 1 Dam, 1 Sewage and Water	• Wastewater and drinking water facilities and infrastructure may be damaged or destroyed resulting in service disruption or outage for multiple days or weeks. • Disruptions and outages impact public welfare as safe drinking water is critical. • A break in essential and effective wastewater collection and treatment is a health concern, potentially spreading disease. • Exposure to untreated wastewater is harmful to people and the environment. • Any service disruptions can negatively impact or delay emergency management operations. • Power losses

Within the Santa Fe County planning area, a total of 504 fire events were reported from 1970 through 2022 by the USFS. All events were suspected wildfires. Historic loss and annualized estimates of acres burned due to wildfires are presented in Table 19-7 below. The average frequency is approximately 9 events every year.

Table 19-7. Average Annualized Acreage Losses[16]

JURISDICTION	TOTAL ACRES BURNED	AVERAGE ANNUAL ACRE LOSSES
Santa Fe County	49,847	941

Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too small for the respiratory system to filter can cause immediate and possibly long-term health effects. The elderly or those individuals with compromised respiratory systems may be more vulnerable to the effects of diminished air quality after a wildfire event.

Climatic conditions such as severe freezes and drought can significantly increase the intensity of wildfires since these conditions kill vegetation, creating a prime fuel source for wildfires. The intensity and rate at which wildfires spread are directly related to wind speed, temperature, and relative humidity.

Wildfires can cause further cascading impacts such as flooding and debris flow. The loss of vegetation reduces the ability of the ground to absorb water, increasing runoff during rainstorms and increasing the risk of flash flooding. Without the stabilizing effect of live vegetation, slopes are more prone to erosion, leading to debris flows where mud, ash, and debris rush downhill, posing additional risk to communities. Burn scar areas are known to have impacted flood risk in the Santa Fe County planning area, prolonging the recovery process and increasing the overall damage caused by wildfires.

The severity of impact from a major wildfire event in the Santa Fe County planning area may be considered “Substantial” depending on the size and location of the event. Such events can cause multiple deaths, shut down critical facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. Severity of impact is gauged by acreage burned, homes and structures lost, and the number of resulting injuries and fatalities.

ASSESSMENT OF IMPACTS

A Wildfire event poses a potentially significant risk to public health and safety, particularly if the wildfire is initially unnoticed and spreads quickly. The impacts associated with a wildfire are not limited to direct damage. Significant wildfire events can be frequently associated with a variety of impacts, including:

- The Santa Fe County planning area contains numerous open space areas. Wildfire may adversely affect or destroy endangered species habitat, reduce air quality, increase erosion and risk of flash flooding, contribute to increased local temperatures, and disrupt other ecological functions.

[16] Events divided by 17 years of data.

- Recreation activities throughout county and city parks may be unavailable and tourism can be unappealing for years following a large wildfire event, devastating directly related local businesses and negatively impacting economic recovery.
- Persons, pets, and wildlife in the area at the time of the fire are at risk for injury or death from burns and/or smoke inhalation. First responders are at greater risk of physical injury when in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area.
- First responders can experience heart disease, respiratory problems, and other long-term related illnesses from prolonged exposure to smoke, chemicals, and heat.
- Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty.
- Critical county departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted.
- Non-critical businesses may be directly damaged, suffer loss of utility services, or be otherwise inaccessible, delaying normal operations and slowing the recovery process.
- Displaced residents may not be able to immediately return to work, slowing economic recovery.
- Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility.
- Older homes are generally exempt from modern building code requirements, which may require fire suppression equipment in the structure. An estimated 53 percent (approximately 40,547 structures) of homes in the planning area were built before 1980.
- Similarly, historic buildings may lack fire mitigation materials or measures due to their historic status. There are 95 historical sites listed on the National Register of Historic Places for Santa Fe County and 212 listed on the New Mexico State Register of Cultural Properties.
- Some high-density neighborhoods feature small lots with structures close together, increasing the potential for fire to spread rapidly.
- Air pollution from smoke may exacerbate respiratory problems of vulnerable residents.
- Charred ground after a wildfire cannot easily absorb rainwater, increasing the risk of flooding and potential mudflows, especially during periods of heavy rains, or during monsoon season.
- Wildlife may be displaced or destroyed.
- Historical or cultural resources may be damaged or destroyed.
- Tourism can be significantly disrupted, further delaying economic recovery for the area.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Fire suppression costs can be substantial, exhausting the financial resources of the community.
- Residential structures lost in a wildfire may not be rebuilt for years, reducing the tax base for the community.
- Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground delivery lines, and soil erosion or debris deposits into waterways after the fire.

The economic and financial impacts of a wildfire event on local government will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in

impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a wildfire event.

CLIMATE CHANGE CONSIDERATIONS

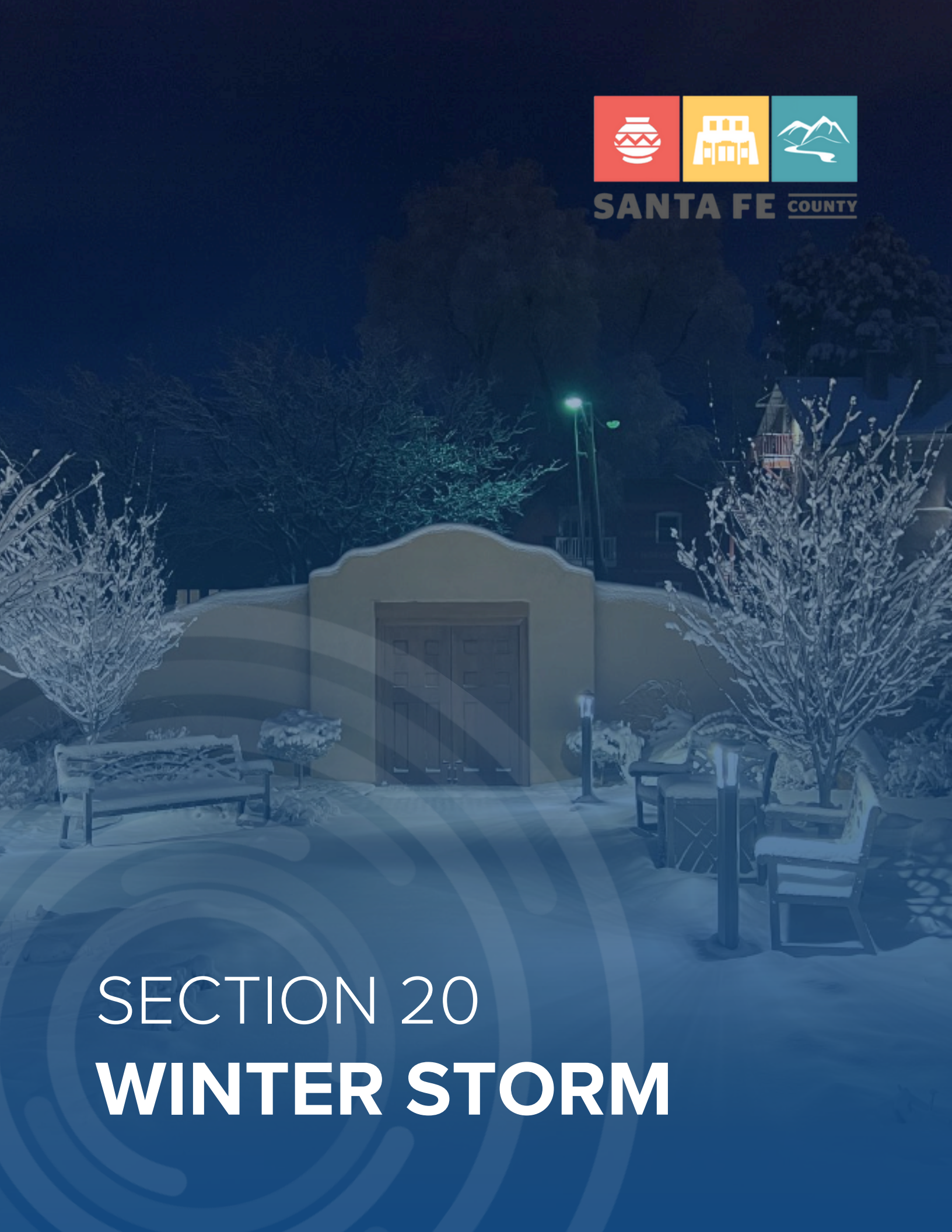
According to the Fifth National Climate Assessment, in the Southwest, fires have become larger, more frequent, and, in many areas, more severe, with clear evidence of climate change as a major cause. Wildfires require the alignment of a number of factors, including temperature, humidity, and the lack of moisture in fuels, such as trees, shrubs, grasses, and forest debris. All these factors have strong direct or indirect ties to climate variability and climate change. Research shows that changes in climate create warmer, drier conditions, leading to longer and more active fire seasons. Increases in temperatures and the thirst of the atmosphere due to human--caused climate change have increased aridity of forest fuels during the fire season.[17]

The U.S. Climate Explorer indicates that wildfire risk for Santa Fe County may increase due to an increase in dry spells, which are periods of consecutive days without precipitation. Historically, the longest yearly dry spell in Santa Fe County averaged 25 days. With current climate change projections this can increase by another 3 days, making the average dry spell 28 days. Additionally, it is projected that future changes to the Santa Fe County planning area will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 90°F in Santa Fe County, but between 2035 and 2064 the average will be 96°F.

Extreme heat and extended periods of drought contribute to wildfire risk in the planning area. Extreme temperatures and periods of drought destroy vegetation in the area, contributing to available fuels that spread wildfires. Additional climate change impacts from drought and extreme heat are discussed in Sections 6 and 10 of this Plan. The projected increases in favorable wildfire conditions, including drought and extreme heat, indicate an increase in favorable wildfire conditions. Additional information and studies are needed to determine the degree and rate of any increased wildfire risk.

As wildfire risk is expected to increase with climate change, additional risks and cascading impacts will be worsened. For example, with an increase in the severity and number of wildfire events, an increase in the frequency and intensity of flash flooding and debris flow can also be expected. Wildfires destroy vegetation and burn the ground, meaning the soil is no longer able to absorb rainwater. It can take years for vegetation to be restored, increasing long term flood risk.

[17] NOAA Wildfire Climate Connection, August 2022: wildfire-climate-connection.



SANTA FE COUNTY

SECTION 20
WINTER STORM

SECTION 20: WINTER STORM

HAZARD DESCRIPTION

A severe winter storm event is identified as a storm with snow, ice, or freezing rain. This type of storm can cause significant problems for area residents. Winter storms are associated with freezing or frozen precipitation such as freezing rain, sleet, snow, and the combined effects of winter precipitation and strong winds. Wind chill is a function of temperature and wind. Low wind chill is a product of high winds and freezing temperatures.

Santa Fe County receives snowfall on a regular seasonal basis, typically between the months of October and April. Due to the average storm size, the entire planning area is usually affected by these events. Most winter precipitation in New Mexico is associated with Pacific Ocean storms that move across the state from west to east. As storms move inland, much of the precipitation that falls in the mountain areas occurs as snow, whereas it may occur as either rain or snow in the valleys.

As indicated in Figure 20-1, the Santa Fe County planning area is located within several Hardiness Zones according to the 2023 USDA Plant Hardiness Zone Map. These range from zone 6a to 7b, indicating a range of annual minimum temperatures between -10°F and 10°F. The southern portion of the planning area, as well as the Sangre de Cristo Mountains in the northeast can anticipate the coldest minimum temperatures. During times of ice and snow accumulation, response times will increase until public works road crews are able to make major roads passable. Table 20-1 describes the types of winter weather possible to occur in the Santa Fe County planning area.

Figure 20-1. Annual Minimum Temperature[1]

[1] USDA

Table 20-1. Types of Winter Weather

TYPE OF WINTER WEATHER	DESCRIPTION
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
Frost/Freeze	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.
Heavy Snowfall	Snowfall accumulating to 4" or more in depth in 12 hours or less; or snowfall accumulating to 6" or more in depth in 24 hours or less.
Ice storm	An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous.
Flurries	Light snow falling for short durations with little or no accumulation.

LOCATION

Winter storm events are not confined to specific geographic boundaries. Additionally, the size of a typical storm in the region is large enough to affect the entire planning area. Therefore, all existing and future buildings, facilities, and populations in the Santa Fe County planning area are vulnerable to a winter storm hazard and could potentially be impacted.

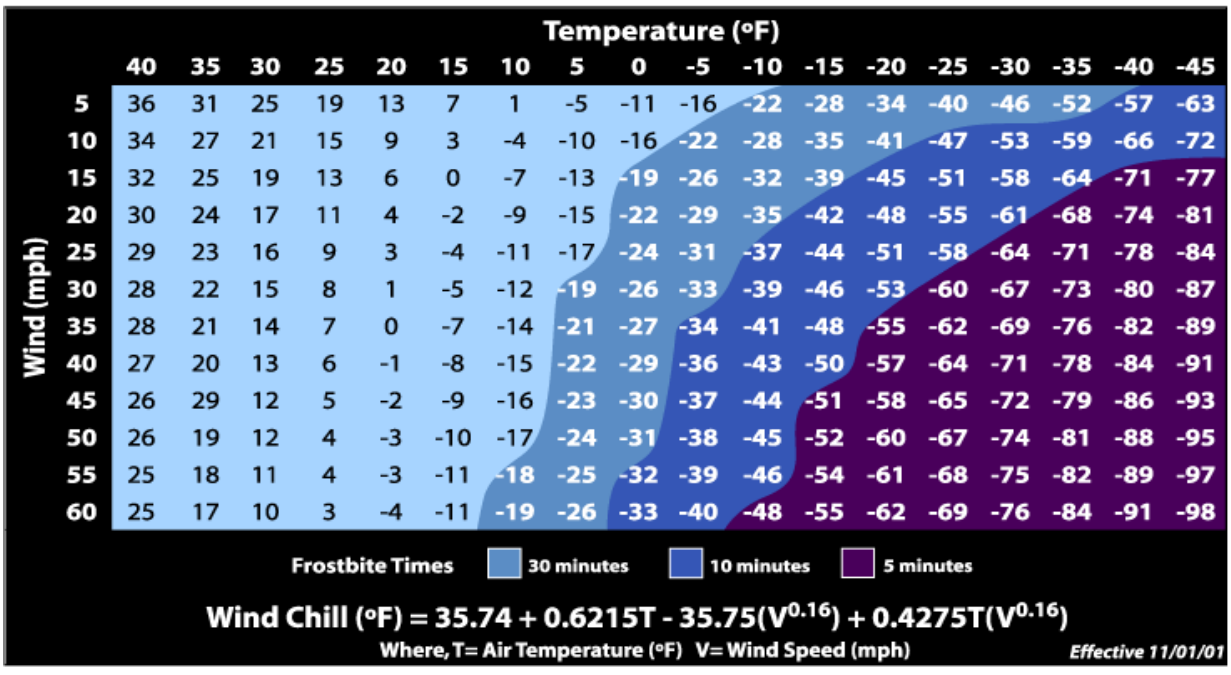
EXTENT

The extent or magnitude of a severe winter storm is measured in intensity based on the temperature and level of accumulations as shown in Table 20-2. Table 20-2 should be read in conjunction with the wind-chill factor described in Figure 20-2 to determine the intensity of a winter storm. The chart is not applicable when temperatures are over 50°F or winds are calm. This is an index developed by the National Weather Service.

Table 20-2. Magnitude of Severe Winter Storms

INTENSITY	TEMPERATURE RANGE (Fahrenheit)	EXTENT DESCRIPTION
Mild	40° – 50°	Winds less than 10 mph and freezing rain or light snow falling for short durations with little or no accumulations
Moderate	30° – 40°	Winds 10 – 15 mph and sleet and/or snow up to 4 inches
Significant	25° – 30°	Intense snow showers accompanied with strong gusty winds between 15 and 20 mph with significant accumulation
Extreme	20° – 25°	Wind driven snow that reduces visibility, heavy winds (between 20 to 30 mph), and sleet or ice up to 5 millimeters in diameter
Severe	Below 20°	Winds of 35 mph or more and snow and sleet greater than 4 inches

Figure 20-2. Wind Chill Chart



Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30°F day would feel just as cold as a calm day with 0°F temperatures. The Santa Fe County planning area has 395 previous winter weather occurrences recorded from 1996 through 2023 in the National Centers for Environmental Information (NCEI) Storm Events Database. The planning area has

experienced several types of winter weather events, including blizzards, heavy snow, extreme cold/wind chill, and winter storms.

The average number of cold days is similar for the entire planning area. Therefore, the intensity or extent of a winter storm event to be mitigated for the area is severe winter storm (Table 20-2), as annual extreme minimum temperatures across the planning area may dip as low as -10°F.

The National Weather Service issues a winter storm watch, advisory or warning in advance of an event in order to give people enough time to prepare for an event. Santa Fe County could be under any of these warning types in advance of a winter storm event. Table 20-3 describes when each warning type would be issued.

Table 20-3. Winter Storm Watch, Advisory, Warning Descriptions

TYPE OF WINTER WEATHER	DESCRIPTION
Winter Weather Advisory	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
Winter Storm Watch	Severe winter weather conditions may affect your area (freezing rain, sleet, or heavy snow may occur separately or in combination).
Winter Storm Warning	Severe winter weather conditions are imminent.

HISTORICAL OCCURRENCES

According to historical records and the best available data there have been 395 recorded winter storm events across 156 different days in the Santa Fe County planning area. These events included instances of heavy snow (375 events), extreme cold/wind chill (11 events), blizzard (8 events), and ice storm (1 event). Three events recorded property damages, with the most damaging event occurring on December 8, 2013, with estimated damages of $65,800 (in 2023 dollars). No fatalities or injuries were reported for any of the 395 events occurring between 2009 and 2023, though many may go unreported. In addition to the events noted in the NCEI database, the Planning Team noted that in 2018 and 2019 the southern portion of the County was isolated from services due to Highway 40 being shut down due to a winter storm event. Food for livestock was airlifted and brought to ranches in the southern portion of the county.

Historical winter storm information, as provided by the NCEI, identifies winter storm activity across a multi-county forecast area for each event. The appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event, when appropriate. Historical winter storm data for the planning area is provided on a County-wide basis per the NCEI database. Table 20-4 shows historical incident information for events which reported damages in the planning area.

Table 20-4. Significant Historical Winter Storm Events, 1996-2023[2]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Santa Fe County	12/7/2009	0	0	$14,200	$0
Santa Fe County	11/23/2013	0	0	$6,600	$0
Santa Fe County	12/8/2013	0	0	$65,800	$0
TOTALS		**0**	**0**	**$86,600**	

Based on the list of historical winter storm events for the Santa Fe County planning area, 112 of the events have occurred since the 2018 Plan.

SIGNIFICANT EVENTS

December 7, 2009

A potent storm system brought heavy snow and high winds across the state, with snowfall starting on December 6th across the San Juan Mountains. Snow increased in coverage and intensity on the 7th, and a final blast of snow came early on the 8th as a cold front swept from west to east across New Mexico. Meanwhile, a mid-level jet streak in excess of 80 knots was moving across the southwest mountains northeastward onto the plains. The strong winds combined with the heavy snow resulted in blizzard conditions across the southwest mountains as well as central New Mexico. In Santa Fe County, between 3 and 6 inches of snow was reported at elevations above 6,500 feet, and strong winds and ice knocked down powerlines resulting in power outages to approximately 4,800 customers. In total, the event's damages across the state are estimated at $760,600 (2023 dollars), with $14,200 (2023 dollars) of those damages being reported for Santa Fe County.

[2] Values are in 2023 dollars.

Figure 20-3. Winter Storm in Santa Fe County, December 2009[3]

December 8, 2013
A bitter cold air mass in the region following an exiting winter storm created plumbing problems for facilities at the Coyote Ranger District office. In the morning, temperatures across the area fell into the single digits below zero. Frozen pipes burst and flooded the station, saturating the building with over 40,000 gallons of water. Approximate property damages due to this incident are estimated at $65,800 (2023 dollars).

March 24, 2021
A combination of heavy snow and strong winds resulted in snow-packed, icy roads and poor travel conditions across much of northern and central New Mexico, heavily impacting travel. A major accident involving 39 vehicles along Interstate 40 east of Moriarty led to several injuries as well as the closure of the busy travel corridor. In Santa Fe County, various sources across the southern Sangra de Cristo Mountains reported snowfall ranging from 8 to 18 inches. While no damages or injuries were reported for Santa Fe County for this event, totals across the state for the storm amounted to 11 injuries and roughly $843,400 in damages (2023 dollars).

PROBABILITY OF FUTURE EVENTS

According to historical records, the Santa Fe County planning area is expected to experience multiple winter storm events each year. The probability of a future winter storm event affecting the Santa Fe County planning area is considered “Highly Likely”, with a winter storm likely to occur

[3] Olsen, Peter/AP Photo. *In this photo provided by the New Mexico Department of Public Safety, a state police officer monitors traffic as it moves slowly on Interstate 25 north of Santa Fe, N.M., on Tuesday, Dec. 8, 2009.* https://www.cbsnews.com/pictures/winter-weather-8-12-09/2/

within the next year. The end of this section addresses climate change and its impacts on future winter storms in the planning area.

VULNERABILITY AND IMPACT

During periods of extreme cold and freezing temperatures, water pipes can freeze and crack, and ice can build up on power lines, causing them to break under the weight or causing tree limbs to fall on the lines. These events can disrupt electric service for long periods.

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

The Santa Fe County Planning Team identified the following critical facilities (Table 20-6) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by winter storm events. For a comprehensive list see Appendix C.

Table 20-6. Critical Facilities Vulnerable to Winter Storm Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Exposure to extreme cold can cause illnesses in first responders if exposed for a period of time. • Roads may become impassable due to snow and/or ice impacting response times by emergency services. • Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged. • Increased number of patients due to exposure to cold temperatures could lead to a strain on staff. • Water pipes can freeze and burst leading to flooding within facilities. • Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations. • Exposure risks to outdoor workers.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable.

CRITICAL FACILITIES	POTENTIAL IMPACTS
	• Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Roads may become impassable due to snow and/or ice impacting response times by emergency services. • Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged. • Water pipes can freeze and burst leading to flooding within facilities.

People and animals are subject to health risks from extended exposure to cold air (Table 20-7). Elderly people are at greater risk of death from hypothermia during these events, especially in the neighborhoods with older housing stock. According to the U.S. Center for Disease Control, every year hypothermia kills about 600 Americans, half of whom are 65 years of age or older.

Due to factors like limited mobility, communication difficulties, medical needs, sensitivity to cold temperatures, reliance on support services, transportation challenges, housing accessibility issues, and possible shortages in emergency shelter accommodations, people with disabilities are particularly vulnerable to winter storms. Inclusive measures are crucial to address these vulnerabilities and ensure their safety during severe weather events.

Populations living below the poverty level may not be able to afford to run heat on a regular basis or extend period of time. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Santa Fe County planning area is estimated at 26 percent of the total population and children under the age of 5 are estimated at 4 percent. The population with a disability is estimated at 14 percent of the total population. An estimated 12 percent of the planning area population live below the poverty level and 31 percent of the populations speaks a language other than English.[4]

[4] US Census Bureau, American Community Survey Five-Year Estimates

Table 20-7. Populations at Greater Risk to Winter Storm Events

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	NON-ENGLISH SPEAKING
Santa Fe County	40,005	5,990	21,458	19,043	48,054

Older homes tend to be more vulnerable to the impacts of winter storm events. Approximately, 53 percent (an estimated 40,547 structures) of the housing units in the planning area were built before 1980 (Table 20-8).

Table 20-8. Structures at Greater Risk to Winter Storm Events

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980
Santa Fe County	40,547

Winter storms have been known to cause injury to humans and occasionally have been fatal. Overall, the total loss estimate of property and crops in the planning area is estimated at $86,600 with an average annualized loss of $3,100. Based on historic loss and damages, the impact of winter storm damages on the Santa Fe County planning area can be considered “Limited” severity of impact, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Table 20-9. Winter Storm Event Damage Totals, 1996-2023

JURISDICTION	PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Santa Fe County	$86,600	$3,100

ASSESSMENT OF IMPACTS

The greatest risk from a winter storm hazard is to public health and safety. The impact of climate change could produce longer, more intense winter storm events, exacerbating the current winter storm impacts. Worsening winter storm conditions can be frequently associated with a variety of impacts, including:

- Vulnerable populations, particularly the elderly (26 percent of total population), children under 5 (4 percent of total population), and those with a disability (14 percent of total population), can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite.
- Loss of electric power or other heat source can result in increased potential for fire injuries or hazardous gas inhalation because residents burn candles for light or use fires or generators to stay warm.

- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders, are subject to injury or illness resulting from exposure to extreme cold temperatures.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents and potential contact with downed power lines.
- Operations or service delivery may experience impacts from electricity blackouts due to winter storms.
- Power outages are possible throughout the planning area due to downed trees and power lines and/or rolling blackouts.
- Critical facilities without emergency backup power may not be operational during power outages.
- Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, unsafe, or obstructed.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.
- Depending on the severity and scale of damage caused by ice and snow events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- Winter storms can reduce the efficacy of shaded fuel breaks for wildfire mitigation as treated areas were more likely to have downed trees and limbs than untreated areas.
- Winter storms can result in damage to endangered species habitat and increased fuel loads within forested habitats.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to impacts of winter storm events. Approximately 53 percent of homes in the County were built before 1980. Similarly, historic buildings and sites are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are 96 historical sites listed on the National Register of Historic Places for Santa Fe County and 212 listed on the New Mexico State Register of Cultural Properties.
- Schools may be forced to shut early due to treacherous driving conditions.
- Exposed water pipes may be damaged by severe or late season winter storms at both residential and commercial structures, causing significant damages.

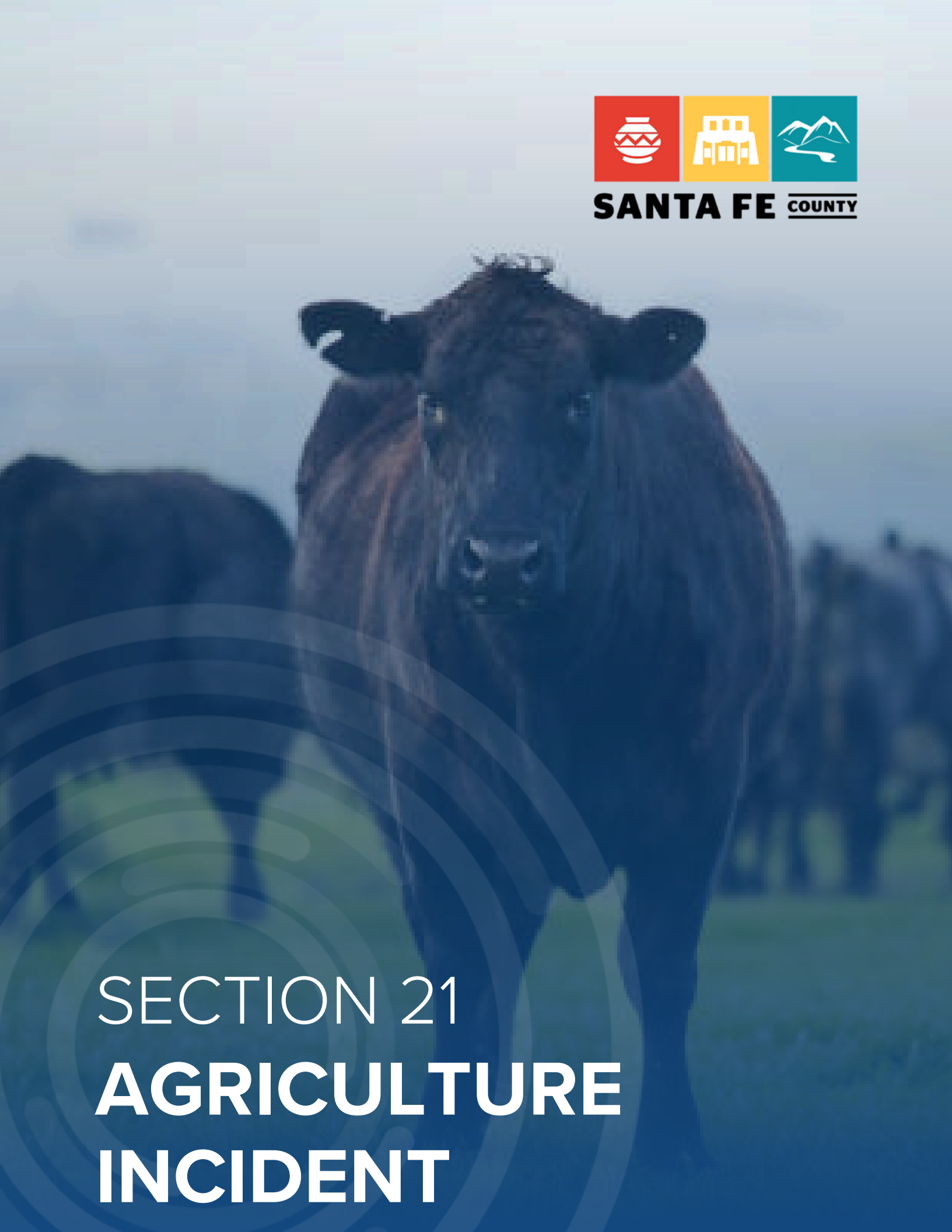
The economic and financial impacts of winter weather on the community will depend on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses and citizens will also contribute to the overall economic and financial conditions in the aftermath of a winter storm event.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to reduce the number of extreme cold events statewide but increase in the variability of events. Extreme cold events will continue to be possible but overall winters are becoming milder, and the frequency of extreme winter weather events are decreasing due to the warming of the Arctic and less extreme cold air coming from that region. Fewer cold spells are projected to occur per year, but the length of cold spells may be longer when they do occur. A

trend that is expected to continue with winter extremes estimated to be milder over the next 50 years compared to extremes in the historic record.[5]

[5] Dunbar, N.W., Gutzler, D.S., Pearthree, K.S., Phillips, F.M., Bauer, P.W., Allen, C.D., DuBois, D., Harvey, M.D., King, J.P., McFadden, L.D., Thomson, B.M., and Tillery, A.C., 2022, Climate change in New Mexico over the next 50 years: Impacts on water resources: New Mexico Bureau of Geology and Mineral Resources, Bulletin 164, 218 p. https://doi.org/10.58799/B-164



SANTA FE COUNTY

SECTION 21

AGRICULTURE INCIDENT

SECTION 21: AGRICULTURE INCIDENT

HAZARD DESCRIPTION

The hazard of agriculture incident refers to the occurrence of disease in vegetation, crops, or livestock which render them unfit for consumption or use. These infections in agriculture organisms can be caused by infestations of insects, vermin, parasites, and pathogens. Some level of agricultural infestation is normal and not necessarily a cause for concern. However, when escalated, large-scale incidents of agricultural infestation occur, or when new infestation types are introduced, there can be a multitude of significant impacts. Specific impacts depend on several factors such as the type of pest involved, the rate at which the infestation spreads, and the types of crops and livestock which are affected by the incident. Primary concerns due to agriculture incidents include: economic impacts related to lost livestock and crops; the spread of disease in humans if tainted agricultural products are distributed to market; and impacts on the health of the natural environment if an infestation spreads to wildlife.

The food and agriculture sector accounts for roughly one-fifth of United States economic activity[1], with 22.1 million jobs (10.4% of U.S. employment) being in the agricultural and food sector in 2022. Of those, there were 2.6 million jobs related to direct on-farm employment.[2] In addition to immediate concerns related to public health, food safety, and food supply, large-scale agriculture incidents can have devasting economic impacts.

Agriculture is a significant industry across the State of New Mexico, playing a major role in supporting the state's communities and overall economy. According to the 2022 USDA Annual Bulletin, New Mexico ranks sixth among all states in total farm land with 40 total million acres, and fourth in average farm size at 1,660 acres per farm. New Mexico is a leading producer of

[1] Source: https://www.fema.gov/sites/default/files/2020-07/fema_incident_annex_food-agriculture.pdf
[2] Source: https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy/#:~:text=In%202022%2C%2022.1%20million%20full,percent%20of%20total%20U.S.%20employment

several agricultural products, including peppers and chiles (1st among all states), pecans (2nd), onions (5th), and milk from cows (9th).[3]

Increases in global trade and travel compound the potential for an agricultural incident to occur, as the probabilities of foreign invasive pests being introduced to new agricultural environments is at an all-time high. Invasive species are of particular concern as crops, livestock, and the natural environment in their new home may be unpredictably impacted and farmers may be unequipped to manage the new threat.

LOCATION

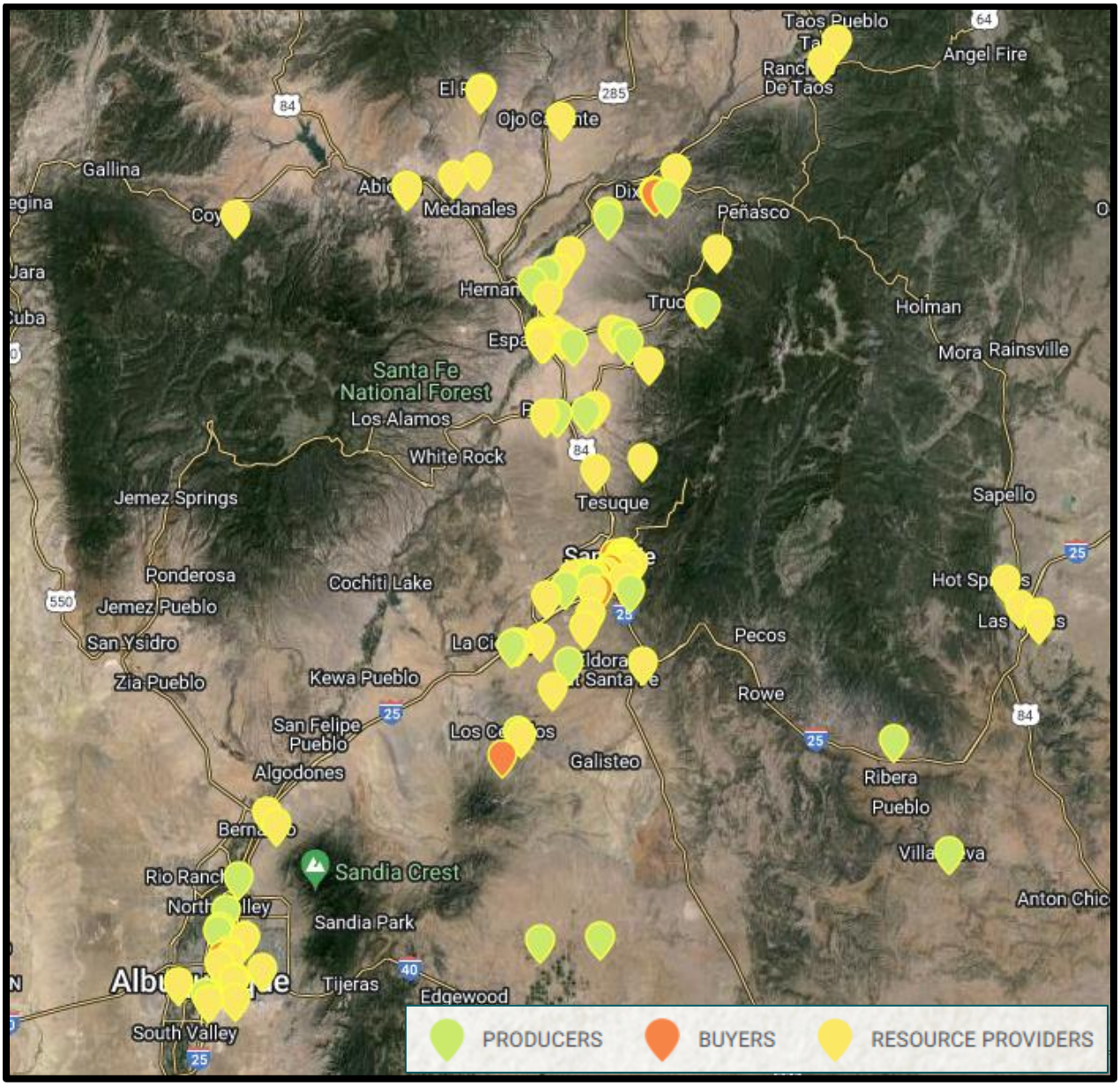
All agricultural land in the Santa Fe County planning area is susceptible to animal / livestock incidents and agricultural infestations. Based on most recent USDA data, Santa Fe County contained 639 farms and ranches in 2017, slightly down from its count of 715 farms and ranches in 2012.[4] All of these agricultural sites are at risk of animal / livestock incidents. Additionally, the rise of urban farming has placed agricultural operations within city boundaries and closer to other residences, businesses, and the rest of the built environment. Depending on the type of infestation causing an agricultural incident, infestations in urban farms could spread to nearby structures, people, pets, and wildlife creating cascading impacts on the planning area beyond loss of agriculture products and revenue.

AgriGate of Santa Fe County is an online platform that supports connections between food producers, food buyers, and resource providers in the Santa Fe County regional food community. The platform includes a searchable map detailing locations of farms, grocery stores, restaurants, distributors, schools, food co-ops and markets, and other institutions that participate in the local agriculture industry. Figure 21-1 shows AgriGate's map of food producers, food buyers, and resource providers in and around the Santa Fe County planning area. All of these could be impacted by an agriculture incident, either directly or indirectly.

[3]Source: https://www.nass.usda.gov/Statistics_by_State/New_Mexico/Publications/Annual_Statistical_Bulletin/2022/2022-NM-Ag-Statistics.pdf

[4] Source: https://www.nass.usda.gov/Statistics_by_State/New_Mexico/Publications/Annual_Statistical_Bulletin/2022/2022-NM-Ag-Statistics.pdf

Figure 21-1. AgriGate of Santa Fe County Food Community Map[5]



EXTENT

The extent of an agricultural incident or infestation will depend on each individual pest or disease and its ability to cause harm. Threat levels from infestations and invasive species range from nuisance to widespread and significant. Existing factors in the county may contribute to the degree of impact of an infestation event. For example, if agriculture operations in the planning area are already stressed, such as during a drought, infestation and disease threats may intensify as they further damage and stress crops and livestock.

[5] Source: https://www.agrigatesfc.org/food-community-map

SECTION 21: AGRICULTURE INCIDENT

The U.S. food supply is among the safest in the world. America's food industry operates entirely by private ownership, with those private entities operating within a highly competitive global market. Entities within the food industry, such as farmers and ranchers, are under the regulation of the U.S. Department of Health and Human Services, Food and Drug Administration, U.S. Department of Agriculture, and the U.S. Food Safety and Inspection Service. The regulations and security measures enforced by federal agencies include physical security, security during manufacture, production, processing and storage, security in shipping, and protocols for managing biological risks on farms for products that lead directly into the food supply. While foodborne animal and plant disease outbreaks do occur in the U.S., an extreme incident requiring a large-scale federal response has never occurred. This national food and agriculture industry context suggests that severe, widespread foodborne illness and food supply impacts from an agricultural incident in the Santa Fe County planning area are unlikely.

In addition to federal regulations, New Mexico state law also requires a number of diseases to be reported immediately to the New Mexico livestock board's state veterinarian when they are discovered or diagnosed. Some reportable conditions and diseases are specific to certain species, while others must be reported when found in any species. Table 21-1 lists the diseases and conditions in livestock that are required to be reported to the State of New Mexico, as well as the affected animal(s). This list indicates which livestock diseases may have outbreak potential in the Santa Fe County planning area.

Table 21-1. Reportable Livestock Diseases and Conditions in New Mexico[6]

DISEASE OR CONDITION	AFFECTED SPECIES
Any disease of unusual morbidity or mortality that does not fit a normally expected clinical picture	Any/All
Any condition suspected of being a foreign or emerging animal disease, or possible bioterrorism	Any/All
Any disease condition in livestock exhibiting vesicular lesions	Any/All
Undiagnosed neurologic, mucosal, and hemorrhagic conditions	Any/All
Contamination by toxic substances, including unexplained increase in aflatoxin, botulism, or T2 toxin	Any/All
Abortion storms of unknown etiology	Any/All
Highly infectious conditions of any etiology	Any/All
Any disease or condition of public health significance	Any/All
Anthrax	Any/All
Avian Influenza	Any/All
Botulism	Any/All
Brucellosis	Any/All

[6] Source: https://www.law.cornell.edu/regulations/new-mexico/21-30-4-9-NMAC

SECTION 21: AGRICULTURE INCIDENT

DISEASE OR CONDITION	AFFECTED SPECIES
Dermatophilosis (club lamb disease) and other fungal diseases of livestock with zoonotic potential	Any/All
Plague (yersinia pestis)	Any/All
Q Fever (Coxiella burnetii)	Any/All
Rabies	Any/All
Swine Influenza	Any/All
Tuberculosis	Any/All
Tularemia	Any/All
West Nile Virus and other arboviral diseases	Any/All
Bluetongue and epizootic hemorrhagic disease in deer, elk, or cattle	Livestock
Classical Swine Fever (hog cholera)	Livestock
Contagious bovine or caprine pleuropneumonia	Livestock
Foot and mouth disease	Livestock
Fungal diseases of livestock with zoonotic potential such as dermatophilosis	Livestock
Heartwater	Livestock
Malignant catarrhal fever	Livestock
Pseudorabies	Livestock
Scabies in livestock	Livestock
Screwworm	Livestock
Texas cattle fever (boophilus ticks)	Livestock
Trichomoniasis	Livestock
All transmissible spongiform encephalopathies (TSEs)	Livestock
African horse sickness	Equines
Contagious equine metritis (CEM)	Equines
Equine encephalopathies such as: eastern equine encephalitis	Equines
Western equine encephalitis (WEE)	Equines
Venezuelan equine encephalitis (VEE)	Equines

DISEASE OR CONDITION	AFFECTED SPECIES
Equine herpesvirus (neurologic form)	Equines
Equine infectious anemia (EIA)	Equines
Equine piroplasmosis	Equines
Glanders	Equines
Strangles (streptococcus equi)	Equines
Vesicular stomatitis or any other vesicular disease in equines	Equines
Newcastle disease	Poultry
Psittacosis	Any/All; Poultry

According to the Centers for Disease Control and Prevention (CDC), the size of a foodborne outbreak varies based on which germ is in contaminated food, how much food is contaminated, where food is contaminated, where the food is served, and how many people eat it. The CDC categorizes outbreaks into three categories: small, local outbreaks, statewide or regional outbreaks, and multistate outbreaks. Table 21-2 contains examples of each of these outbreak scenarios. While small, local outbreaks caused by an agriculture incident within the Santa Fe County planning area would be unlikely to have a wider impact on the region, statewide or multistate outbreaks originating in the planning area could have far reaching effects. Similarly, a statewide or multistate outbreak caused by agriculture event elsewhere in the country could lead to adverse public health impacts within the Santa Fe County planning area.

Table 21-2. CDC Foodborne Disease Outbreak Levels[7]

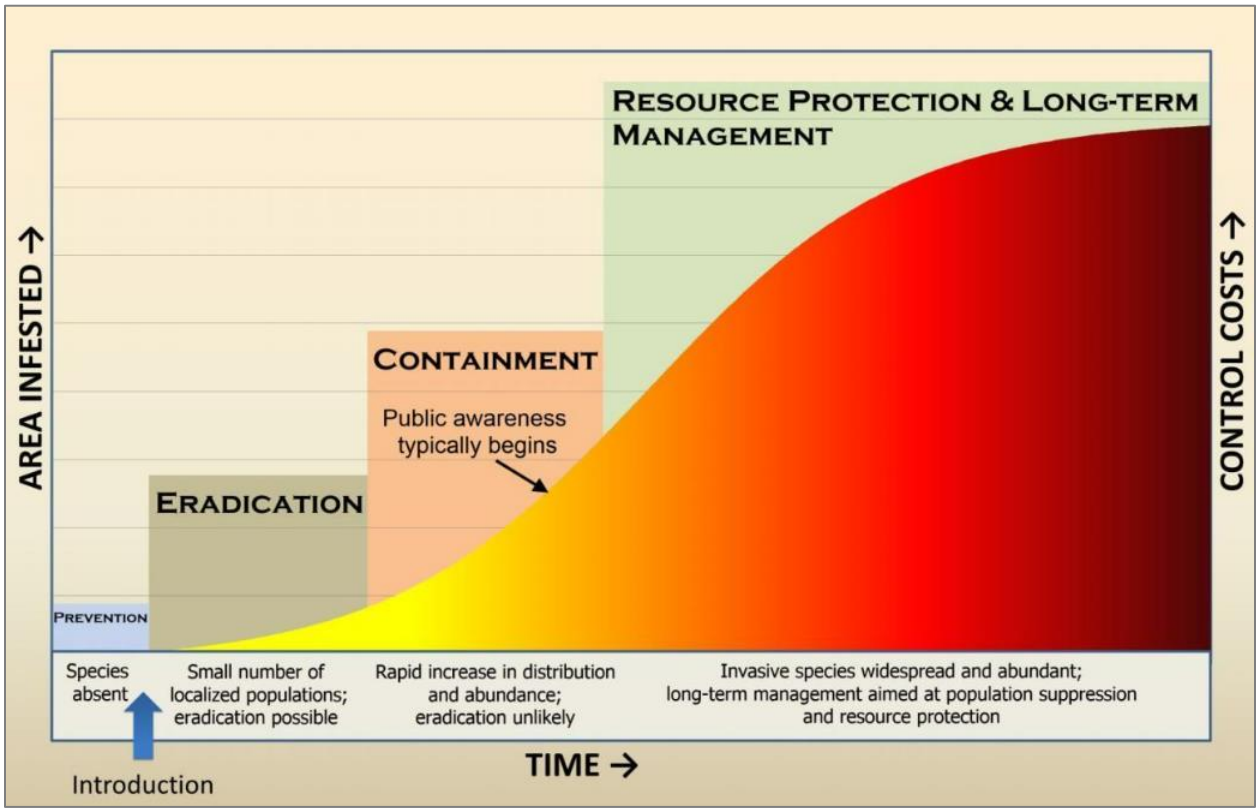
OUTBREAK LEVEL	EXAMPLE SCENARIO
Small, Local Outbreak	A contaminated casserole served at a church supper may cause a small outbreak among church members who know each other.
Statewide or Regional Outbreak	A contaminated batch of ground beef sold at several locations of a grocery store chain may lead to illnesses in several counties or even in neighboring states.
Multistate Outbreak	Contaminated produce from one farm may be shipped to grocery stores nationwide and make hundreds of people sick in many states.

The rise of invasive species, those that are either purposefully or accidentally transported to new, nonnative environments due to human activity, increases the risk for agriculture incidents in the Santa Fe County planning area. The feasibility of invasion prevention, eradication, or containment

[7] Source: https://www.cdc.gov/foodsafety/outbreaks/lists/index.html

decreases as time goes on and species populations increase, resulting in costly resource protection and management measures against abundant invasive species. The costs of preventing a species from entering the Santa Fe County will be significantly less than eradication, containment, or long-term management once that invasive species has established itself in the planning area. Figure 21-2 shows the invasion curve, the rate at which control costs rise as the area of infestation increases.

Figure 21-2. Invasion Curve



Based on the increasing rate of invasive species infesting new habitats globally, and the extent of existing invasive species already present in the planning area, Santa Fe County can expect significant impacts from invasive species on their ecosystems. However, due to the largely unpredictable ways that invasive species are introduced, as well as the variance in each species' impact, the extent of an infestation may be difficult to anticipate.

HISTORICAL OCCURRENCES

Historical trends have seen infectious diseases increase in the past four decades at more than four times the rate of prior decades. Most of these diseases have zoonotic origins, meaning the originate from nonhuman animals. Since 1940, an estimated 50 percent of zoonotic diseases have been associated with agriculture.[8]

[8] Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9629715/#:~:text=In%20the%20past%20four%20decades,agriculture%20(1%E2%80%933)

Since 2006, the CDC has issued 202 outbreak notices pertaining to multistate foodborne outbreaks across the U.S., some of the most common germs for these notices being Salmonella and Listeria. While data is limited on foodborne outbreaks at the county-level, the CDC does maintain outbreak records and data at the state level. Table 21-3 shows the number of outbreaks and impacts in New Mexico from illnesses caused by foodborne disease, animal contact, and environmental factors from 1998-2023. In that reporting period, New Mexico had the most outbreak incidents of any state in the U.S. While it is not possible to know how many of these impacts occurred within the Santa Fe County planning area, state-level impacts provide an idea of the prevalence of food and agriculture related public health concerns in the region.

Table 21-3. Foodborne Illness impacts in New Mexico, 1998-2023[9]

JURISDICTION	OUTBREAKS	ILLNESSES	HOSPITALIZATIONS	DEATHS
New Mexico	186	17,592	3,710	74

Due in part to agriculture operations being private businesses, data on the economic impacts of agriculture events in Santa Fe County largely go unreported. The prevalence of farming and ranching in the planning area, combined with the known number of outbreaks (186) in New Mexico since 1998, does make it likely that those in Santa Fe County's agriculture sector have faced previous economic hardship due to agriculture incidents.

PROBABILITY OF FUTURE EVENTS

Some degree of agriculture incident, including production lost to disease and pests, is to be expected on a regular basis and not necessarily cause for concern. However, larger scale outbreaks could result in significant public health concerns and potentially devastating economic impacts in Santa Fe County. Based on the historic records, trends, and team input, the frequency of occurrence for significant agriculture incident events is considered "Likely," with an event probable within three years.

VULNERABILITY AND IMPACT

Due to the varying nature of agriculture incidents, the impacts of an event will entirely depend on the circumstances of a particular incident. Important factors would include the type of pest or disease inciting the event, how quickly the outbreak spreads, the size and number of farms and ranches affected, and the number of agricultural products lost or damaged.

The most severe and direct impacts from agriculture incidents occur on farms and ranches. According to the 2022 USDA New Mexico Annual Bulletin, Santa Fe County contained 639 farms and ranches in 2017 (the most recent data available). In 2021, cash receipts for livestock and their products totaled $19,968,000 in Santa Fe County, with cash receipts from crops totaling $15,943,000. This nearly $36,000,000 of agriculture revenue in the planning area would be jeopardized during an agriculture incident. Further, realized net farm income in Santa Fe County in 2021 was negative, at -$7,662,000. This indicates that agriculture operators in the planning

[9] Source: https://wwwn.cdc.gov/norsdashboard/

area could suffer extreme economic hardship due to an agriculture incident resulting in lost profits.[10]

Public health impacts from infestations and invasive species may vary from a negligible or nuisance level to wide-spread and significant. Several of the more common foodborne illnesses, such as salmonella, botulism, and listeria have the potential to cause severe symptoms and even death, especially in vulnerable populations such as the elderly or those with already compromised immune systems.

The population over 65 and under the age of 5 in the Santa Fe County planning area is estimated at 30 percent of the total population or an estimated total of 45,995 potentially vulnerable residents in the planning area based on age. An estimated 12 percent of the planning area population live below the poverty level. These populations may experience greater impact from foodborne illnesses or have fewer financial resources to recover from infestation-caused damages to their health and business. Table 21-4 shows vulnerable population counts within the Santa Fe County planning area.

Table 21-4. Vulnerable Populations in Santa Fe County[11]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

The built environment, including infrastructure and critical facilities, are not anticipated to suffer any significant impacts from agriculture incidents directly as disease or infestations in livestock and crops are unlikely to result in any structural impacts. However, the operation of critical facilities may be impacted from large-scale agricultural incidents and their effects on public health and the economy. For example, an agriculture incident resulting in widespread foodborne illness could overwhelm health service centers and lead to staffing issues for critical county operations. Additionally, the economic impact of an agriculture incident could strain County resources. For a comprehensive list of Santa Fe County's critical facilities, please see Appendix C.

While agriculture incident impacts specific to Santa Fe County are not known, agriculture and wildlife related disease has resulted in reports of 74 deaths, 3,710 hospitalizations, and 17,592 illnesses in New Mexico over the past 26 years. It should also be noted that the most significant type of impact an agricultural event may have on the Santa Fe County planning area is economic. Losses of agricultural products due to infestations or disease, or even widespread rumors of tainted food products, could lead to potentially devastating economic impacts for both the food and agriculture sector and the wider Santa Fe County planning area. This supports a "Substantial" severity of impact in relation to public health and the economy for agriculture incidents, meaning multiple deaths and significant damage to the economy in the planning area.

[10] Source: https://www.nass.usda.gov/Statistics_by_State/New_Mexico/Publications/Annual_Statistical_Bulletin/2022/2022-NM-Ag-Statistics.pdf

[11] U.S. Census Bureau, American Community Survey, 2022

SECTION 21: AGRICULTURE INCIDENT

ASSESSMENT OF IMPACTS

Agriculture incidents involving infestations and disease have the potential to pose a significant risk to a community's natural environment, economy, and human population. These events can be associated with a variety of impacts, including:

- Human health can be negatively impacted due to foodborne illnesses if tainted products reach consumers before an outbreak is identified.
- Agricultural production and food security may decrease from pest-caused damage to crops and livestock.
- Those working in the agriculture and food industry may face severe economic hardship due to agriculture incidents. Large-scale incidents may adversely affect the entire economy of the planning area.
- New or proliferating pest populations may lead to the use of harsher chemicals and pesticides in farming practices, damaging the natural environment and ecosystem.
- Local ecosystems may be disrupted as invasive species compete with native organisms, including crops and livestock, for limited resources, altering habitats and reducing biodiversity.
- Native plants and animals face potential extinction as invasive species overwhelm their environment.
- Vulnerable populations, such as those with asthma and allergies, may experience worsened symptoms if certain infestations originating in agriculture take hold in homes and buildings.

The economic and financial impacts of agriculture incidents on the planning area will depend entirely on the scale of the event, where the event occurs, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any agriculture incident.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to influence future agriculture incidents. Rising temperatures, modified precipitation patterns, and other variables like humidity or atmospheric composition can affect the growth, development, and multiplication of pests such as insects, fungi, bacteria, and viruses. Changes in climate could result in the introduction and proliferation of new, invasive pests that could impact agriculture in Santa Fe County, as well as increases in current pest populations and their ability to cause damage. Changes in the frequency of occurrence and severity of agriculture incidents in the planning area should be reevaluated in the next planning cycle.

SANTA FE COUNTY

SECTION 22
HAZARDOUS MATERIAL

SECTION 22: HAZARDOUS MATERIALS

HAZARD DESCRIPTION

Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. A hazardous material (HAZMAT) incident involves a substance outside normal safe containment in sufficient concentration to pose a threat to life, property, or the environment.

Chemicals are found everywhere. They purify drinking water, increase crop production, and simplify household chores. But chemicals also can be hazardous to humans or the environment if used or released improperly. Hazards can occur during production, storage, transportation, use, or disposal. You and your community are at risk if a chemical is used unsafely or released in harmful amounts into the environment where you live, work, or play.

The U.S. Occupational Safety and Health Administration (OSHA) defines hazardous materials as being any substance or chemical which is a "physical or health hazard." This includes chemicals which are carcinogens; toxic agents; irritants; corrosives; sensitizers; agents which act on the hematopoietic system; agents which damage the lungs, skin, eyes, or mucous membranes; chemicals which are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive or water-reactive; and chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the previously mentioned characteristics.

In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. This profile focuses on fixed sites. Weather conditions will directly affect how the hazard develops.

The Toxics Release Inventory (TRI) is a publicly available database from the federal Environmental Protection Agency (EPA) which contains information on toxic chemical releases and other waste management activities that are reported annually by certain covered industry groups federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to the EPA and their state or tribal entity. A facility must report if it meets the following three criteria:

- The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; Resource Conservation and Recovery Act (RCRA) Subtitle C Treatment, Storage and Disposal (TSD) facilities; and solvent recovery services.
- Have ten or more full-time employee equivalents.
- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, Bio-accumulative and Toxic (PBT) chemicals are subject to different thresholds of ten pounds, 100 pounds or 0.1 grams depending on the chemical.

Submission of a Tier II form is required under Section 312 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). Under EPCRA, all facilities which store significant quantities of hazardous chemicals must share this information with state and local emergency responders and planners. Facilities in New Mexico share this information by reporting hazardous chemical inventories with the State Emergency Response Commission (SERC) and Local Emergency Planning Committees (LEPC). This communication between facilities and the SERC and LEPC includes designating a facility representative, providing notice of any facility changes that may be relevant to emergency planning, and providing necessary information for developing or implementing local emergency plans. The New Mexico Tier II Report contains facility identification information and detailed chemical data about hazardous chemicals stored at the facility.

A facility must report if it meets the following criteria:

- Any company using chemicals that could present a physical or health hazard must report them if the quantities of those chemicals exceed Tier II threshold limits.
- If an industry has an Occupational Safety and Health Administration (OSHA) deemed hazardous chemical that exceeds the appropriate threshold at a certain point in time, then the chemical must be reported. These chemicals may be on the list of 355 Extremely Hazardous Substances (EHS) or could be one of the 650,000 reportable hazardous substances (not on the EHS list). This reporting format is for a "snapshot in time." EHS chemicals must be reported if the quantity is greater than 500 pounds or the Threshold Planning Quantity (TPQ) amount, if the TPQ is less than 500 pounds. Chemicals not considered to be EHS must be reported if their quantity is 10,000 pounds or greater.[1]

LOCATION

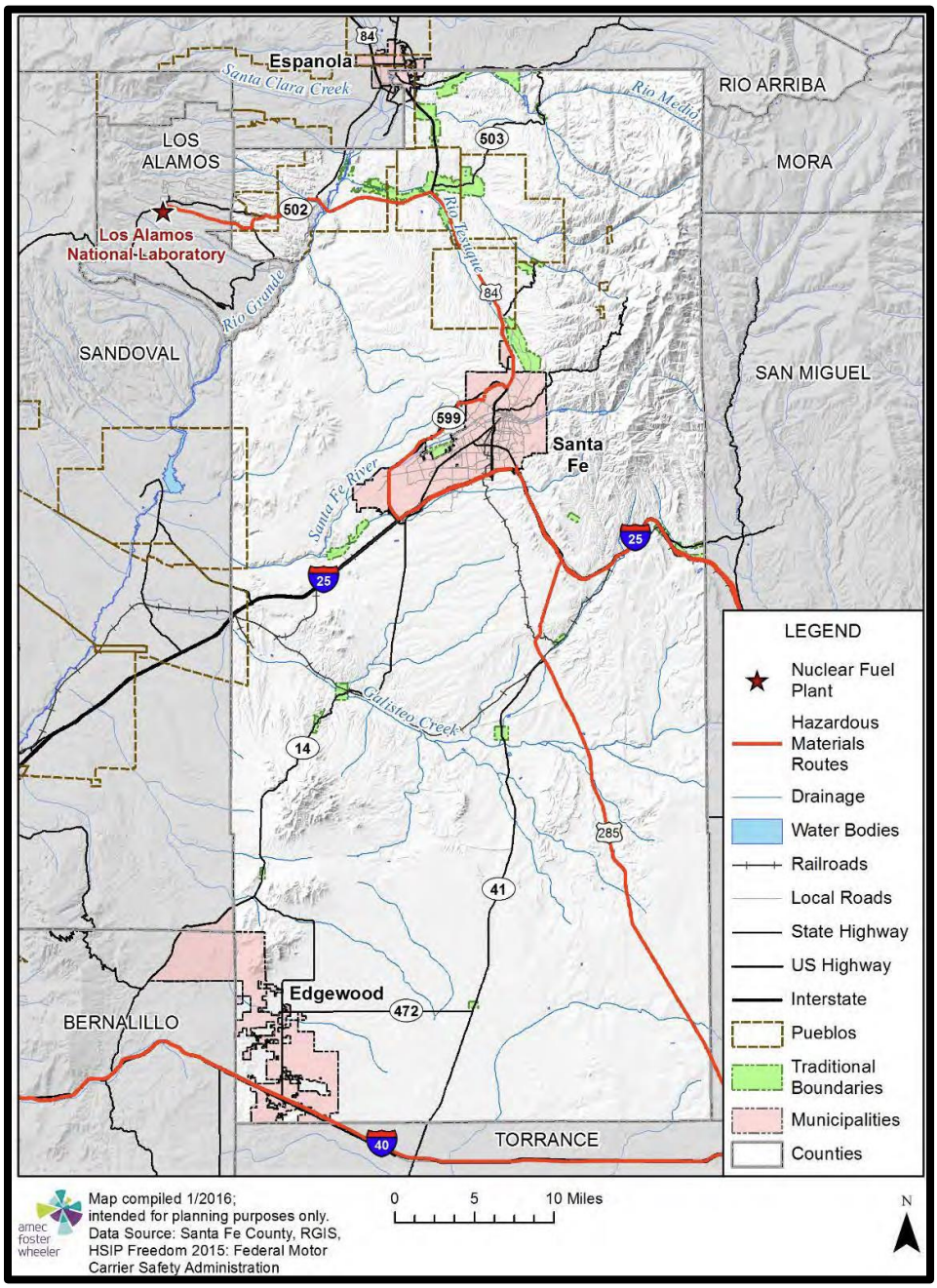
A hazardous material spill occurring along major highways near populated areas in the Santa Fe County planning area is of concern. Trucks can carry a variety of materials that would, in large quantity, threaten the health and safety of people and the natural environment in the vicinity of a spill.

The U.S. Department of Transportation's National Hazardous Materials Route Registry (NHMRR) lists, as reported by States and Tribal governments, all designated and restricted roads and preferred highway routes for transportation of highway route-controlled quantities of Class 7

[1] Source: https://www.nmdhsem.org/preparedness-bureau/hazmat-program/epcra/

radioactive materials and non-radioactive hazardous materials. According to the NHMRR, there are four highways included in major designated hazardous materials transportation routes in Santa Fe County. These are Highway 84/285, Highway 599, Interstate 25, and Interstate 40. Highway 599 is a designated hazardous materials bypass around the densely populated City of Santa Fe.[2]

Figure 22-1. National Hazardous Materials Route



[2] Source: https://www.fmcsa.dot.gov/regulations/hazardous-materials/national-hazardous-materials-route-registry-%E2%80%93-new-mexico

A frequent category of hazardous materials shipments that utilize these designated hazardous materials transportation routes are shipments of wastes generated from research, development, and production of nuclear weapons and other defense-related transuranic (TRU) wastes. These shipments that cross the Santa Fe County planning area come from the Los Alamos National Laboratory (just outside the County on the northwestern side) on their way to the Waste Isolation Pilot Plant (WIPP) found southeast of the City of Carlsbad. The WIPP is the nation's only deep geologic long-lived radioactive waste repository, which permanently stores TRU wastes 2,150 feet underground in an ancient salt formation.[3] As these shipments run through Santa Fe County, they travel a route along Highway 502, U.S. Route 84/285, Highway 599, Interstate 25, and finally traveling southeast on Highway 285 and out of the county. The Buckman Direct Diversion Facility is a water treatment plant located on Highway 599. This facility sees a high volume of hazardous materials transportation to and from the plant on a regular basis.

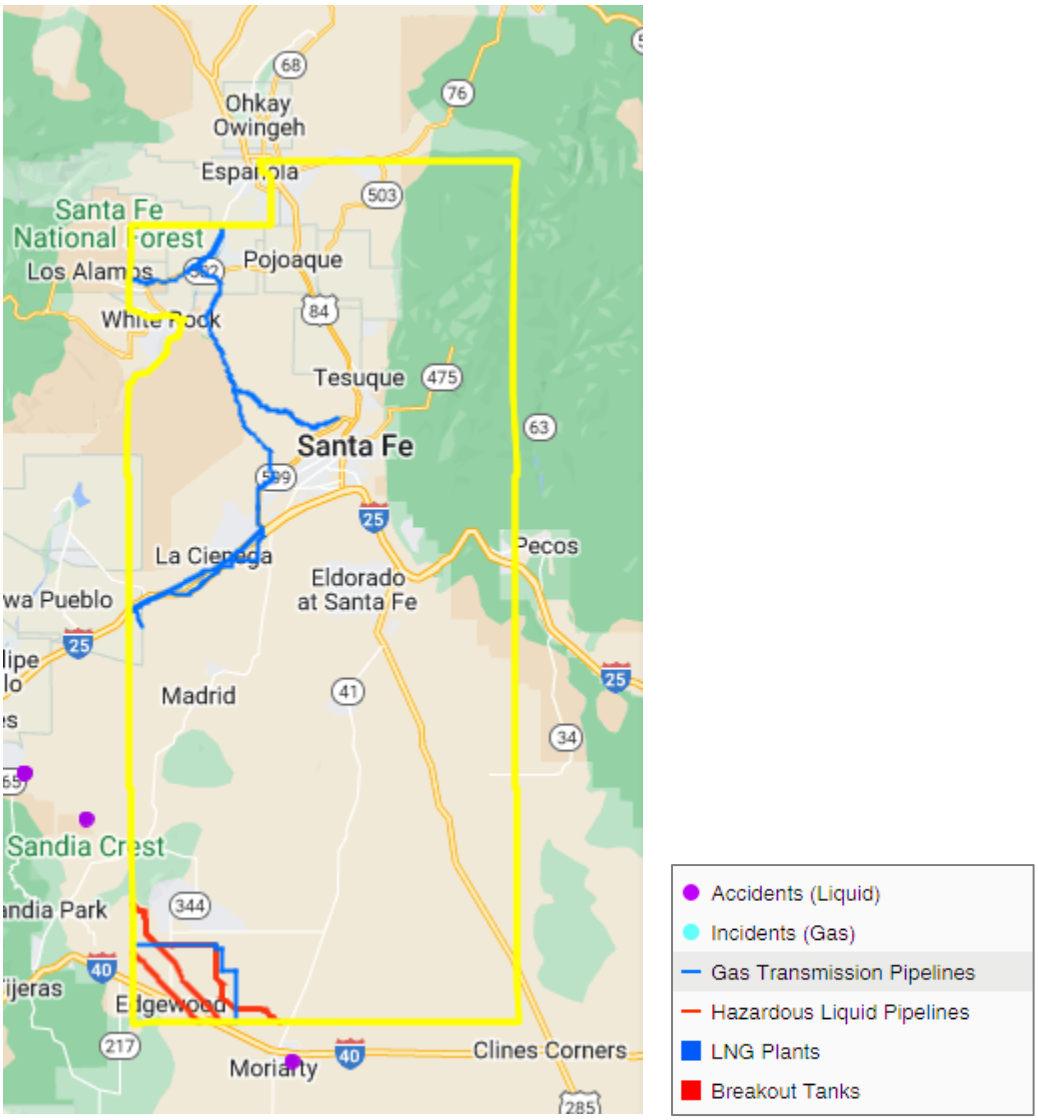
The Santa Fe County planning area does contain rail lines, however these are primarily used for passenger service, such as the New Mexico Rail Runner Express running between the Albuquerque area up through the City of Santa Fe. While train derailments and fuel spills could still create hazardous material incidents, significant risk associated with the transport of hazardous materials by train is not anticipated for the planning area.

Major highways, railroads, and the surrounding areas are at risk of a HAZMAT incident. In the Sante Fe County planning area, the portions of US Route 285, Highway 599, and Interstate 25 nearest to the City of Santa Fe are of particular concern, as they are in close proximity to some of the most densely populated areas in the county. Additionally, the northern segment of US Route 84/285 bisects the Pueblos of Pojoaque and Tesuque.

Pipelines transporting hazardous materials or gas are another type of site which could lead to potential hazardous material events. According to the National Pipeline Mapping System (NPMS), There is a network of gas transmission pipelines in the northwest portion of the county, cutting through San Ildefonso Pueblo in the north, connecting down to Highway 599 north / northwest of the City of Santa Fe, and out to the southwest along Interstate 25. There is an additional gas transmission line in the southwest corner of the county near the City of Edgewood, as well as several hazardous liquid pipelines in that area. Figure 22-1 shows these pipelines mapped in the NPMS public viewer tool.

[3] https://wipp.energy.gov/wipp-site.asp

Figure 22-2. Gas and Hazardous Liquid Pipeline Locations[4]



Under the Community Right-to-Know program laws upheld at the state and federal level, all facilities which store significant quantities of hazardous chemicals must share this information with state and local emergency responders and planners. Facilities in New Mexico share this information by filing annual hazardous chemical inventories with the state, with Local Emergency Planning Committees (LEPCs), and with local fire departments. LEPC's develop hazardous materials emergency plans to use in responding to and recovering from hazardous substance incidents; these plans are then reviewed and approved by the State Emergency Response Commission (SERC).[5]

New Mexico participates in the TRI Data Exchange (TDX), requiring facilities to report TRI to the EPA. However, per the most recent available EPA data on TRI facilities, no facilities which

[4] Source: https://pvnpms.phmsa.dot.gov/PublicViewer/
[5] Source: https://www.nmdhsem.org/preparedness-bureau/hazmat-program/epcra/

reported significant releases of toxic substances were found within the Santa Fe County planning area. The closest sites with reporting in 2022 were the Los Alamos National Laboratory as well as 26 sites in and around the City of Albuquerque.

Another hazardous material concern to note is the presence of per- and polyfluoroalkyl substances (PFAs). PFAs are a group of chemicals used to make fluoropolymer coatings and products that resist heat, oil, stains, grease, and water. These chemicals may be present in fire-fighting foams, non-stick cooking surfaces, electrical wire insulation, adhesives, furniture, and other products. PFAs are a concern because they do not break down in the environment, can accumulate in fish and wildlife, and can move through soils and contaminate drinking water sources. Human health can be impacted by exposure to PFAs in a number of ways, including developmental effects, increased risk of some cancers, negative impacts on the body's immune system, and interference with the body's natural hormones.[6]

EXTENT

The extent of a hazardous material release will depend on whether it is from a mobile or fixed site and the size of impact. The range of intensity will vary greatly depending on the circumstances. These factors and conditions include the material, toxicity, duration of the release, and environmental conditions such as the wind and precipitation.

Hazardous materials or toxic releases can have substantial impact on communities. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions would directly affect how the hazard develops. The micro-meteorological effects on buildings and terrain can alter travel patterns and duration of agents. Shielding in the form of permanent shelter can protect people from harmful effects. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features can substantially increase damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

HISTORICAL OCCURRENCES

Hazardous materials are substances that if released or misused can cause death, serious injury, long-lasting health effects, and damage to infrastructure and the environment. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines.

A total of 90 spill incidents have been reported in Santa Fe County between 1971 and 2023 according to the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration's (PHMSA) Hazmat Incident Database.[7] This includes chemical spills reported using the DOT Hazardous Materials Incident Report Form 5800.1. Comprehensive details on damages, injuries, and fatalities are not always reported in this database, and a spill's inclusion in this dataset does not necessarily indicate significant damage to public health, property, or the

[6] Source: https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas

[7] Source: https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics

natural environment occurred. Of the available data, the only incident that resulted in a fatality occurred during a fire / explosion event in 2005. Since the previous HMAP plan, 11 new incidents have occurred from 2017-2022. Overall, the frequency of these events does indicate a significant level of risk for the planning area.

PROBABILITY OF FUTURE EVENTS

Hazardous material spills are usually the result of human error and/or accidents, which cannot be predicted. However, given the amount of traffic through the planning area and its large network of transportation, it is probable that an incident will occur in any given year. Most spills will not lead to negative health or safety impacts and will not cause substantial negative impacts on the air, soil, or groundwater. The probability of a spill threatening the health of thousands and of having long-term negative environmental consequences is, based on previous experience, low.

Based on the historic incident records and team input, the frequency of occurrence for typical hazardous material incidents would be considered highly likely. However, many of the previous spill incidents were minor and related to vehicle accidents resulting in fuel and oil spills. Based on the best available data the frequency of occurrence for more significant hazardous material incidents is considered “Occasional”, meaning an event is probable in the next five years for the Santa Fe County planning area.

VULNERABILITY AND IMPACT

Based on the prevalence and geographic proximity of hazardous materials transportation routes, as well as gas and hazardous liquid pipelines, there are areas along these routes and pipelines throughout the Santa Fe County planning area that are vulnerable to hazardous materials incidents. Critical facilities, infrastructure, and people located within a mile of these transportation routes would be considered the most vulnerable to a hazardous materials transportation incident. The hazardous materials transportation routes are designed to bypass more densely populated areas, especially the City of Santa Fe. This, to a degree, mitigates the vulnerability these more populated portions of the built environment would otherwise have to hazardous materials incidents.

Public health and environmental impacts are the most common effects of a hazardous materials incident. The release of toxic chemicals can pose immediate health effects including respiratory problems, chemical burns, poisoning, and long-term illnesses such as cancer. Vulnerable populations including children and the elderly may be more susceptible to health impacts. The population over 65 and under the age of 5 in the Santa Fe County planning area is estimated at 30 percent of the total population or an estimated total of 45,995 potentially vulnerable residents in the planning area based on age.

In extreme cases, an evacuation may be ordered to remove people from the hazardous area. Evacuating areas affected by HAZMAT incidents can be difficult, especially for those with disabilities, language barriers, or who live below the poverty level and lack transportation and financial resources.

Table 22-1. Populations at Greater Risk of HAZMAT Incidents[8]

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5	POPULATION WITH A DISABILITY	POPULATION BELOW POVERTY LEVEL	POPULATION SPEAKS LANGUAGE OTHER THAN ENGLISH
Santa Fe County	40,005	5,990	21,458	19,043	48,054

Hazardous materials can have significant and long-term environmental impacts due to the release of toxic chemicals into the environment. Spills or leaks of chemicals may contaminate the soil, making it unsuitable for agriculture. Hazardous material incidents can also cause water pollution. The toxic substances can be carried by rainwater or runoff into nearby water bodies, which can harm aquatic life, disrupt ecosystems, and pose a public health risk if contamination occurs to drinking water sources. Gaseous releases can lead to air pollution, which can become widespread. HAZMAT incidents can also disrupt the local ecosystem, harming animals, and insects, leading to the displacement of native species.

While the best available data does not provide historical dollar loss amounts, hazardous material incidents can also be costly and impact the local economy. Emergency containment, clean up, and disposal may strain local resources and budgets. HAZMAT incidents can also lead to property damage, most commonly to industrial facilities and transportation networks. Based on best available data, the impact of hazardous materials incidents in Santa Fe County planning area is considered “Limited” meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10% of property is destroyed or with major damage.

Critical facilities in the planning area are vulnerable to a range of direct and indirect impacts caused by HAZMAT incidents. Many of the impacts to critical facilities identified by the Santa Fe County Planning Team are similar to the impacts listed in Sections 5 through 21. For a comprehensive list of identified critical facilities see Appendix C.

ASSESSMENT OF IMPACTS

HAZMAT incidents have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. HAZMAT incidents can be frequently associated with a variety of impacts, including:

- Vulnerable populations, particularly the elderly (26 percent of total population) and children under 5 (4 percent of total population), can face serious or life-threatening health problems from exposure to toxic chemicals.
- Transportation disruptions and road closures can result in emergency response vehicles being unable to access areas of the community.
- First responders are exposed to toxic chemicals, hazardous materials, and generally unsafe conditions, which could result in sickness and long-term health impacts.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.

[8] U.S. Census Bureau, American Community Survey, 2022

- Evacuations, shelter in place orders, or the closure of transportation routes can lead to the disruption of critical facilities, businesses, and schools.
- The environment may experience significant damage leading to air and water contamination, loss of wildfire, agriculture, and tourism.

The economic and financial impacts of hazardous material incidents on the area will depend entirely on the scale of the event, where the event occurs, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any HAZMAT incident.

CLIMATE CHANGE CONSIDERATIONS

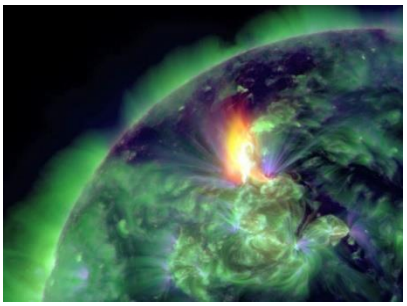
As a non-natural hazard, climate change has no direct impact on the future occurrences of hazardous material incidents. However, climate change is associated with an increase in severe weather. Severe weather events may cause damage to the storage of hazardous materials and can lead to an increase in chemical spills, leaks, or fires. Research and data regarding the impact of climate change on non-natural events is minimal and limited.

SANTA FE COUNTY

SECTION 23
SPACE WEATHER

SECTION 23: SPACE WEATHER

HAZARD DESCRIPTION



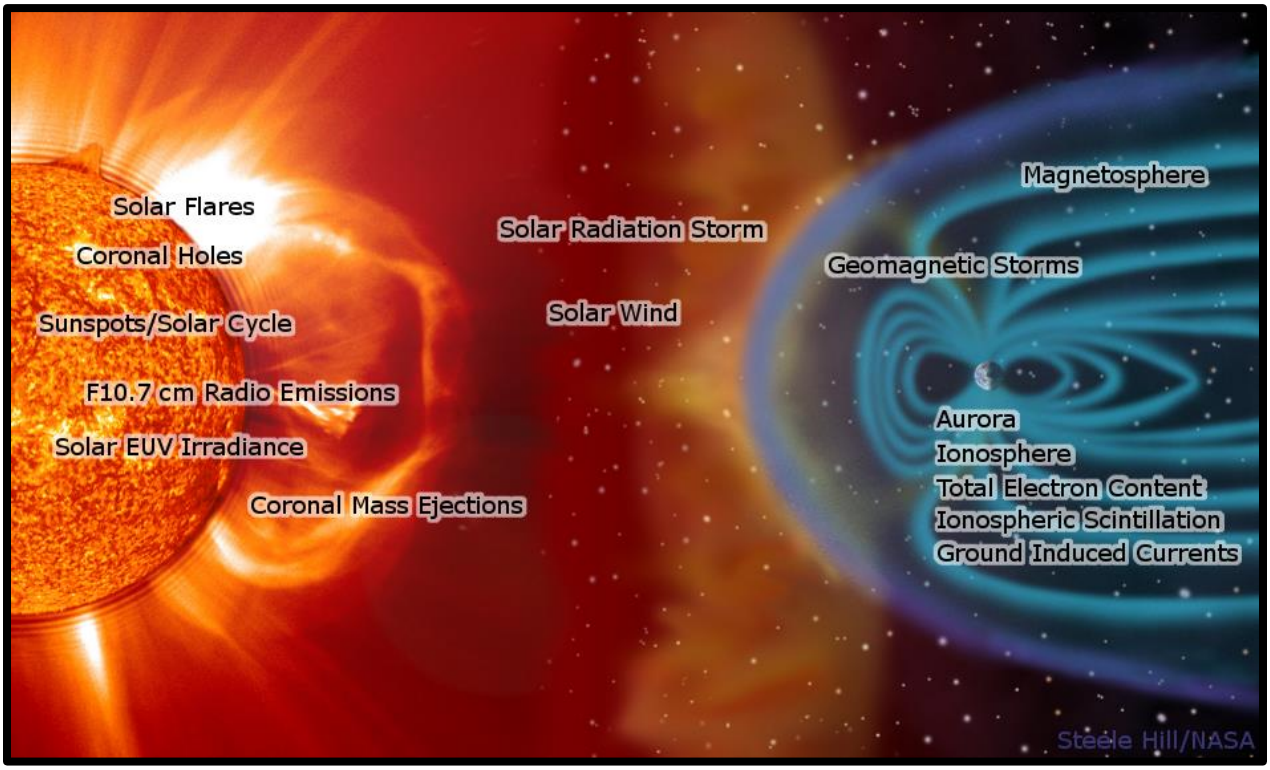
According to the Space Weather Prediction Center, space weather describes the activity between the sun and the Earth. Specifically, Space Weather describes the phenomena that impact systems and technology on Earth. When space weather happens, energy starts from the sun, moves through the sun's outermost layer (the corona), and then into a stream of charged particles called the solar wind. This energy travels to Earth's magnetic field, where it speeds up electrons and protons along magnetic lines toward Earth's poles, where they collide with the atmosphere and ionosphere, specifically at high latitudes. Each component of space weather impacts different technology on Earth. There are many different types of space weather phenomena, as detailed in Figure 23-1. However, there are three broad types: geomagnetic storms, solar radiation storms, and radio blackouts.

A geomagnetic storm is a disturbance in the Earth's magnetic sphere. This is due to changes in the solar wind, which is a flow of charged particles emitted by the Sun. When the solar wind interacts with the Earth's magnetic field, it can cause fluctuations and disturbances in the atmosphere. Geomagnetic storms can impact radio signals and cause errors in GPS (Global Positioning System) systems.

A solar radiation storm occurs when the Sun releases a burst of energetic protons into space, often causing a coronal mass ejection and associated solar flare. These protons move really fast and can reach Earth in under 10 minutes. When these energetic protons collide with satellites or humans in space, they can penetrate deep into the object that they collide with and cause damage to electronic circuits or even biological DNA. During the more extreme Solar Radiation Storms, passengers, and crew in high flying aircraft at high latitudes may be exposed to radiation risk.

Solar flares, also known as radio blackouts, are large eruptions of energy and radiation from the sun that can last minutes or hours. This sudden release of energy travels at the speed of light, so any effect upon the sunlit side of Earth occurs almost instantly. The increased level of X-ray and extreme ultraviolet (EUV) radiation causes ionization in the lower part of the ionosphere on the sunny side of Earth. Normally, high-frequency radio waves can travel long distances. But during a strong solar flare, these waves can get weakened or even blocked entirely, causing a radio blackout.

Figure 23-1. Space Weather Phenomena[1]



LOCATION

Space weather is a widespread global issue. Unlike other natural hazard events, space weather has the potential to impact not only the United States, but wider geographic regions. Space weather can occur anywhere from the surface of the sun to the surface of Earth and can impact the entire sunlit side of the Earth at the same time. Regions and communities dependent on technology are most likely to be impacted. Technological disruption due to space weather phenomena can happen anywhere and at any time within the entire world, including the Santa Fe County planning area.

EXTENT

The National Oceanic and Atmospheric Administration (NOAA) Space Weather Scales were introduced as a way to publicly communicate the current and future space weather conditions and their possible effects on people and systems. Many of the Space Weather Prediction Center (SWPC) products describe the space environment, but few have described the effects that can be experienced as the result of environmental disturbances. The scales describe the environmental disturbances for three event types including geomagnetic storms, solar radiation storms, and radio blackouts. The scales have numbered levels, analogous to events that convey

[1] NOAA, Space Weather Prediction Center. Space Weather Phenomena. https://www.swpc.noaa.gov/phenomena

severity including hurricanes, tornadoes, and earthquakes. The scales identify possible effects of an event, how frequently events occur, and the intensity of the physical causes.[2]

Table 23-1. Geomagnetic Storms

SCALE	DESCRIPTION	EFFECT	PHYSICAL MEASURE	AVERAGE FREQUENCY (1 Cycle = 11 Years)
G 5	**Extreme**	**Power systems:** Widespread voltage control problems and protective system problems can occur, and some grid systems may experience complete collapse or blackouts. Transformers may experience damage. **Spacecraft operations**: Problems with extensive surface charging, orientation, uplink/downlink, and tracking satellites can occur. **Other systems:** Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geographic lat.).	Kp = 9	4 per cycle (4 days per cycle)
G 4	**Severe**	**Power systems:** Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. **Spacecraft operations:** Problems with surface charging and tracking can occur, and corrections may be needed for orientation problems. **Other systems:** Induced pipeline currents can affect preventive measures, HF radio propagation is sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geographic lat.).	Kp = 8, including a 9	100 per cycle (60 days per cycle)

[2] Source: http://www.swpc.noaa.gov/noaa-scales-explanation

SCALE	DESCRIPTION	EFFECT	PHYSICAL MEASURE	AVERAGE FREQUENCY (1 Cycle = 11 Years)
G 3	**Strong**	**Power systems:** Voltage corrections can be required, and false alarms triggered on some protection devices. **Spacecraft operations:** Surface charging can occur on satellite components, drag can increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. **Other systems:** Intermittent satellite navigation and low-frequency radio navigation problems can occur, HF radio can be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geographic lat.).	Kp = 7	200 per cycle (130 days per cycle)
G 2	**Moderate**	**Power systems:** High-latitude power systems can experience voltage alarms, and long-duration storms can cause transformer damage. **Spacecraft operations:** Corrective actions to orientation can be required by ground control, and possible changes in drag can affect orbit predictions. **Other systems:** HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geographic lat.).	Kp = 6	600 per cycle (360 days per cycle)
G 1	**Minor**	**Power systems:** Weak power grid fluctuations can occur. **Spacecraft operations:** Minor impact on satellite operations are possible. **Other systems:** Migratory animals are affected, and aurora is commonly visible at high latitudes (northern Michigan and Maine).	Kp = 5	1700 per cycle (900 days per cycle)

Table 23-2. Solar Radiation Storms

SCALE	DESCRIPTION	EFFECT	PHYSICAL MEASURE (Flux level of >= 10 MeV particles)	AVERAGE FREQUENCY (1 Cycle = 11 Years)
S 5	Extreme	**Biological:** Unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity) occurs; and passengers and crew in high-flying aircraft at high latitudes can be exposed to radiation risk. **Satellite operations:** Satellites can be rendered useless, memory impacts can cause loss of control, serious noise in image data can occur, star-trackers may be unable to locate sources; and permanent damage to solar panels is possible. **Other systems:** Complete blackout of HF communications is possible through the polar regions, and position errors make navigation operations extremely difficult.	10^5	Fewer than 1 per cycle
S 4	Severe	**Biological:** Unavoidable radiation hazard to astronauts on EVA can occur; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** Memory device problems and noise on imaging systems can occur; star-tracker problems can cause orientation problems, and solar panel efficiency can be degraded. **Other systems:** Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10^4	3 per cycle

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SCALE	DESCRIPTION	EFFECT	PHYSICAL MEASURE (Flux level of >= 10 MeV particles)	AVERAGE FREQUENCY (1 Cycle = 11 Years)
S 3	**Strong**	**Biological:** Radiation hazard avoidance is recommended for astronauts on EVA, and passengers and crew in high-flying aircraft at high latitudes can be exposed to radiation risk. **Satellite operations:** Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. **Other systems:** Degraded HF radio propagation through the polar regions and navigation position errors are likely.	10^3	10 per cycle
S 2	**Moderate**	**Biological:** Passengers and crew in high-flying aircraft at high latitudes can be exposed to elevated radiation risk. **Satellite operations:** Infrequent single-event upsets are possible. **Other systems:** Small effects on HF propagation through the polar regions can occur, and navigation at polar cap locations can be possibly affected.	10^2	25 per cycle
S 1	**Minor**	**Biological:** None. **Satellite operations:** None. **Other systems:** Minor impacts on HF radio in the polar regions.	10	50 per cycle

Table 23-3. Radio Blackouts

SCALE	DESCRIPTION	EFFECT	PHYSICAL MEASURE	AVERAGE FREQUENCY (1 Cycle = 11 Years)
R 5	**Extreme**	**HF Radio:** Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours can occur. This results in no HF radio contact with mariners and en route aviators in this sector. **Navigation:** Low-frequency navigation signals used by maritime and general aviation systems can experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours can occur on the sunlit side of Earth, which may spread into the night side.	X20 (2×10^{-3})	Less than 1 per cycle
R 4	**Severe**	**HF Radio:** HF radio communication blackout on most of the sunlit side of Earth can occur for one to two hours, and HF radio contact is lost during this time. **Navigation:** Outages of low-frequency navigation signals can cause increased error in positioning for one to two hours, and minor disruptions of satellite navigation are possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	**Strong**	**HF Radio:** Wide area blackout of HF radio communication, and loss of radio contact for about an hour on sunlit side of Earth can occur. **Navigation:** Low-frequency navigation signals can be degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	**Moderate**	**HF Radio:** Limited blackout of HF radio communication on the sunlit side of the Earth, and loss of radio contact for tens of minutes can occur. **Navigation:** Degradation of low-frequency navigation signals for tens of minutes can occur.	M5 (5×10^{-5})	350 per cycle (300 days per cycle)

SCALE	DESCRIPTION	EFFECT	PHYSICAL MEASURE	AVERAGE FREQUENCY (1 Cycle = 11 Years)
R 1	**Minor**	**HF Radio:** Weak or minor degradation of HF radio communication on the sunlit side of the Earth, and occasional loss of radio contact can occur. **Navigation:** Low-frequency navigation signals can be degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)

HISTORICAL OCCURRENCES

There is no comprehensive database of previous space weather events and data is somewhat limited. However, there are periods of time that we know to expect more solar activity. A solar cycle is a pattern of solar activity that follows an 11-year period. The cycle starts with a period of low activity, called the solar minimum, gradually building up to a peak of high activity, known as solar maximum, before declining again to the next solar minimum. We are currently in Solar Cycle 25, which began in December of 2019, with peak sunspot activity expected in 2025, according to the NOAA. Significant historical space weather events are provided below, including recent events from Solar Cycle 25. Space Weather events are not localized and tend to be more widespread, however, the events occurring in December of 2006 and March of 2023 had the most impact to New Mexico and the Santa Fe County planning area.

SIGNIFICANT EVENTS

August 28-September 2, 1859 (Solar Cycle 10)

The 1859 Solar Flare is the largest magnetic explosion recorded and is referred to as the Carrington Event, named for British Astronomer Richard Carrington, who witnessed growing sunspots and documented a bright white flash that lasted about five minutes. The impacts on Earth were colorful and bright auroras were seen as far south as Hawaii and Cuba. Telegraph operators experienced sparks from telegraph equipment that started fires. Scientists predict that such an event today would be devastating to the internet, communications, and power transformers, satellites, airplanes, or any GPS guided system. Solar activity is closely monitored as sun storms have increased since 2011. Studies have shown that a solar storm of this magnitude occurring today would likely cause widespread problems for modern civilization. The solar storm of 2012 was of similar magnitude, but it passed Earth's orbit without striking the planet.

March 9-13, 1989 (Solar Cycle 22)

The March 1989 geomagnetic storm was a severe storm that caused the collapse of Hydro-Québec's electricity transmission system. The storm began on Earth with extremely intense auroras at the poles. The aurora could be seen as far south as Texas and Florida. As this occurred during the Cold War, people worried that a nuclear first strike might be in progress. Others considered the intense auroras to be associated with the Space Shuttle mission STS-29, which had been launched on March 13, 1989. The burst caused short-wave radio interference, including the disruption of radio signals from Radio Free Europe into Russia. It was initially believed that the signals had been jammed by the Soviet government.

Some satellites in polar orbits lost control for several hours. Geostationary Operational Environmental Satellite (GOES) weather satellite communications were interrupted, causing weather images to be lost. National Aeronautics and Space Administration's (NASA) Tracking and Data Relay Satellite (TDRS)-1 communication satellite recorded over 250 anomalies caused by the increased particles flowing into its sensitive electronics. The Space Shuttle Discovery was having its own problems: a sensor on one of the tanks supplying hydrogen to a fuel cell was showing unusually high-pressure readings on March 13, 1989. The problem went away after the solar storm subsided.

October-November 2003 (Solar Cycle 23)

The Halloween Solar Storms were a series of solar flares and coronal mass ejections that occurred from mid-October to early November 2003, peaking around October 28–29. Satellite-based systems and communications were affected, aircraft were advised to avoid high altitudes near the Polar Regions, and a one-hour-long power outage occurred in Sweden as a result of solar activity. Auroras were observed at latitudes as far south as Texas and the Mediterranean countries of Europe.

The Solar and Heliospheric Observatory (SOHO) satellite failed temporarily, and the Advanced Composition Explorer was damaged by solar activity. Numerous other spacecraft were damaged or experienced downtime. Some spacecrafts were intentionally put into safe mode in order to protect sensitive equipment. Astronauts aboard the International Space Station had to stay inside the more shielded parts of the Russian Orbital Segment to protect themselves against the increased radiation levels. Both the Ulysses spacecraft which was near Jupiter at the time, and Cassini, approaching Saturn, were able to detect the emissions.

December 6, 2006 (Solar Cycle 24)[3]

The largest solar radio burst ever recorded affected GPS receivers over the entire sunlit side of the Earth. There was a widespread loss of GPS in the mountain states region, specifically around the four corners region of New Mexico and Colorado. Several aircrafts reported losing access to GPS. This event was the first of its kind to be detected on the Federal Aviation Administration (FAA) FAA, Wide Area Augmentation System (WAAS) network.

November 4, 2021 (Solar Cycle 25)[4]

A series of CMEs (coronal mass ejections) caused the first severe geomagnetic storm (Level G4) in Solar Cycle 25. As the Sun was rotating a sunspot region launched at least one CME. Another CME soon followed (possibly from the same region) and then another. The third, faster CME caught up to the other two, merging with them in what is called a cannibal CME. The combined gusts of plasma swept over the Earth on November 3rd and 4th. Aurora borealis, or northern lights, were seen as far south as California.

January 29, 2022 (Solar Cycle 25)

Starting on January 29, a series of CMEs erupted on the sun. They were not particularly large or energetic, but when they reached the Earth, they ushered in several days of minor geomagnetic disruption. These disruptions caused Earth's outer atmosphere to heat up and expand. During this event, Starlink, a private space company, launched 49 satellites, destined for low-Earth orbit.

[3] International Space Environment Service. http://www.spaceweather.org/ISES/swxeff/swh.html

[4] NOAA. Time-lapse of Solar Cycle 25. https://www.nesdis.noaa.gov/news/time-lapse-of-solar-cycle-25-displays-increasing-activity-the-sun

As these satellites were rising through the expanded atmosphere, they encountered more drag than expected, causing 38 of the 49 satellites to burn up.

March 23, 2023 (Solar Cycle 25)
The second severe geomagnetic storm (G4) in Solar Cycle 25 was recorded as the largest event in nearly six years. Electrical power disruptions were reported in several states and aurora was visible in more than half of the U.S., reaching as far south as New Mexico, Missouri, and North Carolina.

PROBABILITY OF FUTURE EVENTS

Space weather storms for the Santa Fe County planning area are likely and are expected to continue in the near future. Solar storm activity is expected to increase and is being mapped by NASA's Solar Shield Project and NOAA's Space Weather Prediction Center to show strong currents and warn power companies to protect their systems. The entire Santa Fe County planning area could be affected should there be another major space weather storm, dependent on location of extent within the Earth's atmosphere. With limited historical data for the Santa Fe planning area, known events support an "Occasional" frequency, with an event probable in the next five years.

VULNERABILITY AND IMPACT

Space weather is unlikely to cause localized structural damage, or even injuries or fatalities. Therefore, the impact on the planning area is considered "Limited" severity, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Different types of space weather can affect different technologies on Earth. Space weather has been recognized as causing problems with new technology since the invention of the telegraph in the 19th century. These complex events can have significant economic consequences and have the potential to negatively affect numerous sectors, including communications, satellite and airline operations, manned space flights, navigation and surveying systems, as well as the electric power grid. Space weather will impact all people who depend on these technologies.

Geomagnetic storms are often caused by solar wind activity and coronal mass injections (CMEs). CMEs. While geomagnetic storms sometimes create beautiful aurora, they also can disrupt navigation systems and create harmful geomagnetic induced currents (GICs) that disrupt the power grid and pipelines.

A solar radiation storm occurs when the Sun releases large amounts of energetic protons into space. These energetic protons can disrupt or damage any technology that it touches. In a moderate level event passengers and crew in high-flying aircraft at high latitudes can be exposed to elevated radiation risk. In the most severe case, satellites can be rendered useless, damage to solar panels is possible, and a complete blackout of High Frequency (HF) communications is possible in the polar regions.

Solar flares can produce strong x-rays that degrade or block high-frequency radio waves used for radio communication during events known as Radio Blackout Storms. During the highest extent storm, complete HF radio blackout on the entire sunlit side of the Earth, potentially lasting for hours, is possible. Communication and navigation systems would be completely disrupted.

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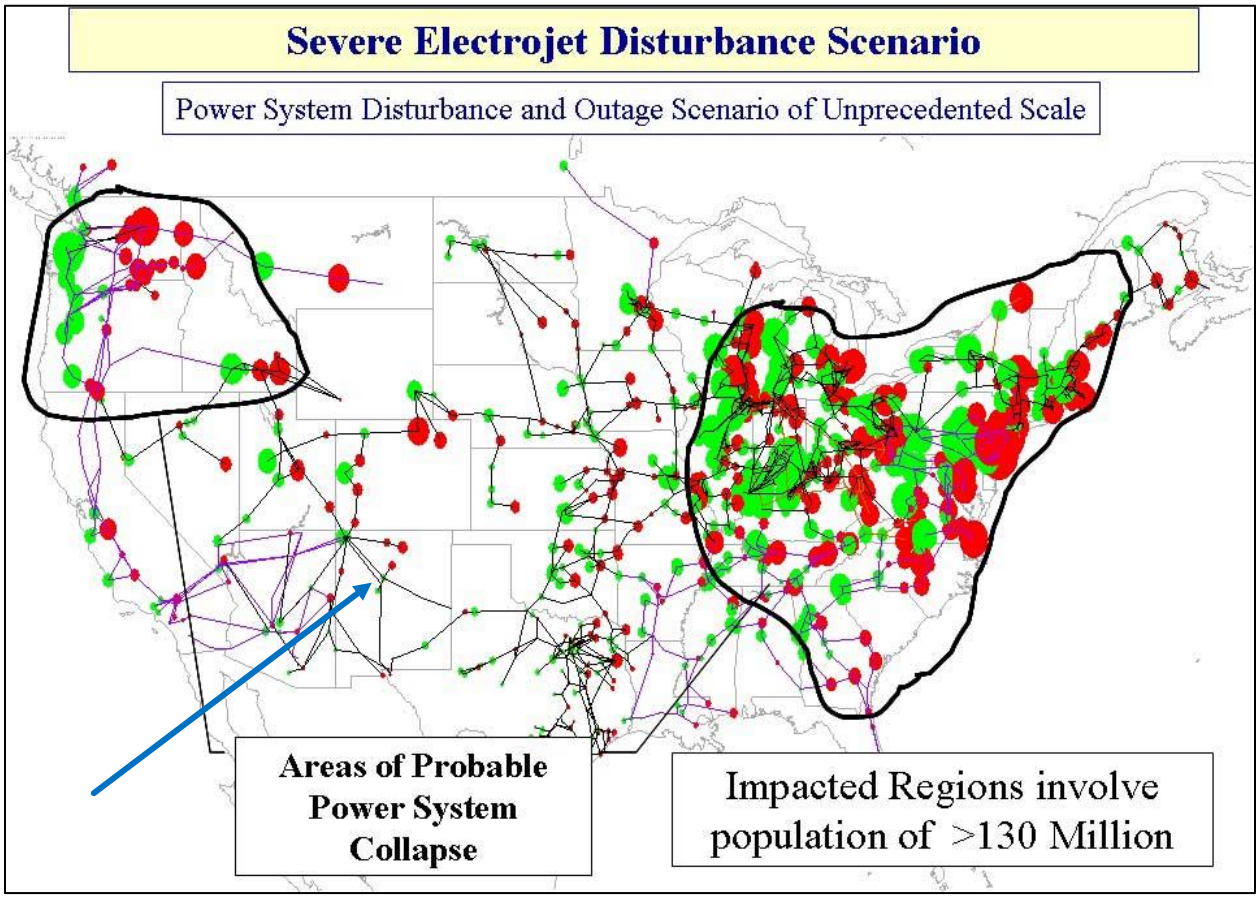
A catastrophic failure of commercial and government infrastructure in space and on the ground can be mitigated through raising public awareness, improving vulnerable infrastructure, and developing advanced forecasting capabilities. Without preventive actions or plans, the trend of increased dependency on space-weather sensitive technology could make society more vulnerable to a technological disruption event in the future.

Figure 23-2 identifies a hypothetical scenario presented by a study on potential extreme space weather events that could result in a partial, wide-spread collapse of the U.S. electric power grid with enormous consequences for the affected population. As seen in Figure 23-2, the Santa Fe County planning area would be affected. Improvements in space weather forecasting, public awareness and infrastructure preparedness can mitigate the potential effects of technological disruption.

Figure 23-2. Power System Disturbance Scenario[5]



The Santa Fe County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by space weather events (Table 23-4). The critical infrastructure with the greatest vulnerability to space weather includes power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on electricity as a medical necessity. For a detailed list see Appendix C.

[5] Source: NASA, Santa Fe County is indicated by the blue arrow.

Table 23-4. Critical Facilities Vulnerable to Space Weather Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to loss of communications and navigation systems. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be disconnected and unable to report for duty, limiting response capabilities. • The ability to monitor weather via satellites may be impacted, and emergency response services, such as sending emergency alerts, would be limited.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Power outages could disrupt critical care. • Loss of navigation systems can directly impact airports. • Staff working at airports or those flying at high altitudes can be exposed to radiation, further disrupting services. • Power outages may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly affect post event recovery. • Disruptions to GPS can prevent people from accessing critical care or emergency shelters.
Commercial Supplier (Food, fuel, etc.)	• Facilities or infrastructure, like gas stations, may be inaccessible due to power outages. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to loss of communications and navigation systems. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be disconnected and unable to report for duty, limiting response capabilities. • Space weather can cause voltage instability, potentially damaging utility infrastructure.

ASSESSMENT OF IMPACTS

Space weather events have the potential to pose a significant risk to people and government systems dependent on technology. This can create dangerous situations and can be frequently associated with a variety of impacts, including:

- Loss of radio, communication, and navigation systems can delay critical staff from reporting for duty as well as delaying first responders from providing for or preserving public health and safety.
- Space weather events can result in power grid instability and power outages. This can greatly disturb normal operations and affect critical infrastructure such as hospitals, emergency services, and communication networks.

- Space weather can damage or interfere with satellites, affecting weather forecasting, which could be detrimental if other natural hazard events are simultaneously occurring.
- With the loss of telecommunications, the ability to send or receive emergency alerts will be limited.
- Santa Fe County municipal and regional airports may be at increased risk of damages or interference due to technological disruptions. In addition, airline crew and passengers flying at high altitudes are at risk of increased radiation exposure during solar radiation storms.
- Space weather can impact electronic payment systems and disrupt financial transactions, affecting resident's access to funds and essential services.
- School closures and disruptions to workplace operations are possible and may occur due to power outages, transportation and navigation issues, or communication failure.
- Businesses that are more reliant on technology than others may suffer greater damage and experience greater disruption.
- Depending on the severity and scale of damage caused by space weather events, damage to power transmission and distribution infrastructure can require repair.
- Residents may experience psychological stress due to uncertainty of access to resources, concerns for safety, and disruptions to daily routine.

The impacts of space weather events will depend entirely on the scale of the event, type of storm, and how long disruptions may occur. The level of preparedness and pre-event planning conducted by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of any space weather event.

CLIMATE CHANGE CONSIDERATIONS

Space weather is very different from the weather on Earth, and typically occurs outside of the Earth's magnetosphere. Since climate change describes the change in the long-term weather patterns on Earth's surface, climate change does not impact space weather. However, there is some research that aims to explore how solar patterns and space weather may impact global climate change, but at this time, the research is not comprehensive.

SANTA FE COUNTY

SECTION 24
MITIGATION STRATEGY

SECTION 24: MITIGATION STRATEGY

MITIGATION GOALS

Based on the results of the risk and capability assessments, the Planning Team developed and prioritized the mitigation strategy. This involved utilizing the results of both assessments and reviewing the goals and objectives that were included in the previous 2018 Plan. At the Mitigation Workshop in March 2024, the Planning Team members reviewed the goals from the previous 2018 Plan. The consensus among all members present was that the strategy developed for the 2018 Plan required some changes including expanding on existing goals and the addition of a seventh goal around equity and vulnerable populations.

GOAL 1

Protect public health and safety.

OBJECTIVE 1.1

Advise the public about health and safety precautions to guard against injury and loss of life from hazards.

OBJECTIVE 1.2

Maximize utilization of the latest technology to provide adequate warning, communication, and mitigation of hazard events.

OBJECTIVE 1.3

Reduce the danger to, and enhance protection of, high risk areas during hazard events.

OBJECTIVE 1.4

Protect critical facilities and services.

GOAL 2

Build and support local capacity and commitment to continuously become less vulnerable to hazards.

OBJECTIVE 2.1

Build and support local partnerships to continuously become less vulnerable to hazards.

OBJECTIVE 2.2

Build a cadre of committed volunteers to safeguard the community before, during, and after a disaster.

OBJECTIVE 2.3

Build hazard mitigation concerns into county planning and budgeting processes.

GOAL 3
Increase public understanding, support, and demand for hazard mitigation.

OBJECTIVE 3.1
Heighten public awareness regarding the full range of natural and man-made hazards the public may face.

OBJECTIVE 3.2
Educate the public on actions they can take to prevent or reduce the loss of life or property from all hazards and increase individual efforts to respond to potential hazards.

OBJECTIVE 3.3
Publicize and encourage the adoption of appropriate hazard mitigation measures.

GOAL 4
Protect new and existing properties.

OBJECTIVE 4.1
Reduce repetitive losses to the National Flood Insurance Program (NFIP).

OBJECTIVE 4.2
Use the most cost-effective approach to protect existing buildings and public infrastructure from hazards.

OBJECTIVE 4.3
Enact and enforce regulatory measures to ensure that future development will not put people in harm's way or increase threats to existing properties.

GOAL 5
Maximize the resources for investment in hazard mitigation.

OBJECTIVE 5.1
Maximize the use of outside sources of funding.

OBJECTIVE 5.2
Maximize participation of property owners in protecting their properties.

OBJECTIVE 5.3
Maximize insurance coverage to provide financial protection against hazard events.

OBJECTIVE 5.4
Prioritize mitigation projects, based on cost-effectiveness and sites facing the greatest threat to life, health, and property.

GOAL 6
Promote growth in a sustainable manner.

OBJECTIVE 6.1
Incorporate hazard mitigation activities into long-range planning and development activities.

OBJECTIVE 6.2
Promote beneficial uses of hazardous areas while expanding open space and recreational opportunities.

OBJECTIVE 6.3

Utilize regulatory approaches to prevent creation of future hazards to life and property.

GOAL 7

Promote equity and protect vulnerable populations and underserved communities through hazard mitigation activities.

OBJECTIVE 7.1

Allocate resources and funding to implement hazard mitigation activities that directly benefit vulnerable and underserved communities.

OBJECTIVE 7.2

Build and support local partnerships to leverage resources and expertise in addressing hazard related equity concerns.

OBJECTIVE 7.3

Establish internal decision-making processes that integrate equity into project selection.

OBJECTIVE 7.4

Monitor and evaluate the effectiveness of mitigation activities to ensure equitable outcomes and protection of vulnerable populations.

SANTA FE COUNTY

SECTION 25
PREVIOUS ACTIONS

SECTION 25: PREVIOUS ACTIONS

SUMMARY

This section includes analysis from the 2018 Santa Fe County Hazard Mitigation Plan. Planning Team members were given copies of the previous mitigation actions submitted in the 2018 Santa Fe County Plan at the mitigation workshop. Each participating entity reviewed the previous actions and provided an analysis as to whether the action had been completed, should be deferred as an ongoing activity, or be deleted from the Plan Update. The actions from the 2018 Plans are included in this section as they were written in 2018, except for the “2024 Analysis” section.

SANTA FE COUNTY

	Santa Fe County – Previous Action #1
Proposed Action:	Reduce Catastrophic Impacts from Dam Failure through enhanced monitoring and coordination.
BACKGROUND INFORMATION	
Site and Location:	Below Santa Cruz Reservoir and Nambe Falls Dam
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Potential to reduce loss of life, improved coordination of mitigation and response agencies.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Earthquake
Priority (High, Moderate, Low):	High
Estimated Cost:	Coordination related items can be done with existing staff time
Potential Funding Sources:	Staff time within existing budgets
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	2016-2017
Incorporation into Existing Plans:	Dam Emergency Action Plans

2024 ANALYSIS:
Defer to Plan Update. Amend action to local plans and regulations. Amend action to say “through enhanced planning and training.”

	Santa Fe County – Previous Action #2
Proposed Action:	Improve public warning capabilities below high hazard dams.
BACKGROUND INFORMATION	
Site and Location:	Below Santa Cruz Reservoir and Nambe Falls Dam
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Loss of life, public awareness of risk and how to mitigate risk.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure
Priority (High, Moderate, Low):	High
Estimated Cost:	Approximately $16,000 per siren; Assuming 10 sirens: $160,000
Potential Funding Sources:	FEMA
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	2016-2020
Incorporation into Existing Plans:	Dam Emergency Action Plans

2024 ANALYSIS:
Defer to Plan Update. Amend action to say, “Improve public warning capabilities below high hazard dams through various alerting mechanisms.” Amend cost and remove “per siren.”

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #3
	Proposed Action:	Update engineering and geologic studies related to dam safety.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Detect geologic hazard risks in advance so that appropriate mitigation measures can be undertaken.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Earthquake, Land Subsidence, Landslide
Priority (High, Moderate, Low):	High
Estimated Cost:	IFSAR analysis may range from $50,000
Potential Funding Sources:	State, BOR
Lead Agency/Department Responsible:	County Emergency Management & Growth Management
Implementation Schedule:	2016-2019
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Defer to Plan Update. Amend action to say, “Receive updated engineering and geologic studies related to dam safety” and remove growth management from the lead agency.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #4
	Proposed Action:	Support drought-resilient land use planning through implementation of the Sustainable Land Use Development Code.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Drought-resiliency incorporated into future growth and development; limit impacts on water resources.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Can be accomplished in staff budgets
Lead Agency/Department Responsible:	Growth Management – Building & Development Services
Implementation Schedule:	2016-2021
Incorporation into Existing Plans:	Santa Fe County Sustainable Growth Management Plan and Sustainable Land Use Development Code

2024 ANALYSIS:
Defer to plan update. In progress. Plans are in place to support this action.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #5
	Proposed Action:	Drought Management Planning.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Drought-resiliency; limit impacts on water resources.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Priority (High, Moderate, Low):	Low
Estimated Cost:	$50,000 - $75,000 for consultant
Potential Funding Sources:	State, Federal (Reclamation) grants
Lead Agency/Department Responsible:	Growth Management – Building and Development Services
Implementation Schedule:	2017-2018
Incorporation into Existing Plans:	Sustainable Land Use Development Code

2024 ANALYSIS:
Defer to Plan Update. Amend action to say, “Facilitate and implement drought management planning strategies.” Add Public Works, the Sustainability Department, and the Growth Management Department as responsible agency.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #6
	Proposed Action:	Improve Earthquake Hazard Assessment.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	N/A
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Earthquake
Priority (High, Moderate, Low):	Low
Estimated Cost:	Could be done through coordination of existing resources and staff time.
Potential Funding Sources:	Staff time
Lead Agency/Department Responsible:	Growth Management – GIS Division
Implementation Schedule:	2016-2018
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Delete action. This is now under development by the New Mexico Institute of Mining and Technology and the county does not monitor earthquakes.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #7
	Proposed Action:	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced flood losses through floodplain ordinance enforcement.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Priority (High, Moderate, Low):	Medium
Estimated Cost:	Staff time
Potential Funding Sources:	Existing staff time
Lead Agency/Department Responsible:	Growth Management – Building and Development Services
Implementation Schedule:	Ongoing 2016-2021
Incorporation into Existing Plans:	Santa Fe County Sustainable Growth Management Plan and Santa Fe Sustainable Land Development Code

2024 ANALYSIS:
Defer to Plan Update.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #8
Proposed Action:	Stream bank stabilization.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced impacts to public property from flooding and erosion. Reduced damages to road infrastructure and need for detours.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Priority (High, Moderate, Low):	High
Estimated Cost:	Variable depending on specific project
Potential Funding Sources:	Greenways
Lead Agency/Department Responsible:	Public Works – Roads Maintenance
Implementation Schedule:	2016-2018
Incorporation into Existing Plans:	Greenway planning, transportation planning

2024 ANALYSIS:
Defer to Plan Update. Amend action to say, “Implement strategies to improve stream bank stabilization,” change general public works to the lead agency, and change the type of action to natural systems protection.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #9
	Proposed Action:	Maximize opportunities to mitigate hazards associated with specific low water crossings as part of ongoing county road improvements.
	BACKGROUND INFORMATION	
	Site and Location:	Problem areas include the CR84 river crossing
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced potential for death or injury during flood events.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Priority (High, Moderate, Low):	Medium
Estimated Cost:	Variable dependent on specific project areas
Potential Funding Sources:	General Fund, Federal Lands Access Program
Lead Agency/Department Responsible:	Public Works – Road Maintenance; Growth Management - Planning
Implementation Schedule:	2021
Incorporation into Existing Plans:	Transportation Master Plan

2024 ANALYSIS:
Defer to Plan Update. Amend action to general public works as the lead agency and add Fire Department and OEM. Add “Install a gate system to prevent passage in high hazard areas during flood events, and incorporate advanced warning of closures at appropriate locations.”

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #10
	Proposed Action:	Analyze stream and arroyo migration patterns with available LiDAR data to predict impacts on county roads and culverts.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Identify areas of problems prior to high flows to target mitigation alternatives.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Priority (High, Moderate, Low):	Medium
Estimated Cost:	Low – Initial analysis can be done with in-house staff; if contracted out could range from $25-75,000 depending on the level of sophistication.
Potential Funding Sources:	Existing staff time
Lead Agency/Department Responsible:	Growth Management – GIS Division / Public Works - Roads Maintenance
Implementation Schedule:	2017
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Defer to Plan Update. Amend action and change lead agency to Public Works and GIS.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #11
	Proposed Action:	Achieve and maintain an operations level radiological / nuclear incident response capability.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Enhanced preparedness capabilities that could mitigate impacts to first responders and the public.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials
Priority (High, Moderate, Low):	High
Estimated Cost:	$110,000
Potential Funding Sources:	Realistic funding to sustain Radiological – Nuclear emergency response program for County Fire Department
Lead Agency/Department Responsible:	Fire Department – Office of Emergency Management
Implementation Schedule:	2016
Incorporation into Existing Plans:	Emergency Operation Plan

2024 ANALYSIS:
Defer to Plan Update. Amend action to say, “Maintain awareness level and increase training to appropriate level to support radiological/nuclear incident response capability.” Amend action type to preparedness/response.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #12
Proposed Action:	Link Hazardous Materials Annex to the Hazard Mitigation Plan; Participate in Regional Hazardous Materials Response Team.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Enhanced preparedness capabilities that could mitigate impacts to first responders and the public.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials
Priority (High, Moderate, Low):	High
Estimated Cost:	Low
Potential Funding Sources:	Staff time
Lead Agency/Department Responsible:	Fire Department – Office of Emergency Management
Implementation Schedule:	2017
Incorporation into Existing Plans:	Emergency Operation Plan

2024 ANALYSIS:
Defer to Plan Update.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #13
Proposed Action:	Implement a multi-weather sensor and notification system on the Tesuque Communication Towers.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	The project would help increase critical infrastructure resiliency through rapid detection and restoration of communication systems.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	High Wind, Winter Storm, Tornado, Extreme Temperatures
Priority (High, Moderate, Low):	Low
Estimated Cost:	To be determined
Potential Funding Sources:	General fund; vendors providing communication services
Lead Agency/Department Responsible:	Advanced Communications/Regional Emergency Coordination Center (RECC)
Implementation Schedule:	2017
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Delete action. The County no longer deems this action a priority.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #14
Proposed Action:	Coordination with Utility Partners to Enhance Tree Trimming near Power lines to Reduce Potential for Power Outages and Wildfires
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced potential for catastrophic wildfire ignitions near developed areas.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	High Wind, Wildfire, Thunderstorm, Winter Weather, Tornado
Priority (High, Moderate, Low):	High
Estimated Cost:	Low – Staff Time
Potential Funding Sources:	Utility Company Fees
Lead Agency/Department Responsible:	Fire Department and Public Works
Implementation Schedule:	2017-2020
Incorporation into Existing Plans:	CWPP

2024 ANALYSIS:
Defer to Plan Update. Amend action to include all applicable hazards addressed. Amend lead agency to Fire Department & Public Works in cooperation with New Mexico PRC and State Forestry.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #15
Proposed Action:	Enhance geologic data in development zones to support Code Enhancement and Enforcement activities
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Knowledge of problem areas will inform wise land use decisions as well as code enhancement and enforcement.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Landslide, Land Subsidence
Priority (High, Moderate, Low):	Low
Estimated Cost:	Low
Potential Funding Sources:	Staff time
Lead Agency/Department Responsible:	Growth Management – GIS Division
Implementation Schedule:	2017
Incorporation into Existing Plans:	Sustainable Growth Management Plan; Sustainable Land Use Code

2024 ANALYSIS:
Completed.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #16
Proposed Action:	Utilize LIDAR surveys conducted in 2001 vs 2014 to assess differences in topography that may be indicative of problem areas associated with landslides, land subsidence, channel migration, subsurface volcanic activity, earthquake faults, etc.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Knowledge of problem areas will inform wise land use decisions.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Landslide, Land Subsidence, Earthquake
Priority (High, Moderate, Low):	Low
Estimated Cost:	Low
Potential Funding Sources:	Staff time
Lead Agency/Department Responsible:	Growth Management - GIS Division
Implementation Schedule:	2016
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Defer to Plan Update. Amend action type to local plans and regulations.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #17
Proposed Action:	Maintain and update multi-hazard plan through structured process.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Implementation will result in a more resilient Santa Fe County.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Multi-Hazard, All
Priority (High, Moderate, Low):	Low
Estimated Cost:	Approximately $50k for plan update
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	County Emergency Management, and HMPC
Implementation Schedule:	Annually 2016-2021, update plan in 2020-2021
Incorporation into Existing Plans:	Santa Fe County Sustainable Growth Management Plan

2024 ANALYSIS:
Defer to Plan Update.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #18
Proposed Action:	Expand NOAA All-Hazard Radios for all Public Buildings.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced loss of life or injuries due to increased awareness and self-protective measures.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Multi-Hazard: High Wind, Tornado, Winter Storm, Wildfire, Extreme Temperatures, Severe Thunderstorm, Earthquake, Hazardous Materials
Priority (High, Moderate, Low):	Medium
Estimated Cost:	Approximately $1,000
Potential Funding Sources:	Federal / State Homeland Security grants
Lead Agency/Department Responsible:	Fire Department – Office of Emergency Management
Implementation Schedule:	2017-2018
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Defer to Plan Update. Amend action to include all applicable hazards. Amend action to say, “Expand RAVE notifications for all public buildings and utilize the or the RAVE system for these notifications.” Add County Manager’s Office to lead agency.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #19
Proposed Action:	Enhance Lightning Protection for Critical Infrastructure.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced potential for loss of function or fires, damaged equipment.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Severe Thunderstorms
Priority (High, Moderate, Low):	Medium
Estimated Cost:	Variable depending on project, estimated at $20,000
Potential Funding Sources:	General fund
Lead Agency/Department Responsible:	Growth Management- Building and Development Services/Facilities
Implementation Schedule:	2019
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Defer to Plan Update. Amend action and change the lead agency to public works.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #20
Proposed Action:	Promote Safe Rooms and/or Shelters near Edgewood.
BACKGROUND INFORMATION	
Site and Location:	Edgewood area in southern county
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Avoided loss of life and injuries from multiple hazards.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Winter Storm, High Wind, Severe Thunderstorm, Hazardous Materials, Extreme Temperatures
Priority (High, Moderate, Low):	Low
Estimated Cost:	Variable from low to designation of existing buildings, to high for a FEMA P-361 compliant tornado safe room.
Potential Funding Sources:	Staff time, FEMA HMGP, PDM
Lead Agency/Department Responsible:	Fire Department, Office of Emergency Management, Growth Management, Building & Development Services
Implementation Schedule:	2016-2017
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Defer to Plan Update.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #21
Proposed Action:	Maintain and Implement the CWPP Including Project Recommendations.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced potential for catastrophic wildfires by implementation of projects.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Priority (High, Moderate, Low):	High
Estimated Cost:	$50,000 for update; treatments variable
Potential Funding Sources:	State, USFS, BLM
Lead Agency/Department Responsible:	Fire Department – Wildland Division
Implementation Schedule:	2016-2019, update CWPP every 5 years
Incorporation into Existing Plans:	CWPP

2024 ANALYSIS:
Defer to Plan Update. Plan to implement in 2025.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #22
Proposed Action:	Expand hazardous fuel mitigation activities.
BACKGROUND INFORMATION	
Site and Location:	Areas adjacent to Wildland Urban Interface communities
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced fire suppression, evacuation, and post-wildfire community reconstruction costs.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Drought
Priority (High, Moderate, Low):	High
Estimated Cost:	Variable depending on scope and extent of treatment
Potential Funding Sources:	Continuing county funding and Community Forest Restoration Grants
Lead Agency/Department Responsible:	Fire Department.
Implementation Schedule:	Ongoing with expanded mitigation treatments in 2017-2020
Incorporation into Existing Plans:	CWPP

2024 ANALYSIS:
Defer to Plan Update. Include the Open Space Department as a lead agency.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #23
	Proposed Action:	Expand Multi-Agency Collaboration to Link Fuel Mitigation Activities.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced fire suppression, evacuation and post-wildfire community reconstruction costs.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Priority (High, Moderate, Low):	High
Estimated Cost:	Coordination is low cost and could lead to leveraging of partner funding for multiple benefits.
Potential Funding Sources:	USFS Title II, New Mexico Forestry Division, USFS, and BLM among others.
Lead Agency/Department Responsible:	Fire Department.
Implementation Schedule:	Ongoing with expanded mitigation treatments in 2017-2020
Incorporation into Existing Plans:	Santa Fe Fireshed restoration strategy

2024 ANALYSIS:
Defer to Plan Update.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #24
	Proposed Action:	Firewise / Ready Set Go Workshops.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Public education helps the public to prepare and/or take care of themselves during and emergency or disaster.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Priority (High, Moderate, Low):	Medium
Estimated Cost:	Staff time
Potential Funding Sources:	Firewise, agency budgets, etc.
Lead Agency/Department Responsible:	Fire Department.
Implementation Schedule:	Implement at least one workshop annually beginning in 2016
Incorporation into Existing Plans:	CWPP

2024 ANALYSIS:
Defer to Plan Update. Amend action to say “Implement the Firewise program and facilitate Ready Set Go Workshops.”

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #25
	Proposed Action:	Improve Public Warning.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Earliest warning possible to get the public out of the way of a wildfire or flood type event; will be able to use the system for other emergencies also Increased responder and public safety.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Dam Failure, Flood
Priority (High, Moderate, Low):	High
Estimated Cost:	Variable depending on scope/technology
Potential Funding Sources:	FEMA, Homeland Security, etc.
Lead Agency/Department Responsible:	Fire Department, Office of Emergency Management
Implementation Schedule:	Research options in 2016 with implementation in 2017-2018
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Defer to Plan Update. Amend action to say, “Improve public warning systems to ensure the earliest warning possible to get the public out of the way of a wildfire or flood type event.” Include Sherrif’s Office and Regional Emergency Communications Center as lead agency.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #26
	Proposed Action:	Update the Wildland Urban Interface (WUI) Ordinance.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced losses to future development through ordinance enhancements.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Priority (High, Moderate, Low):	Medium
Estimated Cost:	Low, can be done with staff time
Potential Funding Sources:	Staff time
Lead Agency/Department Responsible:	Growth Management – Planning; Fire Department
Implementation Schedule:	2018
Incorporation into Existing Plans:	Sustainable Land Use Development Code

2024 ANALYSIS:
Completed.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #27
Proposed Action:	Reduce Flood and Debris Flow Potential Associated with Wildfire Burn Scars
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Avoided damages to roads, property and infrastructure near burn areas. Avoided road closures.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Landslide/Debris Flow, Flood
Priority (High, Moderate, Low):	Low
Estimated Cost:	Variable depending on wildfire extent and intensity
Potential Funding Sources:	NRCS – Emergency Watershed Protection Program; Forest Guild
Lead Agency/Department Responsible:	Fire Department- Wildland Division
Implementation Schedule:	2018 and as needed following events
Incorporation into Existing Plans:	Watershed Plans

2024 ANALYSIS:
Defer to Plan Update. Amend priority to high.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #28
	Proposed Action:	Severe Storm Mass Shelter / Care Operations
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Reduced exposure of public during winter storm or extreme cold events. Coordinated locations for the public. Community resiliency.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Extreme Cold, Wildfire
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Staff Time
Lead Agency/Department Responsible:	Fire Department, Office of Emergency Management
Implementation Schedule:	2017
Incorporation into Existing Plans:	EOP and related annexes

2024 ANALYSIS:
Delete action. The County is exploring alternative action.

SECTION 25: PREVIOUS ACTIONS

	Santa Fe County – Previous Action #29
Proposed Action:	Write Agricultural / Food Incident Annex to the County Emergency Operations Plan; Participate with New Mexico Department of Agriculture Response Task Force.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	Mitigation of an incident through improved preparedness and effective response.
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Agricultural Disease Incident
Priority (High, Moderate, Low):	Medium
Estimated Cost:	Staff time
Potential Funding Sources:	Staff time
Lead Agency/Department Responsible:	Fire Department – Office of Emergency Management
Implementation Schedule:	2017
Incorporation into Existing Plans:	EOP

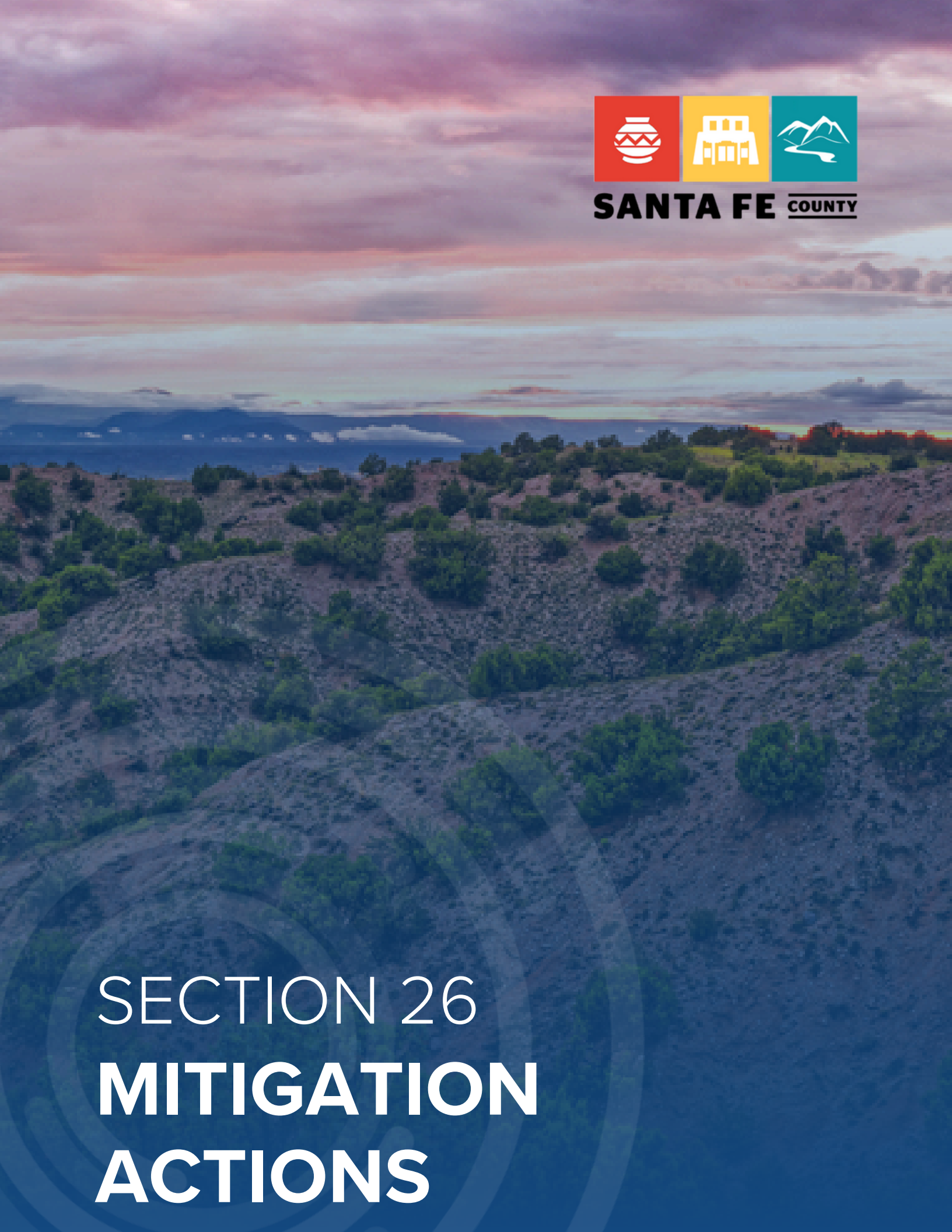
2024 ANALYSIS:
Defer to Plan Update. Amen action to say, “Update the Emergency Operations Plan (EOP) and then collaborate with the NMSU Agriculture Division to include the Agricultural/Food Incident Annex.” Remove Fire Department from lead agency.

SECTION 25: PREVIOUS ACTIONS

		Santa Fe County – Previous Action #30
	Proposed Action:	Local Emergency Management Investment – Enhance Capabilities – Sustainment.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: *(Current Cost/Losses Avoided)*	A comprehensive and effective emergency management program can lead to improved resiliency including reduced impacts on lives and property and more effective recovery.
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All Hazards
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	General funds, legislative initiatives
Lead Agency/Department Responsible:	Since 911, Emergency Management has become the 4th Emergency Service, along with Law Enforcement, Fire, and Emergency Medical Services
Implementation Schedule:	2016-2020
Incorporation into Existing Plans:	N/A

2024 ANALYSIS:
Completed.



SANTA FE COUNTY

SECTION 26
MITIGATION ACTIONS

SECTION 26: MITIGATION ACTIONS

SUMMARY

As discussed in Section 2, at the mitigation workshop the planning team and stakeholders met to develop mitigation actions for each of the natural hazards included in the Plan Update. Each of the actions in this section were prioritized based on FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria necessary for the implementation of each action.

As part of the economic evaluation of the STAPLEE analysis, jurisdictions analyzed each action in terms of the overall costs, measuring whether the potential benefit to be gained from the action outweighed costs associated with it. As a result of this exercise, priority was assigned to each mitigation action by marking them as High (H), Moderate (M), or Low (L). An action that is ranked as "High" indicates that the action will be implemented as soon as funding is received. A "Moderate" action is one that may not be implemented right away depending on the cost and number of residents served by the action. Actions ranked as "Low" indicate that they will not be implemented without first seeking grant funding and after "High" and "Moderate" actions have been completed.

Within each mitigation action worksheet, the Planning Team considered all potential funding sources that could be utilized to implement the proposed project. To ensure all potential funding resources are considered and are not limited to those sources identified within the action worksheet, please see Appendix G for a list of all available State and Federal grant programs as of 2024. The Planning Team will continue to seek out other available funding sources during the 5-year cycle as notices of funding opportunity (NOFO) are released.

All mitigation actions created by Planning Team members are presented in this section in the form of Mitigation Action Worksheets. More than one hazard is sometimes listed for an action, if appropriate. Actions presented in this section represent a comprehensive range of mitigation actions per current State and FEMA Guidelines, including one action, per hazard.

SECTION 26: MITIGATION ACTIONS

Table 26-1. Santa Fe County Mitigation Action Matrix

TYPE OF ACTION	
Action #1 – Plans/Regulations (Blue)	**Action #4 – Structural (Orange)**
Action #2 – Education/Awareness (Red)	**Action #5 – Preparedness/Response (Black)**
Action #3 – Natural Systems Protection (Green)	

HAZARD	SANTA FE COUNTY ACTIONS
Dam Failure	●●●●●
Drought	●●●●●
Earthquake	●●●●●
Expansive Soils	●●●●●
Extreme Cold	●●●●●
Extreme Heat	●●●●●
Flood	●●●●●
Hail	●●●●●
High Winds	●●●●●
Landslide and Rockfall	●●●●●
Land Subsidence	●●●●●
Lightning	●●●●●
Tornado	●●●●●
Volcano	●●●●●
Wildfire	●●●●●
Winter Storm	●●●●●
Agriculture Incident	●●●
Hazardous Materials	●●●●
Space Weather	●●

SANTA FE COUNTY ACTIONS

		Santa Fe County – Action #1
	Proposed Action:	Implement education and awareness program utilizing media, social media, bulletins, flyers, etc. to educate residents of all hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and property damages.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote hazard awareness and protect residents from potential injuries and damages.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm, Agriculture Incident, Hazardous Materials, Space Weather
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$50,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
Education and awareness for all natural and non-natural hazards, including potential risk to hazardous materials exposure.
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

		Santa Fe County – Action #2
	Proposed Action:	Acquire and install generators, and/or battery backup systems, with hard wired quick connections at all critical facilities.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide critical facilities
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Provide power for critical facilities during power outages and ensure continuity of critical services.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Earthquake, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Energy (Power/Fuel)
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	Within 12 - 24 months, pending plan adoption and available funding
Incorporation into Existing Plans:	Capital Improvements Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.

		Santa Fe County – Action #3
	Proposed Action:	Harden/retrofit critical facilities to hazard-resistant levels.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide and community-wide critical facilities, including senior citizen community centers
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages at critical facilities; Ensure continuity of critical services during and after event; Reduce risk of injury to emergency and critical personnel.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm, Hazardous Materials
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	Within 12 - 24 months, pending plan adoption and available funding
Incorporation into Existing Plans:	Capital Improvements Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

		Santa Fe County – Action #4
	Proposed Action:	Work on a government-to-government basis with willing Pueblos with tribal lands within Santa Fe County and other governmental entities to explore partnerships, collaboration opportunities, and otherwise increase hazard planning, mitigation, and response. Work on a government-to-government basis with willing Pueblos with tribal lands within Santa Fe County and other governmental entities to explore partnerships, collaboration opportunities, and otherwise increase hazard planning, mitigation, and response.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injuries or fatalities to vulnerable populations; Enhance disaster resilience through
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm, Agriculture Incident, Hazardous Materials, Space Weather
Community Lifeline: ((Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
The County plans to schedule regular review times with individual tribal governments of emergency management plans (i.e. yearly, bi annually).
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety

		Santa Fe County – Action #5
	Proposed Action:	Implement a Homebound Delivery program to supply vulnerable residents who are homebound with food and water during natural hazard events.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injuries or fatalities to vulnerable populations.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Preparedness/Response

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Food, Hydration, Shelter
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	Local Department Budget, Staff time
Lead Agency/Department Responsible:	Community Services Department, Public Works, Fire Department, Sheriff's Office
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Continuity of Operations Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

		Santa Fe County – Action #6
	Proposed Action:	Create a plan to assist vulnerable populations during natural hazard events, including the elderly, people with disabilities, and those with medical considerations.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injuries or fatalities to vulnerable populations.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Preparedness/Response

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$50,000
Potential Funding Sources:	Local Department Budget, Staff time
Lead Agency/Department Responsible:	Community Services Department, Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

		Santa Fe County – Action #7
	Proposed Action:	Construct/install Wi-Fi enabled weather stations at select fire stations across the county.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide Fire Stations
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of hazards through improved communications and early warning.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Lightning, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security, Communications
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Fire Department, Public Works
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

		Santa Fe County – Action #8
	Proposed Action:	Develop awareness initiatives aimed at promoting increased recruitment in both Regional and Volunteer fire department roles.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Increase local capabilities; Reduce burden on emergency response during hazardous events.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Preparedness/Response

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000 (Per individual, per year)
Potential Funding Sources:	Local Department Budget, SAFR Grant, YCC Grant
Lead Agency/Department Responsible:	County Managers Office, Human Resources, Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS:

		Santa Fe County – Action #9
	Proposed Action:	Coordinate with local dam owners and/or the state dam agency to assess and rehabilitate all High Hazard Potential Dams in Santa Fe County, implementing mitigation measures recommended in the assessment.
	BACKGROUND INFORMATION	
	Site and Location:	Santa Fe County all High Hazard Potential Dams
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages to structures; Ensure continuity of critical services; Reduce risk of injury and fatalities to residents.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Water Systems
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$2,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	County Emergency Management, Soil and Water Conservation District
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	High Hazard Dam EAP’s

COMMENTS:

		Santa Fe County – Action #10
	Proposed Action:	Create a Green Stormwater Infrastructure (GSI) master plan for all county facilities to promote the incorporation of nature-based solutions like rain gardens, stormwater planters, green roofs, porous pavement, and more.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce rainfall runoff volume and risk of flooding; Minimize impacts of expansive soils; Promote climate resilience and reduce future impacts of climate change.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Expansive Soils, Extreme Cold, Extreme Heat, Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Sustainability Division and County Commissioners, Public Works
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Santa Fe County Climate Action Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

		Santa Fe County – Action #11
	Proposed Action:	Explore creating an incentive program for installing green stormwater infrastructure (GSI) in existing development and update county codes to promote use of GSI in new development.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce rainfall runoff volume and risk of flooding; Minimize impacts of expansive soils; Promote climate resilience and reduce future impacts of climate change.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Expansive Soils, Extreme Cold, Extreme Heat, Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Sustainability Division
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Santa Fe County Climate Action Plan (Action #11)

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

		Santa Fe County – Action #12
	Proposed Action:	Explore a Nature Based Climate Solutions Program throughout the County and ways to implement actions to reduce natural hazard impacts, increase soil health, biodiversity, and stormwater capture and infiltration.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of damages to structures and infrastructure; Reduce risk of injuries and fatalities; Promote climate resilience and reduce future impacts of climate change.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	Sustainability Division
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Santa Fe County Climate Action Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

		Santa Fe County – Action #13
	Proposed Action:	Develop Extreme Weather Shelters/Resiliency Hubs throughout the County by expanding on existing infrastructure such as the Senior Centers. Utilize these shelters as a saferoom/shelter during natural hazard events and to support hazard education and outreach.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to residents by providing shelter during extreme weather events; Promote hazard awareness and protect residents from potential injuries and damages.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Earthquake, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$1,000,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOACE, USDA, USFS, USFWS
Lead Agency/Department Responsible:	County Emergency Management, Sustainability Division
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

		Santa Fe County – Action #14
	Proposed Action:	Provide technical advisory support for MS4 Permit Plan implementation to develop collaborative committees and groups aimed at supporting stormwater contamination mitigation, drought management planning, and the implementation of nature-based climate solutions within various non-profit agencies and partner organizations.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce the impacts of drought; Reduce risk of flood water contamination; Promote climate resilience and reduce future impacts of climate change.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	$10,000
Potential Funding Sources:	Local Department Budget, Staff time
Lead Agency/Department Responsible:	County Emergency Management, Sustainability Division, Public Works, Growth Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
This permit plan is in finalization stage and will be presented to Board of Commissions in April of 2024.
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

		Santa Fe County – Action #15
	Proposed Action:	Assess local hazardous material contaminants and implement the best recommended strategies to remove contaminants and/or mitigate their impacts.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injury and illness of residents; Reduce drinking water contaminants; Promote public health and safety.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Hazardous Materials
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: NMED; Federal Grants: CDC, EPA
Lead Agency/Department Responsible:	Public Works, Community Services Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

		Santa Fe County – Action #16
	Proposed Action:	Reduce Catastrophic Impacts from Dam Failure through enhanced planning and training.
	BACKGROUND INFORMATION	
	Site and Location:	Below the Santa Cruz Reservoir and the Nambe Falls Dam
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce loss of life; Reduce damages to infrastructure; Improved coordination of mitigation and response agencies.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Water Systems
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000
Potential Funding Sources:	Local Budget, Staff Time
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Dam Emergency Action Plans

COMMENTS:

SECTION 26: MITIGATION ACTIONS

		Santa Fe County – Action #17
	Proposed Action:	Improve public warning capabilities below for all high hazard potential dams, through various alerting mechanisms.
	BACKGROUND INFORMATION	
	Site and Location:	All High Hazard Potential Dams within Santa Fe County, with priority consideration to Below Santa Cruz Reservoir and Nambe Falls Dam
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to residents through improved communications and early warning.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$16,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Dam Emergency Action Plans

COMMENTS:

		Santa Fe County – Action #18
	Proposed Action:	Receive updated engineering and geologic studies related to dam safety.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Improve risk assessment; Detect geologic hazard risks in advance so that appropriate mitigation measures can be undertaken.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Earthquake, Land Subsidence, Landslide and Rockfall, Expansive Soils
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$50,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	County Emergency Management
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

		Santa Fe County – Action #19
	Proposed Action:	Support drought-resilient land use planning through implementation of the Sustainable Land Use Development Code.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Drought-resiliency incorporated into future growth and development; Limit impacts on water resources.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Low
Estimated Cost:	$10,000
Potential Funding Sources:	Local Budget, Staff time
Lead Agency/Department Responsible:	Growth Management, Building & Development Services
Implementation Schedule:	Within 48 months or more of plan adoption
Incorporation into Existing Plans:	Santa Fe County Sustainable Growth Management Plan and Sustainable, Land Use Development Code

COMMENTS:
In progress. Plans are in place to support this action.

		Santa Fe County – Action #20
	Proposed Action:	Facilitate and implement drought management planning strategies.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote drought-resiliency; Limit impacts on water resources.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	$75,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Public Works, Sustainability Division, Growth Management
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Sustainable Land Use Development Code

COMMENTS:

		Santa Fe County – Action #21
	Proposed Action:	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Provide access to flood insurance for residents; Reduce flood risk and build resiliency.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$10,000
Potential Funding Sources:	Local Budget, Staff time
Lead Agency/Department Responsible:	Growth Management, Building & Development Services
Implementation Schedule:	Within 48 months or more of plan adoption
Incorporation into Existing Plans:	Santa Fe County Sustainable Growth Management Plan, Santa Fe Sustainable Land Development Code

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

		Santa Fe County – Action #22
	Proposed Action:	Implement strategies to improve stream bank stabilization.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduced impacts to infrastructure from flooding and erosion; Reduced damages to road infrastructure and need for detours.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Greenway Plan, Transportation Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

		Santa Fe County – Action #23
	Proposed Action:	Maximize opportunities to mitigate hazards associated with specific low water crossings as part of ongoing county road improvements. Install a gate system to prevent passage in high hazard areas during flood events and incorporate advanced warning of closures at appropriate locations.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide, problem areas include the CR84 river crossing
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduced potential for death or injury during flood events; Reduce damages to infrastructure.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Public Works, Fire Department, OEM
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Transportation Master Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

		Santa Fe County – Action #24
	Proposed Action:	Analyze stream and arroyo migration patterns with available LiDAR data to predict impacts on county roads and culverts.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Identify areas of risk prior to high flows to target mitigation alternatives; Reduce flood risk and build resiliency.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$75,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Public Works, GIS
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

		Santa Fe County – Action #25
	Proposed Action:	Maintain awareness level and increase training to appropriate level to support radiological/nuclear incident response capability.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injuries and fatalities to first responders and residents.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness Preparedness/Response

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$110,000
Potential Funding Sources:	Local Budget, Staff time
Lead Agency/Department Responsible:	Fire Department, County Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

SECTION 26: MITIGATION ACTIONS

		Santa Fe County – Action #26
	Proposed Action:	Link Hazardous Materials Annex to the Hazard Mitigation Plan; Participate in Regional Hazardous Materials Response Team.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injuries and fatalities to first responders and residents.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Preparedness/Response

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000
Potential Funding Sources:	Local Budget, Staff time
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

		Santa Fe County – Action #27
	Proposed Action:	Encourage utility partners to enhance tree trimming near power lines to reduce potential for power outages and wildfires.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages to infrastructure; Ensure continuity of services during and after event; Reduce damages associated with power outages; Reduce risk of injuries or fatalities to vulnerable populations.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, High Winds, Lightning, Tornado, Wildfire, Winter Storm
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security, Energy (Power/Fuel)
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$10,000
Potential Funding Sources:	Local Department Budget, Staff time
Lead Agency/Department Responsible:	Fire Department & Public Works in cooperation with New Mexico PRC and State Forestry
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

		Santa Fe County – Action #28
	Proposed Action:	Utilize LIDAR surveys conducted in 2001 vs 2014 to assess differences in topography that may be indicative of problem areas associated with land subsidence, collapsible soils, landslides, channel migration, subsurface volcanic activity, earthquake faults, etc.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Improve risk assessment; Improve knowledge of risk areas and inform wise land use decisions.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Land Subsidence, Expansive Soils, Landslide and Rockfall, Volcano
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Low
Estimated Cost:	$5,000
Potential Funding Sources:	Local Budget, Staff time
Lead Agency/Department Responsible:	Growth Management, GIS Division
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

		Santa Fe County – Action #29
	Proposed Action:	Maintain and update multi-hazard plan through structured process.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Build resiliency within the community.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm, Agriculture Incident, Hazardous Materials, Space Weather
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	$50,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	County Emergency Management, HMPC
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Santa Fe County Sustainable Growth Management Plan

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

		Santa Fe County – Action #30
	Proposed Action:	Expand RAVE notifications for all hazards at all public buildings and utilize the RAVE system for these notifications.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to residents through improved communications and early warning.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Cold, Extreme Heat, Flood, Hail, High Winds, Landslide and Rockfall, Land Subsidence, Lightning, Tornado, Volcano, Wildfire, Winter Storm, Agriculture Incident, Hazardous Materials, Space Weather
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$1,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	County Manager's Office, Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

		Santa Fe County – Action #31
	Proposed Action:	Enhance Lightning Protection for County Critical Infrastructure.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce damages at critical facilities; Ensure continuity of critical services during and after event.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Lightning
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$20,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

		Santa Fe County – Action #32
	Proposed Action:	Promote Safe Rooms and/or shelters near Edgewood.
	BACKGROUND INFORMATION	
	Site and Location:	Edgewood area in southern county
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Avoided loss of life and injuries from multiple hazards.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, High Wind, Lightning, Winter Storm, Hazardous Materials
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Fire Department, Office of Emergency Management, Growth Management, Building & Development Services
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:

		Santa Fe County – Action #33
	Proposed Action:	Maintain and Implement the CWPP Including Project Recommendations.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of wildfires and the spread of wildfire through implementation of projects.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$50,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Fire Department, Wildland Division
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:
Plan to implement in 2025.

		Santa Fe County – Action #34
	Proposed Action:	Expand hazardous fuel mitigation activities.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of wildfires and the spread of wildfire through targeted fuels reduction programs; Reduced fire suppression, evacuation, and post-wildfire community reconstruction costs.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Drought
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	$500,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Fire Department, Wildland Division, Open Space Department
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

		Santa Fe County – Action #35
	Proposed Action:	Expand Multi-Agency Collaboration to Link Fuel Mitigation Activities.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of wildfires and the spread of wildfire through targeted fuels reduction programs; Reduced fire suppression, evacuation, and post-wildfire community reconstruction costs.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

		Santa Fe County – Action #36
	Proposed Action:	Implement the Firewise program and facilitate Ready Set Go Workshops.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk and spread of wildfires through education and awareness programs; Reduce risk of damages and injuries.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$10,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Fire Department, Emergency Management, USFS, BLM, Regional Emergency Communications Center
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	CWPP

COMMENTS:

		Santa Fe County – Action #37
	Proposed Action:	Improve public warning systems to ensure the earliest warning possible to get the public out of the way of a wildfire or flood type event.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk to residents through improved communications and early warning.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Dam Failure, Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Communication
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Fire Department, Office of Emergency Management, Sherrif's Office, Regional Emergency Communications Center
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Promotes public safety.

	Santa Fe County – Action #38
Proposed Action:	Implement strategies to reduce flood and debris flow associated with wildfire burn scars.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Reduce risk of injuries, fatalities and damages.
Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Landslide and Rockfall, Flood
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	$200,000
Potential Funding Sources:	Local Department Budget, Staff time, Bonds, Tax Revenue; State Grants: DFA (Capacity Building Grant), NM Forestry Grants (EMNRD), NM Forest Health Initiative, BGMR, NMED; Federal Grants: FEMA HMA Grants, CDBG, CDC, DOI, DOH, EDA, EPA, HUD, NFIP, NFWF, NOA
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	CWPP, Watershed Plans

COMMENTS:
NFIP & WHY MITIGATION ACTION IS APPROPRIATE:
Protects communities and reduces risk of flooding.

		Santa Fe County – Action #39
	Proposed Action:	Update the Emergency Operations Plan (EOP) and then collaborate with the NMSU Agriculture Division to include the Agricultural/Food Incident Annex.
	BACKGROUND INFORMATION	
	Site and Location:	County-wide
	Risk Reduction Benefit: (Current Cost/Losses Avoided)	Promote community resiliency; Reduce risk of injuries and fatalities.
	Type of Action: (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)	Local Plans and Regulations Preparedness/Response

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Agriculture Incident
Community Lifeline: (Safety/Security, Food, Hydration, Shelter, Health/Medical, Energy (Power/Fuel), Communications, Transportation, Hazardous Materials, Water Systems)	Safety/Security
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$10,000
Potential Funding Sources:	Local Budget, Staff time
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	EOP

COMMENTS:

SANTA FE COUNTY

SECTION 27
PLAN MAINTENANCE

SECTION 27: PLAN MAINTENANCE

PLAN MAINTENANCE PROCEDURES

The following is an explanation of how Santa Fe County and the general public will be involved in implementing, evaluating, and enhancing the Plan over time. When the plan is discussed in all maintenance procedures it includes mitigation actions and hazard assessments. The sustained hazard mitigation planning process consists of four main parts:

- Incorporation
- Monitoring and Evaluation
- Updating
- Continued Public Involvement

INCORPORATION

Santa Fe County will be responsible for further development and implementation of mitigation actions. Each action has been assigned to a specific department within the county. The following describes the process by which the county will incorporate elements of the mitigation plan into other planning mechanisms.

PROCESS OF INCORPORATION

Once the Plan Update is adopted, Santa Fe County will implement actions based on priority and the availability of funding. The county currently implements policies and programs to reduce loss to life and property from hazards. The mitigation actions developed for this Plan Update enhance this ongoing effort and will be implemented through other program mechanisms where possible.

The potential funding sources listed for each identified action may be used when the jurisdiction seeks funds to implement actions. An implementation time period or a specific implementation date has been assigned to each action as an incentive for completing each task and gauging whether actions are implemented in a timely manner.

Santa Fe County will integrate implementation of their mitigation actions with other plans and policies such as construction standards and emergency management plans, and ensure that these actions, or proposed projects, are reflected in other planning efforts. Coordinating and integrating components of other plans and policies into goals and objectives of the Plan Update

will further maximize funding and provide possible cost-sharing of key projects, thereby reducing loss of lives and property and mitigating hazards affecting the area.

Upon formal adoption of the Plan Update, Planning Team Members will work to integrate the hazard mitigation strategies into other plans and codes as they are developed. Planning Team Members will conduct periodic reviews of plans and policies, once per year at a minimum, and analyze the need for revisions in light of the approved Plan. The planning team will review all comprehensive land use plans, capital improvement plans, annual budget reviews, emergency operations or management plans, and transportation plans to guide development. The County will ensure that capital improvement planning in the future will also contribute to the goals of this hazard mitigation Plan Update to reduce the long-term risk to life and property from all hazards. Within one year of formal adoption of the hazard mitigation Plan Update, existing planning mechanisms will be reviewed by Santa Fe County.

Santa Fe County is committed to implementing their mitigation actions. Planning team members will review and revise, as necessary, the long-range goals and objectives in strategic plan and budgets to ensure that they are consistent with this mitigation action plan. Additionally, the team will work to advance the goals of this hazard mitigation plan through its routine, ongoing, long-range planning, budgeting, and work processes.

Table 27-1 identifies types of planning mechanisms and examples of methods for incorporating the Plan Update into other planning efforts. The team members, listed in Table 27-2 below, will be responsible for the review of these planning mechanisms and their incorporation of the plan, with the exception of the Floodplain Management Plans; the Floodplain Administrator on staff will be responsible for incorporating the plan when floodplain management plans are updated or new plans are developed.

Table 27-1. Methods of Incorporation of the Plan

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
Annual Budget Review	• Emergency Management Coordinator • Fire Chief • County Manager	Various departments and key personnel that participated in the planning process for Santa Fe County will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.
Capital Improvement Plan	• Emergency Management Coordinator • Fire Chief • County Manager	Prior to any revisions to the CIP, County departments will review the risk assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
		long-term mitigation actions available to local governments.
General Plan	• Emergency Management Coordinator • Fire Chief • County Manager	Since general plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of Santa Fe County's General Plan.
Floodplain Management Plans	• Floodplain Administrator	Floodplain management plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 11 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when updating management plans or developing new plans.
Grant Applications	• Emergency Management Coordinator • Fire Chief • County Manager	The Plan will be evaluated when grant funding is sought for mitigation projects. If a project is not in the Plan Update, a Plan Revision may be necessary to include the action in the Plan.
Regulatory Plans	• Emergency Management Coordinator • Fire Chief • County Manager	Currently, Santa Fe County has regulatory plans in place, such as Emergency Management Plans, Land Use Plans, and Evacuation Plans. The Plan Update will be consulted when County departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.

MONITORING AND EVALUATION

Periodic revisions of the Plan are required to ensure that goals, objectives, and mitigation actions are kept current. When the plan is discussed in these sections it includes the risk assessment and mitigation actions as a part of the monitoring, evaluating, updating and review process. Revisions may be required to ensure the Plan is compliant with federal and state statutes and regulations. This section outlines the procedures for completing Plan revisions, updates, and review. Table 27-2 indicates the department and title of the party responsible for Plan monitoring, evaluating, updating, and review of the Plan.

Table 27-2. Team Members Responsible for Plan Monitoring, Evaluating, Updating, and Review of the Plan

TITLE
Emergency Management Coordinator
Fire Chief
County Manager

MONITORING

Designated Planning Team members are responsible for monitoring, evaluating, updating, and reviewing the Plan, as shown in Table 27-2. Individuals holding the title listed in Table 27-2 will be responsible for monitoring the Plan on an annual basis. Plan monitoring includes but is not limited to reviewing and incorporating into the Plan other existing planning mechanisms that relate or support goals and objectives of the Plan; monitoring the incorporation of the Plan into future updates of other existing planning mechanisms as appropriate; reviewing mitigation actions submitted and coordinating with various county departments to determine if mitigation actions need to be re-evaluated and updated; evaluating and updating the Plan as necessary; and monitoring plan maintenance to ensure that the process described is being followed, on an annual basis, throughout the planning process. The Planning Team will develop a brief report that identifies policies and actions in the plan that have been successfully implemented and any changes in the implementation process needed for continued success. A summary of meeting notes will report the particulars involved in developing an action into a project. In addition to the annual monitoring, the Plan will be similarly reviewed immediately after extreme weather events include but not limited to state and federally declared disasters.

EVALUATION

As part of the evaluation process, the Planning Team will assess changes in risk; determine whether the implementation of mitigation actions is on schedule; determine whether there are any implementation problems, such as technical, political, legal, or coordination issues; and identify changes in land development or programs that affect mitigation priorities for each respective department or organization.

The Planning Team will meet on an annual basis to evaluate the Plan and identify any needed changes and assess the effectiveness of the plan achieving its stated purpose and goals. The team will evaluate the number of mitigation actions implemented along with the loss-reduction associated with each action. Actions that have not been implemented will be evaluated to determine if any social, political, or financial barriers are impeding implementation and if any changes are necessary to improve the viability of an action. The team will evaluate changes in land development and/or programs that affect mitigation priorities in their respective jurisdictions. The annual evaluation process will help to determine if any changes are necessary. In addition, the Plan will be similarly evaluated immediately after extreme weather events including but not limited to state and federally declared disasters.

SECTION 27: PLAN MAINTENANCE

UPDATING

PLAN REVISIONS

At any time, minor technical changes may be made to update the Santa Fe County Hazard Mitigation Action Plan Update 2025. Material changes to mitigation actions or major changes in the overall direction of the Plan or the policies contained within it, must be subject to formal adoption by the county.

Santa Fe County will review proposed revisions and vote to accept, reject, or amend the proposed change. Upon ratification, the Revision will be transmitted to NMDHSEM.

In determining whether to recommend approval or denial of a Plan Revision request, Santa Fe County will consider the following factors:

- Errors or omissions made in the identification of issues or needs during the preparation of the Plan Update;
- New issues or needs that were not adequately addressed in the Plan Update; and
- Changes in information, data, or assumptions from those on which the Plan Update was based.

FIVE (5) YEAR REVIEW

The Plan will be thoroughly reviewed by the Planning Team at the end of three years from the approval date, to determine whether there have been significant changes in the planning area that necessitate changes in the types of mitigation actions proposed. Factors that may affect the content of the Plan include new development in identified hazard areas, increased exposure to hazards, disaster declarations, increase or decrease in capability to address hazards, and changes to federal or state legislation.

The Plan review process provides Santa Fe County an opportunity to evaluate mitigation actions that have been successful, identify losses avoided due to the implementation of specific mitigation measures, and address mitigation actions that may not have been successfully implemented as assigned.

It is recommended that the full Executive and Advisory Planning Team (Section 2, Tables 2-1 and 2-2) meet to review the Plan at the end of three years because grant funds may be necessary for the development of a five-year update. Reviewing planning grant options in advance of the five-year Plan update deadline is recommended considering the timelines for grant and planning cycles can be in excess of a year.

Following the Plan review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and Plan Revision process outlined herein. Upon completion of the review, update, and revision process the revised Plan will be submitted to NMDHSEM for final review and approval in coordination with FEMA.

CONTINUED PUBLIC INVOLVEMENT

Public input was an integral part of the preparation of this Plan and will continue to be essential for Plan updates. The public will be directly involved in the annual evaluation, monitoring, reviews, and cyclical updates. Changes or suggestions to improve or update the Plan will provide opportunities for additional public input.

SECTION 27: PLAN MAINTENANCE

The public can review the Plan on the county website, where officials and the public are invited to provide ongoing feedback, via email.

The Planning Team may also designate voluntary citizens from the planning area or willing stakeholder members from the private sector businesses that were involved in the Plan's development to provide feedback on an annual basis. It is important that stakeholders and the immediate community maintain a vested interest in preserving the functionality of the planning area as it pertains to the overall goals of the mitigation plan. The Planning Team is responsible for notifying stakeholders and community members on an annual basis and maintaining the Plan.

Media, including local newspaper and radio stations, will be used to notify the public of any maintenance or periodic review activities during the implementation, monitoring, and evaluation phases. Additionally, local news media will be contacted to cover information regarding Plan updates, status of grant applications, and project implementation. Local and social media outlets, such as Facebook and Instagram, will keep the public and stakeholders apprised of potential opportunities to fund and implement mitigation projects identified in the Plan.

APPENDIX A
PLANNING TEAM

APPENDIX A: PLANNING TEAM

PLANNING TEAM MEMBERS

The Santa Fe County Hazard Mitigation Action Plan 2025 was organized using a direct representative model. An Executive Planning Team from the participating jurisdictions, shown in Table A-1, was formed to coordinate planning efforts and request input and participation in the planning process. Table A-2 reflects the Advisory Planning Team, consisting of area organizations and departments that participated throughout the planning process. Table A-3 is comprised of stakeholders who were invited to provide Plan input. Public outreach efforts and meeting documentation is provided in Appendix E.

Table A-1. Executive Planning Team

DEPARTMENT	TITLE
Office of Emergency Management	Emergency Management Coordinator
Fire Department	Fire Chief

Table A-2. Advisory Planning Team

DEPARTMENT	TITLE
Administrative Services Department	IT Administration
Building & Development Services	Supervisor of Conditional Use Permits, Overlay Zones, Wireless Communication Facilities, Commercial Development, DCIs, Community Solar
Building & Development Services	Supervisor of Terrain Management, Flood zone Determinations, Variances, Appeals, Conceptual Plans, Conditional Use Permits
Bureau of Elections	Chief Deputy
Clerk's Office	County Clerk
Community Development Department	Deputy Director
Community Development Department	Economic Development Division Manager
Community Development Department	Economic Development Division Specialist
Community Development Department	Executive Director
Community Development Department	Sustainability Division Manager
Community Services	Health Services Division Director

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DEPARTMENT	TITLE
County Attorney	Legal ACA II
County Commissioner	Constituent Services Liaison
County Commissioner	District 1 County Commissioner
County Commissioner	District 2 County Commissioner
County Commissioner	District 3 County Commissioner
County Commissioner	District 4 County Commissioner
County Commissioner	District 5 County Commissioner
County Ethics Board	Home Occupations, Film Permits, Temporary Use Permits Specialist
County Manager's Office	County Manager
County Manager's Office	Office Administrator
County Manager's Office	Deputy County Manager
County Manager's Office	Operations Manager
County Manager's Office	Strategic Operational Planning Director
Fire Department	Assistant Fire Chief / Fire Marshal
Fire Department	Assistant Fire Chief of Operations
Fire Department	Battalion Chief & District Liaison
Fire Department	Deputy Fire Chief
Fire Department	Fire Prevention Specialist Urban Wildland
Fire Department	Hondo District Fire Chief
Fire Department	Wildland Captain
Fire Department	Turquoise Trail District Fire Chief
Growth Management Department	Deputy Director
Growth Management Department	Director
Growth Management Department	E-911 & GIS Administrative Assistant
Growth Management Department	GIS Manager
Growth Management Department	GIS Specialist
Growth Management Department	GIS Team Lead

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DEPARTMENT	TITLE
Office of Emergency Management	Director of Emergency Management
Planning Division	Planning Manager
Public Safety	Operations Manager
Public Safety	Regional Emergency Communications Center (RECC) Deputy Director
Public Safety	Regional Emergency Communications Center (RECC) Director
Public Works	Director
Senior Services	Senior Services Program Manager
Sheriff's Office	Computer Aided Dispatch Administrator
Sherrif's Office	County Sheriff
Sheriff's Office	Captain
Sheriff's Office	Undersheriff

STAKEHOLDERS

The following groups listed in Table A-3 represent a list of organizations invited to stakeholder meetings, public meetings, and workshops throughout the planning process and include members of community groups, non-profit organizations, private businesses, utility providers, neighboring counties, school and universities, state and federal agencies, and legislators. The public were also invited to participate via email throughout the planning process. Many of the invited organizations and stakeholders participated and were integral to providing comments and data for the Plan. For a list of attendees at meetings, please see Appendix E[1].

Table A-3. Stakeholders

AGENCY	TITLE	STAKEHOLDER TYPE
Acequia Associations	Director of Operations	Utility Provider
Acequia Associations	Executive Director	Utility Provider
American Red Cross	Executive Director for Arizona and New Mexico Region	Community Organization / Non-Profit
Bernalillo County	Emergency Management	Neighboring Community
Bienvenidos Outreach	Assistant Director	Community Organization / Non-Profit

[1] Information contained in Appendix E is exempt from public release under the Freedom of Information Act (FOIA).

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AGENCY	TITLE	STAKEHOLDER TYPE
City of Espanola	City Manager	Neighboring Community
City of Espanola	Fire Chief	Neighboring Community
City of Santa Fe	Assistant City Manager	Neighboring Community/HHPD Dam Owner
City of Santa Fe	City Manager	Neighboring Community/HHPD Dam Owner
City of Santa Fe	Emergency Manager	Neighboring Community/HHPD Dam Owner
Town of Edgewood	Town Manager	Neighboring Community
Edgewood Police Department	Chief of Police	Community Organization
El Valle De La Cieneguilla Land Grant Association	Tribal Administrator for Government Affairs	Tribal Agency
Environmental Protection Agency, Region 6	Director of Emergency Management Division	Federal Agency
Environmental Protection Agency, Region 6	Regional Contact, Albuquerque	Federal Agency
Environmental Protection Agency, Region 6	Western Regional Contact	Federal Agency
Espanola Humane	President	Community Organization
Felines & Friends	Executive Director	Community Organization / Non-Profit
FEMA	Region 6	Federal Agency
The Food Depot	Media Representative	Community Organization / Non-Profit
Forest Stewards Guild	Forest Health Specialist for New Mexico State Forestry Division	State Agency
Forest Stewards Guild	Regional Representative	State Agency
Goodwill Industries of New Mexico	Director of Government Relations	Community Organization / Non-Profit
Goodwill Industries of New Mexico	President / CEO	Community Organization / Non-Profit
Habitat for Humanity	General Representative	Community Organization / Non-Profit
Homewise	Media Representative	Community Organization

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AGENCY	TITLE	STAKEHOLDER TYPE
Indigenous Ways	President	Community Organization / Non-Profit
Institute of American Indian and Alaska Native Culture and Arts	Executive Assistant to the President	Academia
Institute of American Indian and Alaska Native Culture and Arts	Vice President of Operations	Academia
Interfaith Community Shelter at Pete's Faith	Executive Director	Community Organization / Non-Profit
Keep Santa Fe Beautiful	General Representative	Community Organization
Kitchen Angels	Director of Food Services	Community Organization / Non-Profit
Los Alamos County	Deputy Emergency Management	Neighboring Community
Los Alamos County	Emergency Management	Neighboring Community
Nambe Pueblo	Governor	Tribal Agency
The Nature Conservancy	Executive Director	Community Organization
New Mexico Aging and Long-Term Services	Cabinet Secretary	State Agency
New Mexico Bureau of Minerals and Geology	Director and State Geologist	State Agency
New Mexico Cattle Growers Association	President	State Agency
New Mexico Department of Agriculture	Co-Director for Southwest Board and Emergency Preparedness	State Agency
New Mexico Department of Agriculture	County Extension Agent	State Agency
New Mexico Department of Agriculture	Director for Southwest Board and Emergency Preparedness	State Agency
New Mexico Department of Agriculture	Southwest Board and Emergency Preparedness Representative	State Agency
New Mexico Department of African American Affairs	Communications and Marketing Coordinator	State Agency
New Mexico Department of African American Affairs	Deputy Director	State Agency

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AGENCY	TITLE	STAKEHOLDER TYPE
New Mexico Department of Energy, Minerals, and Natural Resources	Cabinet Secretary	State Agency
New Mexico Department of Energy, Minerals, and Natural Resources	Public Information Officer	State Agency
New Mexico Department of Game and Fish	Director	State Agency
New Mexico Department of Health	Communications Coordinator	State Agency
New Mexico Department of Health	Public Information Officer	State Agency
New Mexico Department of Homeland Security and Emergency Management	Response, Recovery, and Mitigation Bureau Chief	State Agency
New Mexico Department of Homeland Security and Emergency Management	State Hazard Mitigation Officer	State Agency
New Mexico Department of Homeland Security and Emergency Management	State Planner (Contractor I)	State Agency
New Mexico Department of Homeland Security and Emergency Management	State Planner (Contractor II)	State Agency
New Mexico Department of Indian Affairs	Cabinet Secretary	State Agency
New Mexico Department of Transportation	Director of Communications	State Agency
New Mexico Environmental Department	Cabinet Secretary	State Agency
New Mexico Environmental Department	Chief Public Information Officer	State Agency
New Mexico Environmental Department	Director of Environmental Protection Division	State Agency
New Mexico Highlands University	Santa Fe Center Manager	Academia
New Mexico Livestock Bureau	Deputy Director	State Agency
New Mexico Livestock Bureau	Inspector	State Agency
New Mexico Office of the State Engineer	District 6 Dam Safety	State Agency

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AGENCY	TITLE	STAKEHOLDER TYPE
New Mexico School for the Deaf	Superintendent	Academia
New Mexico State University Agricultural Extension	Northern District Director	Academia
New Mexico State University Earth Data Analysis Center	Director	Academia
New Mexico Wildlife Center	Communications Specialist	Community Organization
Pojoaque	Director of Security	Academia
Pojoaque Pueblo	Governor	Tribal Agency
Pojoaque Valley Irrigation District/Santa Fe Pojoaque Soil Conservation District	District Manager	Utility Provider
Pojoaque Valley Irrigation District/Santa Fe Pojoaque Soil Conservation District	Office Manager	Utility Provider
Pojoaque Valley Irrigation District/Santa Fe Pojoaque Soil Conservation District	Board Member/Treasurer	Utility Provider/HHPD Dam Owner
Quivira Coalition	Communications Director	Community Organization
Rio Arriba County	County Manager	Neighboring Community
Sandoval County	Emergency Management	Neighboring Community
San Ildefonso Pueblo	Governor	Tribal Agency
San Miguel County	Emergency Management	Neighboring Community
Santa Fe Animal Shelter	Director of Shelter Operations	Community Organization / Non-Profit
Santa Fe Community College	Director of Facilities	Academia
Santa Fe Community College	President	Academia
Santa Fe Community Foundations	Senior Director of Community Programs	Community Organization / Non-Profit
Santa Fe Community Housing Trust	Executive Director	Community Organization
Santa Fe Railyard Community Corporations	Executive Director	Community Organization
Santa Fe Railyard Community Corporations	Operations Manager	Community Organization
Santa Fe Public Schools	Superintendent	Academia
Santa Fe Watershed Association	Director of Stewardship and Community Outreach	Community Organization

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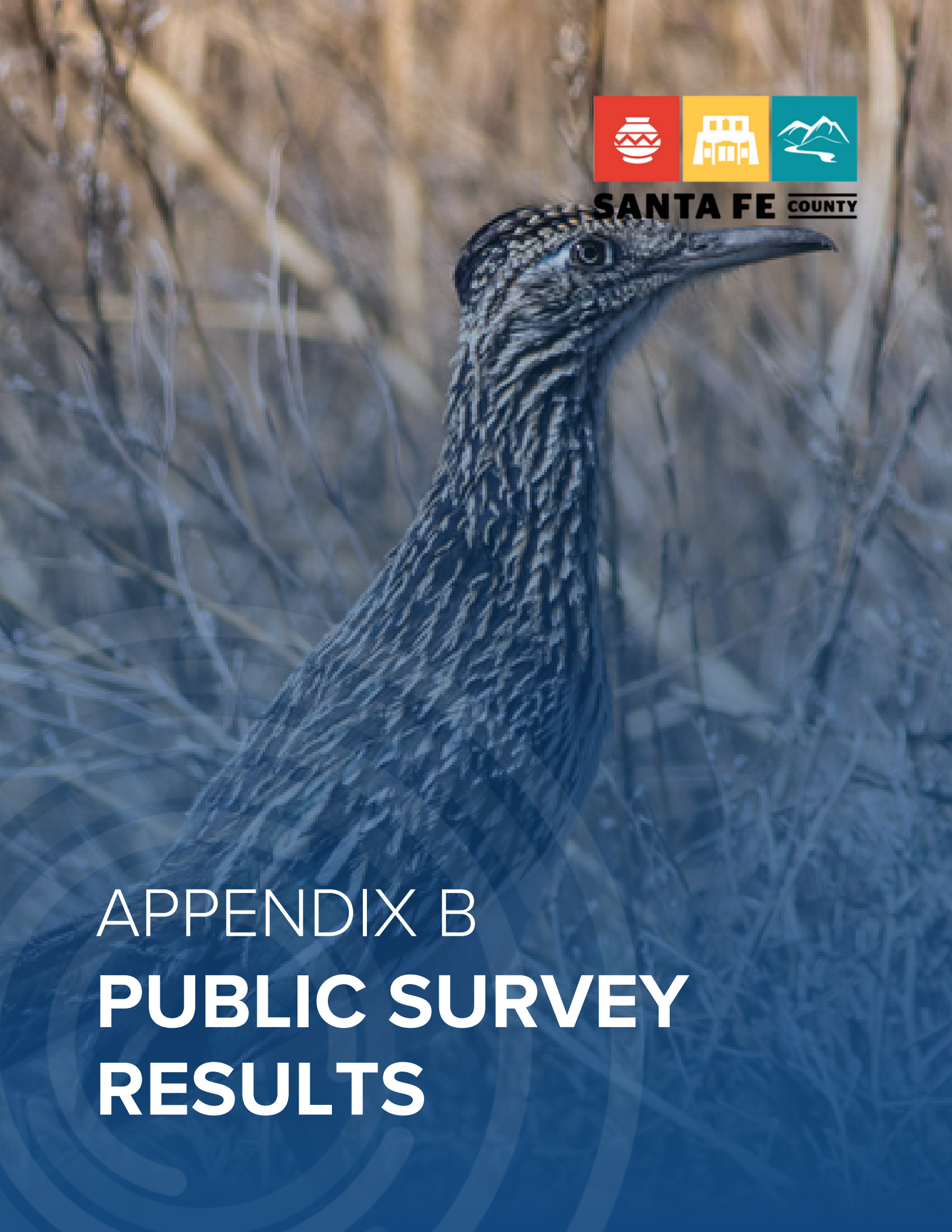
AGENCY	TITLE	STAKEHOLDER TYPE
Santa Fe Watershed Association	Executive Director	Community Organization
Santa Mario El Mirador	President / CEO	Healthcare Agency
Southwestern College	President	Academia
Stanley VFD	District Chief	Community Organization
State Governor	Governor	State Agency
State Legislature	District 46 Representative	State Agency
State Senate	District 25 Representative	State Agency
St. John's College	President	Academia
Tesuque Pueblo	Governor	Tribal Agency
Torrance County	Emergency Management	Neighboring Community
United Ways	Santa Fe Area Director	Community Organization
U.S. Army Corps of Engineers	Southwest Region	Federal Agency
U.S. Fish & Wildfire	Southwest Region	Federal Agency
Water Engineers for the Americas (WEFTA)	Executive Director	Community Organization
WildEarth Guardians	Climate and Energy Advocate	Community Organization
WildEarth Guardians	Operations & Development Coordinator	Community Organization
YouthWorks	Chief of Operations	Community Organization
YouthWorks	Executive Director	Community Organization



SANTA FE COUNTY

APPENDIX B
PUBLIC SURVEY RESULTS

APPENDIX B: PUBLIC SURVEY RESULTS

OVERVIEW

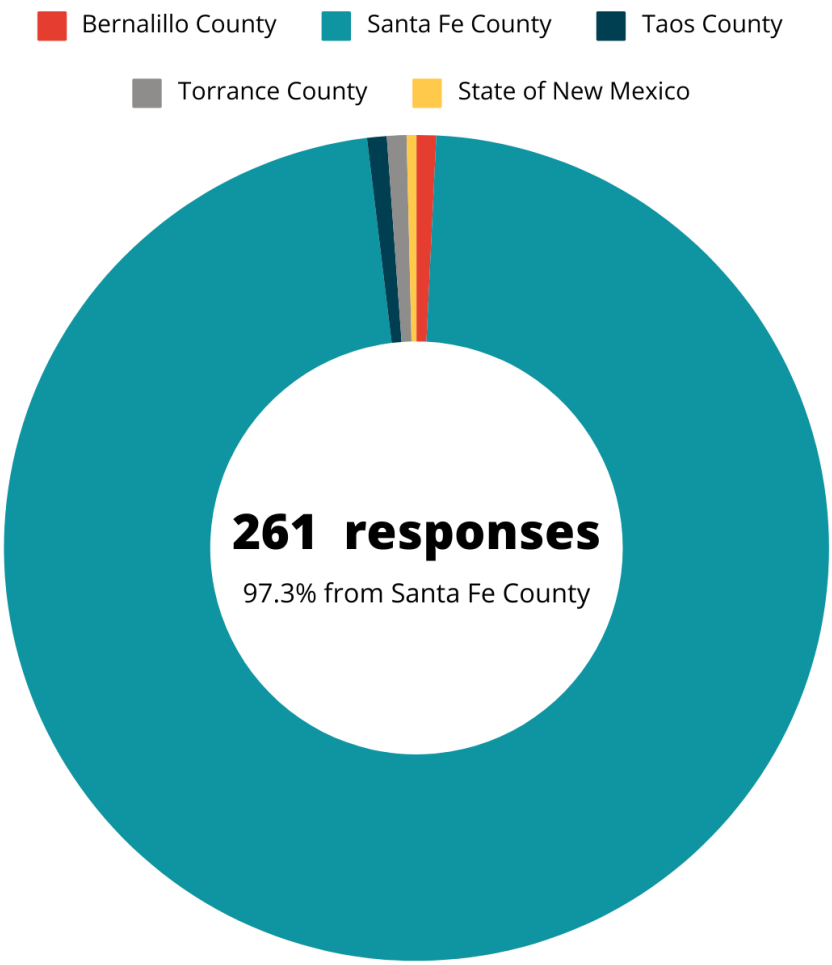
Santa Fe County prepared a public survey that requested public opinion on a wide range of questions relating to natural hazards. The survey was made available via the participating counties and jurisdiction's websites. This survey link was also distributed at public meetings and stakeholder events throughout the planning process.

A total of 261 surveys were collected, the results of which are analyzed in Appendix B. The purpose of the survey was twofold: 1) to solicit public input during the planning process, and 2) to help the jurisdictions identify any potential actions or problem areas.

All public survey results were discussed and shared with the Planning Team during the Mitigation Strategy Workshop. These results are also provided below. The survey results provide information regarding the public's experience with natural hazards, their perceived hazards of concern, recommended mitigation actions, and additional valuable insights. Overall, this survey enhances the mitigation planning process by ensuring the plan properly represents the community, is informed through local knowledge, and by promoting equity.

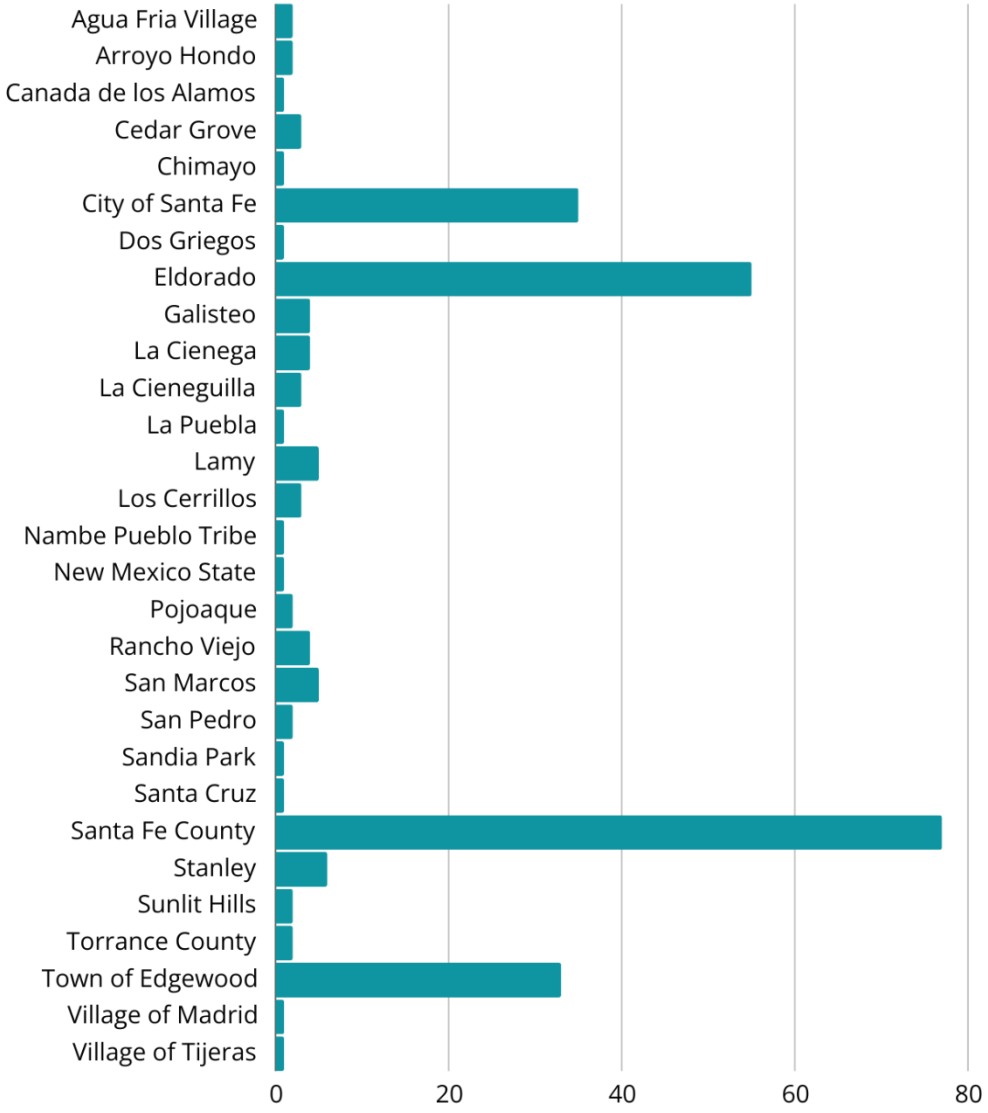
PUBLIC SURVEY RESULTS

Responses by County:



APPENDIX B: PUBLIC SURVEY RESULTS

Responses by Jurisdiction:



41% of survey responders have been impacted by a disaster.

Personal experiences shared in survey responses included:

"Flood, fire. Lived in communities outside Santa Fe that were impacted in the past 10 years with 100 year flood incidents and multiple wildfires in mountain areas. Lived in areas with Tornado hazard and growing hail impact."

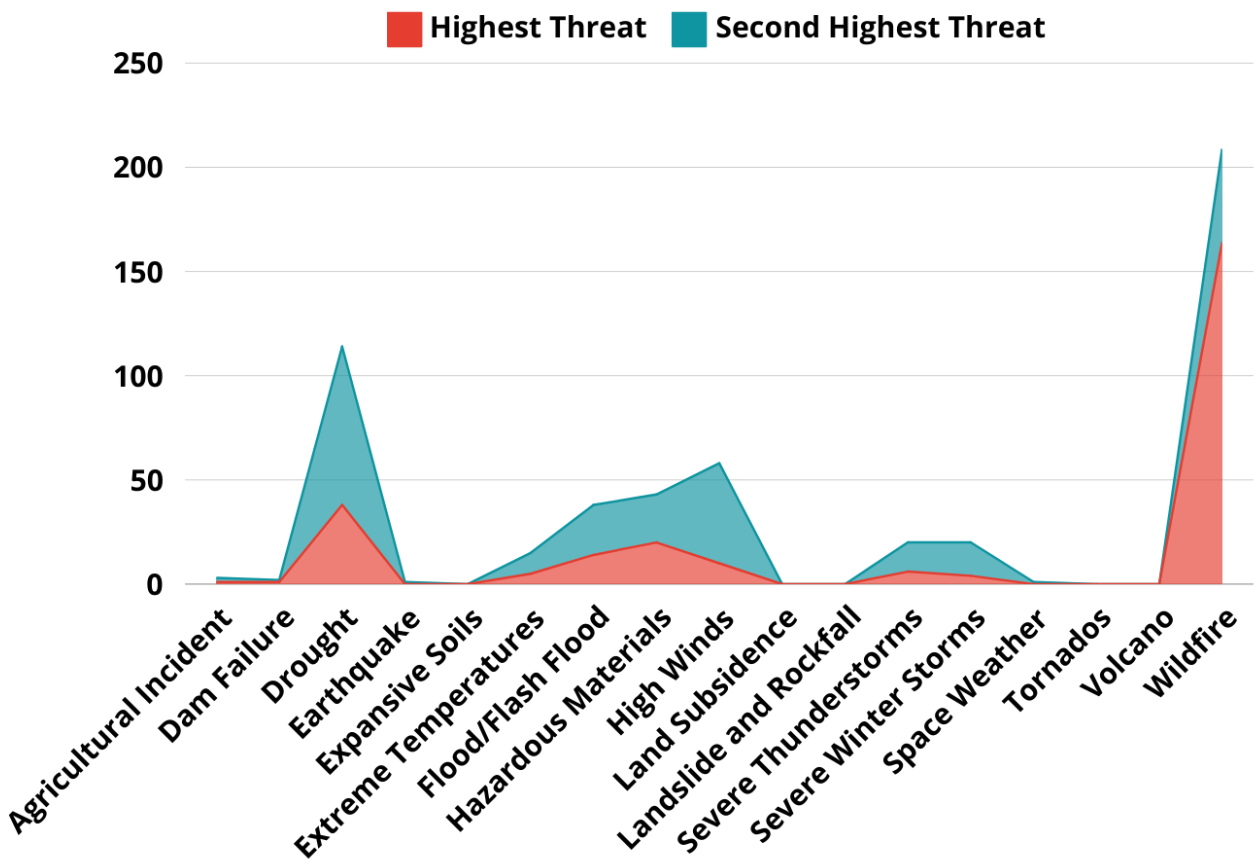
"Living downwind and downstream of the Dome Fire (1996), Cerro Grande fire (2000), Las Conchas fire (2011), Cerro Pelado fire (2022) - all areas where LANL pollutants have been deposited and resuspended and released in these fires causing short- and long-term hazards."

"Being in traffic with a loaded WIPP truck next to my car. Transportation of plutonium-contaminated waste from LANL through Santa Fe County is a hazard. The one or more drums of LANL waste that exploded in the WIPP underground on February 14, 2014 could have exploded on the route."

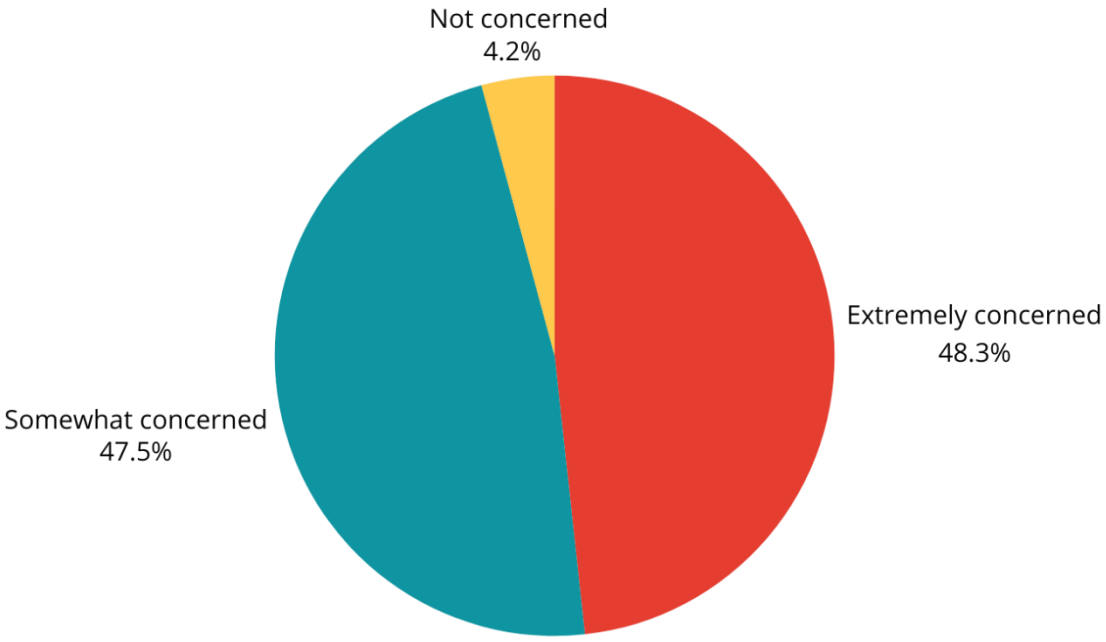
"'We lived two ridges u from the Paradise fire in CA. The air quality was terrible. We worried that the fire would reach us. We did not evacuate but the experience was frightening."

33% of those who have been impacted by a disaster mentioned winter storms in their response.

Hazards that pose the highest perceived threat level:

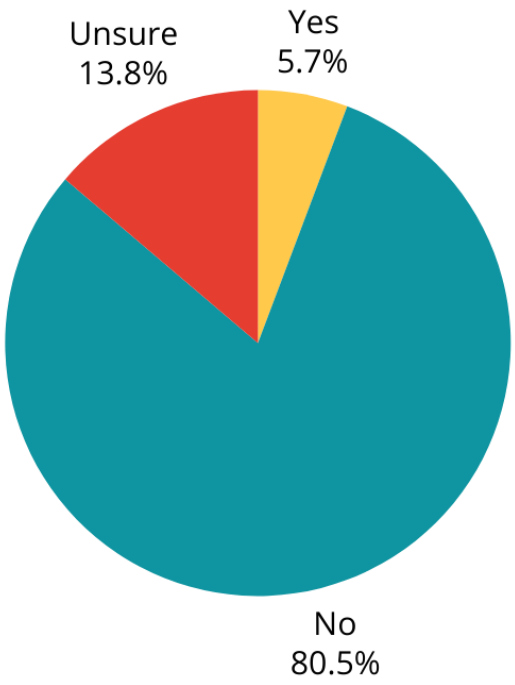


Concern level for potential hazard impacts:

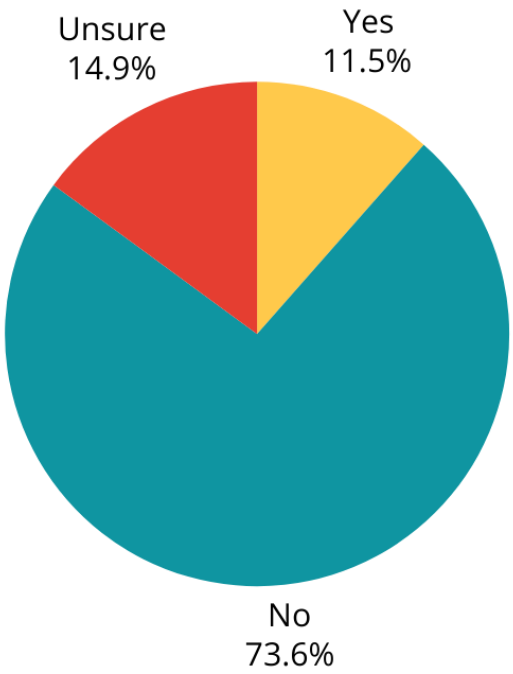


Hazards not profiled in the Hazard Mitigation Plan update that are of concern included:

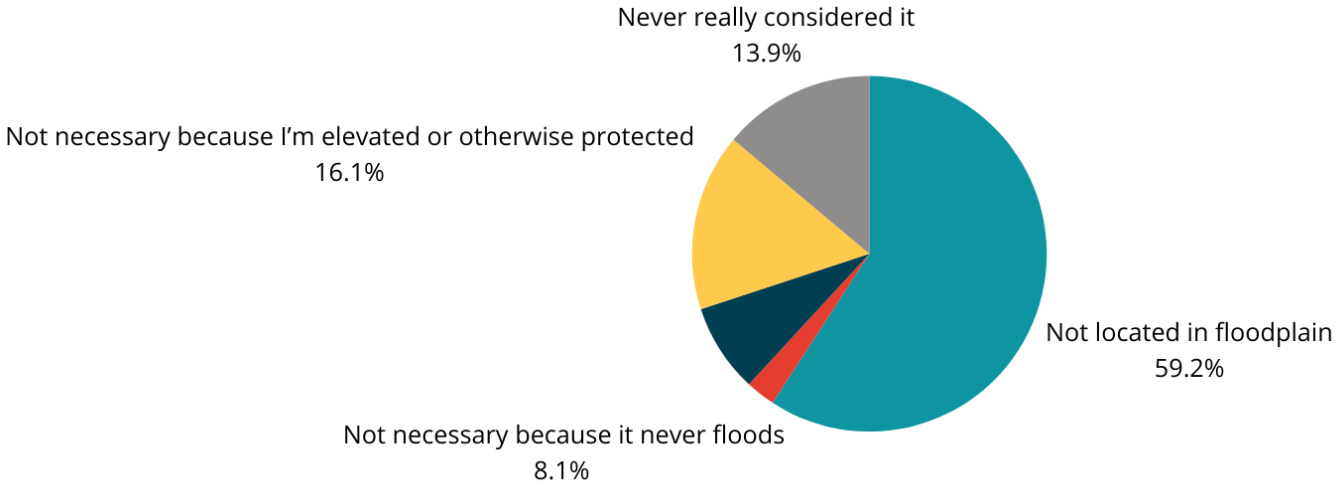
Home is in floodplain:



Has flood insurance:



Reasoning for not having flood insurance:



Have you taken any actions to make your home or neighborhood more resistant to hazards?

81% responded 'Yes'

32% of those who have taken action mentioned wildfire fuel reduction through landscaping practices.

80% of survey responders are interested in making their homes or neighborhoods more resistant to hazards.

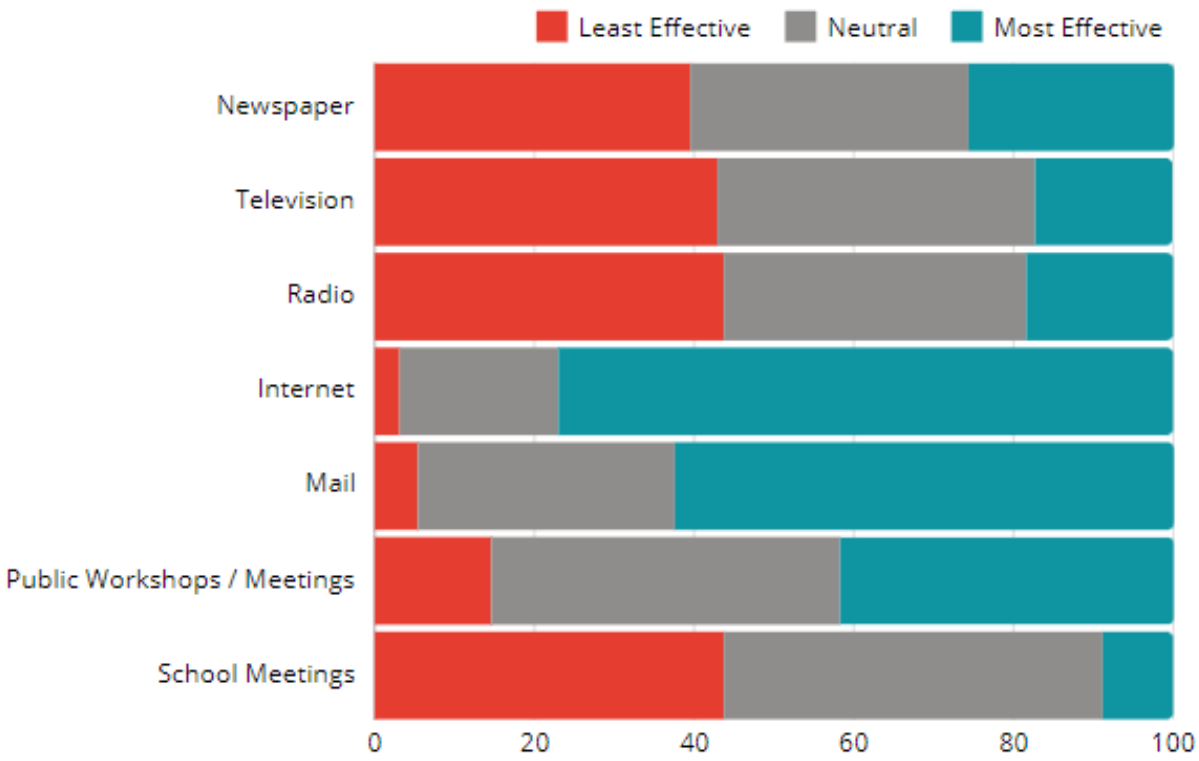
Actions taken included:

"Brush removal. Installed solar system 15 years ago. Installed huge water storage tanks holding 1,000 gallons of water. We are on a well and are very concerned about the state of a shallow aquifer and potential water contamination from any use of firefighting suppressants such as Novec 1230 with PFA's."

"A) Erosion mitigation on confluence of 2 large arroyos that usually do Not flood - only in extreme rain events or pulse events (ie. HP/CC flooding across I-25 into Ojo de la Vaca area), B) thinning dead trees (Ips) and removing slash, C) mowing large meadow areas near house."

"Efforts seasonally to minimize dry grasses, ladder fuels, dead/fallen timber. Create and maintain grading and drainage pathways for extreme runoffs during storms. Within reason, maintain defensible space near home."

Effectiveness of communication methods for receiving information about how to make your home and neighborhood more resistant to hazards.



Additional communication methods suggested:

Top 10 steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood:

1. Prevent/ restrict development in hazard prone areas.
2. Inform property owners how to minimize damage to their properties
3. Protect and strengthen critical facilities (e.g. transportation, hospitals, fire stations, schools)
4. Preserve or restore natural systems to reduce hazard impacts (e.g. floodplain protection, habitat preservation, slope stabilization and forest management)
5. Protect and improve reliability of utilities
6. Construct, maintain, or retrofit infrastructure to reduce hazard impact (e.g. elevating roadways, improving drainage systems, dams, detention basins, storm sewers, etc.)
7. Disclose natural hazard risks during real estate transactions
8. Distribute information on water conservation methods to use during drought event
9. Assist vulnerable property owners with securing funding to protect their property
10. Strengthen building codes and laws to improve standards for development in high hazard areas

Are there any other issues regarding the reduction of risk and loss associated with hazards or disaster in the community that you think are important?

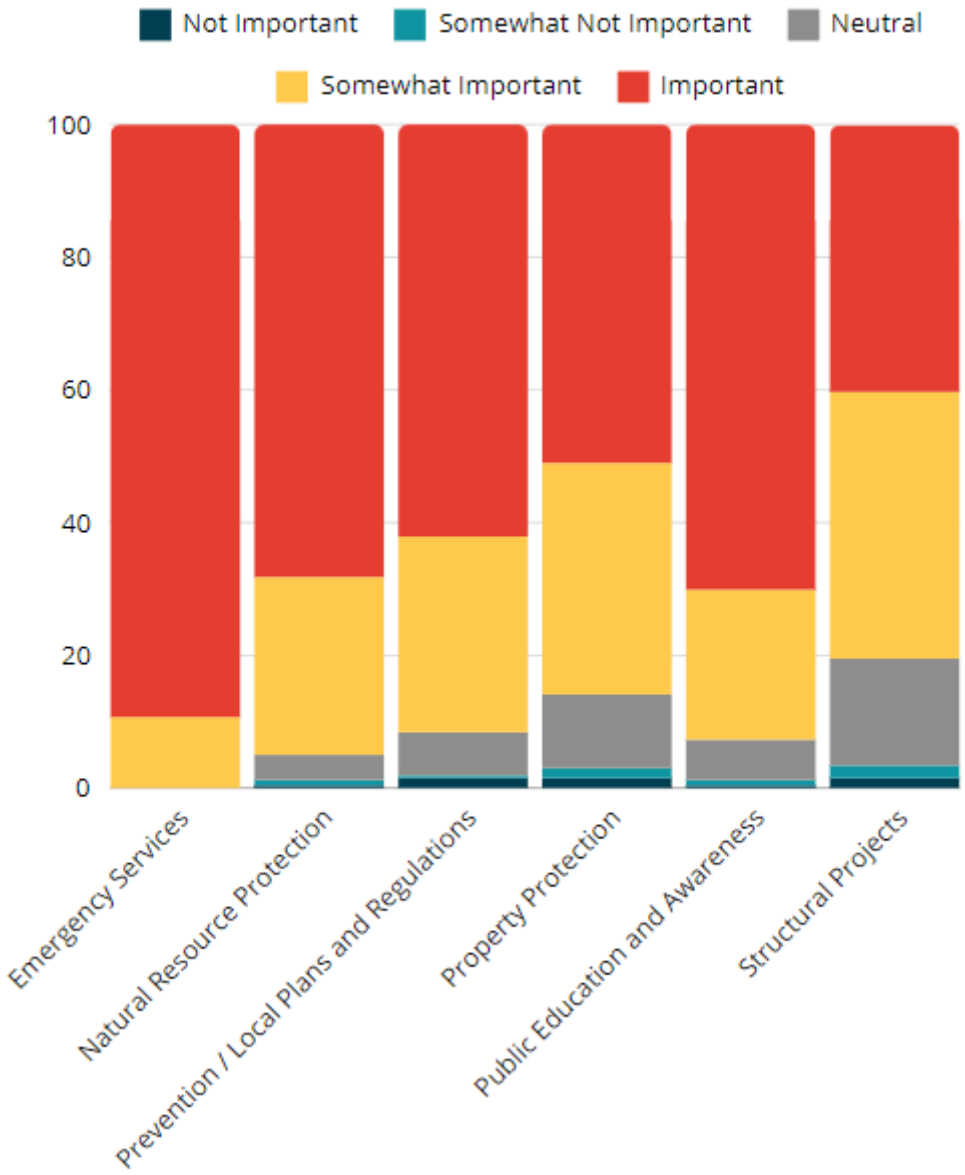
There were 151 responses to this question, some reoccurring topics are covered in the responses below. All responses have been provided to the planning team.

"Addressing PFAS and other water contamination in the lower Santa Fe watershed, developing cultural literacy training and trust building with community members for more effective communication and relationships**."**

"Protect the groundwater aquifer system that provides a safe drinking water source for the community that does not have a county water system in place during major floods in our community."

"Better public communication via cell phone alerts, email alerts, TV alerts, for emergency events, restrict development, no high tension electric poles and above ground transmission wires. Restrict all fire hazards during fire season ie. shooting, fireworks, open fires, etc. Make evacuation plans for each neighborhood public and known to local fire departments and HOAs and other rural residents."

A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.



Emergency Services - Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical facilities or systems.

Natural Resource Protection - Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.

Prevention / Local Plans & Regulations - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.

Property Protection - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.

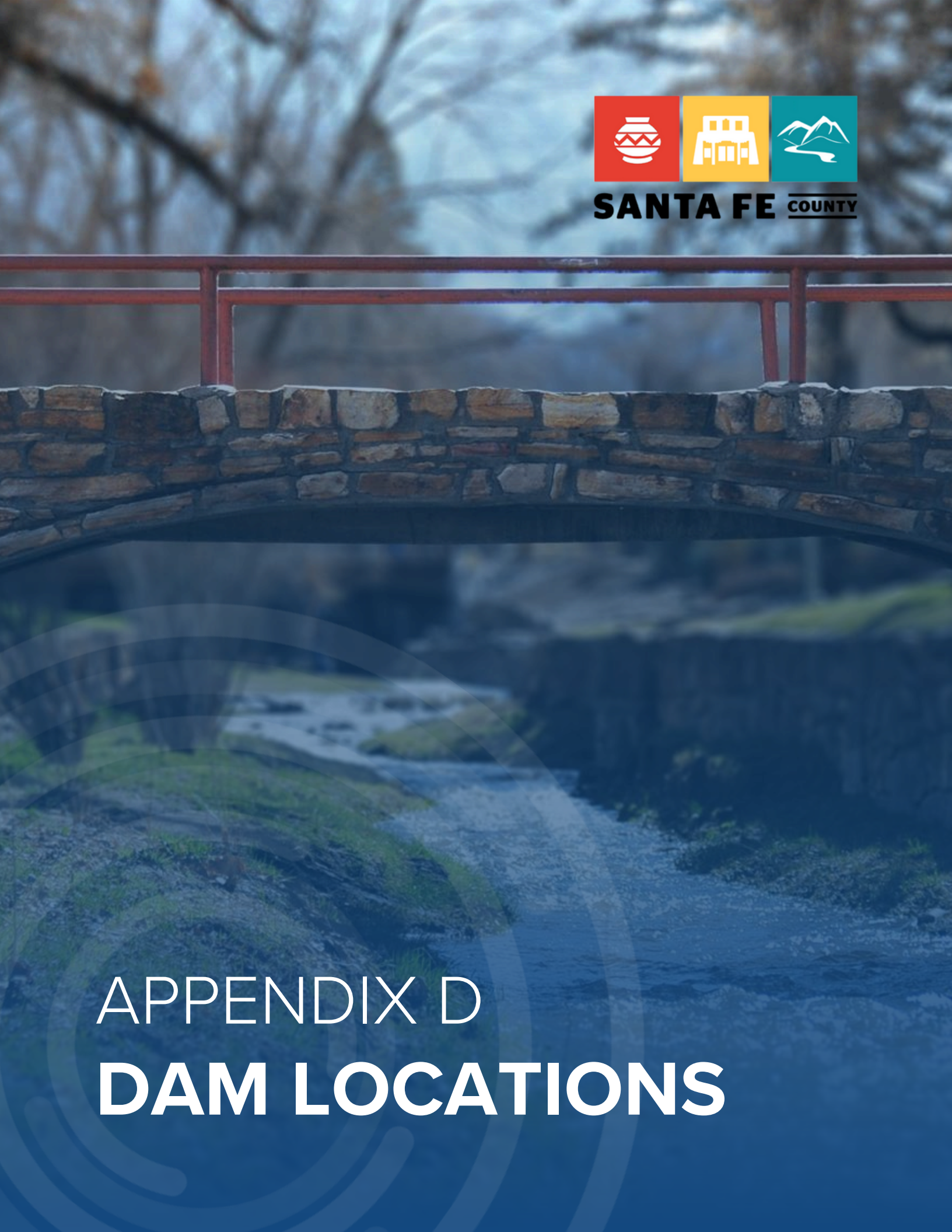
Public Education and Awareness - Actions to inform citizens about hazards and techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.

Structural Projects - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, seawalls detention / retention basins, channel modification, retaining walls, and storm sewers.

APPENDIX C
CRITICAL FACILITIES

APPENDIX C: CRITICAL FACILITIES

Appendix C is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).



SANTA FE COUNTY

APPENDIX D
DAM LOCATIONS

APPENDIX D: DAM LOCATIONS

Appendix D is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

APPENDIX E
MEETING DOCUMENTATION

APPENDIX E: MEETING DOCUMENTATION

Appendix E is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

SANTA FE COUNTY

APPENDIX F
CAPABILITY ASSESSMENT

APPENDIX F: CAPABILITY ASSESSMENT

Appendix F is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

SANTA FE COUNTY

APPENDIX G
STATE AND FEDERAL FUNDING OPPORTUNITIES

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

OVERVIEW

New Mexico utilizes state funds to improve statewide hazard mitigation capabilities and advance their hazard mitigation goals to help identify, understand, and manage various risks associated with natural hazards. State funds also provide funding for state facility and infrastructure upgrades, hazard mapping, mitigation planning, and other mitigation programmatic activities. Table G-1 describes varied loan and grant programs offered by state agencies for which mitigation activities may be eligible.

Table G-1. Summary of State Funded Mitigation Programs

AGENCY	FUNDING PROGRAM
Department of Homeland Security & Emergency Management (DHSEM)	• Annual Emergency Management Performance Grant (EMPG) • Building Resilient Infrastructure Communities (BRIC) • Community Assistance Program-State Support Services Element (CAP-SSSE) • EMPG-American Recovery Act (EMPG-ARPA) • Non-Profit Security Grant Program (NSGP) • Fire Management Assistance Grants (FMAG) • Fire Protection Grants • Flood Mitigation Assistance (FMA) • Hazard Mitigation Grant Program (HMPG) • Hazard Mitigation Grant Program-Post Fire (HMPG-PF) • Hazardous Materials Emergency Preparedness Grant (HMEP) • Homeland Security Grant Program (HSGP) • Off Cycle EMPG American Recovery Act Plan (EMPG-ARPA) • Operation Stonegarden Grant (OPSG) • Public Assistance (PA) • State and Local CyberSecurity Grant Program (SLCGP)
Environmental Department (NMED)	• Brownfield Clean-up Resolving Loan Fund • Clean Diesel Program • Clean Water State Revolving Fund (CWSRF) • Corrective Action Fund (CAF) • Diesel Emissions Reduction Act • Dredge and Fill Activities Drinking Water State Revolving Fund (DWSRF) • Drinking Water State Revolving Fund • Drinking Water and Wastewater Investments • Recycling and Illegal Dumping Fund • Rural Infrastructure Program • Overflow Sewer Grants • Rural infrastructure Program • Solid Waste Facility Grant Fund • Stormwater Reuse Municipal Grants Program

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

AGENCY	FUNDING PROGRAM
Economic Development Department (EDD)	• Collateral Assistance Program (CAP) • LEDA Rural Infrastructure Grants • New Mexico MainStreet (NMMS) • State Small Business Credit Initiative (SSBCI)
Office of Science & Technology (OSST)	• Science & Technology Business Start-Up Grants • Small Business Innovation Research Grant (NM SBIR)
Outdoor Recreation Division (ORD)	• Outdoor Equity Fund • Outdoor Recreation Trails
Financial Authority (NMFA)	• Drinking Water Loan • Local Government Planning Fund • Public Project Revolving Fund
EMNRD Forestry Division	• Community Wildfire Defense Grants • Conservation Seedling Program • Urban and Community Forestry Program • Volunteer Fire Assistance Grant (VFA)
Grant Administration	• Destination Forward Grant Program • Fire Prevention & Safety • Large-Scale Water Recycling Projects • Route 66 Corridor Preservation • SAFER Grant Program • Walmart Community Impact • WaterSMART: Planning and Project Design • WaterSMART: Small-scale Water Efficiency Projects
Department of Finance and Administration	• Community Development Block Grant (CDBG)

In addition to State funded programs, many local jurisdictions benefit from federal mitigation funding opportunities. FEMA's Hazard Mitigation Assistance is a primary source for the implementation of mitigation projects throughout the Nation. Table G-2 described additional Federal, State, Local, and Non-Profit mitigation funding sources specifically within the State of New Mexico.

Table G-2. Federal, State, Local and Non-Profit Mitigation Funding Sources in New Mexico

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Agricultural Conservation Easement Program (ACEP)	Federal	NRCS	EMNRD	Provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits.
Agricultural Management Assistance (AMA)	Federal	USDA, NRCS	NMDA	Provides financial and technical assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation methods into their farming operations.
Agricultural Water Enhancement Program (AWEP)	Federal	USDA, NRCS	NMED	Voluntary conservation initiative that provides financial and technical assistance to agricultural producers to implement water enhancement activities on agricultural land to conserve surface and ground water and improve water quality.
AmeriCorps – Corporation for National & Community Service (CNCS)	Federal	AmeriCorps		Provides funding for volunteers to serve communities, including disaster prevention. AmeriCorps/Vista has assisted local communities with wildfire mitigation projects.
American Recovery and Reinvestment Act (ARRA)	Federal	EPA	NMED	Provided significant funding for states to finance high priority water infrastructure projects through a $2 billion appropriation to the DWSRF (see below) program and a $4 billion appropriation to the CWSRF program.
Aquatic Ecosystem Restoration	Federal	DOD-USACE		Direct Support for carrying out aquatic ecosystem restoration project that will improve the equality of the environment.
Assistance to Firefighters Program - Fire Prevention & Safety (FP&S) **Grants**	Federal	FEMA	EMNRD	The grant program contains the Assistance to Firefighters Grants (AFG), Fire Prevention & Safety (FP&S), and Staffing for Adequate Fire and Emergency Response (AFER).
Beneficial Uses of Dredged Materials	Federal	DOD-USACE	NMED	Direct Assistance for projects that protect, restore, and create aquatic and ecologically related habitats, including wetlands, in connection with dredging and authorized Federal navigation project

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Bridges Replacement and Rehabilitation	Federal	US DOT Federal Highway Administration FHWA	NMDOT	Funding for eligible bridges on any public road that require replacement or rehabilitation.
Building Resilient Infrastructure & Communities (BRIC)	Federal	FEMA	DHSEM	Pre-disaster/annual cycle addressing all natural hazards, emphasis on infrastructure & lifelines.
Carbon Reduction Program (CRP)	Federal	USDOT	NMDOT	Designed to fund projects that are designed to reduce transportation emissions (CO2). Will fund a wide range of projects designed to reduce carbon dioxide emissions from on-road highway sources.
Center for Integration of Natural Disaster Information	Federal	DOI/USGS, The Center for Integration of Natural Hazards Research	DHSEM	Technical Assistance: Develops and evaluates technology for information integration and dissemination.
Clean School Bus Program	Federal	EPA		Replace existing school buses with zero-emission and low-emission models.
Clean Water Act Section 319 Grants	Federal	EPA	NMED	Grants to State to implement non-point source programs, including support for non-structural watershed resource restoration activities.
Clean Water Act Section 604(b)	State	NMED	NMED	Provides funding for to regional planning organizations for planning activities
Clean Water State Revolving Fund (CWSRF)	Federal	EPA	NMED	Providing Loans at actual or below-market interest rates to help build, repair, relocate, or replace wastewater treatment plants.
Community Assistance Program (CAP)	Federal	FEMA, NFIP	EDD	Product-oriented financial assistance program directly related to the flood loss reduction objectives of the NFIP.
Climate Pollution Reduction Grant	Federal	EPA	NMED/ EMNRD	This grant supports the State in creating two climate action plans (i.e., one priority plan and one comprehensive plan) for implementing effective greenhouse gas reduction strategies while ensuring the benefits of these actions are delivered to New Mexicans, especially Low Income or Disadvantaged communities (LIDAC) as defined by US EPA. This grant will give New

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
				Mexico communities the opportunity to collaborate with the State to build projects and programs that provided high-quality jobs, improve health, and keep families safe where they live.
Community Development Block Grant (CDBG)	Federal	HUD	DFA	Grants to States to develop viable communities (e.g., housing, a suitable living environment, expanded economic opportunities) in non-entitled areas, for low- and moderate-income persons.
Community Development Block Grant – Disaster Recovery (CDBG-DR)	Federal	HUD	DFA	Grants to fund recovery in cities, counties, and State after a Presidential Declaration.
Community Development Block Grant – Entitlement Communities Program	Federal	HUD	DFA	Grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- income persons.
Community Fire Protection Program	Federal	USDA		Mitigation delivered via USDA Forest Service and Private Forestry Coop Fire Program.
Community Rating System	Federal	FEMA		Voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. CRS not only assist communities in reducing flood risks, but also enhances public safety, reduces damages to property and public infrastructure, avoids economic disruption and losses, reduces human suffering, and protects the environment. Technical assistance on designing and implementing some activities is available at no charge. Participating in the CRS provides an incentive to maintaining and improvement a community's floodplain management program over the years. Implementing some CRS activities can help project qualify for certain other Federal assistance funds.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Community Wildfire Defense Grant	Federal	USFS	EMNRD-Forestry	Offers financial assistance to at-risk local communities with planning for and mitigating against the risk of catastrophic wildfire. This program is authorized in Public Law 117-58, the Infrastructure Investment and Jobs Act. Two primary objectives: The development and revision of Community Wildfire Protection Plans (CWPP), and the implementation of projects described in a CWPP that is less than ten years old. Prioritizes at-risk communities that are in an area identified as having high or very high wildfire hazard potential, are low-income, and/or have been impacted by a severe disaster. No minimum federal funding limit for projects.
Conservation Contracts	Federal	USDA-FSA		Debt reduction for delinquent and non-delinquent borrowers in exchange for Conservation contracts placed on environmentally sensitive real property that secures FSA Loans.
Conservation Innovation Grants (CIG)	Federal	USDA, NRCS		Voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production.
Conservation Technical Assistance (CTA) **Program**	Federal	USDA-NRCS		Technical assistance for run-off retardation and soil erosion prevention to reduce hazards to life and property.
Decision, Risk, and Management Science Program	Federal	NSF		Funding for research and related educational activities on risk, perception, communication, and management (primarily technological hazards).
Disaster Mitigation Planning and Technical Assistance	Federal	DOC, EDA		Technical and planning assistance grants for capability building and mitigation project activities focusing on creating disaster resistant jobs and workplaces.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Division of Homeland Security Financial Assistance	Federal	US Department of Homeland Security	HSD	Supports a wide variety of funding and financial assistance programs that support preparedness, resilience, and post-disaster relief.
Drinking Water State Revolving Fund (DWSRF)	Federal	EPA	NMED	Makes funds available to drinking water systems to finance infrastructure improvements. The program also emphasizes providing funds to small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water.
Economic Development Administration Grants and Investments	Federal	U.S. DOC, EDA	EDD	Invests and provides grants for community construction projects, including mitigation activities.
Emergency Community Water Assistance Grants	Federal	USDA	HSD	$150,000 to $500,000 available to rural communities with populations over 10,000 people with a median household income less than $65,900. Provides assistance to communities who have experienced a decline in quantity or quality of drinking water as a result of an emergency including drought.
Emergency Management/ Mitigation Training	Federal	FEMA	DHSEM	Training in disaster mitigation, preparedness, planning
Emergency Management Institute	Federal	FEMA		Training education programs to prepare emergency management professionals to prepare for, respond to, and recover from disasters and emergency.
Emergency Management Performance Grant (EMPG)	Federal	FEMA	DHSEM	The EMPG program provides a yearly allocation of funding to support state and local emergency management programs. This has included providing some funding for local mitigation plans, mitigation-oriented studies, and related activities.
Emergency Relief (ER) **Program**	Federal	US DOT - FHWA		Provides funds for roads and bridges on Federal-aid highways that are damaged as a direct result of a natural disaster or catastrophic failure from an external cause.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Emergency Watershed Protection Program (EWPP)	Federal	USDA, NRCS	NMDA	Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events.
Environmental Justice Government-to-Government Program (EJG2G)	Federal	EPA	NMED	Provides funding to support government activities that lead to measurable environmental or public health impacts in communities disproportionately burdened by environmental harms.
Environmental Justice Collaborative Problem Solving Program	Federal	EPA		Provides funding directly to community-based organizations to address environmental injustices.
Environmental Quality Incentives Program (EQIP)	Federal	USDA, NRCS		Voluntary conservation program for farmers that provides technical, educational, and limited financial assistance to encourage environmental enhancement.
Farm Ownership Loans	Federal	USDA-FSA		Direct loans, guaranteed / insured loans, and technical assistance to farmers so that they may develop, construct, improve, or repair farm homes, farms, and service buildings, and to make other necessary improvements.
Federal Land Transfer/ Federal Land to Parks Program	Federal	DOI-NPS		Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space.
Fire Management Assistance Grants (FMAG)	Federal	FEMA	DHSEM	Provides fire suppression support to states when loss of life and property are imminent. Wildfire mitigation is also eligible under emergency protection if life is in imminent danger.
Fire Prevention and Control – Recruitment and Retention Grant Program	State	DHSEM	DHSEM	Grant program to support the recruitment and retention of volunteer firefighters and emergency services personnel by promoting the development of, or supporting existing, regional recruitment and retention efforts. The program's primary objectives are to support organizational leadership development through education and training and to develop and implement recruitment and retention programs and materials.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Fire Prevention and Safety Grant Program	Federal	US Fire Administration	DHSEM	Grants to support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death.
Flood Mitigation Assistance (FMA) **Program**	Federal	FEMA	DHSEM	Grants to States and communities for pre-disaster mitigation to help reduce or eliminate the long-term risk of flood damage to structures insurable under the National Flood Insurance Program. This includes repetitive loss and severe repetitive loss.
Floodplain Management Services	Federal	DOD-USACE	DHSEM	Technical and planning assistance at the local, regional, or national level needed to support effective floodplain management.
Forest Land Enhancement Program	Federal	USDA, NRCS	EMNRD	Provides educational, technical, and financial assistance to help landowners implement sustainable forestry management objectives.
Forest Legacy Program	Federal	USFS	EMNRD	Program providing funding to protect private forest lands that are environmentally, economically, and socially critical. This program reduces development in the wildland-urban interface.
Greenhouse Gas Reduction Fund (GGRF)	Federal	EPA		This program is a $27-billion investment to mobilize financing and private capital to combat crisis and deliver lower energy costs to communities, particularly communities that have been historically left behind. This includes National Clean Investment Fund: $14 billion competition will fund 2-3 nonprofits with private capital provides. Clean Communities Investment Accelerator: $6 billion competition will fund 2-7 hub non-profits with plans and capabilities to rapidly build the clean financing capability of specific networks. Solar for All: $7 billion will provide up to 60 grants.
Grid Resilience Program (GRIP)	Federal	DOE		Enhance grid flexibility and improve the resilience of the nation's power grid against threats of extreme weather and climate change.
Hazard Mitigation Grant Program (HMGP)	Federal	FEMA	DHSEM	Grants to States and communities for implementing long-term hazard mitigation measures following a major disaster declaration. Post-disaster multi-hazard mitigation funding for federally declared disasters. HMGP Post Fire funds are available for FMAG declarations.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Hazardous Materials Emergency Preparedness (HMEP) **Grant Program**	Federal	DOT	SHSEM	Grant funding available to help facilitate preparedness in transporting hazardous materials. The program recognizes Local Emergency Planning Committees (LEPCs) as applicants to maximize funding impact in regional partnerships.
Healthy Forests Reserve Program (HFRP)	Federal	NRCS		Assist landowners, on a voluntary basic, in restoring, enhancing and protecting forestland resources on private lands through easements.
Highway Bridge Replacement and Rehabilitation Program	Federal	FHWA	NMDOT	Provides funding to enable states to improve the condition of highway bridges through replacement, rehabilitation and systematic preventive maintenance. Also includes the National Historic Covered Bridge Preservation Program.
HOME Disaster Relief	Federal	HUD	DHSEM	The Department's practice is to maintain a HOME Disaster Relief Fund balance of $1 million whenever possible. These funds can be accessed to support impacted households not located in communities that receive HOME funds directly from the U.S. Department of Housing and Urban Development (HUD).
HOME Investments Partnership Program	Federal	HUD		Grants to States, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons.
Homeland Security Grant Program (HSGP)	Federal	Department of Homeland Security	DHSEM	Homeland security activities identified in the state and local strategic plans. Funding supports threat & hazard and risk identification for natural, technological, and human-caused hazards. Some prevention activities may be considered mitigation.
Hospital Preparedness Program (HPP) **Cooperative Agreement**	Federal	HHS	DOH	HPP is the primary source of federal funding for health care system preparedness and response and, in collaboration with public health, prepares health care delivery systems to save lives through the development of health care coalitions (HCCs). Under the direction of the HPP providers, the HCCs develop plans and provide training, and coordinate regional exercises.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Hydrologic Research Grants	Federal	NOAA		Up to $125,000 to conduct joint research and development on pressing surface water hydrology issues common to national, regional, local operational offices. Eligible applicants are federally recognized agencies of state or local governments, quasi-public institutions such as water supply or power companies, hydrologic consultants and companies involved in using and developing hydrologic forecasts.
Indian Housing Assistance (Housing Improvement Program)	Federal	DOI-BIA		Project grants and technical assistance to substantially eliminate sub-standard Indian housing.
Individual Assistance (IA)	Federal	FEMA	DHSEM	Following a disaster, funds can be used to mitigate hazards when repairing individual and family homes.
In-Lieu Fee Program Mitigation Projects	Federal	USACE	Community Applicants	Restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for Department of the Army permits.
Land Acquisition	Federal	DOI-FWS		Acquires or purchases easements on high quality lands and waters for inclusion into the National Wildlife Refuge System.
Landowner Incentive Program	Federal	USFWS	EMNRD	A unique partnership between the Forestry Division and private landowners to protect the habitat of at-risk species on private lands. Landowner involvement is entirely voluntary.
Mapping Standards Support	Federal	DOI/USGS		Expertise in mapping and digital data standards to support the National Flood Insurance Program.
National Dam Safety Program	Federal	FEMA		Technical assistance, training, and grants to help improve State dam safety programs.
National Digital Orthophoto Program	Federal	DOI-USGS		Develops topographic quadrangles for use in mapping of flood and other hazards.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
National Earthquake Hazards Reduction Program (NEHRP)	Federal	FEMA; DOI-USGS		Training, planning and technical assistance under grants to States or local jurisdictions. Provides money to support enhanced earthquake risk assessments in local hazard mitigation plans and other earthquake hazard mitigation and preparedness activities.
National Earthquake Hazard Reduction Program (NEHRP) **in Earth Sciences**	Federal	NSF		Research into basic and applied earth and building sciences.
National Earthquake Hazard Reduction Program	Federal	DOI-USGS		Seismic mapping for U.S.
National Flood Insurance Program	Federal	FEMA	DHSEM	Formula grants to States to assist communities to comply with NFIP floodplain management requirements (Community Assistance Program).
National Flood Insurance Program: Technical Mapping Advisory Council	Federal	DOI-USGS		Technical guidance and advice to coordinate FEMA's map modernization efforts for the National Flood Insurance Program.
National Training and Education (NTE)	Federal	FEMA		Educational and training programs through the National Training and Education (NTE) online Course Catalog, which provides searchable, integrated information on courses provided or managed by FEMA's Center for Domestic Preparedness (CDP), Emergency Management Institute (EMI), and National Training and Education Division (NTED).
National Weather Service (NWS)	Federal	NOAA - NWS		NWS offers storm spotter training, along with weather and flooding safety guides. They can also sometimes provide funding to support severe weather signage in parks or other public places.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
National Wildlife Wetland Refuge System	Federal	USFWS		Provides funding for the acquisition of lands into the federal wildlife refuge system.
Non-Structural Alternatives to Structural Rehabilitation of Damaged Flood Control Works	Federal	DOD-USACT		Direct planning and construction grants for non- structural alternatives to the structural rehabilitation of flood control works damaged in floods or coastal storms. $9 million FY99
North American Wetland Conservation Fund	Federal	USFWS		Provides funding for wetland conservation projects. Cost-share grants to stimulate public/private partnerships for the protection, restoration andmanagement of wetland habitats.
NRCS Conservation Programs	Federal	USDA, NRCS		Provides funding through a number of programs for the conservation of natural resources.
Office of Disaster Assistance	Federal	SBA		Provides financial assistance through low interest disaster loans to businesses of all sizes, private non-profit organizations, homeowners, and renters to repair or replace real estate, personal property, machinery & equipment, inventory and business assets that have been damaged or destroyed in a declared disaster.
Partners for Fish and Wildlife	Federal	USFWS		Provides financial and technical assistance to landowners for wetland restoration projects in “Focus Areas” of the state.
Physical Disaster Loans and Economic Injury Disaster Loans	Federal	SBA		Disaster loans to non-farm, private sector owners of disaster damaged property for uninsured losses. Loans can be increased by up to 20 percent for mitigation purposes.
Planning Assistance to States	Federal	USACE		Provides assistance to states in planning for the development, utilization, and conservation of water and related land resources.
Pre-Disaster Mitigation Loan Program	Federal	SBA		Provides low-interest loans to small businesses for mitigation projects.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Pollution Prevention Grant: Environmental Justice in Communities	Federal	EPA		To support technical assistance for businesses to specifically target an improve human health and the environment in disadvantaged communities.
Pollution Prevention Grant: Environmental Justice Through Safer and More Sustainable Products	Federal	EPA		Supports technical assistance to businesses to increase the supply, demand, and use of safer and more sustainable products, such as those that are certified DPS's Safer Choice program, or those that confirm to EPA's Recommendations for Specifications, Standards, and Ecolabels for Federal Purchasing.
Post-Disaster Economic Recovery Grants and Assistance	Federal	DOC-EDA		Grant funding to assist with the long-term economic recovery of communities, industries, and firms adversely impacted by disasters.
Pre-Disaster Mitigation (PDM)	Federal	FEMA	DHSEM	Congressionally directed funding for local governments, tribes and states to plan for and implement sustainable cost-effective measures designed to reduce risk to individuals and property from future natural hazards.
Preparedness (Non-Disaster) Grants	Federal	FEMA	DHSEM	Provides financial assistance through Non-Disaster Grants to state and local governments with preparedness program. Program funding is meant to enhance the capacity of state and local emergency responders to prevent, respond to, and recover from a weapons of mass destruction terrorism incident involving chemical, biological, radiological, nuclear, and explosive devices and cyber-attacks.
Project Modifications for Improvement of the Environment	Federal	DOD-USACE		Provides for ecosystem restoration by modifying structures and/or operations or water resources projects constructed by the USACE or restoring areas where a USACE project contributed to the degradation of an area.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Protection of Essential Highways, Highway Bridge Approaches, and Public Works	Federal	USACE		Technical assistance to ensure bank protection of highways, highway bridges, essential public works, churches, hospitals, schools, and other nonprofit public services endangered by flood-caused erosion.
Public Assistance	Federal	FEMA	DHSEM	Grants to States and communities to repair damaged infrastructure and public facilities and help restore government or government-related services.
Public Assistance (PA) **Section 406 funds**	Federal	FEMA	DHSEM	Following a disaster, funds can be used to mitigate hazards when repairing damage to a public structure or infrastructure. Wildfire mitigation is also eligible under emergency protection if life is in imminent danger.
Public Health Emergency Preparedness (PHEP) **Cooperative Agreement**	Federal	CDC	DOH	Helps health departments build and strengthen their abilities to effectively respond to a range of public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear, and radiological events. Preparedness activities funded by the PHEP cooperative agreement specifically target the development of emergency-ready public health departments that are flexible and adaptable.
Public Housing Capital Fund	Federal	HUD		Funding to public housing agencies for modernization needs resulting from natural disasters (including elevation, flood proofing, and retrofit).
Repetitive Flood Claims Program	Federal	FEMA	DHSEM	The Repetitive Flood Claims (RFC) grant program provides funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).
Risk MAP Program	Federal	FEMA, NFIP		Establishes or updates floodplain mapping and multi-hazard risk products.
Rural Development Assistance - Housing	Federal	USDA-Rural Housing Service		Provides grants and loans for infrastructure and public safety development and enhancement in rural areas. Provides $100,000 or 75% of the total project, whichever is less.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Rural Development Assistance - Utilities	Federal	USDA-Rural Development		RUS administers programs that provide much-needed infrastructure or infrastructure improvements to rural communities. These include water and waste treatment, electric power and telecommunications services. Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.
Section 108 Loan Guarantee Program	Federal	HUD		Loan guarantees to public entities for community and economic development (including mitigation measures).
Section 502 Loan Guaranteed Loan Program	Federal	USDA-RHS		Provides loans, loan guarantees, and technical assistance to very low and low income applicants to purchase, build, or rehabilitate a home in a rural area.
Section 504 Loans for Housing	Federal	USDA-RHS		Repair loans, grants and technical assistance to very low-income senior homeowners living in rural areas to repair their homes and remove health and safety hazards.
Silver Jackets	Federal	USACE		Can provide funding for flood related studies, public awareness, risk analysis, and flood response plans. Construction of small flood control projects.
Small Flood Control Projects (USACE Section 205)	Federal	USACE		Authorizes use of USACE to do feasibility and construction of small flood control projects.
Societal Dimensions of Engineering, Science, and Technology Program	Federal	NSF		Funding for research and related educational activities on topics such as ethics, values, and the assessment, communication, management and perception of risk
Soil Survey	Federal	USDA-NRCS		Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes.
State Water Resources Research Act Program	Federal	USGS		USGS in cooperation with the National Institutes for Water Resources supports an annual call for proposals to focus on water problems and issues that are of a regional or interstate nature or relate to a specific program priority identified by the Secretary of the Interior and the Institutes.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Stream Gauging and Flood Monitoring Network	Federal	DOE-USGS		Operation of a network of over 7,000 stream gauging stations that provide data on the flood characteristics of rivers.
Surface Transportation Program	Federal	USDOT/ FHWA		Funding for activity including safety construction and transportation enhancements. Transportation enhancements encompass a broad range of safety education, environmental and historically related activities.
Transfers of Inventory Farm Properties to Federal and StateAgencies for Conservation Purposes	Federal	USDA-FSA		Transfers title of certain inventory farm properties owned by FSA to Federal and State agencies for conservation purposes (including the restoration of wetlands and floodplain areas to reduce future flood potential)
Transportation Enhancement program	Federal	FHA		Provides opportunities for non-traditional transportation related activities. Projects should go above and beyond standard transportation activities and be integrated into the surrounding environment in a sensitive and creative manner that contributes to the livelihood of the communities, promotes the quality of our environment, and enhances the aesthetics of our roadways. Projects undertaken with enhancement funds are eligible for reimbursement of up to 80 percent of allowable costs.
Urban & Community Forestry Program Cost Share Grants	State	DEC		Assistance to communities to comprehensive planning, management, and education to create healthy urban and community forests. Street tree planning, one eligible project type, may fit will with the green infrastructure projects.
Urban Waters Small Grants	Federal	EPA		Funding to improve urban water quality through activities that also support community revitalization and other local priorities. RFPs may include green infrastructure.
United States Geological Survey (USGS)	Federal	USGS		USGS issues competitive grants and cooperative agreements to support research in earthquake hazards, the physics of earthquakes, earthquake occurrence, and earthquake safety policy.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
USDA Conservation Programs	Federal	USDA/FSA		Programs include: Conservation Reserve Program, Conservation Reserve Enhancement Program, Emergency Conservation Program, Emergency Forest Restoration Program, Farmable Wetlands Program, Grassland Reserve Program, Source Water Protection Program. These programs work to address a large number of farming and ranching related conservation issues including: drinking water protection, reducing soil erosion, wildlife habitat preservation, preservation and restoration of forests and wetlands, aiding farmers whose farms are damaged by natural disasters.
Volcano Hazards Program	Federal	DOS-USGS		Technical assistance through volcano hazard warnings and operation of four volcano observatories to monitor and assess volcano hazard risk.
Water and Waste Disposal Direct Loans and Grants	Federal	USDA		Financial assistance through grant programs to develop water and waste disposal systems in rural areas and towns with a population not in excess of 10,000.
Water Quality Improvement Project (WQIP) **Program**	State	DEC		Competitive, reimbursement grant program for projects that reduce polluted runoff, improve water quality and restore habitat.
Watershed Processes and Water Resources – National Research Initiative Standard Research (Part T)	Federal	USDA		$100,000 available. Sponsors research that addresses two areas: (1) understanding fundamental watershed processes; and (2) developing appropriate technology and management practices for improving the effective use of water (consumptive and nonconsumptive) and protecting or improving water quality for agriculture and forestry production.
Watershed Protection and Flood Prevention Program	Federal	USDA-NRCS		Technical and financial assistance for installing works of improvement to protect, develop, and utilize land or water resources in small watersheds under 250,000 acres.

APPENDIX G: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Watershed Surveys and Planning	Federal	USDA-NRCS		Provides technical assistance and funding for local and state governments to protect watersheds, and conduct surveys and planning studies for appraising water and related resources, and service formulating alternative plans for conservation use and development.
Watershed Surveys and Planning	Federal	USDA-NRCS		Surveys and planning studies for appraising water and related resources and formulating alternative plans for conservation use and development. Grants and advisory/counseling services to assist w/ planning and implementation improvement.
WaterSMART – Drought Response Program	Federal	USDA		$500,000 available. Innovative research in understanding fundamental processes that affect the quality and quantity of water resources at diverse spatial and temporal scales, ways on improving water resource management in agriculture, forested, and rangeland watersheds, and developing appropriate technology to reach those goals.
Wastewater Infrastructure Engineering Planning Grants	State	DEC		Grant program for municipalities to help pay for initial planning of water quality projects eligible for the Clean Water State Revolving Fund.
Wetlands Protection – Development Grants	Federal	EPA		Grants to support the development and enhancement of State and tribal wetlands protection programs.
Wetlands Reserve Program	Federal	USDA, NRCS		Financial and technical assistance to protect and restore wetlands through easements and restoration agreements.
Wildlife Habitat Incentive Program (WHIP)	Federal	USDA, NRCS		Voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and tribal land.

SANTA FE COUNTY

ADOPTION RESOLUTIONS