Village of Angel Fire Hazard Mitigation Plan

Prepared by:

Angel Fire Hazard Mitigation Planning Committee

With Professional Planning Assistance from:

AECOM

DRAFT

June 2018

Disclaimer: *This Plan has been specifically prepared for planning purposes only. The figures and information contained herein are not suitable for individual property analyses or budgeting purposes. Mapping and analyses were conducted using data from others and were not technically verified for accuracy.*

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Acronym List

BOR	Bureau of Reclamation
CDBG	Community Development Block Grant
CEDS	Comprehensive Economic Development Strategy
DMA2000	Disaster Mitigation Act 2000
FEMA	Federal Emergency Manager Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
GIS	Geographic Information Systems
HAZMAT	Hazardous Materials Release
HMP	Hazard Mitigation Plan
HMPT	Hazard Mitigation Planning Team
HUD	U.S. Department of Housing and Urban Development
mph	miles per hour
NCEI	National Center for Environmental Information (formerly known as the National Center for Climatic Data)
NFIP	National Flood Insurance Program
NRCS	Natural Resource Conservation Services
QA/QC	Quality Assurance and Quality Control
SOW	Scope of Work
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
USFS	United States Forest Service
WUI	Wildland Urban Interface

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PLACEHOLDER

For Village of Angel Fire

Adoption Resolution

(Once the Plan is 'Approved Pending Adoption' by FEMA Region VI, the plan shall be formally adopted and the adoption resolution provided.)

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1. Introduction

This section provides a general introduction to the Village of Angel Fire Hazard Mitigation Plan (HMP). Previously the Village of Angel Fire was part of the Colfax County Hazard Mitigation Plan. This document is the Village of Angel Fire standalone Hazard Mitigation Plan (HMP or Plan) and includes updates and changes from material presented initially in the Colfax County plan. This Plan analyzes the ten natural hazards presenting the greatest threat to the planning area. Three additional hazards identified in the 2013 New Mexico State Hazard Mitigation Plan (State Plan) were reviewed but were excluded from additional consideration as they present little to no risk to the planning area. Members of the Hazard Mitigation Planning Team (HMPT) selected specifically for the Village of Angel Fire Hazard Mitigation Plan reviewed the hazards, independently ranking their relevance and potential impacts to the community. The Plan includes a detailed characterization of relevant natural hazards in Angel Fire; a risk assessment that describes potential losses to physical assets, people and operations; a set of goals, objectives, and actions that will guide the Village's mitigation program in coming years; and a detailed strategy for implementation and monitoring results.

This Plan focuses on the hazards with the highest potential for causing damage to buildings and other physical assets, injuries and fatalities to the residents of Angel Fire and disruption of government and business operations in the area. These hazards include flood, wildfire, drought, earthquake, extreme heat, severe winter storms, thunderstorms (including hail and lightning), high wind, erosion, volcanic activity, dam failure, infestation/disease, terrorist attack, hazmat, and radiological incidents. Other hazards identified in the 2013 State Plan were evaluated and discussed but were not considered to pose a significant threat to the planning area.

This section consists of the following subsections:

- Vision and Purpose of the Plan
- Village of Angel Fire Community Description and Geography
- Scope
- Authority
- Summary of Plan Contents

1.1 Vision and Purpose of the Plan

The primary purpose of hazard mitigation planning is to organize people and resources to produce long-term and recurring benefits that help break the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that the investments made before a hazard event will significantly reduce the demand for post-event assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Both the localized events that temporarily disrupt normal functioning as well as the larger events that receive Presidential disaster declarations will be addressed. Adopting mitigation practices will enable Angel Fire to re-establish itself in the wake of a larger disaster event, becoming more resilient with less disruption to services and businesses.

An emphasis was placed on severe winter storms, high wind events, flood, thunderstorms, drought and wildfire as these are considered to pose the greatest threat to the planning area.

Three other natural hazards that are part of the 2013 State Plan were considered to pose a lower risk to the planning area are also profiled in this plan.

The benefits of mitigation planning go beyond solely reducing hazard vulnerability. Related measures emanating from the mitigation plan such as preserving open space, protecting vital infrastructure, designing sustainable buildings, maintaining environmental health, and protecting critical facilities meet other important community objectives including public safety, natural resource protection, and business development. It is important that any mitigation planning process be integrated with other local planning efforts, like the Village's comprehensive plan, and any proposed mitigation strategies must take into account other existing goals or initiatives that will help complement or hinder their future implementation. All information in this HMP is for planning and risk management information purposes only.

From FEMA's March 2009 Comprehensive Planning Guide (CPG-101):

"Planning has a proven ability to influence events before they occur and is an indispensable contribution to unity of effort"

In summary, the purpose of the Village of Angel Fire Hazard Mitigation Plan is to:

- Break the cycle of repetitive natural hazards
- Protect life, safety and property by reducing the potential for future damages and economic losses that result from hazards
- Make Angel Fire a safer place to work, visit, and live
- Restore and preserve Angel Fire's natural and recreational resources
- Help the Village thrive economically
- Support preservation of hazard prone natural areas.
- Reduce future vulnerability by guiding development and redevelopment
- Avoid interruptions caused by hazards
- Qualify for mitigation grant funding in both the pre-disaster and post-disaster environment
- Document coordination efforts with other stakeholders in the hazard mitigation effort
- Speed recovery following disaster events
- Develop broad based community support for hazard mitigation
- Record successful hazard mitigation projects and programs
- Demonstrate a firm commitment to hazard mitigation principles
- Comply with state and federal legislative requirements for Hazard Mitigation Plans

The Village of Angel Fire Hazard Mitigation Plan is a living document, and as such will be reviewed and updated as necessary to evaluate the progress made on the risk reduction actions identified through the planning process. The Plan will also be reviewed when new hazards are identified or when large hazard events occur that may require new mitigation priorities in the planning area.

1.2 Village of Angel Fire Planning Area: History, Demographics, and Geography

Village of Angel Fire, incorporated in 1986, is a predominately resort and retirement community located in Colfax County within the Moreno Valley in the north-central quadrant of New Mexico close to the Colorado Border.

According to the estimated 2016 U.S. Census, the population of Angel Fire is 1,113 residents. The 2010 Census recorded 1,216 while the 2000 census shows the population at 1,048. This data indicates the population in the community is relatively stable. These are estimates of the permanent, full-time population. Angel Fire estimates that there are around 1,200 additional seasonal residents and that during the winter ski season the population swells to over 10,000.

Employment composition in Angel Fire is comprised of:

- 33.2% Arts, Entertainment, Recreation, Accommodation, and Food Service
- 15% Professional, Scientific, Manager, Administrative, and Waste
- 14.2% Construction
- 11.5% Finance
- 8.1% Other Services, Except Public Administration
- 7.7% Educational Services, Health Care, and Social Assistance
- 4.3% Agriculture, Forestry, Fishing, Hunting, and Mining
- 3.6% Retail Trade
- 1.6% Manufacturing
- 0.8% Public Administration

The number of total housing units in the Village is 2,480 (2016 U.S. Census). Since housing is a function of population, the highest growth in housing units is anticipated within a couple of years due to the Angel Fire Resort expansion.

The Village of Angel Fire covers approximately 29 square miles, of which 28.9 square miles is land and .04 square miles is water. The Village center is at an elevation of 8,420 feet. Angel Fire Resort is located on the east side of the valley off of Highway 434 with a base elevation of 8,600 and a summit elevation of 10,677 feet.

Moreno Valley is a 15-mile long, 3-mile wide sub alpine valley; the gently sloping plains of the valley are bordered to the east and west, respectively, by the rugged Cimarron and Taos mountain ranges. Native plants to the area include aspen and mixed conifer forest at the break of the mountains, with wide-open grassland meadows and valleys.

Average precipitation in Angel Fire ranges from 16 to 18 inches per year at the lower elevations and 20-22 inches per year in the mountains, including 88 inches of average annual snowfall. Temperatures range from -10° F to 40° F in the winter and 40° F to 80° F in the summer.

Cieneguilla Creek flows northerly in the Moreno Valley, running through the Village, and draining into Eagle Nest Lake. Numerous drainage ditches, arroyos, and washes intersect the creek. The drainage area of Cieneguilla Creek and its tributaries is approximately 56 square

miles. Monte Verde Lake, a spring-fed high mountain lake is south of the Village on the Angel Fire Resort.

Transportation routes include Highway 434, which bisects the Village from north to south. U.S. Highway 64 passes about three miles north of the Village connecting Taos and Eagle Nest.

Angel Fire Airport (AXX) is located on Highway 434 serving residents within the local area. There are two runways: Runway 17, an 8,900' x 100' asphalt runway and Runway 35, an 8,900' x 100' asphalt runway. The airport is managed by Ross Aviation/Pearce Enterprises and can accommodate corporate and private aircraft. The closest commercial airport is the Santa Fe Municipal Airport located 101 miles to the southwest.

1.3 Plan Scope

The planning process included five major elements (see **Table 1.1**) that were completed over the course of approximately 12 months starting in July 2017. The completion of each of these planning elements contributed to the overall Hazard Mitigation Plan. These elements make up several sections of the Plan as described in detail in **Section 1.5: *Summary of Plan Contents***. The overall purpose of mitigation planning is to document the best risk information possible so that it can be used to establish a sustainable on-going process that results in actions to lower the risk. Due to the large scope of mitigating the risk from natural hazards, the Plan helps the Village establish both short-term and long-term goals.

Table 1.1: Hazard Mitigation Planning Phases

Phase 1: Planning Process including Pre-Kickoff and Kickoff Meetings
Phase 2: Hazard Identification, Analysis and Risk Assessment
Phase 3: Mitigation Strategy including Capability Assessment, Assessment of Alternative Hazard Mitigation Measures, and Implementation Strategy
Phase 4: Plan Monitoring, Evaluation, and Updating
Phase 5: Plan Adoption

In developing this plan, AECOM followed the most up-to-date FEMA guidance available, the March 2013 Local Mitigation Planning Handbook, and the most current State Mitigation Plan that was available, the September 2013 New Mexico State Hazard Mitigation Plan.

1.4 Authority

This Plan has been developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390)
- Local Mitigation Planning requirements found in 44 CFR Part 201.6

This Plan shall be routinely monitored and revised to maintain compliance with the above provisions, rules and legislation.

1.5 Summary of Plan Contents

The remaining contents of this Plan are designed and organized to be reader-friendly and functional. **Section 2: *Planning Process*** (Phase 1,) provides a complete narrative description of the process used to prepare the Plan. This includes identification of the planning process participants and descriptions of the meetings. Documentation of the process is in **Appendix A** which includes meeting attendance records, meeting minutes and other results of planning meetings.

The Hazards Identification, Analysis, and Risk Assessment phase (Phase 2) is presented in two sections - **Section 3: *Hazard Identification*** and **Section 4: *Hazards Analysis and Risk Assessment*.** **Section 3** identifies the natural hazards addressed in this Plan **Section 4** outlines the community's risk from these hazards.

The Risk Assessment provides a record of available historical data from past hazard occurrences and detailed hazard profiles which included general probabilities of recurrence, the spatial extent of the hazard, and its potential impact. The risk assessment serves a critical function as the community seeks to determine the most appropriate mitigation actions to pursue and implement – enabling them to prioritize and focus efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The ***Mitigation Strategy*** (Phase 3) consists of two sections – **Section 5**: ***Mitigation Strategy***, where mitigation actions to address vulnerabilities identified in **Section 4** are placed, and **Section 6**: ***Implementation Plan*** which includes a capability assessment. The capability assessment describes the regulations and policies in the planning area relevant to addressing the identified hazards. The mitigation actions provide specific implementation mechanisms and target completion dates. The actions are prioritized to help focus future efforts. Together, these sections are designed to make the Plan both strategic (through the identification of long-term goals) but also functional through the identification of short-term and immediate actions that will guide day-to-day decision-making and project implementation.

In addition to the identification and prioritization of possible mitigation projects, emphasis is placed on the use of program, regulatory, and policy mitigation alternatives. These types of actions can also help achieve other economic, social and environmental goals. Each action was evaluated for its appropriateness for the planning area.

Plan Maintenance Procedures (Phase 4); found in **Section 7**, includes the measures that the community will take to ensure the Plan's continuous long-term implementation. These procedures provide a framework to keep the plan current, dynamic, and effective so that over time that becomes integrated into the routine decision making process. The procedures also describe how the Plan will be regularly evaluated and updated to remain a current and meaningful planning document and meet FEMA requirements.

For Phase 5, **Plan Adoption**, a resolution for adoption of this Plan will be placed right after the Table of Contents once the Plan has been 'approved pending adoption' by FEMA and the Village passes a resolution.

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2. Planning Process

While the hazard mitigation plan is the final product, it is the planning process, where community resources are organized to best minimize or manage those risks, which is the true legacy of this effort. This section consists of the following subsections:

- Hazard Mitigation Planning Team
- Data Collection
- Meetings
- Public Involvement and Outreach
- The State Hazard Mitigation Plan
- Agency and Organization Coordination
- Future Development Trends

2.1 Hazard Mitigation Planning Team (HMPT)

In June 2017, the Village of Angel Fire entered into a contractual agreement with the consulting firm AECOM for assistance in the preparation of the Village of Angel Fire Hazard Mitigation Plan. The funds for the contract were from a hazard mitigation planning grant approved by the Federal Emergency Manager Agency (FEMA) and the State of New Mexico Department of Homeland Security and Emergency Manager (DHSEM). The planning lead from the Village of Angel Fire is Kelli Murtagh, Angel Fire Emergency Manager.

AECOM was led by an experienced professional hazard mitigation planner, Kimberley Pirri, a Certified Floodplain Manager (CFM); with assistance from experienced mitigation planner, Brent Edwards. AECOM and the Village of Angel Fire followed the hazard mitigation planning steps, activities and process outlined in 44 CFR Part 201.6 and FEMA's Local Mitigation Planning Handbook to develop this Plan. The completed Mitigation Plan Review Tool in **Appendix C** provides the location of where each requirement is met within the Plan.

Table 2.1 provides a list of the HMPT members, representing a wide range of Village departments.

Table 2.1: Angel Fire HMPT

Name	Title	Email	Phone
Amos Torres	Utilities Superintendent	atorres@angelfirenm.gov	(575) 377-1674
Arwin Vasquez	Utility Foreman	avasquez@angelfirenm.gov	(575) 595-5190
Benjamin Gulley	Village of Angel Fire	gulley528@gmx.com	(575) 224-0015
Bret Wier	Finance Manager	bwier@angelfirenm.gov	(575) 377-3232
Brian Bredthauer	Solid Waste Supervisor	bbredthauer@angelfirenm.gov	(575) 377-6967
Christine Breault	Planning and Zoning Interim Director	cbreault@angelfirenm.gov	(575) 377-1389
Chuck Howe	Mayor Pro Team/Councilor	chuck1559@aol.com	(575) 595-0061
Elaine Leitch	Solid Waste Senior Administrator	eleitch@angelfirenm.gov	(575) 377-2305

Name	Title	Email	Phone
J.D. Harvey	Police Lieutenant	jharvey@angelfirenm.gov	(575) 337-3214
John Murtagh	Fire Chief	jmurtagh@angelfirenm.gov	(505) 463-4112
Kelli Murtagh	Emergency Manager	nmepc1@gmail.com	(505) 239-8483
Maya Lengerich	Angel Fire Resort Risk Manager	mlengerich@angelfireresort.com	(575) 377-4217
Richard Cordova	Streets Superintendent	rcordova@angelfirenm.gov	(575) 377-3232
Rick Tafoya	Village Manager	rtafoya@angelfirenm.gov	(575) 377-2305
Sandy Garcia	Grant Manager	sgarcia@angelfirenm.gov	(575) 377-3232
Shay Tibljas	Community Center Supervisor	stibljas@angelfirenm.gov	(575) 377-1544
Terry Cordova	Village Clerk/Assistant Manager/HR Manager	tcordova@angelfirenm.gov	(575) 377-3232

The HMPT is leading the hazard mitigation effort for the planning area and will continue the planning process past approval into implementation and then a future update.

2.2 Data Collection – Existing Plans and Programs

The HMPT and AECOM were diligent in collecting best available and updated data during the 2017-2018 hazard mitigation planning process. The following plans, studies and reports were evaluated for opportunities to integrate information related to hazard mitigation and incorporated into this planning process where appropriate:

- ***2013 New Mexico State Hazard Mitigation Plan*** - A summary of the latest update of the State Mitigation Plan was used to inform this Plan, which is summarized in Section 2.5.
- ***2008 Colfax County Community Wildfire Protection Plan*** **(CWPP)** – Evaluated plan for wildfire risk assessment background information and mitigation project ideas. Captured appropriate information and project ideas for this plan.
- ***2007 Colfax County Local Hazard Mitigation Plan –*** The Plan provided a regional overview of resources, land use, infrastructure, and economic development for the county and local jurisdictions, as well as previously evaluated planning policies and procedures and mitigation actions.

2.3 Meetings

The members of the HMPT were solicited for their voluntary participation in the development of the plan. An equal opportunity was given to all planning area residents to participate in the process through public announcements /notifications. The public meeting was advertised through the village website, Facebook page, and the local newspaper. HMPT meetings were open to the public and all attendees were encouraged to participate in exercises and discussions. All meeting materials were available online prior to a scheduled meeting. It was the goal of this plan to have a committee that represented a broad spectrum of community stakeholders, including representatives from village government, emergency response organizations, health care, private businessmen, local environmental agencies, and neighboring

communities and counties. During the next planning cycle, the Village will continue to broaden the scope of stakeholders by inviting additional surrounding counties and communities to participate in the planning process. The approved plan will be made available to the participating local jurisdictions, residents, and neighboring communities on the Village website.

The HMPT met several times during the course of preparing this plan. The meetings described below are the formal ones for this planning process. Documentation for these meetings is located in **Appendix A**.

July 13, 2017 Kickoff Meeting – The Kickoff Meeting was the first formal planning meeting after the Village of Angel Fire officially contracted with AECOM to prepare the plan. This meeting was facilitated by AECOM (Jim DeAngelo) and attended by 15 members of the HMPT. Mr. DeAngelo opened the meeting with an overview of the purpose as well as introductions. He discussed the overall planning process including the data collection process, hazard identification, risk assessment and the mitigation strategies. Emphasis was given to linking the risk assessment to the mitigation strategy. A Hazard Mitigation Planning Survey was completed by HMPT members during the meeting. Meeting materials and sign in sheets are in **Appendix A**; **Appendix B** has returned surveys from the meeting.

January 24, 2018, Risk Assessment Meeting – The Risk Assessment Meeting was facilitated by AECOM (Kimberley Pirri and Brent Edwards) and attended by eight members of the HMPT. Kim Pirri opened the meeting with an overview of the purpose as well as introductions. The team then reviewed each hazard and worked through a CPRI exercise to determine what hazard concerned the community. The mitigation Goals were reviewed and the previous mitigation actions were discussed. The meeting continued with a capability discussion and a review of the draft plan. Meeting materials and sign in sheets are in **Appendix A**.

April 25, 2018, Final Meeting – The final meeting was facilitated by AECOM (Kimberley Pirri and Brent Edwards) and attended by nine members of the HMPT. The mitigation goals were reviewed and the community's capabilities were discussed. The HMPT also reviewed the Implementation Strategy and Plan Maintenance sections of the plan. AECOM then guided the HMPT through all of the new mitigation actions that were created by the HMPT. Meeting materials and sign in sheets are in **Appendix A**.

2.4 Public Involvement and Outreach

The HMPT pursued a number of avenues for notifying the Village of Angel Fire's residents of this planning initiative. The planning team met several times during the course of preparing this plan, as detailed in the previous section. HMPT meetings were open to the public and all attendees were encouraged to participate in exercises and discussions.

Also, after the conclusion of the final HMPT meeting on April 25, 2018, the Village and AECOM held a public meeting to educate Village residents on the hazard mitigation planning process and where the Village is in the planning process. There were four public attendees for the meeting. Due to this being the first hazard mitigation plan for Angel Fire, there were some questions about the planning process and the purpose of the plan. Meeting invitations were posted on the Village's website and social media. (**Appendix A**).

The standard process for the Village of Angel Fire to advertise meetings and disseminate information is through the Village website, local email distribution lists, and social media. The general public relies on this Village's website and social media for public announcements.

2.5 The State Hazard Mitigation Plan and Mitigation Program

The 2013 New Mexico State Hazard Mitigation Plan was a critical document to review for this Plan and a valuable resource for risk assessment background information. The plan was reviewed for information on natural hazards and mitigation project ideas so the Village of Angel Fire's plan was consistent with State information.

The 2013 State Plan states that the goal of mitigation is the following:

> *"…is to save lives, reduce injuries, property damage and recovery times. Mitigation can reduce the enormous cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical facilities, reduce exposure to liability and minimize community disruption. Preparedness, response, and recovery measures support the concept of mitigation and may directly support identified mitigation actions."*

The Village of Angel Fire HMP addressed nine natural hazards covered in the State Plan. Not all hazards in the State Plan have a significant impact in the planning area; if a hazard has a very low probability of occurring and/or has negligible impact, this is noted in **Section 4**.

The Local Plan Integration section of the State Plan lists four hazards as the most significant in the state:

- Wildfires
- Drought
- Thunderstorms
- High Wind

The State Plan divides New Mexico into five preparedness areas. The Village of Angel Fire is included in Preparedness Area #2, along with Colfax, Union, Mora, Harding, and San Miguel Counties. In State Preparedness Area #2, three hazards were ranked as the highest priority:

- Drought
- Severe Winter Storms
- Wildfire

The State's mitigation goals were also reviewed and are closely aligned with the Village of Angel Fire's goals:

- Reduce the number of injuries due to natural hazards
- Reduce the number of fatalities from natural hazards
- Reduce the amount of property damage, both public and private, from natural hazards
- Reduce the number of necessary evacuations
- Shorten recovery times for both community function and the natural environment after natural hazard events
- Improve communication, collaboration and integration among State, tribal and local emergency Manager agencies

- Increase awareness and understanding of risk and opportunities for mitigation among the citizens and elected officials of New Mexico

The plan was reviewed for mitigation action best practices and types of mitigation actions appropriate for the Village of Angel Fire. The State has been a valuable partner of the Village of Angel Fire and provided technical assistance during the development of this plan.

2.6 Agency and Organization Coordination

From the beginning of the planning process until the final drafting of this plan in June 2018, the Village of Angel Fire has actively coordinated with multiple state and federal agencies to discuss and evaluate risk reduction activities. Additional outreach efforts have included coordination with DHSEM to discuss risk and mitigation.

2.7 Future Development Trends

The HMPT examined the Village of Angel Fire's existing limits, urban services boundary, and capital improvement program to determine areas of future growth and expansion.

The 2016 Census estimated that the Village has a population of 1,113 permanent residents. According to the 2010 census, 25% of all housing units were occupied and the remaining 75% percent were vacant. This is likely due to the fact that the Village of Angel Fire has a ski resort that makes up for most of its buildings and housing.

The Village of Angel Fire has not experienced recent large scale population growth. The community recognizes the hazards of development in the floodplain and Wildland Urban Interface (WUI) zones.

The Village of Angel Fire's economy is driven by the hospitality industry, and the education/ health, and social services industry. There are a small number of manufacturers; however, greater diversification is needed to increase wages and promote population growth.

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3. Hazards Identification

The Village of Angel Fire is vulnerable to a wide range of natural hazards that threaten life and property. Current regulations and interim guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards.

Upon a thorough review of the full range of natural hazards covered in the 2013 State Plan, and the hazards suggested under FEMA mitigation planning guidance, the HMPT identified 15 hazards that are to be addressed in the Plan. These hazards were identified through an extensive process that included input from HMPT members and are listed in **Table 3.1**.

Table 3.1: Hazards Identified in This Plan

Hazard Category	Hazard Type	Hazard Category	Hazard Type
Atmospheric	Extreme Heat High Wind Thunderstorm (Hail/Lightning) Severe Winter Storms	Geologic	Earthquake Erosion Volcanic Activity
Hydrologic	Drought Flood	Other	Wildland/Urban Interface Fire Dam Failure HAZMAT Infestation/Diseases Terrorist Attack Radiological Incidents

The HMPT carefully screened each hazard with the goal of refining the list to reflect the hazards that pose the greatest risk to the community represented in this plan. All hazard-specific information and analysis for profiled hazards is provided in **Section 4**. Several hazards listed in the State Hazard Mitigation Plan were excluded from additional consideration as they present little to no risk to the planning area. Hazards that were dropped from further evaluation are summarized as follows:

- **Landslide** - There were no previous occurrences of landslide events reported in the Village of Angel Fire. Per the 2013 State Plan and other past research, no records of past landslides have been found for the planning area. Based on historic records the Village of Angel Fire does not appear to be vulnerable to landslide. Any impact would be minor. Therefore the hazard is considered a nuisance and is not addressed in the rest of the plan.
- **Land Subsidence -** Based on historic records the Village of Angel Fire does not appear to be vulnerable to subsidence. Any impact would be minor. Therefore the hazard is considered a nuisance and is not addressed in the rest of the plan.
- **Expansive Soils** - Due the low frequency of this hazard and its minor potential impact, it is considered a nuisance and is not addressed in the rest of the plan.

All hazard-specific information and analysis is provided in **Section 4**.

3.1 Major and National Emergency Disaster Declarations

Complementing the Hazards Analysis and Risk Assessment section is a review of the past major disaster declarations that impacted the Village of Angel Fire. Major disasters are declared by the President of the United States when the magnitude of a disaster event is of such severity and magnitude that effective response is beyond the capabilities of the State and the local governments. In these situations, eligible applicants may apply for a wide range of federal disaster assistance that include funds for public assistance, individual assistance, and hazard mitigation assistance.[1]

Table 3.2 provides a list for all of the disaster declarations for Colfax County. Since 1953, Colfax County received three presidential disaster declarations for severe storms. Please note that this listing does not include all state or local emergency declarations issued for localized disaster events that did not warrant a presidential or federal emergency declaration.

Table 3.2: Presidential and Emergency Disaster Declarations in Colfax County (1954 –2017)

Event	Declaration Date	Declaration Number
Severe Storms and Flooding	9/30/2013	FEMA-4148-DR
Severe Storms, Flooding, and Mudslides	10/29/2013	FEMA-4152-DR
Severe Storms and Flooding	10/29/2014	FEMA-4199-DR

Source: Federal Emergency Manager Agency

1 For more information on the disaster declaration process and federal disaster assistance, see *http://www.fema.gov/disasters* Accessed March 2016

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4. Hazards Analysis and Risk Assessment

In this section of the plan, the HMPT reviewed nine natural hazards and three other hazards identified as posing a threat to the planning area. Each hazard was reviewed for its potential to impact the planning area. Nine hazards were selected based on the historical record and expertise of the HMPT members, as having the greatest potential for significant impact on Angel Fire. These hazards are profiled including a detailed description and analysis of each one. For each hazard type, the plan describes the locations that can be affected, the potential severity, and previous occurrences of the hazard in Angel Fire. This information is used to estimate the probability of an occurrence of the hazard in any given year. The plan describes the impact of each hazard and the planning areas vulnerability to it. Several hazards were determined to be insignificant to the planning area, posing little to no threat. These hazards were not addressed further in the plan, including Landslide, Land Subsidence, Expansive Soils, and Dam Failure

4.1 Methodology

Seven primary sources of data were used to profile, describe, and analyze the hazards.

1. Experience and knowledge from the HMPT as captured in site visits and meetings
2. Existing local plans and data
3. The National Climactic for Environmental Information (NCEI) information
4. The September 2013 New Mexico State Hazard Mitigation Plan.
5. Studies, data, and reports by USACE and other federal agencies
6. The FEMA 2017 Disaster Declaration database
7. Resources published on the Internet with relevant information. These sources are referenced in footnotes.

Each hazard profile is organized in the following manner:

- *Overview* – General description of the hazard
- *Location and Spatial Extent* – Specific areas in Angel Fire that may be affected and the extent. Any available maps displaying risk are shown.
- *Previous Occurrences* – List and description of past events where available.
- *Probability and Extent of Future Events* – Establishes the likelihood of the hazard occurring annually and extent of damages if it occurred (severity)
- *Vulnerability and Impact* – The level of impact currently and on future development
- *Conclusions* – Includes summary statements about the hazard, any mitigation accomplishments, and establishes link to Mitigation Actions in Section 5.

In each hazard profile, hazards are assigned varying degrees of risk in five categories probability, impact, spatial extent, warning time, and duration) as shown in **Table 4.1**.

Table 4.1: Degree of Risk

	Level	Criteria	Index Value	Assigned Weighting Factor
Probability	Highly Unlikely	Probability so remote close to 0% annual probability	0	40%
	Unlikely	Less than 1% annual probability	1	
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 50% annual probability	3	
	Highly Likely	Between 50 to 100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	20%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self-explanatory	1	10%
	12 to 24 hours	Self-explanatory	2	
	6 to 12 hours	Self-explanatory	3	
	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	10%
	Less than 24 hours	Self-explanatory	2	
	Less than 1 week	Self-explanatory	3	
	More than 1 week	Self-explanatory	4	

At the end of this section is a summary of the vulnerability of Angel Fire to the nine identified natural hazards using the evaluation of each hazard with the categories from **Table 4.1**.

4.2 Flood

4.2.1 Overview

Three types of flooding appear to be of the most concern in the planning area: flash flooding, storm water drainage, and riverine flooding.

Flash flood. A flash flood is a very dynamic event in which a large volume of water moves through an area at high velocity in a very short time. This type of flooding can be very difficult to predict and can occur with little or no warning. In many cases flash floods can move through an area miles from where rain has occurred, thereby increasing the danger to persons within the flood's path.

Flash floods are created as a result of rainfall. As rainwater runs into small channels, it begins to collect. As these channels merge together, the amount of water increases and picks up speed and force. This collection of water becomes a wall of water that can wash vegetation, structures and other debris along with it. This debris then increases the amount of force available and increases its destructive power. In addition to the amount of water that creates a flash flood, other factors also affect the dynamics of this type of flood, including slope, width, and vegetation that is in place along the banks of the water course.

The slope that a flash flood traverses has a definite relation to the overall speed in which the water will travel. The steeper the incline, the faster the water will travel. The incline on which the water moves affects the width of the flooding area. Generally, the faster the water moves, the narrower the channel will be created, since the water digs the channel deeper as it flows. When the water flows on a shallower slope, the water tends to spread out more, which can decrease its potential to cause mass damage. However, it must still be considered dangerous. Finally, the type of vegetation located along the flood's path can prevent further erosion of the channel banks. A structure that lies along a flood channel that has no surrounding vegetation is at risk of having its foundation undercut, which can cause structural damage, or in some cases, a building's complete collapse.

Storm drainage. As rain falls on any given area, some of the water will be absorbed into the ground. However, the water that is not absorbed or ponded on site will run off. Depending on the area's flatness and the presence of a storm drainage system, this water can create localized flooding. Since the water will flow to the lowest possible location, these areas become temporary holding ponds. The water then evaporates back into the atmosphere, is absorbed back into the earth, or is physically removed using pumps or other equipment.

Depending on the angle of the slope, passing storm waters develop a tremendous amount of force. In such instances these waters can damage structures, push debris in front of them much like a flash flood, and cause soil erosion.

Riverine Flooding. About 10 miles north of Angel Fire is Eagle Nest Lake. The lake turns into Cieneguilla Creek which then runs through Angel Fire. When it rains, it can cause flooding along its path. The amount of water flowing through a river at any given time determines the river's depth. When a higher than normal amount of water finds its way into a river or stream, the height of the water relative to its path increases. When this occurs, the river will overflow its

normal banks and flood the surrounding area to the water's present height. The height of the river's banks determines how far out a flood will spread. This type of flooding, like flash flooding, will begin at some point above where the flooding occurs.

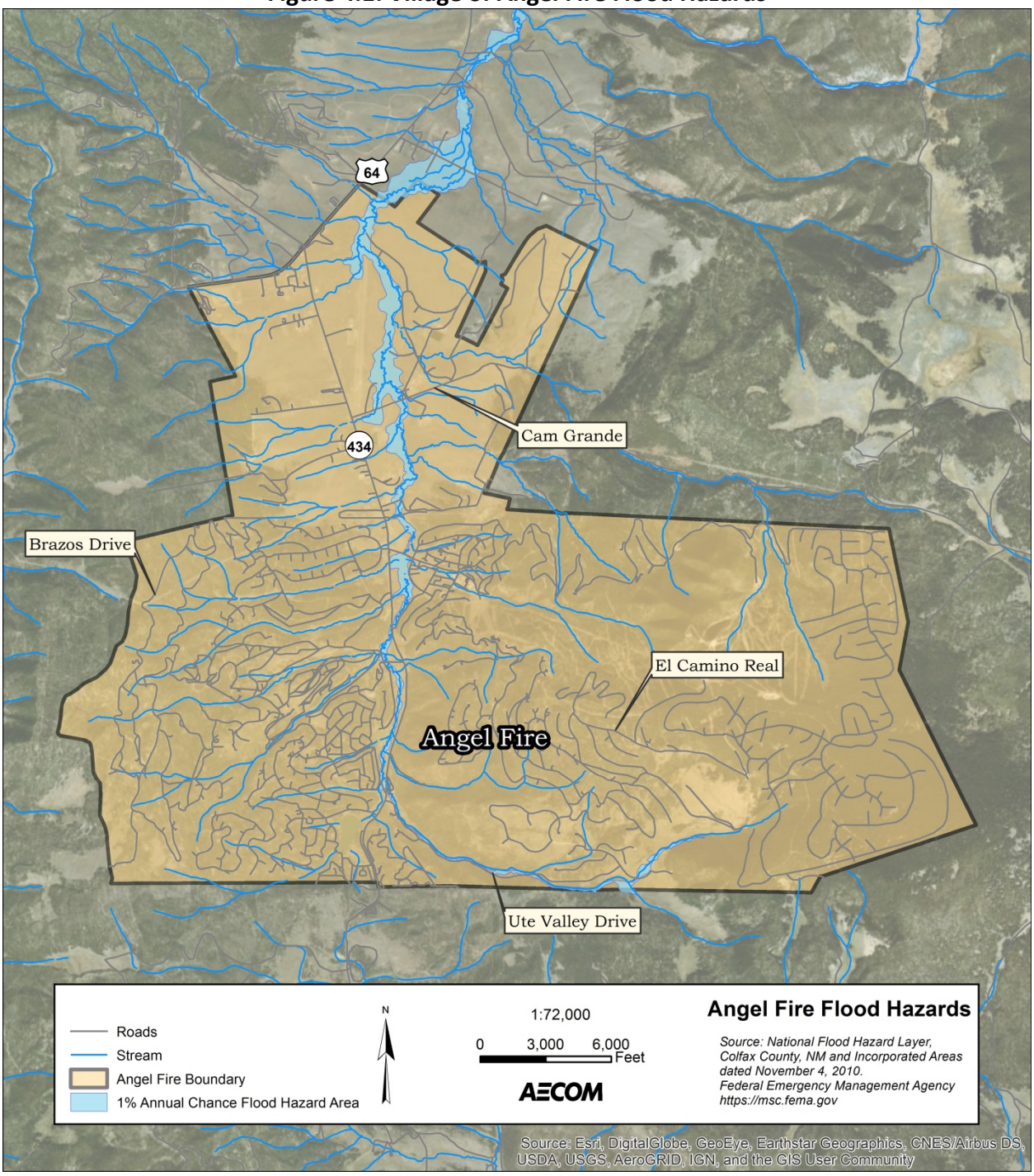
The periodic flooding of lands adjacent to rivers, streams, and shorelines (land known as floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence intervals, and floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be inundated by the 10-year flood and the 100-year floodplain by the 100-year flood. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1-percent-annual-chance of occurring in any given year. The 500-year flood has a 0.2-percent-annual-chance of occurring in any given year.

4.2.2 Location and Spatial Extent

The population centers of Angel Fire are the primary areas of concern for flooding. For this mitigation plan, the HMPT was asked to identify the primary flooding concern. Available mapping was used to create floodplain maps. **Figure 4.1** is a flood hazard map for Angel Fire.

The biggest area of concern is in the southern part of the village at Monte Verde Lake. The narrow valley running down Highway 434 allows for widespread flooding in the event of a significant flood. The southern portion of the village has a steeper topography compared to the northern portion. With a steeper topography there is a higher vulnerability to flash flooding. With NM-434 being directly adjacent to a steep mountain and being a low-lying road, this could cause more flooding and possible landslide risk on the roadway due to significant runoff from the mountain.

Figure 4.1: Village of Angel Fire Flood Hazards



4.2.3 Previous Occurrences

New Mexico has a long history of flash flooding problems. Many minor flash flood events occur each year during New Mexico's summer monsoon season. Due to the small-scale and localized nature of these events, no consistent records are available. However, Colfax County has suffered damage from floods and localized flash flooding almost every year.

According to the National Oceanic and Atmospheric Administration's (NOAA) National Center for Environmental Information (NCEI), there have been 15 reported flood events in Colfax County and no events in Angel Fire from January 1, 1996 (the start date of Storm Events Database) through November 30, 2017. **Table 4.2** lists event locations along with associated damages.

Table 4.2: Colfax County Previous Flood Events

Location	Date	Event Type	Deaths/Injuries	Property Damage
Raton	7/8/1998	Flash Flood	0/0	$0
Cimarron	4/30/1999	Flash Flood	0/0	$0
Raton	7/5/1999	Flash Flood	0/0	$0
Raton	7/13/2001	Flash Flood	0/0	$0
Cimarron	7/29/2002	Flash Flood	0/0	$0
Raton	8/5/2004	Flash Flood	0/0	$0
Cimarron	8/29/2008	Flash Flood	0/0	$75,000
Raton	7/28/2011	Flash Flood	0/0	$0
Raton	8/13/2011	Flash Flood	0/0	$0
Elizabethtown	7/8/2013	Flash Flood	0/0	$0
Maxwell	7/14/2013	Flood	0/0	$0
Raton	7/25/2013	Flash Flood	0/3	$10,000
(RTN) Raton Crews Airport	9/12/2013	Flood	0/0	$1,000,000
Cimarron	9/21/2014	Flash Flood	0/0	$0
Eagle Nest	6/27/2015	Flash Flood	1/3	$50,000

Source: NCEI

4.2.4 Probability and Extent of Future Events

Flooding occurs on a regular basis in Angel Fire and can be expected to continue. The impact of these events will depend on their location and the specific circumstances existing at the time. Angel Fire ranks the future probability of floods as "**Likely**".

4.2.5 Vulnerability and Impact

The current US Census estimated 2016 information for Angel Fire has 2,480 homes. A visual inventory conducted against available aerial photography indicates just one residential structure and two businesses located in the FEMA-designated Special Flood Hazard Area (SFHA). Spatial data correlating physical location to assessed value is not available at this time; therefore, the value of the assets at risk cannot be estimated.

For this Plan there was a data deficiency in cataloging and studying the complete expected damages from flooding within Angel Fire. Future plan updates should consider more study of the flood risk. Flooding will cause an increase in the demands placed on first response capabilities and increase delays in providing normal service to the community.

4.2.6 Conclusions

Flooding is a significant concern for Angel Fire. Heavy rains during the typical monsoon season could result in homes and businesses flooding, damaging the economy of Angel Fire. Flash flooding and impassable egress routes are primary concerns during flood events.

4.3 Wildland Fire/Wildland-Urban Interface (Wildfire)

4.3.1 Overview

A wildfire is an uncontrolled fire spreading through vegetative fuels, threatening and possibly consuming structures and other community assets. Wildfires can begin unnoticed in wild areas and can spread quickly, creating dense smoke that may be seen for miles. A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines and similar facilities. A wildland urban interface fire is a wildfire in an area where structures and other human development meet or intermingle with wildland or vegetative fuels.

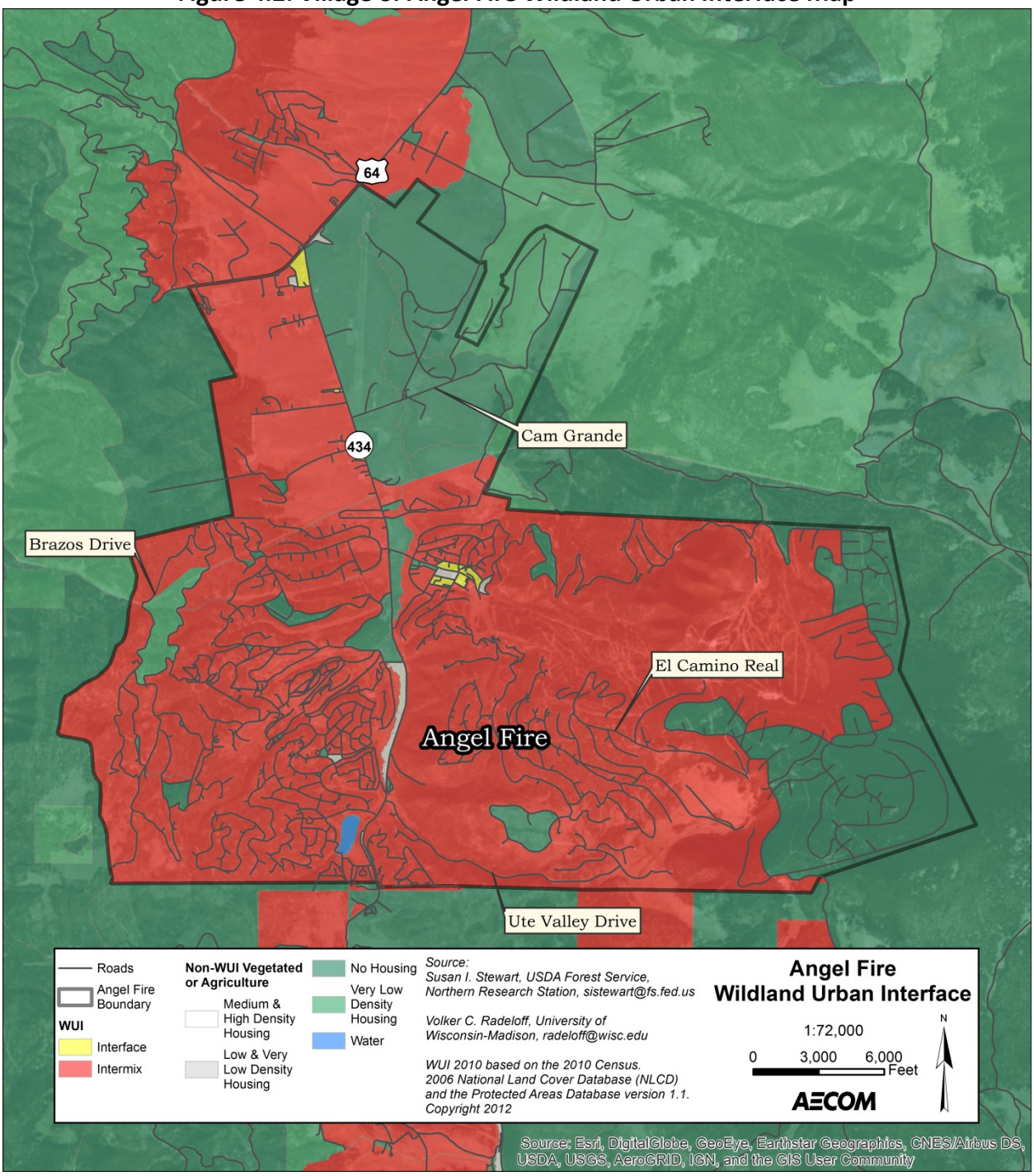
In New Mexico, periodic prolonged droughts lead to higher wildfire risk. To exacerbate the wildfire risk problem is windblown dry air (typical of New Mexico). This dry wind creates a 'hairdryer' effect and further dries out vegetation making it more combustible.

After a fire starts, it can burn as three different burn types: surface, ground, and crown fire. It can also be a combination of all three. A surface burn consumes the ground cover and is limited to the surface, a ground fire burns roots and plants beneath the soil, and a crown fire burns the tops of trees and vegetation[2].

The most common catastrophic wildfires are usually in forested areas where the fuel load is high. Potential consequences of wildfires include severe erosion and the silting of streambeds and reservoirs, which causes damage to the watershed and flooding due to a loss of ground cover. **Figure 4.2** is a WUI map produced for this plan.

[2] Cohen, Jerry, 2003. *The Impact of Fire on Ecosystem*, University of Texas

Figure 4.2: Village of Angel Fire Wildland Urban Interface Map



4.3.2 Location and Spatial Extent

The Keetch-Bryam Drought Index (KBDI) was developed specifically for fire potential assessment. It is a number representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers. It is a continuous index, relating to the flammability of organic material in the ground.

The KBDI attempts to measure the amount of precipitation necessary to return the soil to full field capacity. It is a closed system ranging from 0 to 800 units and represents a moisture regime from 0 to 8 inches of water through the soil layer. At 8 inches of water, the KBDI assumes saturation. Zero is the point of no moisture deficiency and 800 is the maximum drought that is possible. At any point along the scale, the index number indicates the amount of net rainfall that is required to reduce the index to zero, or saturation.

The inputs for KBDI are weather station latitude, mean annual precipitation, maximum dry bulb temperature, and the last 24 hours of rainfall. KBDI levels and its relationship to expected fire potential are reflected in the following **Table 4.3**:

Table 4.3: Keetch-Byram Drought Index

	Keetch-Byram Drought Index Fire Rating System
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 still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possible through the night.
400 – 600	Fire 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 soils. 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.

Typical conditions in the planning area from September through December usually centers on the 200-400 rating while January through August are usually drier months and, depending on fuel and moisture, usually will rate in the 400-600 range. During extreme dry and drought times, typically in the months of May, June, and July the Village may be rated at 600-800.

Wildfires in Angel Fire can occur in fields, grass, and brush as well as in the forested areas. Much of the planning area consists of dry rangeland with occasional stands of junipers and forested areas. Potential aftermath of wildfires includes severe erosion and the silting of streambeds and reservoirs, resulting in damage to the watershed, and flooding due to a loss of ground cover.

4.3.3 Previous Occurrences

According to NCEI and the 2013 State Plan, there have been four notable wildfires to date equaling approximately $2.5 million in property damages. **Table 4.4** describes those fires.

Table 4.4: Wildfire Previous Occurrences in Colfax County

Location	Date	Event Type	Deaths/ Injuries	Property Damage	Description
Raton	4/27/1996	Wildfire	0/0	$0	
Ute Park	5/21/2002	Wildfire	0/0	$0	Dry lightning started and then gusty winds fanned a series of wildfires that eventually consumed over 100,000 acres. The 12,800 acre Berrego fire in Rio Arriba County forced the evacuation of the Truchas and Cordova communities before the fire front turned northeast away from the villages into the Pecos Wilderness. The Ponil complex of two fires merged and burned over 90,000 acres northwest of Cimarron in Colfax County. Only a few small cabins and barns were lost, but the fires raised concern for flash flooding in the downstream communities.
Colfax County	6/1/2002	Wildfire	0/0	$0	The Ponil Wildfire occurred northwest of Cimarron, in Colfax County near the Philmont Scout Ranch. This fire was caused by lightning and is the largest fire to occur in New Mexico to date. Valiant efforts by 1,342 personnel, 13 water dropping helicopters, 31 engines, 24 dozers, and 12 water tenders contained the fire by June 17, but not before it encompassed 92,000 acres (143 Sq. miles). About 28,000 (42 Sq. miles) of those were part of Philmont Scout Ranch.
Raton Ridge/ Johnson MESA (Zone)	6/12/2011	Wildfire	0/0	$2,500,000	This grass and timber fueled fire, named the Track Fire, started just north of Raton and burned along and between Bartlett and Horse Mesas, and on either side of the Interstate 25 corridor. I-25 was closed for approximately 3.5 days. This fire was caused by engine exhaust particles, likely expelled by an ATV on Burlington Northern Santa Fe Railway property. The ATV rider trespassed onto land owned by BNSF through access from nearby private property. Evacuations were needed along the north side of Raton, Pine Valley Estates, and within Sugarite Canyon State Park and Yankee Canyon. The Raton watershed sustained significant damage. In all, 27,792 acres burned, 19,962 of which was in New Mexico. In all, 8 residences and 11 outbuildings were destroyed.

4.3.4 Probability and Extent of Future Events

The potential for wildfire is present throughout Angel Fire. The location where a wildfire occurs becomes the overriding concern. The severity of a wildfire is relatively high due to the grasslands and heavy forested areas. **Figures 4.3 and 4.4** are maps from the Colfax County Community Wildfire Protection Plan showing the risk and threat of wildfires in Colfax County. The probability of another wildfire in Angel Fire is "**Highly Likely**".

Figure 4.3: Colfax County Wildfire Risk Map

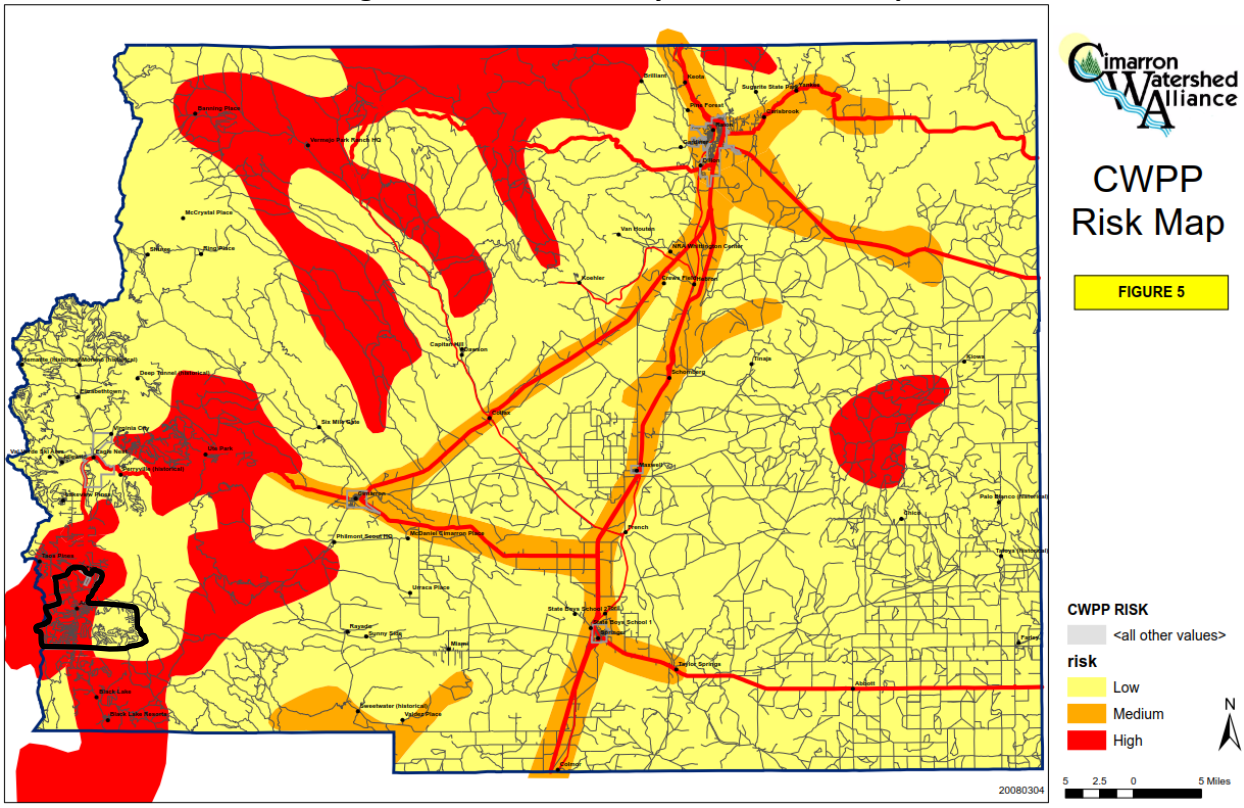
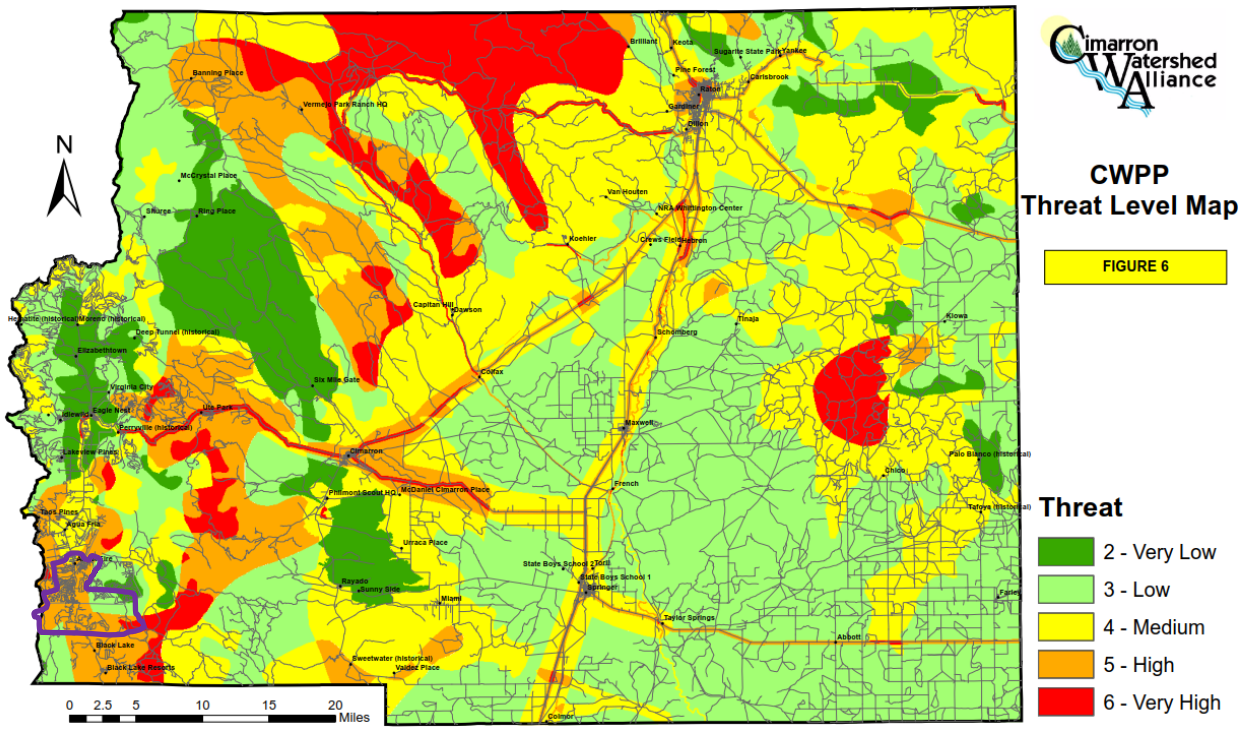


Figure 4.4: Colfax County Wildfire Threat level Map



4.3.5 Vulnerability Assessment and Impact

Future wildfires in Angel Fire could cause substantial loss of property, along with direct and indirect economic effects for residents and community businesses. Due to the recent drought situation in Angel Fire, virtually all areas could be designated seasonally as high or extreme fire danger. There are approximately 1,113 people and 2,480 housing units in Angel Fire. Fire damage to rangeland would result in a short-term economic loss. Due to security issues, the names of specific facilities vulnerable to wildfire are not included in this document. For this Plan there was a data deficiency in cataloging and studying the expected damages from wildfire within Angel Fire. Future plan updates should consider more study of the wildfire risk.

4.3.6 Conclusions

Past experience has proven that wildfires can be a significant threat to the citizens, structures, infrastructure, and natural resources within Angel Fire. Wildfires in Angel Fire have the potential to impact all 2,480 housing units. As a result, the HMPT has identified the wildfire hazard as a priority in the Plan.

4.4 Drought

4.4.1 Overview

A drought is a period of prolonged dryness that contributes to depletion of water supplies, both underground and on the surface. Drought is a natural climatic condition caused by an extended period of limited rainfall (less than normal) in a broad geographic area. High temperatures, high winds, and low humidity exacerbate drought conditions. Human demands and actions also exacerbate drought-related impacts.

Droughts are often categorized as meteorologic, hydrologic, agricultural, or socioeconomic:

- A meteorologic drought is defined by a period of less than average or normal precipitation.
- A hydrologic drought occurs when a meteorologic drought begins to affect surface and subsurface water supplies.
- An agricultural drought refers to the effects of a meteorologic or hydrologic drought in terms of soil moisture and its relation to plant life, usually crops.

A socioeconomic drought is when the water shortages affect public health and economic activity including agriculture. The National Weather Service (NWS) and the United States Department of Agriculture (USDA)'s collaborate with academic institutions to categorize drought. Taking input from these entities and local sources, the National Drought Mitigation Center (NDMC) through the US Drought Monitor website issues a state by state weekly drought severity assessment using these categories shown in increasing intensity from top to bottom:

- **D0** – Abnormally dry
- **D1** – Drought - Moderate
- **D2** – Drought - Severe
- **D3** – Drought - Extreme

- **D4 –** Drought - Exceptional

Droughts do the worst damage when they are prolonged and in New Mexico this is possible over multiple years like the droughts of the 1950s and the multi-year drought in effect through December 2013. While drought is a cyclical process, a growing population in New Mexico and threat from wildfire as a result of dry conditions make it a significant hazard.

4.4.2 Location and Spatial Extent

Droughts are common in New Mexico and Colfax County. Drought is generally a broad geographic hazard that is not tied to site specific topographic and geologic features like flooding. The climate in Angel Fire is semi-arid with average annual precipitation of about 23 inches. In addition, due to the monsoon effect, most of the precipitation occurs from July to September annually. This normally small and concentrated annual precipitation causes extended periods of low flow in the State's rivers and streams. Any measurable decrease in precipitation rates can create drought conditions in a relatively short time. The entire planning area is at risk from all levels of drought.

Angel Fire officials consider any conditions indicating a D2 (severe drought) rating on the drought monitor scale would be a severe threat and appropriate warnings would be issued throughout the planning area.

4.4.3 Previous Occurrences

New Mexico has always known drought which is a product of climate ranges. Archeological records indicate that drought has led to the collapse of early civilizations in New Mexico.

According to the New Mexico Drought Plan, the state has experienced droughts since prehistoric times. Extended drought conditions in the region evidently led to the collapse of many early civilizations. Periods of drought since 1950 have been documented during 1950-1957, 1963-1964, 1976-1978, 1989, 1996, 1998-1999, 1999-2003, 2003-2006.

The most recent Drought Executive Order was signed by Governor Martinez on May 11, 2012 (Executive Order 2012-006). This order summarized the drought conditions at that time, and declared a state of emergency statewide due to the drought conditions. The Executive Order further directed the continuation of the New Mexico Drought Task Force and for them to meet once a quarter. It also directed the following:

- Assess the continued severity of the drought and its effects on the various sectors of the state's resources and economy.
- Make recommendations to the Governor for intermediate actions and long-term strategies to mitigate drought conditions and impacts in the state.
- Appoint such working groups as may be necessary and appropriate to examine and recommend solutions regarding the drought conditions to the task force.
- Provide information and guidance to the Governor regarding drought conditions.

The Governor's Drought Task Force is led by the State Engineer's Office and has representation from the following state agencies:

- Agriculture Department
- Economic Development Department
- Energy Minerals and Natural Resources Department
- Environment Department
- Finance and Administration Department
- Finance Authority
- Governor's Office
- Indian Affairs Department
- Interstate Stream Commission
- Homeland Security and Emergency Manager
- State Engineer's Office
- Interstate Stream Commission
- Tourism Department

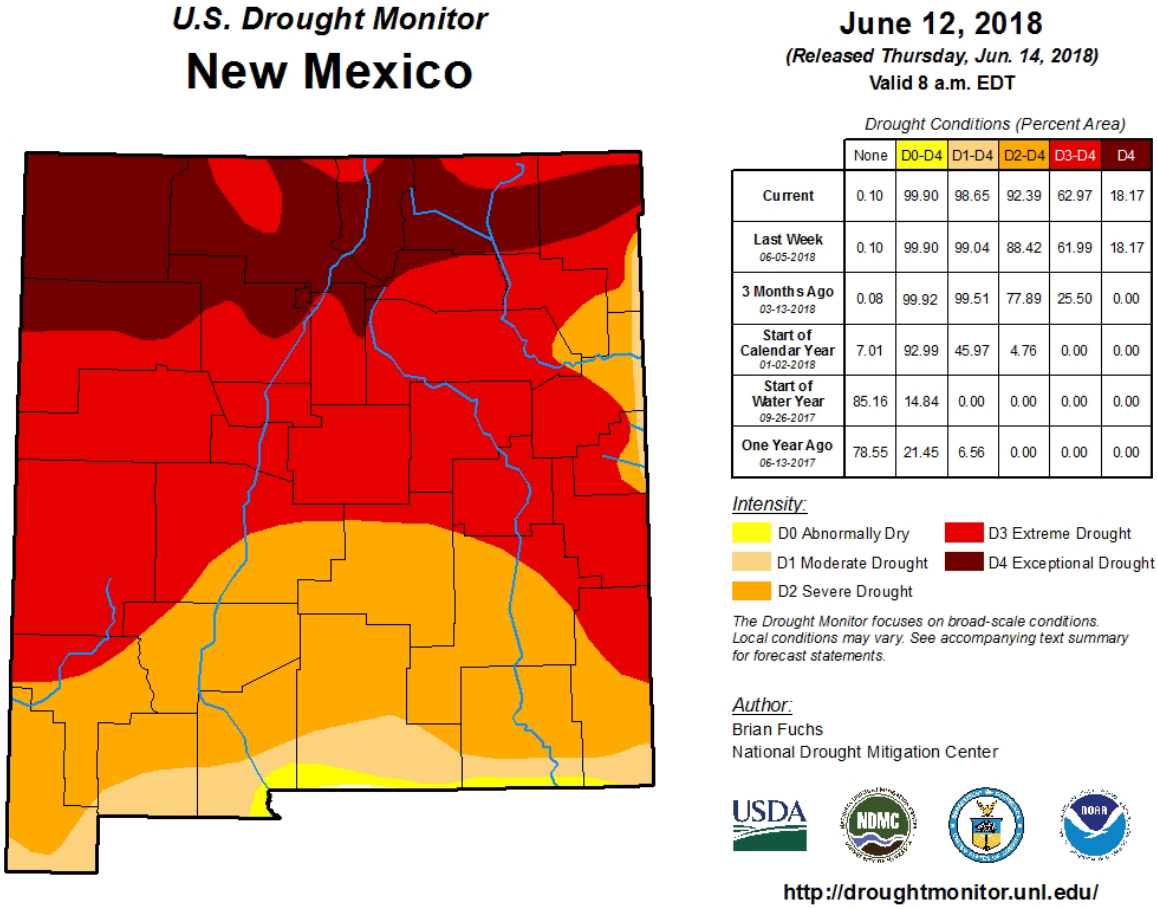
All Preparedness Areas in New Mexico have experienced drought conditions over the last nine years. The current online NCEI database is limited in past events and only contains data from January 2006 to present, as entered by NOAA's National Weather Service (NWS). Referencing this online database, NCEI currently does not have data on drought losses. Between 1995 and May 2007, there were three state declared disasters for effects related to drought, primarily for loss of domestic drinking water: May 1996, May 2000, and June 2002. The total cost for drought related events for this time period is $279,459. However, indirect costs are estimated to be between $50-100 Million.

As seen in **Figure 4.5**, as of June 12, 2018, a U.S. Drought Monitor map shows that most of New Mexico is experiencing extreme drought conditions, including Angel Fire. Drought conditions had dramatically improved since the peak of the most recent drought, in 2013, but with a very dry winter of 2017, drought conditions are significantly worse. The 2013 drought had also been in effect in 2012 when the Governor of New Mexico declared a Drought State of Emergency on May 15, 2012. The drought declaration convened the New Mexico Drought Task Force, led by the State Engineer, to determine ways the State can prepare for and mitigate the effects of the drought.

Due to the fact that in May 2013, 44.14% of the state was at the highest level of drought intensity (Exceptional), and 81.68% was either Exceptional or Extreme (the second highest level), the drought that continued in 2013 is considered by some federal meteorologists as the worst one since the 1950s drought[3].

[3] http://www.abqjournal.com/192344/news/drought-is-worst-since-the-1950s.html Accessed February 2016

Figure 4.5: New Mexico Drought Map (as of August 15, 2017)



	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.10	99.90	98.65	92.39	62.97	18.17
Last Week 06-05-2018	0.10	99.90	99.04	88.42	61.99	18.17
3 Months Ago 03-13-2018	0.08	99.92	99.51	77.89	25.50	0.00
Start of Calendar Year 01-02-2018	7.01	92.99	45.97	4.76	0.00	0.00
Start of Water Year 09-26-2017	85.16	14.84	0.00	0.00	0.00	0.00
One Year Ago 06-13-2017	78.55	21.45	6.56	0.00	0.00	0.00

Source: http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?NM *Accessed June 2018.*

4.4.4 Probability and Extent of Future Events

In a mountain region such as Angel Fire, the probability of recurring droughts with moderate to exceptional severity is "**Likely**". Droughts can last from one season to over 40 years and should be expected at any time. The length of the recovery period is a function of the intensity of the drought, its length, and the quantity of precipitation received as the drought ends. There is scientific evidence suggesting that prolonged periods of drought are increasingly likely in the future in the planning area[4].

4.4.5 Vulnerability and Impact

When severe to exceptional droughts occur they have significant consequences for water supply (drinking water and agriculture uses), water quality, fighting forest fires, agriculture and navigation and recreation. When a drought begins, agriculture is usually first to be affected because of its heavy dependence on stored moisture in the soil. Soil moisture can be rapidly depleted during extended dry periods. Dryland farming and ranching are most at risk from

[4] *Long Term Trends and their Implications for Emergency Manager* from http://www.fema.gov/pdf/about/programs/oppa/climate_change_paper.pdf Accessed December 2015

drought. The impacts of drought on agriculture and rangeland increase with longer duration droughts and can have a significant long term impact on the community in Angel Fire. Impact on these activities can be seen during a short-term drought. Water uses depending on in-stream flows, such as irrigated farms; aquatic, wetland, and riparian environmental communities; and recreational uses are at high risk. Urban and agricultural water users who rely on reservoirs and wells that are not dependent on high rates of aquifer recharge are the last to feel the effects[5].

Drought affects the entire Village and is a hazard that cannot be eliminated. In addition, drought is cyclic and will always be a potential problem. The effect on the village government infrastructure is the same as for the general public and poses no specific danger to the normal operation of government.

Drought affects the entire community by placing a higher demand on the present water supply systems. Drought also limits the amount of growth that can be expected for the Village due to the lack of recharge of the already finite water supply. Additionally, a higher demand on the water system infrastructure can lead to disruption of service due to line breakage.

It is extremely difficult to estimate the amount of dollar damages from a drought because of the slow-moving nature of droughts and the lack of direct immediate impacts. The 2013 State Plan reports on page 54 that from 2003-2012, the costs of droughts were $500,000, state wide. For the planning area, drought impacts cattle-grazing, other agricultural activities, the tourist economy, and reduced charge to the aquifer. Droughts in Angel Fire leaves exposed soils susceptible to erosion, and flash flooding. A particularly long spell of drought could mean water restrictions. Using Table 2.18 found in the 2013 State Plan and applying it to the Village's assets, **Table 4.5** of this Plan lists specific potential impacts of drought to the Village.

Table 4.5: Potential Impacts from Drought

Subject	Potential Impacts
HEALTH and SAFETY of the PUBLIC	• Increased number of wildfires • Health problems related to low water flows and poor water quality • Health problems related to dust
HEALTH and SAFETY of RESPONDERS	Increased wildfire risk coupled with limited water supply makes it more challenging for responders to fight fires and puts responders at greater risk
ENVIRONMENT	• Animal habitat and food supply can dwindle causing species die-off • Poor soil quality • Loss of wetlands • Increased soil erosion • Migration of wildlife

[5] New Mexico Drought Task Force, 2002

Subject	Potential Impacts
ECONOMIC CONDITION	• Decreased tourism • Crop loss • Decreased land prices • Unemployment from drought-related declines in production • Increased importation of food • Rural population loss
PUBLIC CONFIDENCE	• Reduced incomes • Fewer recreational activities • Increase in food costs due to loss of crops and livestock • Loss of aesthetic values • Loss of cultural sites

4.4.6 Conclusions

In New Mexico, drought conditions are often the norm rather than the exception. In most cases, the dry weather conditions that cause droughts will need to persist for months or even years before it becomes clear that drought conditions exist. It is also difficult in an arid state like New Mexico to verify when an affected area has actually recovered from a drought. Many drought events are followed by years of average or slightly below average rainfall that do not restore surface water and/or groundwater levels to pre-drought conditions. More accurate monitoring of groundwater levels in critical aquifers would help to establish base conditions and to assess levels of recovery from a drought. There are also data limitations in determining the available quantity and quality of groundwater.

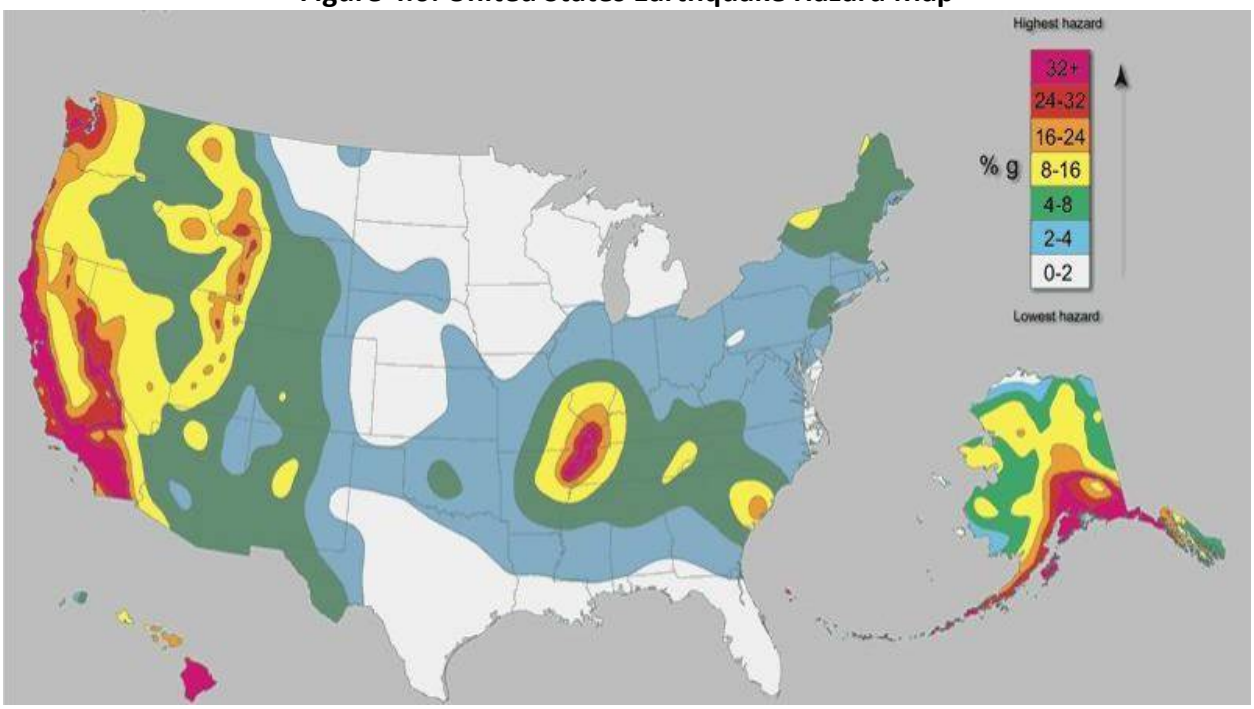
Mitigation Manager for drought is a proactive process. The best practices include early assessment, public education, and water conservation programs. Identifying the first phases of the drought and reacting with water conservation at the earliest time will help to mitigate drought later in the disaster. At the State level, the Governor's Drought Task Force Monitoring Working Group monitors the drought situation and can help determine best practices for mitigating the drought effects.

4.5 Earthquake

4.5.1 Overview

Earthquakes result from sudden ground motion or trembling caused by a release of strain accumulated within or along the edge of the Earth's crustal plates. Earthquakes occur most frequently in the boundaries between the great crustal plates that form the earth's outer shell. As these plates move, stress accumulates. Eventually, when faults along or near plate boundaries slip abruptly, an earthquake occurs. The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk to less frequent, less intense earthquake events. **Figure 4.6** shows relative seismic risk for the United States.

Figure 4.6: United States Earthquake Hazard Map

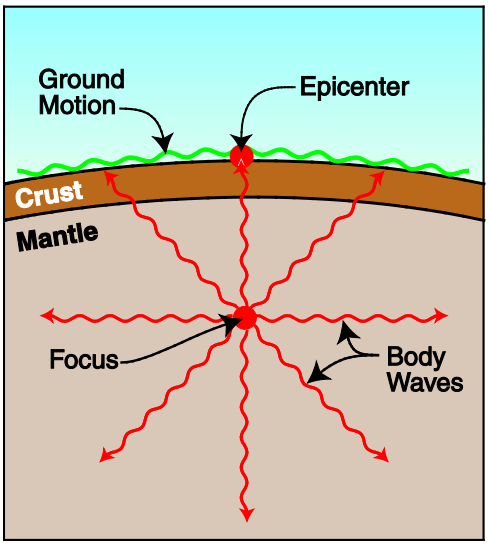


Source: United States Geological Survey

The severity of an earthquake depends on the amount of energy released from the fault or epicenter of the earthquake. The severity is described in terms of magnitude and intensity. Magnitude characterizes the total energy released, and intensity subjectively describes effects at a particular place. While an earthquake has only one magnitude, its intensity varies throughout the affected region.

The Richter scale is a logarithmic magnitude scale that defines magnitude in terms of the motion that would be measured by a standard type of seismograph. On the Richter scale, as seen in **Table 4.6**, magnitude is expressed in whole numbers and decimals. For every increase of 1.0 on the Richter scale, the energy released by the earthquake increases 10-fold. In more qualitative terms, an earthquake of 5.0 is a moderate event, 6.0 is a strong event, 7.0 is a major earthquake, and 8.0 or higher is catastrophic. The effect of an earthquake on the Earth's surface is called the intensity. In the U.S., intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from “I” corresponding to imperceptible (instrumental) events to “XII” for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in **Table 4.7**.

Figure 4.7: Definition Sketch for Earthquake



Source: Understanding Your Risks – FEMA Publication 386-2, page 2-16.

Another way to express earthquake severity is through peak ground acceleration (PGA) which compares the rate at which the ground surface accelerates due to an earthquake's force with the rate of acceleration experienced by a falling object due to gravity. PGA measures the strength of ground movements in this manner. Although the specific damages caused by different magnitudes of earthquakes are listed in **Table 4.8**, generally when the PGA exceeds 15, significant damage will occur. **Table 4.8** also shows the relationship between PGA, magnitude, and intensity (to get the most accurate picture of risk, locational variables such as the distance from the epicenter and depth of the epicenter would need to be factored in as well).

Table 4.6: Richter Scale

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

Source: Federal Emergency Manager Agency

Table 4.7: Modified Mercalli Intensity Scale for Earthquakes

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church bells ring.	< 4.8
VI	STRONG	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	VERY STRONG	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	DESTRUCTIVE	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	RUINOUS	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	DISASTROUS	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	VERY DISASTROUS	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	CATASTROPHIC	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: Federal Emergency Manager Agency

Table 4.8: Earthquake Magnitude/Intensity Comparison

PGA (% g)	Magnitude (Richter)	Intensity (MMI)	Description
<0.17	1.0 - 3.0	I	**I**. Not felt except by a very few under especially favorable conditions.
0.17 - 1.4	3.0 - 3.9	II - III	**II**. Felt only by a few persons at rest, especially on upper floors of buildings. **III**. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
1.4 - 9.2	4.0 - 4.9	IV - V	**IV**. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. **V**. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
9.2 - 34	5.0 - 5.9	VI - VII	**VI**. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. **VII**. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
34 - 124	6.0 - 6.9	VII - IX	**VIII**. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. **IX**. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
>124	7.0 and higher	**VIII** or higher	**X**. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. **XI**. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly **XII**. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: Wald, D., et al., 1999, "Relationship between Peak Ground Acceleration, Peak Ground Motion, and Modified Mercalli Intensity in California," Earthquake Spectra, v. 15, p. 557 – 564. USGS Magnitude/Intensity Comparison http://earthquake.usgs.gov/learn/topics/mag_vs_int.php Accessed October 2013.

Although earthquakes in the U.S. have caused less economic loss annually than other hazards like flood, they have the potential to cause great and immediate losses, especially near the epicenter. Within one to two minutes, an earthquake can devastate a city through ground shaking, surface-fault ruptures, and ground failures. Seismic hazards often trigger other devastating events, such as landslides, fires, and damage to dams and levees. Earthquakes can even trigger volcanic eruptions or cause tsunamis in coastal areas.

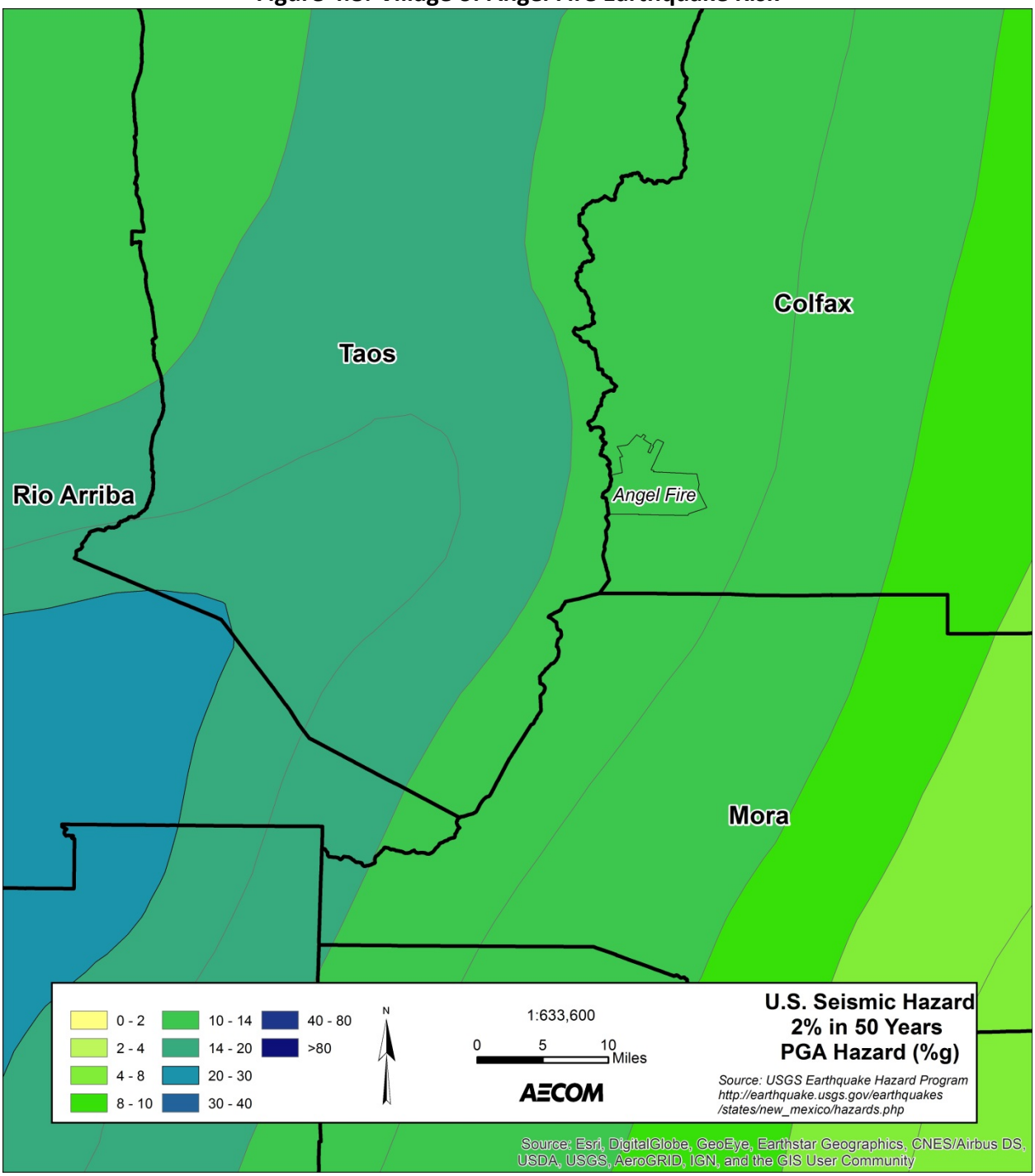
The most significant area of seismic activity in the state is located in the Rio Grande River valley and is centered in Socorro, New Mexico. Eight seismic events have occurred there between 1869 and 1992. The largest recorded seismic event in New Mexico occurred in Socorro in 1906. The effects of this event were felt from El Paso, Texas to Las Vegas, New Mexico; however, little damage was reported and there were no fatalities. This event would not have been felt in Angel Fire.

Present structural building code requirements in New Mexico do not consider the possibility of seismic events.

4.5.2 Location and Spatial Extent

Though not nearly as intense or as numerous as in some other parts of the world, earthquakes have occurred in New Mexico. In the last 110 years, New Mexico has experienced earthquakes with an estimated magnitude as high as 6.5 (1906). In 1935 and 1966, earthquakes with a magnitude of 5.5 in 1935 and 1966, causing damage to homes and schools. A seismic event would generally have the same magnitude across the Village similarly as the effects are wide-spread. **Figure 4.8** below depicts seismic risk across the planning area. It shows a moderate risk (dark green areas on the map) throughout Angel Fire. The spatial extent of a potential earthquake would be large.

Figure 4.8: Village of Angel Fire Earthquake Risk



Source: AECOM

4.5.3 Previous Occurrences

The Village of Angel Fire is vulnerable to low grade earthquakes. Earthquakes in the Village occurred in at least 10 different locations between 1962 and 1980. The magnitude of these earthquakes ranged from 1.5 to 3.99 on the Richter Scale. No known damages were reported for these events.

The closest large New Mexico earthquakes outside of the Village were all located more than 150 miles away from the Village including:

- September 7, 1893 – Belen, Magnitude 5.2
- May 28, 1918 – Los Cerrillos, Magnitude 5.5
- November 6, 1947– Albuquerque, Magnitude 4.5
- August 3, 1955 – Dulce, Magnitude 4.5
- January 23, 1966 – Dulce, Magnitude 4.8

While earthquakes are possible in Angel Fire, the potential of a damaging event occurring is fairly small. Additionally, of the earthquakes that have occurred in New Mexico since 1869, none have produced significant damage to property or injury to the population. Although there will always be the potential of an earthquake occurring in Angel Fire, it is not presently anticipated that one of significant magnitude will occur. Historically, no infrastructure of Angel Fire has been impacted by earthquakes.

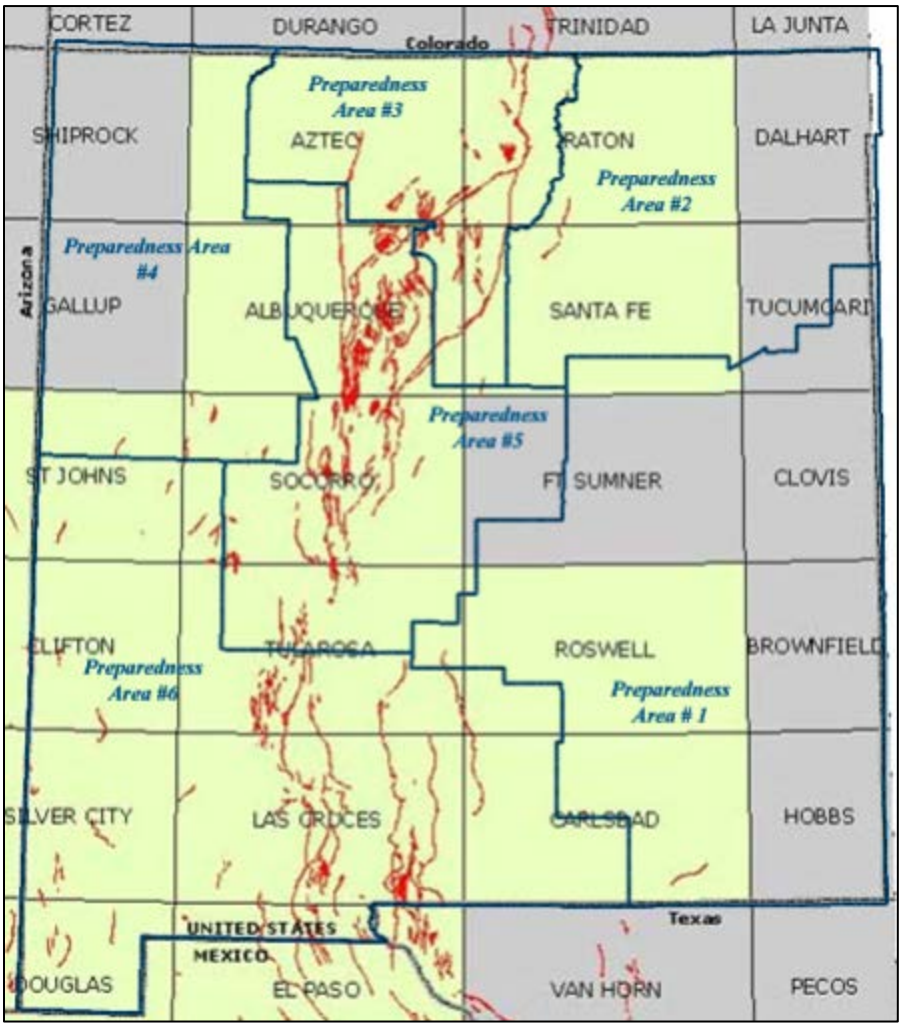
4.5.4 Probability and Extent of Future Events

Given the rare past occurrence and moderate risk in magnitude of earthquakes to the Village, the probability of a future event is "**Unlikely**". However, earthquakes are nearly impossible to predict and the consequences can be devastating.

4.5.5 Vulnerability and Impact

Earthquakes with epicenters in or near Angel Fire have been detected in the past, although they have been small and damage has been relatively minor. The 2013 State Plan includes Angel Fire in Preparedness Area #2 but close to the boundary with Preparedness Area #3. The State Plan shows a map that illustrates the fault lines in New Mexico. As shown in **Figure 4.9**, you can see that there are multiple fault lines near Angel Fire. This type of event would cause minor damage in the planning area.

Figure 4.9: Preparedness Areas and Fault Lines in New Mexico



The HMPT would need to study the structures in the planning area—their age, condition, and construction type—to rate their relative vulnerability. Unreinforced masonry and adobe structures built before current building codes are more susceptible to damage than other types of structures built to seismic-resistant codes. For this update there was a data deficiency in cataloging and studying the expected damages from earthquake within Angel Fire. Future plan updates should consider more study of the earthquake risk.

4.5.6 Conclusions

Significant earthquakes with epicenters in or near the Village have not been detected. The potential for such a disaster is low. Even the worst earthquake the planning area might expect would not inflict significant damage if buildings were built to a code that incorporates seismic resistance. More detailed information on other structures in the planning area is required to identify vulnerable structures.

Damage from earthquakes can be mitigated for existing buildings by structural retrofits and non-structural retrofits for interior contents that can be damaged by a fall (e.g., computer) or can cause harm by falling (e.g., bookshelves). Structures erected before standard building

codes, such as un-reinforced adobe and masonry buildings, are typically vulnerable to earthquake damage. Structural retrofits are generally very expensive whereas non-structural can be relatively inexpensive.

More detailed information on other structures in Angel Fire is required to identify those that are highly vulnerable. New buildings can be built stronger, according to the most recent seismic design specifications found in contemporary building codes, to minimize their vulnerability to earthquake damage.

4.6 Severe Winter Storms

4.6.1 Overview

Winter storms in New Mexico generally begin as low-pressure systems that move through the state following the jet stream. These systems are usually generated in the Pacific Ocean and move eastward across California, Nevada, Arizona and Utah before reaching New Mexico, if strong enough. Severe winter storms may bring bursts of heavy snow accumulating three to six inches in short periods or one to two feet in 12 to 24 hours. Blizzard conditions can develop with winds over 35-mph. Freezing rain and drizzle can create a coating of ice that is hazardous to walk or drive on. Unusually heavy ice accumulations can damage trees, power lines and other utilities, and buildings.

Table 4.9 provides descriptions of the various types and impacts of winter storms that are consistent with NWS approved definitions found in the 2013 State Plan.

Table 4.9: Types of Winter Storms

Storm Type	Description
Heavy Snowstorm/ Snowfall	Accumulations of 6 inches or more in a 12-hour period, or 8 inches or more in a 24-hour period. The most common effects are traffic accidents; interruptions in power supply and communications; and the failure of inadequately designed and/or maintained roofing systems.
Sleet/Sleet Storm	Significant accumulations of solid grains or pellets of ice that form from the freezing of raindrops or partially melted snowflakes. While this ice does not cling to surfaces, it causes slippery surfaces, posing hazards to pedestrians and motorists.
Ice Storm	Significant accumulations of rain or drizzle freezing on exposed objects (trees, power lines, roadways), causing slippery surfaces and damage from the weight of ice accumulation.
Blizzard	Wind velocity of 35 mph or more, temperatures below freezing, and considerable blowing snow with visibility frequently below one-quarter mile, prevailing over an extended period of time.
Severe Blizzard	Wind velocity of 45 mph or more, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in inches, prevailing over an extended period of time.
Wind Chill	An apparent temperature that describes the combined effect of wind and low air temperatures on exposed skin

Storm Type	Description
Freezing Drizzle/ Freezing Rain	The effect of drizzle or rain freezing upon impact on objects that have a temperature of 32° F or below

The 2013 State Plan lists the likely severe winter storm scenarios for New Mexico:

- 4 or more inches of snowfall below 7,500 feet
- 6 or more inches of snowfall above 7,500 feet in a 12 hour period
- 6 or more inches of snowfall below 7,500 feet
- 9 inches of snowfall above 7,500 feet in a 24-hour period

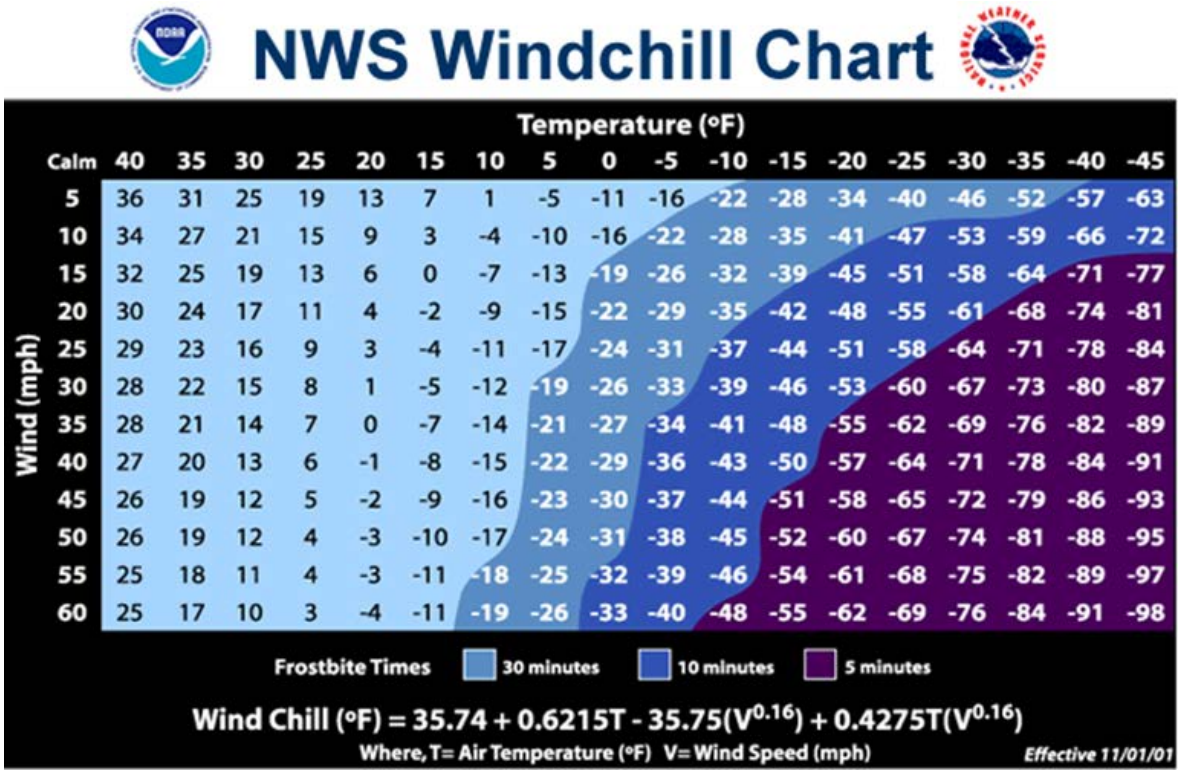
Winters in New Mexico are generally mild, but occasionally winter storms produce large amounts of snow and below-freezing temperatures. Severe winter storms are not of major concern to the citizens of Angel Fire because they do not typically cause significant problems in the planning area. Generally when such a storm hits, it may cause some traffic slow-down, but it rarely causes major transportation routes to be closed for more than a day. This situation creates more of an inconvenience than a hazard. During winter storms, heavy/wet snowfall can create a risk to flat-roofed residential structures, but the damage is generally limited.

4.6.2 Location and Spatial Extent

The complex terrain of New Mexico, ranging from the eastern plains, to the high mountains across the northern and western regions, to the Rio Grande Valley, creates weather systems that change quickly over relatively short distances. The weather may be relatively mild and sunny along the Rio Grande Valley with near blizzard conditions found across the high plains east of the central mountain chain.

Wind chills play the most significant role in Angel Fire's severe winter weather since the welfare of residents is directly related to wind chill. Local officials encourage citizens to heed the warning and take extra precautions. Wind chill is the combination of wind and temperature that serves as an estimate of how cold it actually feels to exposed human skin. Local officials throughout the planning area consider wind chill values below -10 degrees to be extremely dangerous to the population although hypothermia can occur at higher temperatures and cause death. **Figure 4.10** gives a range of physical intensities from winter storms along with the potential effect:

Figure 4.10: National Weather Service Windchill Chart with Impacts



NWS Windchill Chart

Wind (mph) \ Temperature (°F)	Calm	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	19	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

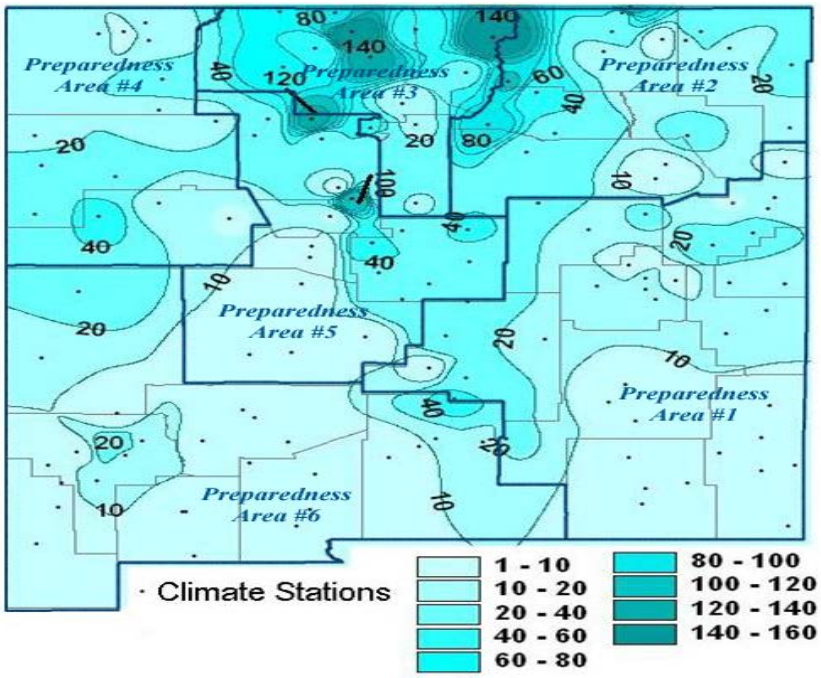
$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Figures 4.11 and **4.12** from SRH of NOAA show annual snowfall amounts across New Mexico[6]:

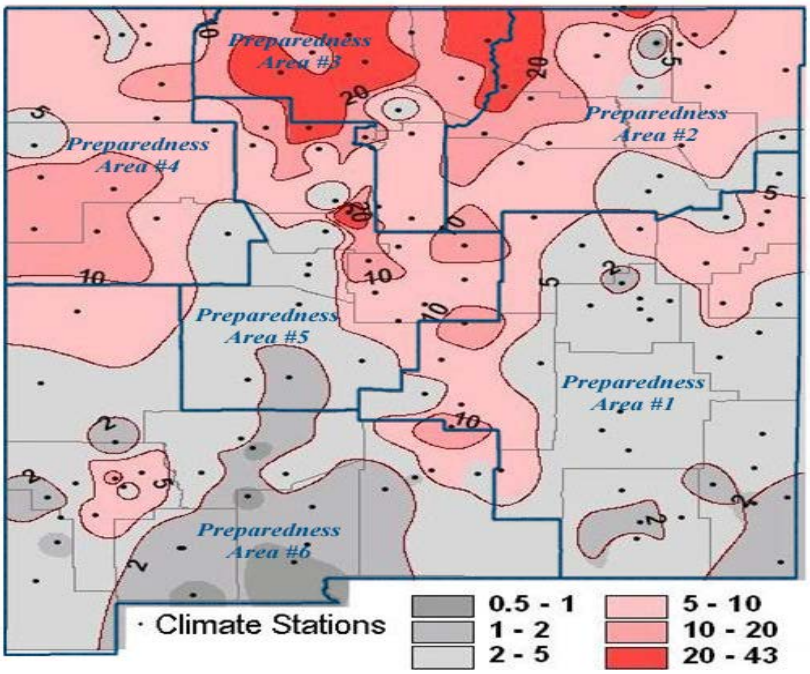
Figure 4.11: Average Annual Snowfall in New Mexico



Source: NOAA Southern Region Headquarters (SRH)

[6] Source: http://www.srh.noaa.gov/abq/?n=prepwinterwxclimo

Figure 4.12: Average Annual Number of Days with Snowfall in New Mexico



Source: NOAA Southern Region Headquarters (SRH)

4.6.3 Previous Occurrences

According to NCEI, as shown in **Table 4.10**, there have been a total of 111 days with a winter storm event since 2009. These events include heavy snow, blizzard, winter storm, and winter weather. These events accumulated approximately $103,000 in total property damages.

Table 4.10: Winter Storms Previous Occurrences in Village of Angel Fire

Location	Date	Event Type	Deaths/ Injuries	Property Damage
East Slopes of the Sangre De Cristo Mountains	10/21/2009	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	10/21/2009	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	10/25/2009	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	10/28/2009	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	10/28/2009	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	10/28/2009	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	11/14/2009	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	11/14/2009	Heavy Snow	0/0	$0
Far Northeast Highlands	12/2/2009	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/7/2009	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/7/2009	Heavy Snow	0/0	$0
Far Northeast Highlands	12/7/2009	Heavy Snow	0/3	$0
Northern Sangre De Cristo Mountains	1/21/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	1/21/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	1/28/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	1/28/2010	Heavy Snow	0/0	$0

Location	Date	Event Type	Deaths/ Injuries	Property Damage
East Slopes of the Sangre De Cristo Mountains	2/3/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	2/3/2010	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/7/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/7/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	2/7/2010	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/21/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/21/2010	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/21/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	2/22/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/8/2010	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/8/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	3/10/2010	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/10/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/10/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	3/14/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/14/2010	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/19/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/19/2010	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/23/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/23/2010	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	3/24/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	3/24/2010	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/16/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	12/16/2010	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/16/2010	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/29/2010	Heavy Snow	0/0	$0
Far Northeast Highlands	1/31/2011	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	1/31/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	1/31/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/1/2011	Heavy Snow	0/0	$0
Far Northeast Highlands	2/1/2011	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/1/2011	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/6/2011	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/8/2011	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/8/2011	Heavy Snow	0/0	$0
Far Northeast Highlands	2/8/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/8/2011	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	4/24/2011	Heavy Snow	0/0	$0
Far Northeast Highlands	5/1/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	5/1/2011	Heavy Snow	0/0	$0

Location	Date	Event Type	Deaths/ Injuries	Property Damage
Northern Sangre De Cristo Mountains	10/7/2011	Heavy Snow	0/0	$0
Far Northeast Highlands	10/26/2011	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	10/26/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	10/26/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	11/7/2011	Heavy Snow	0/0	$0
Far Northeast Highlands	11/7/2011	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	11/7/2011	Heavy Snow	0/0	$0
Far Northeast Highlands	12/2/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/4/2011	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/4/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/12/2011	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/12/2011	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/19/2011	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	12/19/2011	Blizzard	0/0	$0
Far Northeast Highlands	12/19/2011	Blizzard	0/0	$3,000
Northern Sangre De Cristo Mountains	1/16/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/2/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/12/2012	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/2/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/19/2012	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/19/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	4/2/2012	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	4/2/2012	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	4/2/2012	Heavy Snow	0/0	$0
Far Northeast Highlands	4/2/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	4/14/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	11/10/2012	Heavy Snow	0/0	$0
Far Northeast Highlands	12/9/2012	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	12/9/2012	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/9/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/9/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/14/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/15/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/19/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/31/2012	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	1/1/2013	Heavy Snow	0/0	$0
Far Northeast Highlands	1/13/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	1/29/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/9/2013	Heavy Snow	0/0	$0
Far Northeast Highlands	2/11/2013	Heavy Snow	0/0	$0

Location	Date	Event Type	Deaths/ Injuries	Property Damage
Northern Sangre De Cristo Mountains	2/20/2013	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/20/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/21/2013	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/24/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/8/2013	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	3/9/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	11/5/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	11/15/2013	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	11/21/2013	Heavy Snow	0/0	$0
Far Northeast Highlands	11/21/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	11/21/2013	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/4/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/4/2013	Heavy Snow	0/0	$0
Far Northeast Highlands	12/5/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/7/2013	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	1/30/2014	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/1/2014	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	4/5/2014	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	5/12/2014	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	5/12/2014	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	11/15/2014	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	11/15/2014	Heavy Snow	0/0	$0
Far Northeast Highlands	11/15/2014	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	11/23/2014	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/13/2014	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/13/2014	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	12/22/2014	Winter Storm	0/0	$0
Northern Sangre De Cristo Mountains	12/25/2014	Winter Storm	0/0	$0
Far Northeast Highlands	12/26/2014	Winter Storm	0/0	$0
Far Northeast Highlands	1/21/2015	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	1/21/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	1/21/2015	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	1/21/2015	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	1/30/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	1/30/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/11/2015	Heavy Snow	0/0	$0
Far Northeast Highlands	2/16/2015	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/21/2015	Heavy Snow	0/0	$0
Far Northeast Highlands	2/22/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/22/2015	Heavy Snow	0/0	$0

Location	Date	Event Type	Deaths/ Injuries	Property Damage
Northern Sangre De Cristo Mountains	2/25/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/25/2015	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/25/2015	Heavy Snow	0/0	$0
Far Northeast Highlands	2/25/2015	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/1/2015	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	3/1/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/1/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/4/2015	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/19/2015	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	4/26/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	4/26/2015	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	5/5/2015	Winter Weather	0/0	$0
East Slopes of the Sangre De Cristo Mountains	5/5/2015	Winter Weather	0/0	$0
Northern Sangre De Cristo Mountains	5/15/2015	Winter Weather	0/0	$0
Northern Sangre De Cristo Mountains	5/16/2015	Winter Weather	0/0	$0
Northern Sangre De Cristo Mountains	11/16/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	11/16/2015	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	11/17/2015	Blizzard	0/0	$0
Far Northeast Highlands	11/17/2015	Blizzard	0/0	$0
Northern Sangre De Cristo Mountains	11/26/2015	Winter Weather	0/0	$0
Northern Sangre De Cristo Mountains	12/11/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/11/2015	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	12/12/2015	Blizzard	0/0	$0
Far Northeast Highlands	12/12/2015	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/14/2015	Heavy Snow	0/0	$0
Far Northeast Highlands	12/26/2015	Blizzard	0/0	$0
Northern Sangre De Cristo Mountains	12/26/2015	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/26/2015	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	12/26/2015	Blizzard	0/0	$0
Northern Sangre De Cristo Mountains	1/7/2016	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	1/25/2016	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/1/2016	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/1/2016	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/1/2016	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/22/2016	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/22/2016	Heavy Snow	0/0	$0
Far Northeast Highlands	2/22/2016	Heavy Snow	0/0	$0
Far Northeast Highlands	3/26/2016	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	3/26/2016	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	12/15/2016	Heavy Snow	0/0	$0

Location	Date	Event Type	Deaths/ Injuries	Property Damage
Northern Sangre De Cristo Mountains	12/16/2016	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/22/2016	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	12/24/2016	Winter Storm	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	1/5/2017	Heavy Snow	0/0	$50,000
East Slopes of the Sangre De Cristo Mountains	1/5/2017	Heavy Snow	0/0	$0
Far Northeast Highlands	1/5/2017	Heavy Snow	0/0	$50,000
Northern Sangre De Cristo Mountains	1/5/2017	Heavy Snow	0/0	$0
Far Northeast Highlands	1/15/2017	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	1/20/2017	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	1/23/2017	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	2/27/2017	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	2/27/2017	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	3/24/2017	Blizzard	0/0	$0
East Slopes of the Sangre De Cristo Mountains	3/24/2017	Blizzard	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	3/24/2017	Blizzard	0/0	$0
Northern Sangre De Cristo Mountains	4/3/2017	Heavy Snow	0/0	$0
East Slopes of the Sangre De Cristo Mountains	4/3/2017	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	4/3/2017	Winter Storm	0/0	$0
Far Northeast Highlands	4/3/2017	Winter Storm	0/0	$0
East Slopes of the Sangre De Cristo Mountains	4/28/2017	Heavy Snow	0/0	$0
Northern Sangre De Cristo Mountains	4/28/2017	Heavy Snow	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	4/29/2017	Heavy Snow	0/0	$0

Source : NCEI

4.6.4 Probability and Extent of Future Events

Snow and ice can be hazards in two respects: when they fall from the sky, they reduce visibility; and when they accumulate on the surface, they reduce traction and put a strain on power lines, roofs, and other structures. Severe winter storms have been and will continue to be a threat to the economic and social well-being of the Village.

Disruptions of emergency and other essential services are the main threats to the people and property. Isolated, rural communities and limited snow removal equipment exacerbate the effects of snow events in the community.

Given this approximate frequency, the probability of a future severe winter storm event to the entire planning area is "**Highly Likely**".

4.6.5 Vulnerability and Impact

Due to the altitude and terrain, the severity of winter storms impacts the entire community. The entire Village is vulnerable to severe winter storms with wind and light snow or ice. The severity of winter storms may vary from mild impacts to an extremely dangerous storm that can bring wind, snow and ice that can create whiteout conditions, hazards to safety, and

impacts to structures and infrastructure. A severe winter storm in Angel Fire would have the following types of impacts:

Overwhelm local capabilities to handle disruptions to emergency services, traffic, communications, and electric power when snow and ice-laden branches fall across power lines and interrupt service;

Cause school and business closures, as well as disruptions in transportation systems, electric power, telecommunications, and emergency services;

- Residents potentially running out of basic supplies, including food and fuel
- Livestock suffer from severe cold and lack of feed
- In extreme cases, building roof systems fail due to snow loading

Severe Winter Storms have occurred in the past and will occur again in the future. However, given the community's capabilities and adaptation of the extreme cold events and the relatively minor losses associated with this type of event, the overall vulnerability is considered to be low. For this update there was a data deficiency in cataloging and studying the expected damages from Severe Winter Storm within Angel Fire. Future plan updates should consider more study of the Severe Winter Storm risk.

4.6.6 Conclusions

Severe winter storms have been and will continue to be a threat to the economic and social well-being of Angel Fire. Disruptions of emergency and other essential services are the main threats to people and property.

One important part of mitigating severe weather is forecasting and warning so people can prepare. Communities can prepare for winter storms by stocking sand and salt to improve road conditions, advising people to stay home or to use caution if they must go out, and recommending that people stock up on food, water, batteries, and other supplies.

Future development should take into consideration the effects of winter storms, including excessive snow loading on roofs. Interior piping that is not insulated or protected can burst causing damage.

4.7 Thunderstorm (including Lightning/Hail)

4.7.1 Overview

Thunderstorms are generally produced when dry and cool air converges with warm moist air. Large cold fronts moving through areas of warm moist air can produce long lines of thunderstorm cells. Thunderstorms are responsible for much of the severe weather across New Mexico, particularly during the North American Monsoon season in the summer. The thunderstorm season in New Mexico is well defined, from early July to September. Thunderstorms are a frequent occurrence in July and August, especially over the northwest and north central mountains of New Mexico.

Thunderstorms are characterized by high winds, heavy rain, hail, lightning, and, on rare occasions, tornados. The National Weather Service defines a severe thunderstorm as a

thunderstorm with any of the following attributes: downbursts with winds of 58 miles (50 knots) per hour or greater (often with gusts of 74 miles per hour or greater), hail 0.75 of an inch in diameter or greater, or a tornado. Due the fact that high rainfall impacts are covered in the "Flood" section (**4.2**) and that both high winds and tornadoes have their own sections in this plan (**4.8** and **4.9** respectively), this section primarily focuses on hail and lightning.

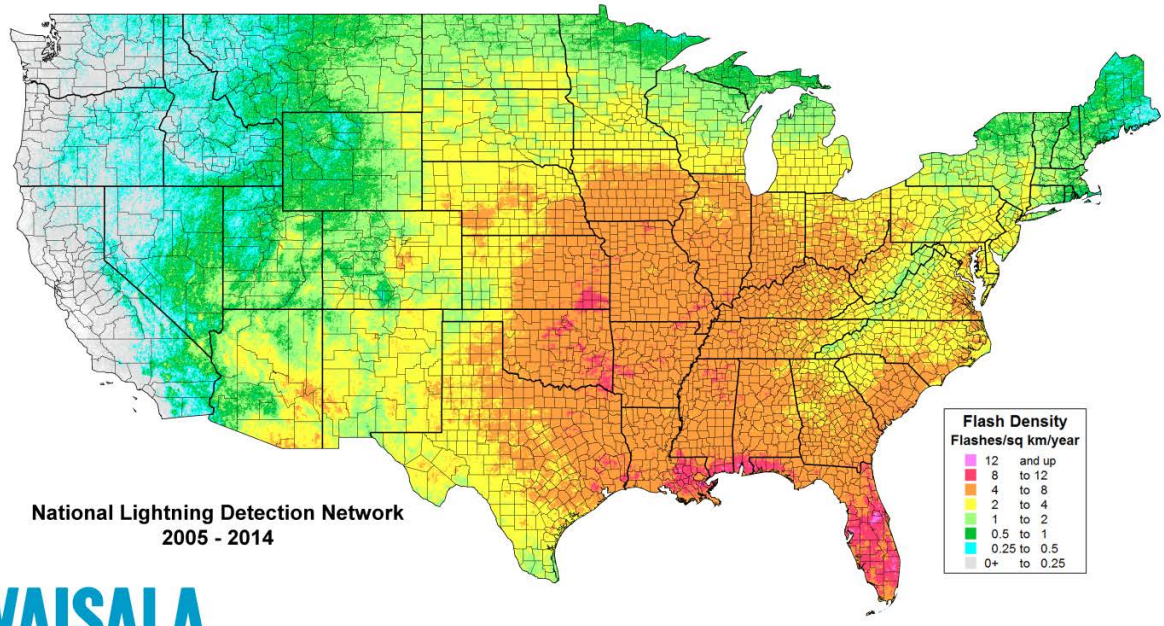
The 2013 State Plan describes lightning as "a sudden and violent discharge of electricity, usually from within a thunderstorm, due to a difference in electrical charges. Lightning is a flow of electrical current from cloud to cloud or cloud to ground." Hail is described as the movement of water droplets up and down inside the cloud. First, through cold air, where the droplets freeze and then warmer air temperatures, where additional water condenses on the frozen droplet. Layers of ice can be added to the frozen droplets which can become quite large, sometimes round or oval shaped and sometimes irregularly shaped. The frozen droplets of various sizes finally fall to the ground as hail. The failing ice is hard and depending on size can be very dangerous. Hail sizes can range from pea-sized to the size of a softball. The 2013 State Plan states that severe hailstorms most commonly occur in May, followed by June, July and April.

4.7.2 Location and Spatial Extent

All areas of Angel Fire are susceptible to thunderstorms (including lightning and hail), although local topography, such as elevation and land contours, plays a significant role in how weather affects a particular area. Thunderstorms can be either localized or widespread so their impact can vary depending on the size, strength and speed of the storm. At the time of storm occurrence, one neighborhood may experience severe damage while another, located nearby, escapes with minimal impact. Large-scale thunderstorms with multiple lightning strikes, hail and high wind would create the most impact over a wide area.

The Vaisala Flash Density map shown in **Figure 4.13** shows a lightening flash density of 2-4 flashes/square kilometer/year for the entire planning area. Specific records are not kept at the local level. Officials consider all thunderstorm events which contain lightning to be severe events and warrant evasive actions.

Figure 4.13: Flash Density Map



Source: Vaisala

The TORRO Hailstorm Intensity Scale in relation to typical damage and hail size is presented below in **Figure 4.14**. H0 to H1 hail intensity could typically be expected for the planning area.

Figure 4.14: TORRO Hailstorm Intensity Scale

Intensity Category		Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	Typical Damage Impacts
H0	Hard Hail	5	0-20	No damage
H1	Potentially Damaging	5-**15**	>20	Slight general damage to plants, crops
H2	Significant	10-**20**	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-**30**	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-**40**	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-**50**	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-**60**		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-**75**		Severe roof damage, risk of serious injuries
H8	Destructive	60-**90**		(Severest recorded in the British Isles) Severe damage to aircraft bodywork

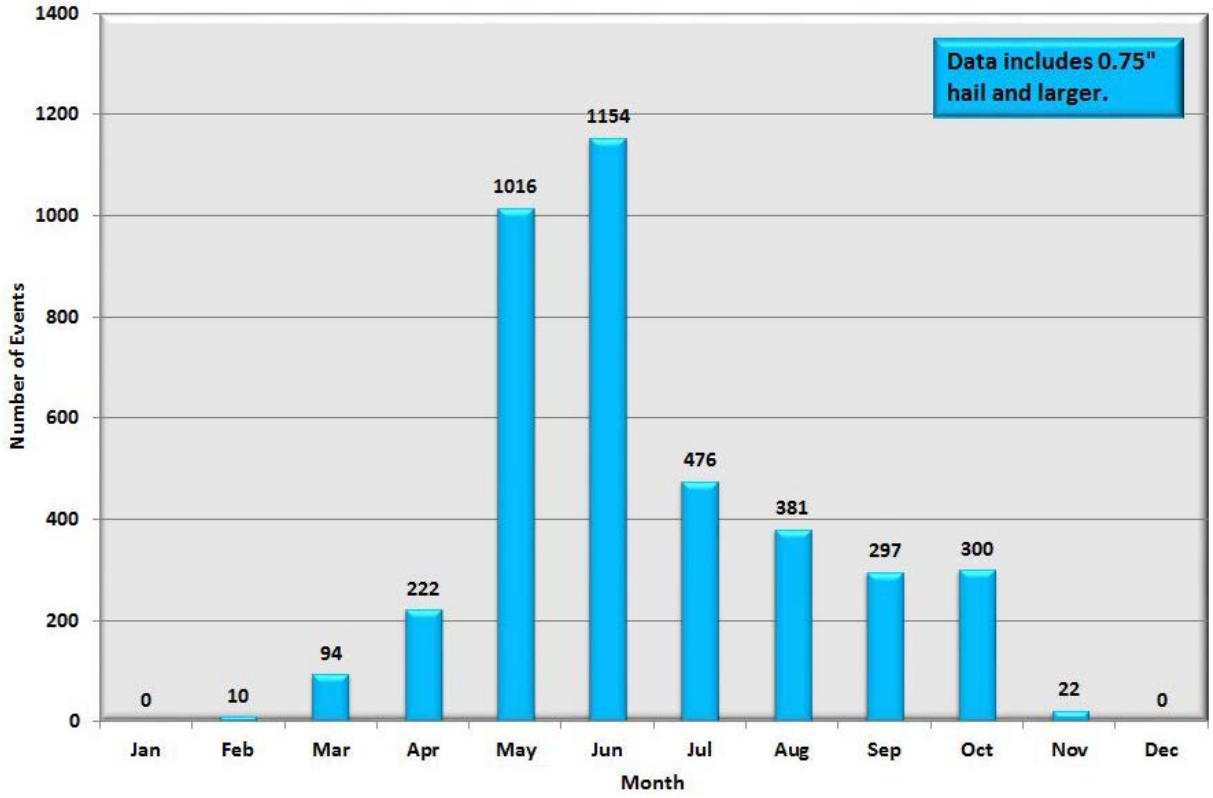
Intensity Category		Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	Typical Damage Impacts
H9	Super Hailstorms	75-**100**		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

The complex terrain of New Mexico, ranging from the eastern plains, to the high mountains across the northern and western regions, to the Rio Grande Valley, creates weather regimes that change quickly over relatively short distances. Thunderstorms (including lightning and hail) in Angel Fire may directly impact the entire community. The spatial extent of thunderstorms (including lightning and hail) is large.

4.7.3 Previous Occurrences

The NOAA Southern Region Headquarters website shows that May (1016 events) and June (1154) have had the most hail events in New Mexico from 1955 to 2016[7] as seen in **Figure 4.15**. According to NOAA, no damage was reported in Angel Fire due to lightning events through this same time period.

Figure 4.15: New Mexico Hail Events by Month (1955-2016)



Source: NOAA National Weather Service

[7] http://www.srh.noaa.gov/abq/?n=prephazards Accessed December 2017

The 2013 State Plan reports that there were 190 hail events in Colfax County from 1955 to 2012. By comparison, the counties experiencing the highest number of hail events during this timeframe are Eddy (383) and Lea (369). The 2013 State Plan also reports that of the hail events that affected Preparedness Area #2, including Angel Fire, $2,500 of property damage and $4,731,000 of crop damage occurred.

Table 4.11 shows a description of past hail and lightning events in Colfax County from 1980-2017. According to NCEI, Colfax County experienced 141 days with a hail event, including two of those dates with lightning, accumulating approximately $5.3 million in property damages.

Table 4.11: Hail and Lightning Previous Occurrences in Colfax County

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Colfax County	6/25/1982	Hail	1.50 in.	0/0	$0
Colfax County	6/26/1982	Hail	0.75 in.	0/0	$0
Colfax County	6/9/1983	Hail	1.50 in.	0/0	$0
Colfax County	6/2/1989	Hail	1.50 in.	0/0	$0
Colfax County	7/27/1990	Hail	0.75 in.	0/0	$0
Colfax County	7/27/1990	Hail	1.50 in.	0/0	$0
Colfax County	7/27/1990	Hail	1.00 in.	0/0	$0
Colfax County	7/27/1990	Hail	1.00 in.	0/0	$0
Colfax County	7/2/1991	Hail	0.75 in.	0/0	$0
Colfax County	5/31/1992	Hail	1.75 in.	0/0	$0
Colfax County	6/29/1992	Hail	1.75 in.	0/4	$0
Colfax County	7/17/1992	Hail	1.00 in.	0/0	$0
Raton	8/2/1993	Hail	1.00 in.	0/0	$5,000
Maxwell	8/2/1993	Hail	0.75 in.	0/0	$0
Springer	8/2/1993	Hail	2.75 in.	0/0	$5.000,000
Springer	8/2/1993	Hail	0.75 in.	0/0	$0
Colfax County	6/10/1994	Hail	1.75 in.	0/0	$50,000
Cimarron	5/5/1995	Hail	0.75 in.	0/0	$0
Angel Fire	5/5/1995	Hail	0.75 in.	0/0	$0
Cimarron	5/5/1995	Hail	0.75 in.	0/0	$0
Raton	5/5/1995	Hail	0.75 in.	0/0	$0
Colfax County	6/1/1995	Hail	1.00 in.	0/0	$0
Cimarron	6/2/1995	Hail	1.75 in.	0/0	$5,000
Raton	6/2/1995	Hail	0.75 in.	0/0	$0
Cimarron	6/3/1995	Hail	1.00 in.	0/0	$0
Raton	6/4/1995	Hail	0.00 in.	0/0	$0
Maxwell	5/30/1996	Hail	0.75 in.	0/0	$0
Raton	7/23/1996	Hail	0.75 in.	0/0	$0
Cimarron	7/26/1996	Hail	1.75 in.	0/0	$0
Cimarron	8/29/1996	Hail	1.75 in.	0/0	$0
Farley	8/30/1996	Hail	1.75 in.	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Springer	9/7/1996	Hail	0.75 in.	0/0	$0
Cimarron	5/30/1997	Hail	0.75 in.	0/0	$0
Springer	5/30/1997	Hail	50.00 in.	0/0	$0
Raton	6/2/1997	Hail	1.75 in.	0/0	$0
Maxwell	6/10/1997	Hail	1.00 in.	0/0	$0
Ute Park	6/25/1997	Hail	0.88 in.	0/0	$0
Raton	8/25/1997	Hail	0.75 in.	0/0	$0
Raton	8/29/1997	Hail	0.75 in.	0/0	$0
Raton	10/11/1997	Hail	0.75 in.	0/0	$0
Springer	6/7/1998	Hail	1.75 in.	0/0	$0
Raton	6/7/1998	Hail	1.50 in.	0/0	$0
Raton	7/1/1998	Hail	0.75 in.	0/0	$0
Eagle Nest	7/7/1998	Lightning		0/1	$0
Angel Fire	7/16/1998	Hail	0.88 in.	0/0	$0
Colfax	8/9/1998	Hail	0.75 in.	0/0	$0
Raton	9/23/1998	Hail	0.75 in.	0/0	$0
Maxwell	6/10/1999	Hail	0.88 in.	0/0	$0
Cimarron	6/11/1999	Hail	0.88 in.	0/0	$0
Springer	6/11/1999	Hail	1.00 in.	0/0	$0
Springer	6/11/1999	Hail	1.00 in.	0/0	$0
Eagle Nest	6/12/1999	Hail	0.75 in.	0/0	$0
Cimarron	6/17/1999	Hail	0.88 in.	0/0	$0
Springer	6/17/1999	Hail	0.75 in.	0/0	$0
Abbott	7/2/1999	Hail	0.75 in.	0/0	$0
Raton	7/5/1999	Hail	1.00 in.	0/0	$0
Cimarron	7/24/1999	Hail	0.88 in.	0/0	$0
Springer	4/28/2000	Hail	0.75 in.	0/0	$0
Abbott	6/27/2000	Hail	0.75 in.	0/0	$0
Raton	7/17/2000	Hail	1.25 in.	0/0	$0
Cimarron	7/21/2000	Hail	2.00 in.	0/0	$0
Cimarron	5/11/2001	Hail	1.00 in.	0/0	$0
Cimarron	5/11/2001	Hail	0.75 in.	0/0	$0
Springer	5/17/2001	Hail	0.75 in.	0/0	$0
Abbott	5/17/2001	Hail	1.75 in.	0/0	$0
Abbott	5/17/2001	Hail	1.00 in.	0/0	$0
Abbott	5/17/2001	Hail	1.75 in.	0/0	$0
Vermejo Park	5/28/2001	Hail	1.00 in.	0/0	$0
Ute Park	5/28/2001	Hail	0.88 in.	0/0	$0
Abbott	6/7/2001	Hail	1.75 in.	0/0	$0
Springer	8/25/2001	Hail	0.75 in.	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Abbott	4/12/2002	Hail	0.88 in.	0/0	$0
Abbott	6/13/2002	Hail	1.00 in.	0/0	$0
Abbott	6/13/2002	Hail	0.75 in.	0/0	$0
Raton	6/13/2002	Hail	0.75 in.	0/0	$0
Abbott	6/13/2002	Hail	0.75 in.	0/0	$0
Cimarron	6/14/2002	Hail	1.25 in.	0/0	$0
Maxwell	6/14/2002	Hail	1.75 in.	0/0	$0
Springer	6/14/2002	Hail	1.00 in.	0/0	$0
Springer	6/14/2002	Hail	1.75 in.	0/0	$0
Springer	6/20/2002	Hail	0.75 in.	0/0	$0
Raton	6/20/2002	Hail	0.88 in.	0/0	$0
Springer	8/28/2002	Hail	1.00 in.	0/0	$0
Raton	6/2/2003	Hail	0.75 in.	0/0	$0
Maxwell	6/4/2003	Hail	0.75 in.	0/0	$0
Springer	6/4/2003	Hail	0.75 in.	0/0	$0
Springer	6/4/2003	Hail	1.25 in.	0/0	$0
Springer	9/28/2003	Hail	1.75 in.	0/0	$0
Springer	9/28/2003	Hail	1.75 in.	0/0	$0
Springer	6/16/2004	Hail	0.75 in.	0/0	$0
Springer	6/16/2004	Hail	0.75 in.	0/0	$0
Springer	6/18/2004	Hail	1.00 in.	0/0	$0
Springer	6/18/2004	Hail	0.88 in.	0/0	$0
Springer	6/18/2004	Hail	0.88 in.	0/0	$0
Abbott	6/18/2004	Hail	1.00 in.	0/0	$0
Maxwell	6/19/2004	Hail	0.88 in.	0/0	$0
Maxwell	6/19/2004	Hail	0.88 in.	0/0	$0
Farley	6/19/2004	Hail	1.75 in.	0/0	$0
Farley	6/19/2004	Hail	1.25 in.	0/0	$0
Abbott	6/19/2004	Hail	1.25 in.	0/0	$0
Raton	6/21/2004	Hail	0.88 in.	0/0	$0
Raton	6/21/2004	Hail	1.75 in.	0/0	$0
Raton	6/21/2004	Hail	1.00 in.	0/0	$0
Raton	6/21/2004	Hail	1.75 in.	0/0	$300,000
Raton	6/21/2004	Hail	2.00 in.	0/0	$0
Raton	6/21/2004	Hail	1.75 in.	0/0	$0
Raton	6/21/2004	Hail	1.75 in.	0/0	$0
Raton	6/21/2004	Hail	1.75 in.	0/0	$0
Farley	6/21/2004	Hail	0.75 in.	0/0	$0
Maxwell	6/24/2004	Hail	1.00 in.	0/0	$0
Raton	8/11/2004	Hail	0.88 in.	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Cimarron	8/11/2004	Hail	0.88 in.	0/0	$0
Raton	8/12/2004	Hail	1.00 in.	0/0	$0
Springer	8/12/2004	Hail	1.75 in.	0/0	$0
Cimarron	8/14/2004	Hail	0.75 in.	0/0	$0
Maxwell	8/28/2004	Hail	1.25 in.	0/0	$0
Raton	5/22/2005	Hail	1.75 in.	0/0	$0
Maxwell	5/30/2005	Hail	1.75 in.	0/0	$0
Raton	5/30/2005	Hail	0.88 in.	0/0	$0
Raton	6/15/2005	Hail	1.75 in.	0/0	$0
Sugarite	6/30/2005	Hail	1.00 in.	0/0	$0
Raton	7/1/2005	Hail	0.75 in.	0/0	$0
Raton	7/6/2005	Hail	0.75 in.	0/0	$0
Eagle Nest	7/18/2005	Hail	0.75 in.	0/0	$0
Cimarron	6/24/2006	Hail	0.75 in.	0/0	$0
Maxwell	7/11/2006	Hail	0.75 in.	0/0	$0
Raton	8/17/2006	Lightning		0/1	$0
Abbott	8/17/2006	Hail	0.88 in.	0/0	$0
Raton	8/29/2006	Hail	0.88 in.	0/0	$0
Abbott	9/1/2006	Hail	0.75 in.	0/0	$0
Ute Park	5/16/2007	Hail	0.75 in.	0/0	$0
Cimarron	5/16/2007	Hail	1.00 in.	0/0	$0
Springer	6/9/2007	Hail	0.75 in.	0/0	$0
Springer	6/9/2007	Hail	0.75 in.	0/0	$0
Springer	6/26/2007	Hail	0.88 in.	0/0	$0
Cimarron	6/26/2007	Hail	0.75 in.	0/0	$0
Springer	6/26/2007	Hail	1.00 in.	0/0	$0
Raton	6/27/2007	Hail	0.75 in.	0/0	$0
Raton	6/28/2007	Hail	0.75 in.	0/0	$0
Raton	7/1/2007	Hail	0.75 in.	0/0	$0
Springer	7/2/2007	Hail	1.25 in.	0/0	$0
Raton	6/19/2008	Hail	0.88 in.	0/0	$0
Raton	6/19/2008	Hail	1.00 in.	0/0	$0
Ute Park	6/21/2008	Hail	0.75 in.	0/0	$0
Farley	8/14/2008	Hail	0.75 in.	0/0	$0
Van Houten	8/15/2008	Hail	1.25 in.	0/0	$0
Abbott	9/21/2008	Hail	0.75 in.	0/0	$0
Van Houten	7/5/2009	Hail	0.75 in.	0/0	$0
Ute Park	7/18/2009	Hail	0.75 in.	0/0	$0
Raton	7/31/2009	Hail	0.75 in.	0/0	$0
Maxwell	8/11/2009	Hail	1.00 in.	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Cimarron	5/17/2010	Hail	0.75 in.	0/0	$0
Springer	5/17/2010	Hail	1.75 in.	0/0	$0
Abbott	5/17/2010	Hail	1.75 in.	0/0	$0
Springer	5/17/2010	Hail	1.00 in.	0/0	$0
Abbott	5/17/2010	Hail	1.00 in.	0/0	$0
Farley	5/24/2010	Hail	1.00 in.	0/0	$0
Black Lake	6/12/2010	Hail	1.00 in.	0/0	$0
Farley	6/12/2010	Hail	1.25 in.	0/0	$0
Sugarite	7/10/2010	Hail	1.75 in.	0/0	$0
(Rtn) Raton Crews Airport	7/20/2010	Hail	1.00 in.	0/0	$0
(Rtn) Raton Crews Airport	6/1/2011	Hail	0.75 in.	0/0	$0
Springer	6/1/2011	Hail	1.00 in.	0/0	$0
Springer	6/1/2011	Hail	1.00 in.	0/0	$0
Raton	7/2/2011	Hail	1.00 in.	0/0	$0
Raton	8/2/2011	Hail	0.75 in.	0/0	$0
Raton	8/2/2011	Hail	1.00 in.	0/0	$0
Raton	8/10/2011	Hail	0.88 in.	0/0	$0
Springer	8/29/2011	Hail	1.75 in.	0/0	$0
Springer	5/21/2012	Hail	1.50 in.	0/0	$0
Maxwell	5/31/2012	Hail	1.50 in.	0/0	$0
Raton Crews Airport	6/12/2012	Hail	1.00 in.	0/0	$0
Springer	6/20/2012	Hail	1.00 in.	0/0	$0
Cimarron	6/20/2012	Hail	1.00 in.	0/0	$0
Cimarron	6/20/2012	Hail	1.00 in.	0/0	$0
Black Lake	7/1/2012	Hail	0.75 in.	0/0	$0
Eagle Nest	8/17/2012	Hail	0.88 in.	0/0	$0
Cimarron	5/24/2013	Hail	0.75 in.	0/0	$0
Maxwell	5/24/2013	Hail	0.88 in.	0/0	$0
(Rtn)Raton Crews Airport	5/24/2013	Hail	1.75 in.	0/0	$0
Van Houten	6/18/2013	Hail	0.88 in.	0/0	$0
Raton	6/18/2013	Hail	1.25 in.	0/0	$0
Raton	6/18/2013	Hail	1.00 in.	0/0	$0
Cimarron	8/7/2013	Hail	1.00 in.	0/0	$0
Cimarron	8/7/2013	Hail	0.88 in.	0/0	$0
Cimarron	8/7/2013	Hail	1.75 in.	0/0	$0
Raton	9/19/2013	Hail	0.88 in.	0/0	$0
Cimarron	5/22/2014	Lightning		1/0	$0
Cimarron	6/6/2014	Hail	1.50 in.	0/0	$0
Cimarron	6/6/2014	Hail	0.88 in.	0/0	$0
Maxwell	6/6/2014	Hail	1.75 in.	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Maxwell	6/6/2014	Hail	2.50 in.	0/0	$10,000
(Rtn)Raton Crews Airport	6/8/2014	Hail	1.00 in.	0/0	$0
Raton	6/8/2014	Hail	1.00 in.	0/0	$0
Maxwell	6/23/2014	Hail	0.88 in.	0/0	$0
Raton	6/24/2014	Hail	1.00 in.	0/0	$0
Black Lake	7/17/2014	Hail	0.75 in.	0/0	$0
Cimarron	9/4/2014	Hail	1.00 in.	0/0	$0
Cimarron	9/4/2014	Hail	1.00 in.	0/0	$0
Raton	5/26/2015	Hail	0.75 in.	0/0	$0
Farley	5/29/2015	Hail	1.00 in.	0/0	$0
Raton Crews Airport	5/30/2015	Hail	1.50 in.	0/0	$0
Maxwell	6/5/2015	Hail	1.00 in.	0/0	$0
Maxwell	6/5/2015	Hail	1.00 in.	0/0	$0
Maxwell	6/6/2015	Hail	1.00 in.	0/0	$0
Springer	6/7/2015	Hail	1.25 in.	0/0	$0
Vermejo Park	6/16/2015	Hail	1.25 in.	0/0	$2,000
Sugarite	6/17/2015	Hail	1.00 in.	0/0	$0
Maxwell	6/22/2015	Hail	0.75 in.	0/0	$0
Maxwell	8/14/2015	Hail	1.00 in.	0/0	$0
Raton	6/5/2016	Hail	1.00 in.	0/0	$0
Raton	7/8/2016	Hail	1.25 in.	0/0	$0
Raton	7/8/2016	Hail	1.25 in.	0/0	$0
Abbott	7/8/2016	Hail	2.75 in.	0/0	$30,000
Van Houten	9/14/2016	Hail	1.75 in.	0/0	$0
Farley	6/5/2017	Hail	0.75 in.	0/0	$0
Springer	6/25/2017	Hail	1.75 in.	0/0	$0
(Rtn)Raton Crews Airport	6/30/2017	Hail	0.88 in.	0/0	$0
Vermejo Park	6/30/2017	Hail	0.75 in.	0/0	$0
Vermejo Park	7/1/2017	Hail	1.50 in.	0/0	$0
Springer	9/30/2017	Hail	1.25 in.	0/0	$0

Source: NCEI

4.7.4 Probability and Extent of Future Events

Angel Fire experiences thunderstorms with hail and/or lightning on a fairly frequent basis. The 2013 State Plan reports that New Mexico ranks sixth in the nation in lightning fatalities with 0.55 deaths per million people annually. The State ranks 22nd in lightning frequency overall. While typical thunderstorms can be expected almost 100% annually, thunderstorms that are capable of producing lightning and hail severe enough to threaten safety and property are considered "**Likely**".

4.7.5 Vulnerability and Impact

Vulnerability to the effects of thunderstorms on buildings is dependent on the age of the building (and what building codes were in effect at the time it was built), type of construction, and condition of the structure (how well the structure has been maintained). All of the planning areas critical facilities are vulnerable to potential disruption of services and transportation systems as well as disruptions to emergency communications capabilities. Electric and telephone services are particularly vulnerable to disruption.

For this update there was a data deficiency in cataloging and studying the expected damages from Thunderstorms within Angel Fire. Future plan updates should consider more study of the Thunderstorm risk. The most probable impact of a thunderstorm in Angel Fire is lightning. Other impacts of thunderstorms, flood and wildfire ignition, are addressed in **Sections 4.2** and **4.3** respectively. The potential impacts of hail and lightning to Angel Fire are:

- Local capabilities to handle disruptions to emergency services, traffic, communications, and electric power are overwhelmed
- Hail causes damage to property (particularly crops, roof systems of building, and vehicles)
- Lightning strikes a person or animal causing severe injury or death
- Lightning directly strikes a building causing damage or strikes a tree that falls on a building, person, animal or vehicle
- Lightning strikes ignite a wildfire that threatens the safety of people and destroy property
- Lightning causes a power surge in a building's electrical system that damages the system and/or electronic equipment plugged into the system

4.7.6 Conclusions

One important part of mitigating severe weather is forecasting and warning so people can prepare. Communities can be notified of approaching severe thunderstorms and take action to seek shelter or get out of the path of the storm. Important community structures and critical facilities should have their electric and roof systems evaluated for vulnerability to hail and lightning. Electronic systems should be unplugged once warning of a thunderstorm has been issued.

4.8 High Wind

4.8.1 Overview

High winds that damage property and endanger the safety of people and animals come from a variety of sources. High winds in New Mexico are usually generated by severe thunderstorms and severe winter storms. Angel Fire is Wind Speed Zone II; experiencing wind speeds up to 160 mph (see **Figure 4.16**).

Wind is defined by FEMA's Multi-Hazard Identification and Risk Assessment as "the motion of air relative to the earth's surface." A microburst is a strong, localized thunderstorm downdraft which, when it strikes the surface, produces winds affecting an area less than 2.5 miles across.

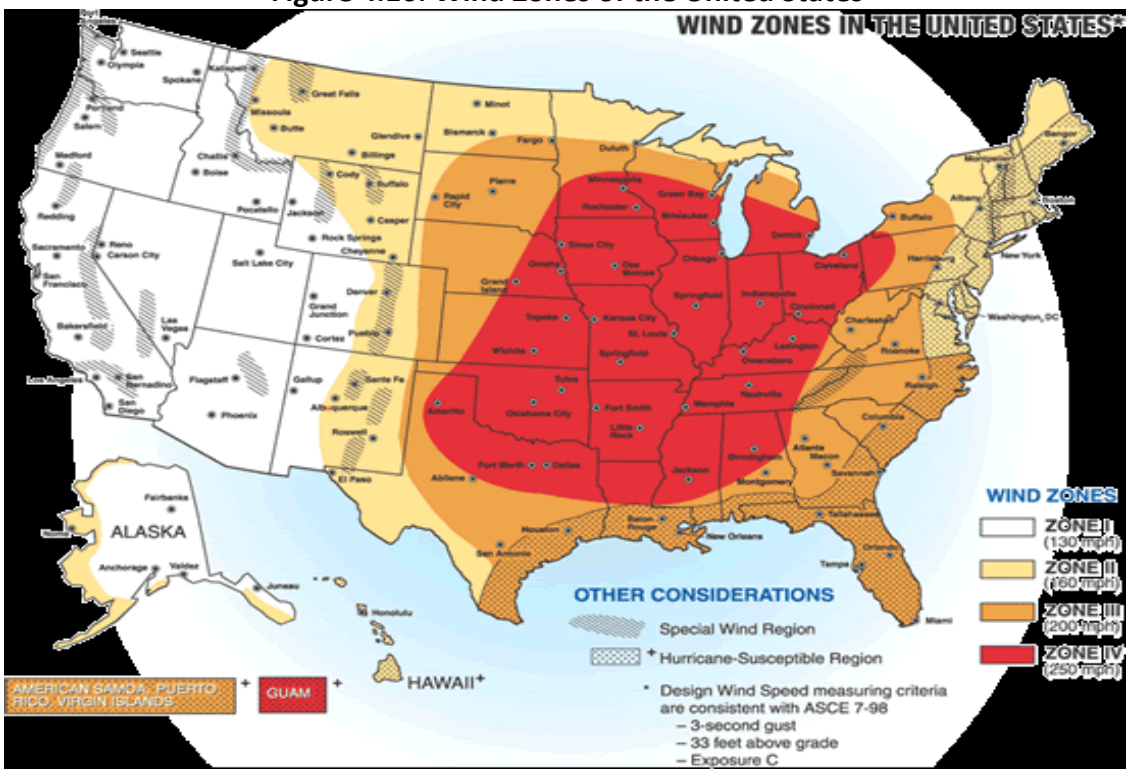
A microburst according to the US Weather Service "is a small area of rapidly descending air beneath a thunderstorm. When the descending air hits the ground, it quickly spreads out in all directions, causing very strong, strait-line winds." A microburst forms "inside a thunderstorm, [when] water vapor condenses into raindrops, which then fall to the ground. When these raindrops fall through the air, they start to evaporate. The evaporation cools the air, causing it to become denser than the air around it. This rain-cooled air, along with the falling raindrops, accelerates downwards; it is this down-rushing air that eventually hits the ground … causing the damaging straight-line winds."

High winds are considered hazards when the winds cause direct damage to crops, buildings or infrastructure through impacts to the buildings themselves or causing debris or trees to crash into the asset creating damage. Flying debris in high winds can also cause injuries to people and animals.

4.8.2 Location and Spatial Extent

High winds are a hazard that generally has a large geographic impact being caused by larger scale storms, like thunderstorms and winter storms. Angel Fire's location in wind speed zone II means a fairly low possibility of extreme wind speeds up to 160 mph.

Figure 4.16: Wind Zones of the United States



Source: 2013 State Plan (originally from ASCE 7-10)

The Beaufort Wind Scale in **Figure 4.17** shows the specific effects that various wind speed has on land. The entire planning area can experience all 12 Beaufort categories.

Figure 4.17: Beaufort Scale

Beaufort number	Mean wind speed (kt / km/h / mph)	*Description*	Land conditions
0	0 / 0 / 0	Calm	Calm. Smoke rises vertically.
1	2 / 4 / 2	Light air	Wind motion visible in smoke.
2	5 / 9 / 6	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	9 / 17 / 11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13 / 24 / 15	Moderate breeze	Dust and loose paper raised. Small branches begin to move.
5	19 / 35 / 22	Fresh breeze	Smaller trees sway.
6	24 / 44 / 27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	30 / 56 / 35	Near gale	Whole trees in motion. Effort needed to walk against the wind.
8	37 / 68 / 42	Gale	Twigs broken from trees. Cars veer on road.
9	44 / 81 / 50	Strong galc	Light structurc damagc.
10	52 / 96 / 60	Storm	Trees uprooted. Considerable structural damage.
11	60 / 111 / 69	Violent storm	Widespread structural damage.
12	N/A	Hurricane	Massive and widespread damage to structures

4.8.3 Previous Occurrences

Angel Fire frequently experiences high wind events. Colfax County has experienced 89 days with thunderstorm wind and high wind events from January 1992 to December 2017 as shown

in **Table 4.12**. These events have occurred over that period of time during any given month. While most of New Mexico experiences high wind events primarily in the months of March, April, and May, Colfax County high wind events typically happen between October and May. Colfax County winds routinely exceed 40 mph, and 60 mph wind speeds are not uncommon. Other events called microbursts generate damage similar to a tornado. According to NCEI, these events have accumulated approximately $884,000 in property damages

Table 4.12: High Wind Previous Occurrences for Colfax County

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Colfax County	6/29/1992	Thunderstorm Wind	0 kts.	0/3	$0
Raton	10/11/1997	Thunderstorm Wind		0/0	$10,000
Springer	10/11/1997	Thunderstorm Wind		0/0	$20,000
Raton	10/11/1997	Thunderstorm Wind	52 kts.	0/0	$30,000
Raton	6/7/1998	Thunderstorm Wind		0/0	$2,000
Raton Crews Airport	5/22/2006	Thunderstorm Wind	58 kts. MG	0/0	$0
Raton Crews Airport	5/22/2006	Thunderstorm Wind	50 kts. MG	0/0	$0
(Rtn)Raton Crews Airport	8/22/2007	Thunderstorm Wind	52 kts. MG	0/0	$0
Abbott	6/22/2008	Thunderstorm Wind	65 kts. EG	0/0	$5,000
Raton Crews Airport	6/14/2009	Thunderstorm Wind	56 kts. MG	0/0	$0
Raton Crews Airport	7/28/2009	Thunderstorm Wind	54 kts. MG	0/0	$0
(Rtn)Raton Crews Airport	7/28/2009	Thunderstorm Wind	53 kts. MG	0/0	$0
Maxwell	8/11/2009	Thunderstorm Wind	52 kts. EG	0/0	$0
Far Northeast Highlands (Zone)	9/30/2009	High Wind	50 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	1/22/2010	High Wind	50 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	3/27/2010	High Wind	50 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	4/1/2010	High Wind	42 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	4/1/2010	High Wind	59 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	4/1/2010	High Wind	52 kts. EG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	4/6/2010	High Wind	50 kts. EG	0/0	$0
Far Northeast Highlands (Zone)	4/13/2010	High Wind	62 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	4/28/2010	High Wind	41 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	4/29/2010	High Wind	51 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	4/29/2010	High Wind	53 kts. MG	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Raton Ridge/Johnson Mesa (Zone)	4/29/2010	High Wind	35 kts. MS	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	5/6/2010	High Wind	36 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	5/10/2010	High Wind	37 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	5/11/2010	High Wind	61 kts. MG	0/0	$0
Raton Crews Airport	7/20/2010	Thunderstorm Wind	53 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	10/25/2010	High Wind	61 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	10/25/2010	High Wind	37 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	12/15/2010	High Wind	64 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	12/20/2010	High Wind	53 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	12/21/2010	High Wind	56 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	12/29/2010	High Wind	55 kts. MG	0/0	$5,000
Far Northeast Highlands (Zone)	4/3/2011	High Wind	35 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	4/9/2011	High Wind	62 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	4/9/2011	High Wind	43 kts. ES	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	4/29/2011	High Wind	64 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	4/29/2011	High Wind	51 kts. MG	0/0	$0
Raton Crews Airport	7/9/2011	Thunderstorm Wind	56 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	10/6/2011	High Wind	58 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	10/6/2011	High Wind	39 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	11/2/2011	High Wind	50 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	11/5/2011	High Wind	53 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	11/5/2011	High Wind	50 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	11/12/2011	High Wind	54 kts. MG	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
East Slopes Of The Sangre De Cristo Mountains	11/13/2011	High Wind	56 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	12/1/2011	High Wind	61 kts. EG	0/0	$7,500
East Slopes Of The Sangre De Cristo Mountains	1/18/2012	High Wind	52 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	1/21/2012	High Wind	51 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	2/23/2012	High Wind	60 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	2/23/2012	High Wind	55 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	2/28/2012	High Wind	57 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	2/28/2012	High Wind	55 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/28/2012	High Wind	61 kts. EG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	2/28/2012	High Wind	56 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	2/28/2012	High Wind	53 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	2/28/2012	High Wind	39 kts. MS	0/0	$0
Northern Sangre De Cristo Mountains	3/1/2012	High Wind	56 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	3/7/2012	High Wind	58 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	3/18/2012	High Wind	50 kts. EG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	3/18/2012	High Wind	51 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	3/18/2012	High Wind	58 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	4/2/2012	High Wind	52 kts. EG	0/0	$375,000
Raton Ridge/Johnson Mesa (Zone)	4/2/2012	High Wind	61 kts. EG	0/0	$375,000
Far Northeast Highlands (Zone)	4/14/2012	High Wind	64 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	4/26/2012	High Wind	52 kts. EG	0/0	$0
Far Northeast Highlands (Zone)	4/26/2012	High Wind	60 kts. MG	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
East Slopes Of The Sangre De Cristo Mountains	4/27/2012	High Wind	52 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	5/26/2012	High Wind	40 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	5/26/2012	High Wind	56 kts. MG	0/0	$0
Raton Crews Airport	6/6/2012	Thunderstorm Wind	55 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	11/10/2012	High Wind	35 kts. MS	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	11/10/2012	High Wind	35 kts. ES	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	11/10/2012	High Wind	52 kts. EG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	12/14/2012	High Wind	52 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	12/19/2012	High Wind	50 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	1/11/2013	High Wind	69 kts. EG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	1/11/2013	High Wind	50 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	2/9/2013	High Wind	57 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	3/23/2013	High Wind	52 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	3/23/2013	High Wind	55 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	4/14/2013	High Wind	40 kts. MS	0/0	$0
Far Northeast Highlands (Zone)	4/14/2013	High Wind	56 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	11/16/2013	High Wind	50 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	11/17/2013	High Wind	53 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	11/25/2013	High Wind	53 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	1/30/2014	High Wind	72 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	1/30/2014	High Wind	53 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	2/16/2014	High Wind	50 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	2/16/2014	High Wind	50 kts. MG	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Far Northeast Highlands (Zone)	3/17/2014	High Wind	54 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	3/17/2014	High Wind	35 kts. ES	0/0	$5,000
Far Northeast Highlands (Zone)	3/26/2014	High Wind	52 kts. MG	0/0	$20,000
East Slopes Of The Sangre De Cristo Mountains	3/30/2014	High Wind	53 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	3/30/2014	High Wind	56 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	4/27/2014	High Wind	50 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	6/4/2014	High Wind	50 kts. MG	0/0	$0
Abbott	6/6/2014	Thunderstorm Wind	52 kts. EG	0/0	$5,000
Raton Crews Airport	6/22/2015	Thunderstorm Wind	50 kts. MG	0/0	$0
Maxwell	6/22/2015	Thunderstorm Wind	61 kts. EG	0/0	$25,000
East Slopes Of The Sangre De Cristo Mountains	11/10/2015	High Wind	35 kts. MS	0/0	$0
Northern Sangre De Cristo Mountains	12/22/2015	High Wind	59 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	12/22/2015	High Wind	52 kts. EG	0/0	$0
Far Northeast Highlands (Zone)	1/30/2016	High Wind	61 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	2/17/2016	High Wind	57 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/18/2016	High Wind	50 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	3/22/2016	High Wind	71 kts. MG	0/0	$0
(AXX)Angel Fire Airport	5/16/2016	Thunderstorm Wind	50 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	10/17/2016	High Wind	50 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	11/17/2016	High Wind	57 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	11/17/2016	High Wind	52 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	11/17/2016	High Wind	57 kts. MG	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	11/17/2016	High Wind	54 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	12/11/2016	High Wind	61 kts. EG	0/0	$0

Location	Date	Event Type	Magnitude	Deaths/Injuries	Property Damage
Far Northeast Highlands (Zone)	12/16/2016	High Wind	54 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	12/25/2016	High Wind	50 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	12/25/2016	High Wind	50 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	1/8/2017	High Wind	57 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	1/9/2017	High Wind	70 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	1/9/2017	High Wind	59 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	1/9/2017	High Wind	57 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	1/10/2017	High Wind	59 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	1/10/2017	High Wind	53 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	2/6/2017	High Wind	50 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	2/6/2017	High Wind	57 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	2/6/2017	High Wind	57 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	2/23/2017	High Wind	60 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	2/23/2017	High Wind	36 kts. MS	0/0	$0
Raton Ridge/Johnson Mesa (Zone)	2/28/2017	High Wind	54 kts. MG	0/0	$0
Northern Sangre De Cristo Mountains	3/6/2017	High Wind	70 kts. MG	0/0	$0
East Slopes Of The Sangre De Cristo Mountains	3/6/2017	High Wind	60 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	3/6/2017	High Wind	52 kts. MG	0/0	$0
Far Northeast Highlands (Zone)	3/23/2017	High Wind	60 kts. MG	0/0	$0
Raton Crews Airport	5/6/2017	Thunderstorm Wind	50 kts. MG	0/0	$0

Source: NCEI

4.8.4 Probability and Extent of Future Events

Given the fairly frequent occurrence of high wind in Angel Fire, the probability of a future event is "**Highly Likely**".

4.8.5 Vulnerability and Impact

Angel Fire experiences high wind frequently, based on seasonal meteorological patterns and local topographical conditions. All areas of the community are vulnerable to high winds, although local topography plays a significant role in how wind affects a particular area. Compared to the hurricane-prone southeastern U.S. coast, the vulnerability is not as high.

For this update there was a data deficiency in cataloging and studying the expected damages from high winds within Angel Fire. Future plan updates should consider more study of the high wind risk. The likely impacts of high winds in Angel Fire would be damage to manufactured homes, disruption of power and telephone services, highway closures, and disruptions to emergency communications capabilities. Additional future studies should focus on the vulnerability of key public facilities to high wind.

4.8.6 Conclusions

Mitigation opportunities for high wind in Angel Fire include adopting updated building codes. For existing residential structures, the most effective mitigation actions focus on the most vulnerable structures, particularly manufactured and mobile homes. These structures can be inspected for adequate tie-downs and retrofitted if necessary. Angel Fire should examine its critical facilities for wind retrofits first. Subsequent updates to this Plan will explore this further.

4.9 Extreme Heat

4.9.1 Overview, Previous Occurrences, Location, Probability and Severity

Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and that last for an extended period of time. Humid conditions may also add to the discomfort of high temperatures. Health risks from extreme heat include heat cramps, heat fainting, heat exhaustion, and heat stroke. According to the National Weather Service, heat is one the leading weather-related killers in the United States and kills hundreds of people every year[8]. However, most deaths are attributed to prolonged heat waves in large cities that rarely experience hot weather. It is important to note that while extreme temperatures threaten human health, they typically do not cause significant damage to the built environment. The elderly and the ill are most at-risk, along with those who exercise outdoors in hot, humid weather.

The 2013 State Plan reports that that in New Mexico, at elevations below 5,000 feet, individual day-time temperatures often exceed 100°F during the summer months. However, during July, the warmest month, temperatures range from slightly above 90°F in the lower elevations to 70°F in the higher elevations. Angel Fire is located in the higher altitudes which helps buffer it

[8] http://www.nws.noaa.gov/os/heat/index.shtml#heatindex Accessed August 2013

from some of the higher temperatures. However, at these higher altitudes, ultraviolet (UV) radiation from the sun increases (4% for every 1,000 feet of altitude) exacerbating the heat effects.

The danger of extreme heat is gauged by using the Extreme Heat Index (below). The Heat Index, as shown in **Figure 4.18**, displays the relative danger in relation to air temperature and relative humidity.

Figure 4.18: Extreme Heat Index

Temperature (F)

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

Caution | Extreme Caution | Danger | Extreme Danger

Source: http://www.nc-climate.ncsu.edu/images/climate/heat_index.jpg

The 2013 State Plan reports that there have been three extreme heat events that occurred in all Preparedness Areas, including Preparedness Area #2, and can be interpreted to have affected Angel Fire. These events are listed in **Table 4.13**, along with the maximum temperature observed at the Angel Fire 1 S weather station, located four miles north-northwest of the Village Post Office. Dew point, which is needed to estimate relative humidity, is not recorded at that station; thus, the heat index cannot be estimated. There have been no reported deaths as a result of these events.

Table 4.13: Previous Occurrences of Extreme Heat, with Maximum Recorded Temperature at Angel Fire NM S 1 Weather Station

Date	Statewide Impact Description	Max Temperature
June 1998	Conditions had been unusually warm and dry throughout the month, but the heat intensified beginning on the 20th with daily high temperatures climbing well above 100°F, except in mountain communities at elevations above 7,500 feet. Readings in the southeast section of the state peaked at 108 to 113°F as these locations exceeded 10 consecutive days with daily highs above 100°F. New records for duration of 100+ degree-days were set from Carlsbad north to Clovis and Tucumcari. The heat broke records that had lasted 60 to 70 years. By the end of the month a number of locations in the east had observed 16 to	92°F (NCEI)

	20 days with a daily high over 100°F.	
May 24, 2000	New daily high temperature records were set across the state as temperatures soared into the high 90s and 100s all across the east and south. Record highs in the mid and upper 80s were also set in the higher elevation communities of both the south central, central and northern mountains.	No data available. (NCEI)
July 2003	Hottest month ever recorded in New Mexico. There were 14 days of highs of 100°F or more, and no cooling at night. A new all-time high low temperature of 78°F is set. 21 days do not go below 70°F. Average temperature of 84.6°F for the entire month shatters 1980 record of 82.7°F.	88°F (NCEI)

Source: 2013 State Plan, https://www.ncdc.noaa.gov/cdo-web/quickdata, Accessed June 2018.

Angel Fire considers any extended period with temperatures above 90°F to be hazardous and cause for concern. The entire planning area is equally subject to extreme heat. The probability of extreme heat occurring in the future is "**Possible**". The spatial extent of the damage is negligible.

4.9.2 Vulnerability and Conclusions

While extreme heat events will occur again in the future, Angel Fire's existing buildings, infrastructure, and critical facilities are not considered vulnerable and therefore any estimated property losses are anticipated to be minimal across the area. For this HMP there was a data deficiency in cataloging and studying the expected damages from extreme heat within Angel Fire. Extreme heat does however present a considerable safety risk to Angel Fire's vulnerable populations. Heat casualties are usually caused by lack of adequate air conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirm, who frequently live on low fixed incomes, and cannot afford to run air-conditioning on a regular basis, may experience power outages, and may be isolated, with no immediate family or friends to look out for their well-being. Young children are also extremely vulnerable to heat, particularly when left unattended in the elements.

During extreme heat episodes, the elderly should seek shelter in air-conditioned spaces. Due to the lack of mitigation options for extreme heat, this hazard is considered a nuisance and will not be addressed in the rest of the plan except for an action to designate a cooling center for Angel Fire during times of extreme heat and an education program on the dangers of extreme heat and children, the elderly, and infirm. If future conditions or events warrant further investigation, a future update to this Plan will address it.

4.10 Erosion

4.10.1 Overview

Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

There are two types of soil erosion: wind erosion and water erosion. Wind erosion can cause significant soil loss. Winds blowing across sparsely vegetated or disturbed land can pick up soil particles and carry them through the air, thus displacing them. Water erosion can occur over

land or in streams and channels. Water erosion that takes place over land may result from raindrops, shallow sheets of water flowing off the land, or shallow surface flow, which becomes concentrated in low spots. Stream channel erosion may occur as the volume and velocity of water flow increases enough to cause movement of the streambed and bank soils. Major storms, such hurricanes in coastal areas, may cause significant erosion by combining high winds with heavy surf and storm surge to significantly impact the shoreline.

An area's potential for erosion is determined by four factors: soil characteristics, vegetative cover, topography climate or rainfall, and topography. Soils composed of a large percentage of silt and fine sand are most susceptible to erosion. As the clay and organic content of these soils increases, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the velocity of runoff. Runoff is also affected by the topography of the area including size, shape, and slope. The greater the slope length and gradient, the more potential an area has for erosion. Climate can affect the amount of runoff, especially the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementation of erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with harmful chemicals run-off due to wind or water events. The increase in government regulatory programs and public concern has resulted in a wide range of erosion control products, techniques, and analytical methodologies in the United States. The preferred method of erosion control in recent years has been the restoration of vegetation.

Sinkholes are mentioned in this section as an associated hazard to erosion. While sinkhole topography is not a major concern in the area, human-caused sinkholes are possible. The three general types of sinkholes are: subsidence, solution, and collapse. Subsidence sinkholes form gradually where the overburden (the sediments and water that rest on the limestone) is thin and only a veneer of sediments is overlying the limestone. Solution sinkholes form where no overburden is present and the limestone is exposed at land surface. Collapse sinkholes are most common in areas where the overburden is thick, but the confining layer is breached or absent. Collapse sinkholes can form with little warning and leave behind a deep, steep-sided hole.

Sinkholes occur in many shapes, from steep-walled holes to bowl or cone shaped depressions. Sinkholes are dramatic because the land generally stays intact for a while until the underground spaces get too big. If there is not enough support for the land above the spaces, then a sudden collapse of the land surface can occur. Under natural conditions, sinkholes form slowly and expand gradually. However, human activities such as dredging, constructing reservoirs, diverting surface water and pumping groundwater can accelerate the rate of sinkhole expansions, resulting in the abrupt formation of collapse sinkholes.

Although a sinkhole can form without warning, specific signs can signal potential development:

- Slumping or falling fence posts, trees, or foundations
- Sudden formation of small ponds
- Wilting vegetation
- Discolored well water
- Structural cracks in walls

Sinkhole formation is exacerbated by urbanization. Development increases water usage, alters drainage pathways, overloads the ground surface and redistributes soil. According to FEMA, the number of human-induced sinkholes has doubled since 1930 and insurance claims for damages as a result of sinkholes has increased 1,200 percent from 1987 to 1991, costing nearly $100 million. Human-caused sinkholes are also possible as a result of erosion.

4.10.2 Previous Occurrences

According to the HMPT, there have been no significant erosion events in the past.

4.10.3 Probability and Extent of Future Events

Erosion remains a natural, dynamic, and continuous process for Angel Fire, and it will continue to occur. The annual probability level assigned for erosion is **"Possible"** (between 1 and 10 percent annually).

4.10.4 Vulnerability and Impact

Erosion in the Village of Angel Fire is typically caused by flash flooding events. Erosion occurs in the Village, particularly along the banks of rivers and streams, but is also a threat to the mountains. Enough rain and runoff can cause the soil to deteriorate causing soil, rocks and trees to slide down the mountain. This hazard ranked "low" in the 2013 State Plan. Sinkhole occurrences may occur in places where an underground water pipe resides.

4.10.5 Conclusions

One important part of mitigating erosion is forecasting severe rain and early warning so people can prepare. Communities can be notified of approaching severe thunderstorms and take action to seek shelter or get out of the path of the storm and possible areas at high risk for erosion.

4.11 Volcanic Activity

4.11.1 Overview

A volcano is a vent through which molten rock escapes to the earth's surface. Unlike other mountains, which are pushed up from below, volcanoes are built by surface accumulation of their eruptive products (e.g., lava, pyroclastic flows and surges, and ashfall). When pressure from gases within a magma chamber becomes too great to be contained, an eruption occurs. Volcanic hazards include gases; lava flows, pyroclastic flows and surges; ashfall; volcanic mudflows (lahars), landslides; and earthquakes. Volcanoes produce a wide variety of hazards

that can kill people and destroy property. Large explosive eruptions can endanger people and property hundreds of miles away and even affect global climate.

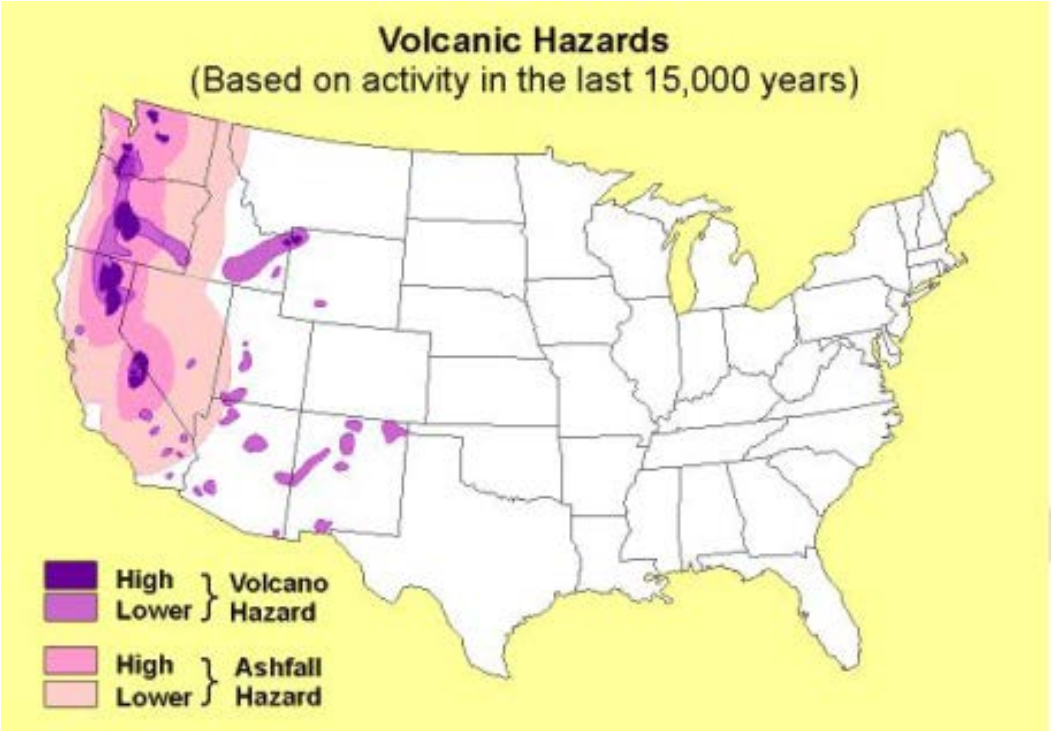
Eruptions can be relatively passive; producing lava flows that creep across the land at 2 to 10 mph. However, explosive eruptions can shoot columns of gases and rock fragments tens of miles into the atmosphere, producing devastating pyroclastic flows and surges, or depositing volcanic ash hundreds of miles downwind. The eruptive styles of volcanoes in New Mexico encompass the entire severity range from dangerously explosive to passive.

Lava flows are streams of molten rock that either pour from a vent quietly or through mildly explosive lava fountains. Lava flows destroy virtually everything in their path, but most move slowly enough that people can move out of the way. The speed at which lava moves across the ground depends on several factors, including the type of lava erupted, which influences the viscosity, the steepness of the ground, and the rate of lava production at the vent. Although lava flows are typically not dangerous to human life, because of their intense heat, they are a significant fire hazards.

The United States is third in the world, after Japan and Indonesia, for the number of active volcanoes. Since 1980, as many as five volcanoes have erupted each year in the United States. Eruptions are most likely to occur in Hawaii and Alaska. For the Cascade Range in Washington, Oregon, and California, volcanoes erupt on the average of once or twice each century.

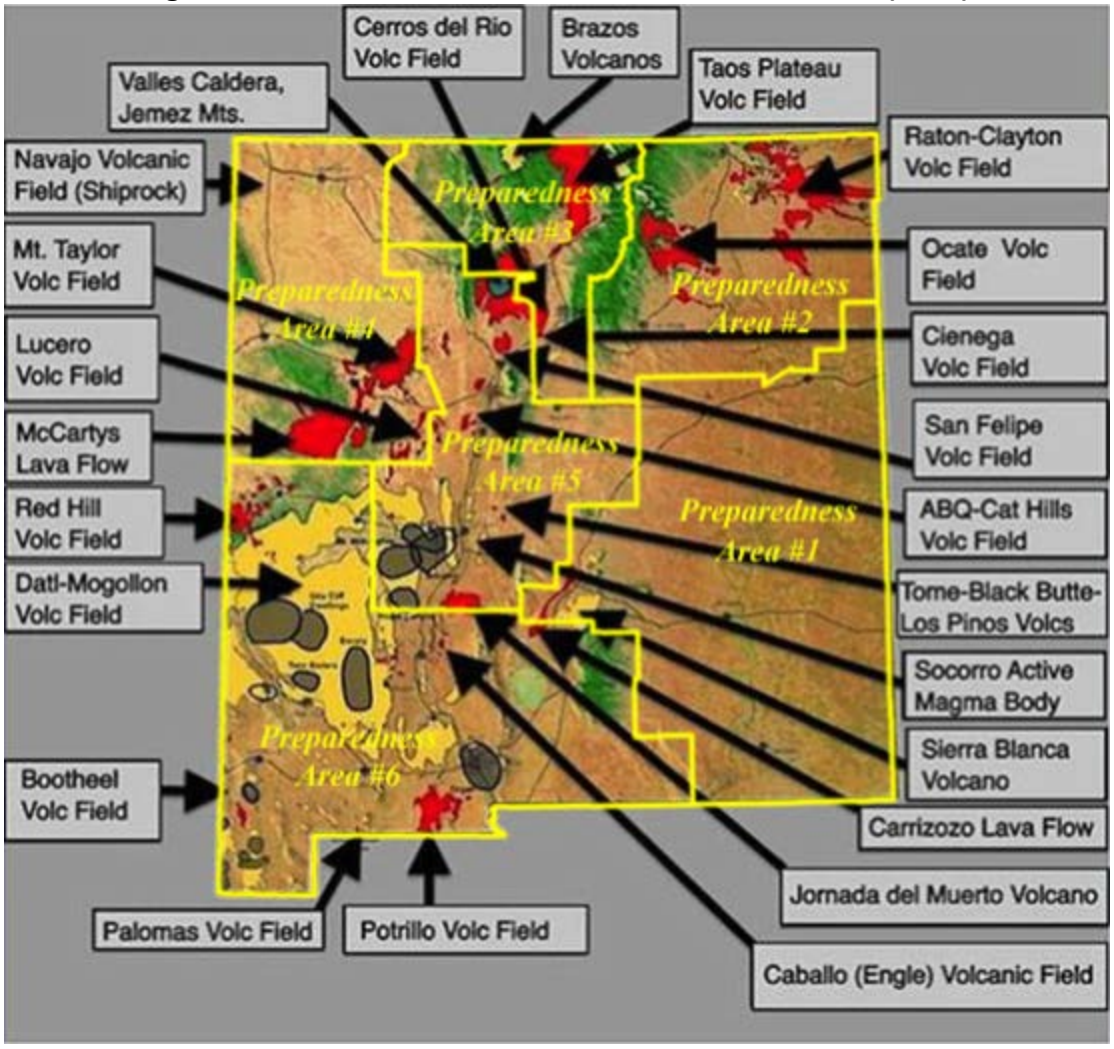
Figure 4.19 illustrates the volcanic hazard areas in the United States based on events over the last 15,000 years. Areas in blue or purple show regions at greater or lesser risk of local volcanic activity, including lava flows, ashfalls, lahars (volcanic mudflows), and debris avalanches. Areas in pink show regions at risk of receiving 5 cm or more of ashfall from large or very large explosive eruptions, originating at the volcanic centers (shown in blue). These projected ashfall extents are based on observed ashfall distributions from an eruption ("large") of Mt. St. Helens that took place 3,400 years ago, and the eruption of Mt. Mazama ("very large") that formed Crater Lake, Oregon, 6,800 years ago.

Figure 4.19: Volcanic Hazard areas based on events over the last 15,000 years



New Mexico has one of the greatest concentrations of young, well-exposed, and un-eroded volcanoes in North America. See **Figure 4.20** below. These volcanoes reside in all Preparedness Areas (1, 2, 3, 4, 5 and 6) with a majority of volcanic concentration in Preparedness Areas 4 through 6 (Figure 1.125 in the 2013 State Plan). The last volcanic episode in the state occurred approximately 3,000 years ago with the eruption of several cubic kilometers of basalt. New Mexico has one of only three large mid-crustal active magma bodies (Socorro) in the continent; the others are Long Valley, California, and Yellowstone, Wyoming. The inflation of this magma body is responsible for elevated seismic hazards in the Socorro region (see Earthquakes section).

Figure 4.20: Concentration of Volcanoes in New Mexico (2012)



Source: http://www.nmnaturalhistory.org/pap.html

According to the 2013 State Plan, Preparedness Area #2 has two scoria cone/silicic dome fields volcanos. As seen in the **Figure 4.20**, the Ocate Volcano Field is the closest to Angel Fire; the Village may be impacted if it were to erupt.

4.11.2 Previous Occurrences

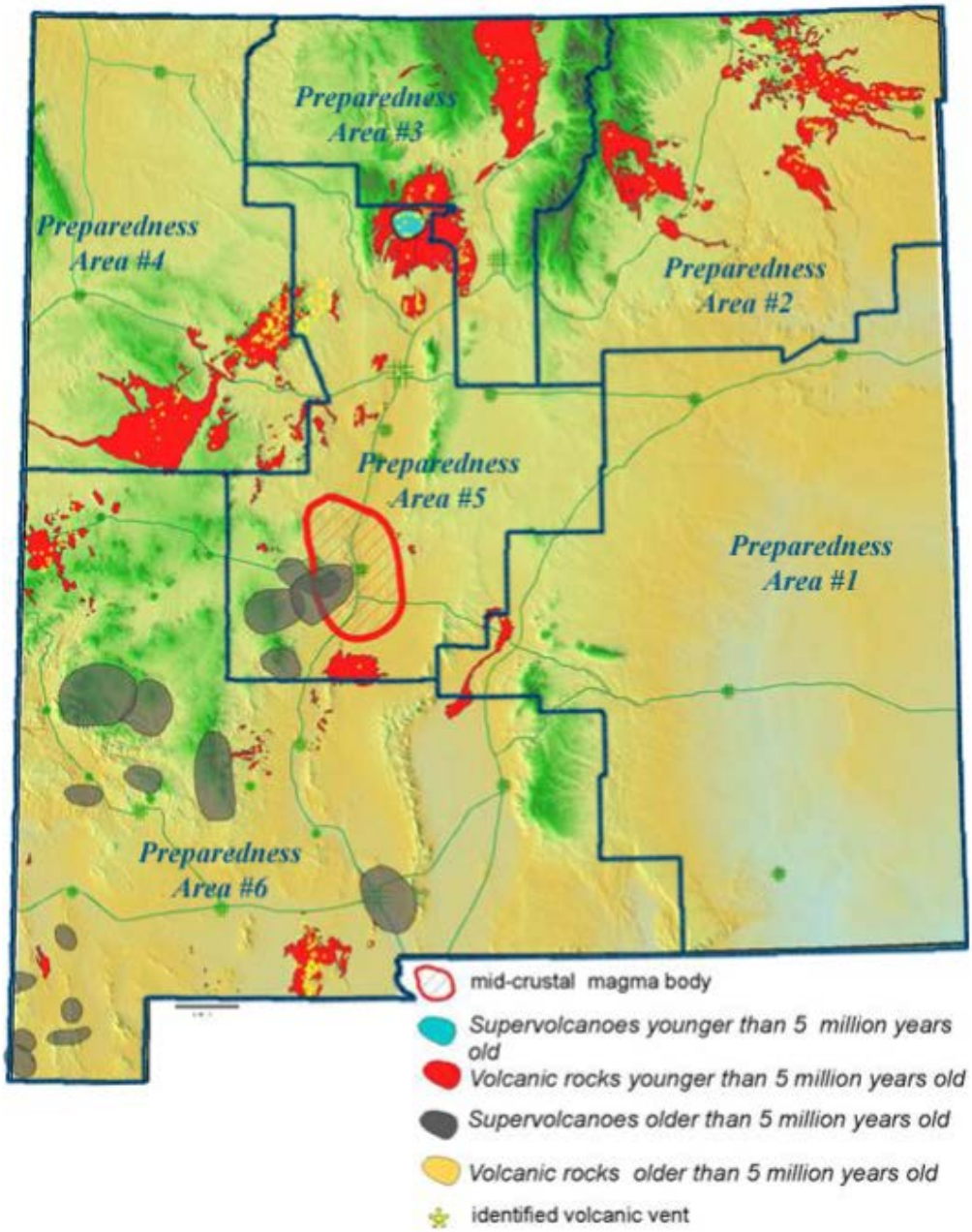
According to NCEI there have been no previous occurrences of volcanic ash in the planning area.

4.11.3 Probability and Severity of Future Events

To date there are no estimates of future occurrence of volcanic eruptions in New Mexico in recent history. Volcanism in New Mexico is not "extinct," but is dormant. As stated previously, the last volcanic episode in the state occurred approximately 3,000 years ago. Based on past occurrence of volcanism in the state, it can be crudely estimated that there is roughly 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. Due to this

"**Highly Unlikely**" probability of occurrence (.01% chance in ten years), this hazard will not be discussed in further detail. If circumstances warrant, future versions of the plan will elaborate.

Figure 4.21: New Mexico Volcanic Activity by Preparedness Area



4.11.4 Vulnerability and Impact

While the magnitude of volcanic eruptions is unpredictable, the only volcanoes in the area surrounding Angel Fire have had little to no activity. However, Angel Fire would be vulnerable to a direct strike by even a low intensity eruption. For this update there was a data deficiency in cataloging and studying the expected damages from a volcano. Future plan updates should consider more study of the volcano risk. The impact of a future eruption in Angel Fire would

include damage to homes property and lives. The economic impact of an eruption would be severe. The entire planning area is equally vulnerable to the impacts of a volcano eruption. Due to the potential of a stronger eruption, the impact would be considered critical.

4.11.5 Conclusion

Mitigation options for volcano eruptions should address the lack of detailed, hazard-specific information at the State and local jurisdiction level. A possible mitigation action may be to assist in conducting mapping and delineation of areas vulnerable to volcano eruption in and around the state. Providing education about the volcano alert system and the aviation color code warning systems is another possible mitigation action item.

4.12 Dam Failure

4.12.1 Overview

This section refers to the failure of large dams that are operated for hydropower, navigation, or large-scale flood control, and impound large pools of water. Dam failures occur when the structural stability of a dam gives way and results in a large release of water downstream that typically causes a high degree of damage to any nearby structures or infrastructure.

Hydrologic or structural deficiencies are the primary cause of dam failure, but the safety of the structure can also be influenced by reservoir operations. Hydrologic deficiencies can result from the following:

- Inadequate spillway capacity
- Excessive runoff after heavy precipitation
- Large waves generated from landslides into the reservoir
- Sudden inflow from upstream dam failures

Structural deficiencies may be a result of the following:

- Seepage through the embankment
- Piping along internal conduits
- Erosion
- Cracking
- Sliding
- Overturning
- Rodent tunneling
- Landslides hitting the dam
- Other weaknesses in the structure

When a dam failure occurs due to structural deficiencies, the subsequent flooding is characterized by a sudden rise in stream level, much like a flash flood from a thunderstorm. Dam failures can occur at any time; however, the risk of structural failure is increased during winter and spring because of increased precipitation and the runoff of melting mountain snow.

Dam failure can occur when a dam is overtopped (i.e., when it overflows). Overtopping is especially dangerous for an earthen dam because the down rush of water will erode the dam face and could breach the dam.

4.12.2 Location and Spatial Extent

Of the 45 dams within Colfax County, only two are near Angel Fire; Lake Monte Verde, located on a tributary of Cieneguilla Creek upstream of the Village on the Angel Fire Resort, and Eagle Nest Lake, located along Cieneguilla Creek, but downstream of the Village. As Eagle Nest Dam is downstream of the Village, there is little risk of inundation in the Village due to dam failure; therefore, further discussion of Eagle Nest Dam is not warranted.

Lake Monte Verde, constructed in 1968, is a 35-foot tall earthen dam impounding an average of 218 acre-feet and a maximum of 435 acre-feet of water for recreation purposes. The dam is approximately 3 miles upstream of the Village. Although the dam is regulated by the New Mexico Office of the State Engineer (NMOSE), it is not required to have an Emergency Action Plan (EAP), a plan that includes inundation maps and identifies critical facilities that may be threatened by dams. Therefore, no information is available regarding the potential inundation and impacts due to a dam failure.

The Association of State Dam Safety Officials indicates that, in the absence of a formal inundation map, for dams with a maximum storage capacity of 100,000 acre-feet or more, or "high" hazard dams, downstream development within five miles were considered to be at risk to potential dam failure hazards. For dams with a maximum storage capacity between 10,000 and 100,000 acre-feet or "significant" hazard dams, downstream development within three miles were considered to be at risk to potential dam failure hazards. For dams with a maximum storage capacity of less than 10,000 acre-feet, downstream development within one mile was considered to be at risk to potential dam failure hazards.

Based on this guidance, given that Lake Monte Verde is approximately three miles upstream of the Village, the dam poses little threat to the planning area.

The spatial extent of a dam failure event would be large and the hazard area is not expected to include the planning area.

4.12.3 Previous Occurrences

No known dam incidents and/or failures involving notable property damage have occurred in Angel Fire. According to the NMOSE, there has been only one dam failure in the greater Colfax County area, which was a low hazard dam used for agricultural purposes. No damage was incurred from the failure of this dam.

4.12.4 Probability and Extent of Future Events

There is a low probability of dam failure occurrence in Angel Fire. However, given the location of the dam and the size of the impoundment, the probability of a future event is **"Possible"**.

4.12.5 Vulnerability and Impact

During periods of drought, communities along river systems are generally not as vulnerable to dam failure because of lower water levels behind the dams. Due to its location on the Cieneguilla Creek, Angel Fire is vulnerable to dam failure in times of sustained heavy rains

where high water levels may expose weaknesses in dam structures that could possibly inundate the developed communities located downstream.

While the chance of dam failure is low, the impact would be critical as the flood wave would impact some structures and several transportation routes within Angel Fire. Potential impacts would be similar to a major flood along Cieneguilla Creek. The flood waters would be swift moving and would likely sweep structures off their foundations. A dam failure incident would likely result in loss of life due to the lack of warning, swift flow of water, and the large spatial extent of the impact.

4.12.6 Conclusions

Dam failure is a concern in northern New Mexico area due to the presence of several dams; however, this hazard may be overlooked during times of drought. Due to the fact that several factors including dam operation and maintenance that are critical to preventing dam failure are not in the control of Angel Fire, there are not many opportunities to mitigate this hazard. Due to data limitations related to dam inundation zones applicable to Angel Fire; it is not entirely clear what the impacts of a dam failure upstream on Angel Fire would be. Therefore, an initial step towards mitigating the risks would be a dam failure inundation study, which has been added as an action item to this HMP.

4.13 Infectious Disease

4.13.1 Overview

An infectious disease is an illness caused by the presence of disease-causing agents or germs, including viruses, bacteria, fungi and parasites and other microbes. These diseases are called communicable diseases or transmissible diseases due to their potential of transmission from one person to another.

Transmission may occur by direct contact with an infected person or animal, by ingesting contaminated food or water, or by contact with infected surroundings or contaminated air. Infectious (communicable) diseases that usually require a more specialized route of infection—for example, by insects such as mosquitoes or ticks (disease vectors) —are usually not regarded as contagious. Contagious diseases acquired by blood or needle transmission or sexual contact require prophylactic strategies but not measures such as social distancing or quarantine. Strict measures as addressed in annual Blood Borne Pathogen training are a prevention strategy in place in the school system.

4.13.2 At-Risk Populations

Students are a high risk population for infectious disease, and exposure to a variety of infectious diseases in a school population is inevitable. Infectious diseases are common in young children who have immature immune systems and are developmentally unable to understand and practice the concepts of good personal Model Emergency Annex for Infectious Disease 4 hygiene. However, older youth and teenagers exposed to different social situations are also prone to certain infections.

In any school population, there are certain individuals who may have a higher risk of complications if exposed to specific diseases. Students and staff who are medically fragile or are immunosuppressed, pregnant, and/or have chronic disease, nutritional deficiencies or debilitating illness should be informed of the possible risks of acquiring an infection.

The responsibility of the school is to inform those individuals to consult with their licensed health care provider. The licensed health care provider will assess the risk, provide appropriate treatment and/or make recommendations so that reasonable accommodations are put in place for the individual by the school.

4.13.3 Location and Spatial Extent

Angel Fire's geographic and demographic characteristics make it particularly vulnerable to importation and spread of infectious diseases. Due to the high volume of tourist coming to Angel Fire Resort, it is important to note that the most vulnerable location would be the resort itself. The resort may experience an infectious disease outbreak caused by factors such as population density and the nature of public meeting areas. Densely populated areas will spread diseases quicker than less densely populated areas.

4.13.4 Previous Occurrences

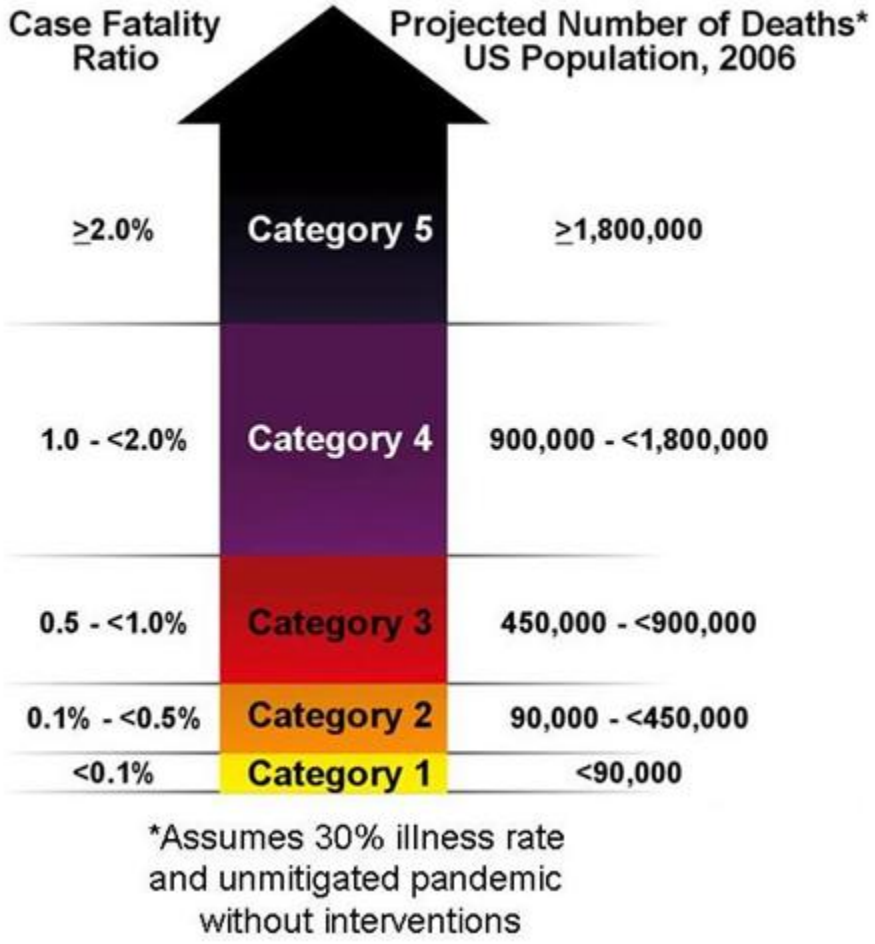
According to the HMPT there have been no infectious disease outbreaks reported for the Village of Angel Fire.

4.13.5 Probability and Extent of Future Events

The severity and length of the next pandemic cannot be predicted; however, experts expect that its effect on the United States could be severe. Based on previous pandemics and without medications or vaccines available, it is estimated that a severe pandemic could cause almost 2 million deaths in the United States, more than nine million hospitalizations, and more than 90 million people ill.

The CDC and Prevention Community Strategy for Pandemic Influenza Mitigation guidance introduced a Pandemic Severity Index (PSI), which uses the case fatality ratio as the critical driver for categorizing the severity of a pandemic. The index is designed to estimate the severity of a pandemic on a population to allow better forecasting of the impact of a pandemic, and to enable recommendations on the use of mitigation interventions that are matched to the severity of influenza pandemic. Pandemics are assigned to one of five discrete categories of increasing severity (Category 1 to Category 5) (NJDOH 2012). **Figure 4.22** illustrates the five categories of the PSI.

Figure 4.22: Pandemic Severity Index



Source: NJDOH 2012

Due to the increasing number of year-round tourists to the Village of Angel Fire, the threat of an outbreak does pose a threat to the community. The annual probability level assigned for infectious disease is **"Likely"** (between 10 and 50 percent annually).

4.13.6 Vulnerability and Impact

The entire Village's population is vulnerable to the effects of an infectious disease outbreak. However, areas with higher population density will have higher exposure to contagious diseases. Due to the Angel Fire Resort being at the center of the community, this makes the entire community more susceptible to an outbreak.

The type of disease pandemic will determine the severity of any effect on the environment. Diseases which are transmitted from man to animals or animals to man (zoonotic) may have agricultural impacts. Sixty percent of emerging infection diseases that affect humans are zoonotic, they originate in animals; with more than two-thirds originating in wildlife. Environmental hazards include infected livestock and poultry populations. With more catastrophic disease pandemics the necessity for mass burials of animals or humans may impact the environment, as well.

4.13.7 Conclusion

One important part of mitigating infectious disease is forecasting and warning so people can prepare. Communities can be notified of possible outbreaks and take action to seek help or get out of the potentially hazardous area.

4.14 Terrorist Attack (Includes Radiological Incidents)

4.14.1 Overview

Terrorism is the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom. Terrorists often use threats to:

- Create fear among the public.
- Try to convince citizens that their government is powerless to prevent terrorism.
- Get immediate publicity for their causes.

Acts of terrorism include threats of terrorism, assassinations, kidnappings, hijackings, bomb scares and bombings, cyber-attacks (computer-based), and the use of chemical, biological, nuclear and radiological weapons.

High-risk targets for acts of terrorism include military and civilian government facilities, international airports, large cities, and high-profile landmarks. Terrorists might also target large public gatherings, water and food supplies, utilities, and corporate centers. Further, terrorists are capable of spreading fear by sending explosives or chemical and biological agents through the mail.

Within the immediate area of a terrorist event, you would need to rely on police, fi re, and other officials for instructions. However, you can prepare in much the same way you would prepare for other crisis events.

The following are general guidelines:

- Be aware of your surroundings.
- Move or leave if you feel uncomfortable or if something does not seem right.
- Take precautions when traveling. Be aware of conspicuous or unusual behavior. Do not accept packages from strangers. Do not leave luggage unattended. You should promptly report unusual behavior, suspicious or unattended packages, and strange devices to the police or security personnel.
- Learn where emergency exits are located in buildings you frequent. Plan how to get out in the event of an emergency.
- Be prepared to do without services you normally depend on—electricity, telephone, natural gas, gasoline pumps, cash registers, ATMs, and internet transactions.
- Work with building owners to ensure the following items are located on each floor of the building:
    - Portable, battery-operated radio and extra batteries.
    - Several flashlights and extra batteries.
    - First aid kit and manual.

- Hard hats and dust masks.
- Fluorescent tape to rope off dangerous areas.

Another form of terror that the Village of Angel Fire is very vulnerable to is arson. During the period 2010-2014, an estimated 261,330 intentional fires were reported to U.S. fire departments each year, with associated annual losses of 440 civilian deaths, 1,310 civilian injuries, and $1 billion in direct property damage. Outside or unclassified fires accounted for three-quarters (75%) of these incidents, while 19% involved structures, and 6% were vehicle fires.

4.14.2 At-Risk Populations

Terrorist attacks can occur anywhere; however, the Village of Angel Fire could be a particularly attractive target of a potential terrorist activity because of its dense population during specific times of the year including peak season.

Additional targets in Angel Fire include the Village's critical infrastructure such as utilities, roadways, hospitals, schools, civic centers, and other high-profile venues such as Angel Fire Resort. The link between Angel Fire and Taos also makes this transportation system a target for terrorists. Locations with a high population density will be attractive targets for terror attacks.

4.14.3 Location and Spatial Extent

Any acts of terrorism can occur anywhere at any time of day. The National Terrorism Advisory System (NTAS) communicates information about terrorist threats by providing detailed information to the public, government agencies, first responders, airports and other transportation hubs, and the private sector. When there is a threat, an NTAS Alert will be announced by the Secretary of Homeland Security and will be shared with the public. It may include specific information about the nature of the threat, including the geographic region, mode of transportation, or critical infrastructure potentially affected, as well as steps that individuals and communities can take to protect themselves and help prevent, mitigate or respond to the threat. The alert indicates whether the threat is elevated or imminent. Elevated threats are when there is no specific information about the timing or location. Imminent threats are when it is believed the threat is impending or very soon. The alerts will be posted online and released to the news media for distribution. The United States Department of Homeland Security (USDHS) will also distribute alerts through its social media channels.

In Angel Fire, the Angel Fire Emergency Manager and the Angel Fire Resort personnel will communicate with Homeland Security with any potential threats of terror to the community.

4.14.4 Previous Occurrences

According to the HMPT, there have been multiple intentional and unintentional arsons reported for the Village of Angel Fire. Each year the Village deals with multiple wildfires throughout the community due to lack of awareness or simple intentional arson.

4.14.5 Probability and Extent of Future Events

While the potential for future terrorism incidents in Angel Fire is difficult to predict, the population density is a potential terrorist target and makes a terrorism incident "**Likely**" based on the Villages' experience with arson. Efforts from local, state, and federal officials must be coordinated to prevent future terrorist incidents from occurring. However, despite the best efforts of these entities, the reality is that a terrorist attack may occur in Angel Fire or the surrounding areas.

The effect of a terrorism event can vary depending on the type of attack and the magnitude of the event or events. A terrorism event can cause public fear regarding the use of mass transportation or leaving their homes in the event of a biological or nuclear attack. Communication systems, both public and private, can fail because of an overwhelming amount of usage or damage to its infrastructure. Healthcare facilities can become quickly inundated and must be prepared to triage injured patients, handle mass casualties, and conduct decontamination operations.

4.14.6 Vulnerability and Impact

The entire population of Angel is exposed to the effects of terrorism and terrorist incidents. Since terrorists typically prefer to impact the greatest number of individuals in a given location, it can be inferred that individuals living in highly populated areas will have a greater exposure to terrorist incidents than those living in rural areas.

4.14.7 Conclusion

Due to the population density of Angel Fire, it is important to monitor and survey the area in case of a terrorism incident including arson. An impact to the entire community makes this hazard a high risk hazard even though the probability of occurrence may be low.

4.15 HAZMAT

4.15.1 Overview

Hazardous materials can be found in many forms and quantities that can potentially cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways, and pipelines. This subsection on the hazardous material hazard is intended to provide a general overview of the hazard, and the threshold for identifying fixed and mobile sources of hazardous materials is limited to general information on rail, highway, and FEMA-identified fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways, and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents, and 266 are due to other causes. In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile

containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

HAZMAT incidents can also occur as a result of or in tandem with natural hazard events, such as floods, hurricanes, tornadoes, and earthquakes, which in addition to causing incidents can also hinder response efforts.

Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

4.15.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency provides public information on hazardous materials. One facet of this program is to collect information from industrial facilities on the releases and transfers of certain toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity is occurring. According to the EPCRA, The Village of Angel Fire has no TRI sites.

According to the HMPT, Angel Fire is a thoroughfare for transportation of hazardous material. This makes the entire population at risk due to the low number of roadways through the Village. A HAZMAT incident could shut down Angel Fire's major roadways for an indefinite amount of time.

4.15.3 Previous Occurrences

According to the HMPT, there have been some minor incidents reported in the Village. These incidents were not significant and were resolved by the local authorities without any secondary hazards occurring.

4.15.4 Probability and Extent of Future Events

Given that there are zero locations of toxic release inventory sites in the Angel Fire but there is the potential of serious roadway incidents, it is "**Possible**" that a hazardous material incident may occur in the community (1 to 10 percent annual probability). Village officials are mindful of this possibility and take precautions to prevent such an event from occurring. This hazard is recognized as a serious threat to the Village of Angel Fire. Furthermore, there are detailed plans in place to respond to an occurrence.

4.15.5 Vulnerability and Impact

A majority of the population is exposed to this hazard because of the impact to the transportation system if an incident occurs. Any HAZMAT incident has the potential to shut down roadways, disrupt activities at the resort and schools.

4.15.6 Conclusion

It is important for the local officials to closely monitor any known transportation of hazardous materials the Village because of the potential impact to the community.

4.16 Summary of Vulnerability

The findings presented in **Section 4** were developed using the best available data and methods that provide an approximation of hazard risk. These approximations should be used to understand relative hazard risk. However, uncertainties are inherent in risk assessment methodology, arising in part from incomplete scientific knowledge concerning specific hazards and their effects on the built environment and from generalities that are necessary to provide a comprehensive analysis and overview of hazard risk for large planning areas.

The preparers of this Plan's hazard risk assessment relied heavily on historical data, stakeholder input, and professional and experienced judgment regarding projected hazard impacts. The preparers also considered the findings in other relevant plans, studies, and technical reports.

To draw some meaningful planning conclusions on hazard risk for Angel Fire, the results of the combined risk assessment process were used to generate hazard profiles according to a "Priority Risk Index" (PRI). The purpose of the PRI, described further below, is to categorize and prioritize the 15 identified hazards for Angel Fire as high, moderate, or low risk (see **Table 4.16**).

4.16.1 Priority Risk Index

The prioritization and categorization of identified hazards for the planning area is based principally on the Priority Risk Index (PRI), a tool used to measure the degree of risk for identified hazards in a particular planning area. The PRI is used to assist the HMPT in gaining consensus on the determination of those hazards that pose the most significant threat to Angel Fire based on a variety of factors. The PRI is by no means scientific, but is rather meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in Angel Fire based on standardized criteria. The hazard profiles developed earlier in this section allows for the prioritization of high hazard risks for mitigation planning purposes.

The numerical PRI results allow identified hazards to be ranked against one another (the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time, and duration) which occurred in the **Section 4** hazard profiles. Each degree of risk was assigned a value (1 to 4) and a weighting factor, as summarized in **Table 4.15**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor.

The sum of all five categories is the final PRI value using this example equation:

PRI VALUE = (PROBABILITY x .40) + (IMPACT x .20) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)

Using the weighting scheme used by Angel Fire, the highest possible PRI value is 3.4. **Table 4.15** summarizes the degree of risk assigned to each category for all identified hazards. The PRI Score for each hazard is in the last column on the right.

Table 4.15: Category/Degree of Risk for Angel Fire

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood	Likely	Limited	Small	Less than 6 Hours	Less than 24 Hours	2.6
Wildfire	Highly Likely	Critical	Large	12 to 24 Hours	Less than 24 Hours	3.4
Drought	Likely	Limited	Large	More than 24 Hours	More than 1 Week	2.9
Earthquake	Unlikely	Critical	Large	6 to 12 Hours	Less than 6 Hours	2.2
Severe Winter Storms	Highly Likely	Limited	Large	More than 24 Hours	Less than 24 Hours	3.1
Thunderstorm (Hail and Lightning)	Likely	Limited	Large	More than 24 Hours	Less than 6 Hours	2.6
High Wind	Highly Likely	Minor	Moderate	12 to 24 Hours	Less than 24 Hours	2.8
Erosion	Possible	Minor	Small	6 to 12 Hours	Less than 6 Hours	1.8
Volcanic Activity	Highly Unlikely	Critical	Large	Less than 6 Hours	More than 1 Week	2.2
Infectious Disease	Likely	Critical	Moderate	Less than 6 Hours	More than 1 Week	3.2
Terror	Likely	Critical	Large	Less than 6 Hours	More than 1 Week	3.4
HAZMAT	Possible	Limited	Moderate	Less than 6 Hours	Less than 1 Week	2.5
Dam Failure	Possible	Critical	Small	Less than 6 Hours	Less than 6 Hours	2.7
Extreme Heat	Possible	Minor	Negligible	More than 24 Hours	Less than 1 Week	1.6

Table 4.16 Shows the 10 natural hazards and 3 man-made hazards categorized by hazard risk:

- ***High*** – PRI score over 2.7
- ***Moderate*** – PRI score between 2.0 and 2.7
- ***Low*** – PRI score 2.0 or below

Table 4.16: Hazards organized by Risk

Hazard Risk	Hazard Type
High	Wildfire High Wind Severe Winter Storms Infectious Disease Drought Terror (includes Radiological Incident)
Moderate	Flood Earthquake Thunderstorm(including lightning/hail) Dam Failure Volcanic Activity HAZMAT
Low	Erosion Extreme Heat

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5. Mitigation Strategy

The intent of the Mitigation Strategy is to provide the Village of Angel Fire with the goals that will serve as guiding principles for future mitigation policy and project administration, along with an analysis of mitigation techniques deemed available to meet those goals and reduce the impact of identified hazards. It is designed to be comprehensive, strategic, and functional in nature:

- In being *comprehensive*, the development of the strategy includes a thorough review of all hazards and identifies extensive mitigation measures intended to not only reduce the future impacts of high risk hazards, but also to help the village achieve compatible economic, environmental, and social goals.
- In being *strategic*, the development of the strategy ensures that all policies and projects proposed for implementation are consistent with pre-identified, long-term planning goals.
- In being *functional*, each proposed mitigation action is linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific mitigation actions. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas through a local ordinance) and hazard mitigation projects that seek to address specifically targeted hazard risks (such as the acquisition and relocation of a repetitive loss structure).

The second step involves the identification, consideration, and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process sustained through the development and maintenance of this Plan. Alternative mitigation measures will continue to be considered as future mitigation opportunities are identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions for the Village of Angel Fire. The Mitigation Action Plan (MAP) represents an unambiguous and functional plan for action and is considered to be the most essential outcome of the mitigation planning process.

The MAP includes a prioritized listing of proposed hazard mitigation actions (policies and projects) for Angel Fire to complete. Each action has accompanying information, such as those departments or individuals assigned responsibility for implementation, potential funding sources, and an estimated target date for completion. The MAP provides those departments or individuals responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring success or progress over time. The cohesive collection of actions listed in the MAP can also serve as an easily understood menu of

mitigation policies and projects for those local decision makers who want to quickly review the recommendations and proposed actions of the Hazard Mitigation Plan.

In preparing each Mitigation Action Plan for the Village of Angel Fire, officials considered the overall hazard risk and capability to mitigate the effects of hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted mitigation goals and unique needs of the community.

5.1 Mitigation Measures

5.1.1 Hazard Mitigation Goals

The mitigation goals reflect the aspirations of the Angel Fire HMPT to provide a safe environment in the planning area while preserving cultural sites, the natural environment and a quality of life. The goals formulation process is linked to the risk and vulnerability findings. The resulting mitigation actions are the specific measures needed to meet the goals. The mitigation goals of Angel Fire are:

I. Make the Village of Angel Fire more resilient to natural hazards and shorten the recovery time after a natural hazard event.
II. Preserve historic and cultural sites and natural resources from natural hazards.
III. Reduce property damages caused by natural hazards.
IV. Increase the capability of The Village of Angel Fire to mitigate future natural hazard events.
V. Enhance the collaborative process with federal, state and local agencies to mitigate natural hazards in the planning area.
VI. Increase awareness and understanding of risks and opportunities for mitigation among residents.

5.1.2 NFIP Participation and Continued Compliance

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 ravages of flooding. The Village of Angel Fire participates in the NFIP and is in good standing. No NFIP repetitive loss properties are identified in Angel Fire.

Angel Fire will continue to ensure compliance in the NFIP through action items identified in this plan.

5.2 Mitigation Action Plan

The mitigation actions and strategies in this section address, to the extent possible, the risk from the hazards described in **Section 4**. The actions and strategies also address areas where additional coordination with other agencies and organizations could benefit Angel Fire's goals to reduce risk. The actions and strategies are the specific measures to help meet the goals of **Section 5.1.1** and include estimated timeframes for completion. Where a specific dollar estimate was not available, a range of costs was used:

- **High** – Over $500,000
- **Medium** - $100,000 to $499,000
- **Low** – $5,000 to $100,000
- **Minimal** – Less than $5,000

5.2.1 Mitigation Action Prioritization

For the 2018 Angel Fire Hazard Mitigation Plan, the Hazard Mitigation Planning Team members were tasked with establishing a priority for each action at the final Hazard Mitigation Planning Committee meeting. HMPT members categorized its actions as having a low, medium, or high priority[9] , primarily based on an assessment of the need for the specific action, the potential beneficial effects (health, safety, quality of life, environmental) from implementation of the action, and the projected cost of implementation. A secondary factor was the current availability of funding. Prioritization of the proposed mitigation action was based on the following six factors:

- Effect on overall risk to life and property
- Ease of implementation
- Political and community support
- A general economic cost/benefit review[10]
- Funding availability
- Continued compliance with the NFIP

The entire HMPT helped coordinate the prioritization process by reviewing each action and working with the lead agency/department responsible to determine a priority for each action using the six factors listed above.

Using these criteria, actions were classified as high, moderate, or low priority by the Village of Angel Fire officials.

The actions were prioritized using a basic format to encourage immediate action (see **Table 5.1**). Flood projects originally receiving a "High" prioritization were also reviewed with STAPLE+E criteria considerations (See **Section 6.2.1.** for criteria).

[9] Mitigation actions with a "high" priority were determined to be the most cost-effective and most compatible with the village's unique needs. Actions with a "moderate" priority were determined to be cost-effective and compatible with the village's needs, but may be more challenging to complete administratively or fiscally than "high" priority actions. Actions with a "low" priority were determined to be important community needs, but the community likely identified several potential challenges in terms of implementation (e.g., lack of funding, technical obstacles, etc.). A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

[10] Only a general economic cost/benefit review was considered by the Hazard Mitigation Planning Team through the process of selecting and prioritizing mitigation actions. Mitigation actions with "high" priority were determined to be the most cost effective and most compatible with the Village's unique needs. A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

Table 5.1: Prioritization Categories

Category	Timeframe	Comments
High	Begin within 1 year from plan adoption	Top organizational priority and is generally a well-detailed project idea. Protects population, resource or property at high risk. Uses feasible methods, techniques or technology.
Medium	2-3 years from plan adoption	A good idea that needs more information or is an action that addresses a moderate hazard.
Low	3-5 years from plan adoption	An idea that needs a lot more information or will take a lot of preliminary action to build support.

Multiple funding sources have been identified (see **Section 6.1.**) for suitability. The priority for each action is at the bottom of each action box. When a proposed project mitigates multiple hazards, this is noted. As described in **Section 6.2.1**, only those actions with a high priority were ultimately reviewed with the STAPLE+E criteria.

5.2.2 Mitigation Actions and Projects

Mitigation Action 1	**Create and Implement an Emergency Master Plan for all hazards including an Emergency Evacuation Plan and route mapping**
Planning Mechanism for Implementation	Council Directive, Village Code, Mayor
Hazard(s) Addressed:	All
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2019
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 2	Create and Implement a Public Warning System for all hazards
Planning Mechanism for Implementation	Council Directive, Village Code, Mayor
Hazard(s) Addressed:	All
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 3	Obtain generators and supplies to set up Community Center in order to use as a public shelter in the event of a disaster.
Planning Mechanism for Implementation	Council Directive
Hazard(s) Addressed:	All
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grants
Implementation Schedule:	2020
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 4	Conduct training on preparedness with home and commercial owners within the flood zone
Planning Mechanism for Implementation	Council Directive, Village Code, Village Manager Directive
Hazard(s) Addressed:	Dam Failure
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Angel Fire Resort
Estimated Cost:	Low
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2020
Priority (High, Moderate, Low):	Low/Medium
2018 Status:	New Action

Mitigation Action 5	Early notification system for public/evacuation planning and routing from Resort to Village of failure or potential failure
Planning Mechanism for Implementation	Angel Fire Emergency Manager, Public Utilities, Angel Fire Resort, Council
Hazard(s) Addressed:	Dam Failure
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Public Utilities, Angel Fire Resort
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018-2019
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 6	Purchase sufficient Priority Water Rights and promote conservation with training by holding community and school events and creating media - similar to Albuquerque's efforts
Planning Mechanism for Implementation	Council Directive, Mayor, Angel Fire Emergency Manager
Hazard(s) Addressed:	Drought
Lead Agency/Department Responsible:	Public Utilities Superintendent, Angel Fire Utilities
Estimated Cost:	High
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 7	Educate public on water consumption and monitor usage for stockpiled emergency supply
Planning Mechanism for Implementation	Public Utilities
Hazard(s) Addressed:	Drought
Lead Agency/Department Responsible:	Public Utilities
Estimated Cost:	Medium
Potential Funding Sources:	Budget
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 8	Educate and warn public of fire dangers during a drought.
Planning Mechanism for Implementation	Council Directive, Fire Chief
Hazard(s) Addressed:	Drought
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Fire Chief
Estimated Cost:	Low
Potential Funding Sources:	Budget
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 9	Implement an Emergency Evacuation Plan including warning systems and educate community on earthquake risk.
Planning Mechanism for Implementation	Council Directive, Village Code, Capital Improvement
Hazard(s) Addressed:	Earthquake
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, USGS
Estimated Cost:	Low
Potential Funding Sources:	Grant
Implementation Schedule:	2019-2022
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 10	Develop action plan regarding effective containment of propane devices and downed power lines.
Planning Mechanism for Implementation	Public Utilities
Hazard(s) Addressed:	Earthquake
Lead Agency/Department Responsible:	Public Utilities
Estimated Cost:	Low
Potential Funding Sources:	Budget
Implementation Schedule:	2018
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 11	Conduct training with Emergency Manager and Village personnel to promote Firewise Training by attending schools and community events
Planning Mechanism for Implementation	Quarterly reports to Village Manager, Fire Department, Firewise committee
Hazard(s) Addressed:	Wildfire
Lead Agency/Department Responsible:	Fire Department
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 12	Promote and encourage property owners to eliminate fallen and dead trees and identify and clear neglected properties
Planning Mechanism for Implementation	Quarterly Reports to Village Manager
Hazard(s) Addressed:	Wildfire
Lead Agency/Department Responsible:	Fire Department, Emergency Manager
Estimated Cost:	High
Potential Funding Sources:	Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 13	Identify Water Storage Tank locations and protect from wildfire
Planning Mechanism for Implementation	Annual Report to Village Manager
Hazard(s) Addressed:	Wildfire
Lead Agency/Department Responsible:	Angel Fire Utilities
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 14	Conduct training with Emergency Manager and Village personnel on Flood Emergency Action Plan as well as homeowners and business owners within the flood zone
Planning Mechanism for Implementation	Council Directive, Emergency Manager
Hazard(s) Addressed:	Flood
Lead Agency/Department Responsible:	Emergency Manager
Estimated Cost:	Low
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2019/To Be Continued
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 15	Design and install early notification system for public for access to earth moving equipment & sandbagging
Planning Mechanism for Implementation	Village Manager, Fire Chief, Angel Fire Police Department , Street Superintendent, Emergency Manager
Hazard(s) Addressed:	Flood
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Public Utilities, Angel Fire Resort
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2022
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 16	Update Flood and Drainage maps.
Planning Mechanism for Implementation	Council Directive, Capital Improvement
Hazard(s) Addressed:	Flood
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	High
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2022
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 17	Mitigate Halo Terrace undersized crossing.
Planning Mechanism for Implementation	Council Directive, Capital Improvement
Hazard(s) Addressed:	Flood
Lead Agency/Department Responsible:	Streets
Estimated Cost:	High
Potential Funding Sources:	Budget
Implementation Schedule:	2019
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 18	Implement communication and mitigation plans
Planning Mechanism for Implementation	Council Directive, Capital Improvement
Hazard(s) Addressed:	HAZMAT
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Low
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2020
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 19	Provide ongoing training to emergency personnel and prepare fire department under EPA requirements
Planning Mechanism for Implementation	Council Directive, Emergency Manager, Fire Department
Hazard(s) Addressed:	HAZMAT
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Fire Department, Angel Fire Police Department
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2020
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 20	Educate and encourage property owners to trim back vegetation growth and have Kit Carson Electric monitor growth near power lines. Be proactive about removing standing dead trees that could cause damage if blown over
Planning Mechanism for Implementation	Council Directive, Emergency Manager
Hazard(s) Addressed:	High Wind
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Village Manager, Mayor
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 21	Create and implement a public notification/warning system for fallen trees, downed power lines, structure damage, etc.
Planning Mechanism for Implementation	Village Manager, Fire Chief, Police Department , Street Superintendent, Angel Fire Emergency Manager
Hazard(s) Addressed:	High Wind
Lead Agency/Department Responsible:	Emergency Manager, Village Manager, Mayor
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 22	Plan for the removal of rodents to include prairie dogs
Planning Mechanism for Implementation	Council Directive, Village Code
Hazard(s) Addressed:	Infestation
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Low
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2020
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 23	Treat trees affected by the bark beetle to mitigate widespread death
Planning Mechanism for Implementation	Council Directive, Emergency Manager
Hazard(s) Addressed:	Infestation
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Medium
Potential Funding Sources:	Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 24	Create and implement public warning system and educate public on proactive prevention and access to agricultural tools for elimination.
Planning Mechanism for Implementation	Council Directive, Emergency Manager, Fire Department, State and Federal Agencies
Hazard(s) Addressed:	Infestation
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Village Manager, Mayor
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 25	Public education on erosion awareness and notification to increase resilience of our watershed of potential hazards and damage.
Planning Mechanism for Implementation	Council Directive, Public Utilities, Emergency Manager, Fire Department
Hazard(s) Addressed:	Erosion
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Public Utilities
Estimated Cost:	Medium
Potential Funding Sources:	Budget
Implementation Schedule:	2018
Priority (High, Moderate, Low):	Low/Medium
2018 Status:	New Action

Mitigation Action 26	Provide security for all 14 water storage tanks by adding perimeter fencing and access control.
Planning Mechanism for Implementation	Council Directive, Capital Improvements
Hazard(s) Addressed:	Terror/HAZMAT
Lead Agency/Department Responsible:	Angel Fire Utilities
Estimated Cost:	Low
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2020
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 27	Public education and notification of potential hazards and damage. Provide ongoing training to emergency personnel and implement communication system
Planning Mechanism for Implementation	Annual Reports to Village Manager
Hazard(s) Addressed:	Terror/HAZMAT
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 28	Implement a reverse 911 type of system to communicate with resident to provide info on services and resources during a storm
Planning Mechanism for Implementation	Council Directive, Village Code, Emergency Manager
Hazard(s) Addressed:	Severe Winter Storm
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Low
Potential Funding Sources:	Budget
Implementation Schedule:	2019
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 29	Create and implement a snow removal plan and an early warning/notification system for communication between the Village and residents
Planning Mechanism for Implementation	Emergency Manager, Police Department , Angel Fire Resort
Hazard(s) Addressed:	Severe Winter Storm
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Fire Department, Police Department , Public Works, Village Manager
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 30	Obtain additional snow removal equipment.
Planning Mechanism for Implementation	Village Manager, Fire Chief, Police Department , Street Superintendent, Emergency Manager
Hazard(s) Addressed:	Severe Winter Storm
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Village Manager, Mayor
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 31	Update and maintain Mutual Aid Agreement with Colfax County.
Planning Mechanism for Implementation	Police Department
Hazard(s) Addressed:	Terror
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Police Chief, Fire Chief
Estimated Cost:	Low
Potential Funding Sources:	Grant
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 32	Educate and train the public on situational awareness and confidential toll free number to federal investigative and homeland security agencies
Planning Mechanism for Implementation	Police Department
Hazard(s) Addressed:	Terror
Lead Agency/Department Responsible:	Police Department
Estimated Cost:	Medium
Potential Funding Sources:	Federal Grant Assistance
Implementation Schedule:	2018/To Be Continued
Priority (High, Moderate, Low):	Medium/High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 33	Designate a Village facility to serve as a cooling center in times of extreme heat.
Planning Mechanism for Implementation	Angel Fire Emergency Manager
Hazard(s) Addressed:	Extreme Heat
Lead Agency/Department Responsible:	Angel Fire Emergency Manager, Village Manager, Mayor
Estimated Cost:	Low
Potential Funding Sources:	Annual Budget
Implementation Schedule:	2019
Priority (High, Moderate, Low):	Low
2018 Status:	New Action

Mitigation Action 34	**Educate the public on the** dangers of extreme heat and children, the elderly, and infirm.
Planning Mechanism for Implementation	Council Directive, Emergency Manager
Hazard(s) Addressed:	Extreme Heat
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Low
Potential Funding Sources:	Annual Budget
Implementation Schedule:	2019
Priority (High, Moderate, Low):	Low
2018 Status:	New Action

Mitigation Action 35	**Obtain and install proper lightning suppressors are equipped on critical equipment and critical infrastructure is grounded to protect from lightning strike**
Planning Mechanism for Implementation	Council Directive, Capital Improvements
Hazard(s) Addressed:	Thunderstorm
Lead Agency/Department Responsible:	Angel Fire Utilities
Estimated Cost:	Medium
Potential Funding Sources:	Budget/Grants
Implementation Schedule:	2019
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 36	Early notification system for public on situational awareness for lighting strikes
Planning Mechanism for Implementation	Emergency Manager, Fire Department, Police Department
Hazard(s) Addressed:	Thunderstorm
Lead Agency/Department Responsible:	Public Utilities, Emergency Manager, Village Manager, Mayor
Estimated Cost:	Medium
Potential Funding Sources:	Annual Budget
Implementation Schedule:	2018
Priority (High, Moderate, Low):	High
STAPLE+E Review	No concerns raised.
2018 Status:	New Action

Mitigation Action 37	Early notification system for public on evacuation planning and routing
Planning Mechanism for Implementation	Angel Fire Emergency Manager
Hazard(s) Addressed:	Volcano
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Low
Potential Funding Sources:	Federal Grant Assistance
Implementation Schedule:	2018
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

Mitigation Action 38	Implement Evacuation Plan and provide training
Planning Mechanism for Implementation	Council Directive, Village Code
Hazard(s) Addressed:	Volcano
Lead Agency/Department Responsible:	Angel Fire Emergency Manager
Estimated Cost:	Low
Potential Funding Sources:	Budget/Grants
Implementation Schedule:	2025
Priority (High, Moderate, Low):	Medium
2018 Status:	New Action

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6. Implementation Strategy

6.1 Capability Assessment

The purpose of conducting a *Capability Assessment* is to determine the ability of a local jurisdiction to implement a comprehensive *Mitigation Strategy*, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects. As in any planning process, it is important to try to establish which goals, objectives, and actions are feasible, based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A *Capability Assessment* helps to determine which mitigation actions are practical and likely to be implemented over time given a local government's planning and regulatory framework, level of administrative and technical support, amount of fiscal resources, and current political climate.

A *Capability Assessment* has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, and programs already in place; and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A *Capability Assessment* also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The *Capability Assessment* completed for the Angel Fire Planning Committee serves as a critical planning step and an integral part of the foundation for designing an effective *Mitigation Strategy*. Coupled with the *Risk Assessment*, the *Capability Assessment* helps identify and target meaningful mitigation actions for incorporation into the *Mitigation Strategy* portion of the Plan. It not only helps establish the goals and objectives for the Village to pursue under this Plan, but also ensures that those goals and objectives are realistically achievable under given local conditions.

Emergency Manager

Hazard mitigation is widely recognized as one of the four primary phases of emergency Manager. The three other phases are preparedness, response, and recovery. In reality each phase is interconnected with hazard mitigation, as **Figure 6.1** suggests. Opportunities to reduce potential losses through mitigation practices are most often implemented before a disaster event, such as elevation of flood-prone structures or through the continuous enforcement of policies that prevent and regulate development that is vulnerable to hazards because of its location, design, or other characteristics. Mitigation opportunities can also be identified during immediate preparedness or response activities (such as installing storm shutters in advance of a hurricane), and in many instances during the long-term recovery and redevelopment process following a disaster event.

Figure 6.1: The Four Phases of Emergency Manager

The Village of Angel Fire has the following internal capabilities related to hazard mitigation which serve as a baseline of what they can accomplish with relation to hazard mitigation goals and strategies:

Table 6.1: Angel Fire Capabilities

Regulations	• Village of Angel Fire Planning and Zoning Commission
Emergency Response	• Village of Angel Fire Emergency Manager • Village of Angel Fire Sheriff's Department • Village of Angel Fire Code Red Public Warning System • Village of Angel Fire Fire Department • Angel Fire's Fire Department can request assistance from any other department within the county and municipalities.
Plans	• Colfax County CWPP
Critical Infrastructure	• Highways 64 and 434 • Angel Fire Airport • Angel Fire Resort

Funding sources for hazard mitigation projects that the HMPT will consider for its identified mitigation actions are:

Table 6.2: Federal, State and Other Funding Sources

Name of Program	Primary Purpose	Status
FEMA Public Assistance 406 Mitigation	For damaged public structures in a Presidential disaster declaration area that are otherwise eligible to receive Public Assistance funds, mitigation measures to reduce future risk can be considered. See http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit/hazard-mitigation-funding-under-section-406-0 for more information.	Potential funding source in the future

Name of Program	Primary Purpose	Status
FEMA Hazard Mitigation Grant Program (HMGP)	Following a Presidential disaster declaration, this program funds mitigation projects and actions that are projected to reduce future losses in excess of the projects' costs. See http://www.fema.gov/hazard-mitigation-grant-program for more information.	Potential funding source in the future
FEMA Pre-Disaster Mitigation Program (PDM)	From an annual Congressional appropriation, this program funds mitigation projects and actions that are projected to reduce future losses in excess of the projects' costs. See http://www.fema.gov/pre-disaster-mitigation-grant-program for more information.	Current
Natural Resource Conservation Service (NRCS) Emergency Watershed Protection Programs[11]	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. EWP is an emergency recovery program. All projects undertaken, with the exception of the purchase of floodplain easements, must have a project sponsor. 75% federal/25% non-federal cost-share	Potential funding source in the future
NRCS Watershed and Flood Prevention Operation Program	Assistance may be provided for authorized watershed projects to install conservation practices and project measures (works of improvement) throughout the watershed project area. The planned works of improvement are described in watershed project plans and are normally scheduled to be installed over multiple years.	Potential funding source in the future
USDA Rural Development Emergency Community Water Assistance Grants (ECWAG)	USDA can provide grants from $150,000 to $500,000 to assist a rural community that has experienced a significant decline in quantity or quality of drinking water due to an emergency, or in which such decline is considered imminent, to obtain or maintain adequate quantities of water that meets the standards set by the Safe Drinking Water Act. This emergency is considered an occurrence of an incident such as, drought, earthquake, flood, tornado, hurricane, disease outbreak or chemical spill, leakage or seepage. See http://www.rurdev.usda.gov/UWEP_HomePage.html for more information.	Potential funding source in the future
USACE Section 205 Authority	Provides authority to the Corps of Engineers to plan and construct small flood damage reduction projects (structural and nonstructural) that have not already been specifically authorized by Congress.	Potential funding source in the future

[11] See the following website for more information and examples of funded projects: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/landscape/ewpp/?cid=nrcs143_008263

Name of Program	Primary Purpose	Status
USACE Section 219 of the Water Resources Development Act of 1992 (WRDA92), Environmental Infrastructure, as amended	Provides assistance to non-federal interests for carrying out water-related environmental infrastructure and resource protection and development projects, including wastewater treatment and related facilities, water supply, storage, treatment, and distribution facilities. Such assistance may be in the form of technical, planning, and design assistance as well as construction assistance for defined projects and locations with specific amounts authorized for each location. A non-federal cost share of not less than 25% is required for all assistance under Section 219.	Potential funding source in the future
USFS Collaborative Forest Restoration Program (CFRP)	Assists public or private forest owners with an opportunity to reduce wildfire dangers that threaten the community as a whole. 80% Federally funded	Potential funding source in the future
USFS Forestland Enhancement Plan	This program is administered directly to private landowners who have at least 10 acres of forestland. It provides 75% federal funding for the reduction of fuel loading to improve forest health and reduce fire risk. A side benefit is the improvement of wildlife habitat and water quality.	Potential funding source in the future
USFS Rural Community Assistance Economic Action Program (RCA-EAP)	The main purpose of the RCA-EAP is to use local forest products to produce value-added materials for resale or for the conversion of biomass materials (waste wood) to energy for heating of public buildings or other uses. It has a multi-objective component as a fuel reduction project in forests thereby mitigation wildfire potential. 80% Federally funded	Plan to seek funding in the next 5 years
HUD CDBG Tornado Shelters Act (TSA)	TSA allows local governments to use CDBG funds to create community tornado shelters (“safe rooms”) in manufactured housing communities. No cost-share info available	Potential funding source in the future
State Fire Assistance – Wildland/Urban Interface (SFA-WUI) Program	This grant program, funded at 50/50 cost-share by various federal agencies, is administered by the NM Forestry Division of the NM Energy, Minerals, and Natural Resources Department (EMNRD). SFA-WUI seeks to benefit local communities where the Wildland/Urban Interface is a concern through fuel reduction and creation of defensible space. Local governments are the grant recipients, and projects may be done on private land in conjunction with landowners.	Potential funding source in the future

Name of Program	Primary Purpose	Status
State Water Trust Board	The Water Trust Board was created in the Act. Its purpose is to: 1) oversee and administer the Water Trust Fund and Water Project Fund; 2) review and recommend funding for qualifying water projects to the Legislature; and 3) pursue additional funding opportunities. See http://governor.state.nm.us/Water_Trust_Board.aspx for additional information.	Potential funding source in the future
New Mexico Community Foundation (NMCF)	NMCF is a statewide endowment-building and grant-making organization that serves and invests in New Mexico's people, communities and environment. With partners in every county, NMCF promotes philanthropy as a tool for building community assets, relationships and self-reliance. NMCF provides grants in several areas related to hazard mitigation and forest stewardship. See www.nmcf.org for more information.	Potential funding source in the future

Opportunities for increased capability:

- **Uniform Building Codes (UBC)** – Building codes are important mitigation tools because they are tailored to fit specific hazards present in each region. Consequently, structures that are built to applicable codes are resistant to hazards, such as strong winds, floods, and wildfires, and can help mitigate the effects of these hazards. New Mexico has adopted the 1997 UBC code as a minimum standard for all communities and provides inspection services through the Construction Industry Division of the New Mexico Department of Regulations and Licensing. Individual counties and municipalities are at liberty to adopt the most current UBC.
- **Floodplain Ordinance and Community Rating System (CRS)** – The Village of Angel Fire is a participant in the NFIP. Those participating can benefit from adopting higher standards in their floodplain ordinances to ensure additional protection for development in the floodplain or prohibit future development. The Village of Angel Fire should consider joining the NFIP CRS to receive credit, and potential flood insurance premium discounts for its policyholders, for any adopted higher standards and other enhanced flood risk reduction activities.
- **Public Warning System** – Warning systems are needed to ensure timely and accurate information to minimize the effects of disasters in the Village
- **Formal Mitigation Function** – For developing and implementing projects as well as maintaining the planning process
- **Firewise Communities/USA** – A project of the National Wildfire Coordinating Group's Wildland-Urban Interface Working Team, it provides information and guidance for communities in the wildland-urban interface area (www.firewise.org).

6.2 Prioritization

6.2.1 STAPLE+E Criteria

FEMA developed a comprehensive set of criteria that allows communities to evaluate proposed actions in categories that reflect community values and sound principles for finding appropriate and cost-effective mitigation actions. The HMPT used these criteria, known by the acronym STAPLE+E, to evaluate the potential impact of high priority proposed mitigation actions (which are the most actionable ones):

Table 6.3: STAPLE+E Criteria

Evaluation Criteria	Considerations
Social	*Does the measure treat people fairly?* (i.e., Are different social and demographic groups, different generations, different creeds treated equally?)
Technical	*Will it work?* (i.e., Does it actually solve the problem and is it feasible?)
Administrative	Does the Village have the capacity to implement and manage the project?
Political	Does support exist from public and political stakeholders?
Legal	Does the Village have the legal authority to implement and assume any reasonable liability?
Economic	Is it cost-effective? Is there a federal, state or non-profit source for funding? If federal, can the non-federal match bet met locally or through another source? Does it contribute to the local economy?
Environmental	Does it comply with environmental regulations? Will it preserve, protect, or enhance existing natural resources?

The prioritization methodology involved comparing each proposed mitigation measure against the established criteria to determine if the measure would help the community meet the mitigation goals and objectives established for this plan. Then the mitigation measures were compared against each other to determine a priority order.

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7. Plan Maintenance

This section discusses how the Village of Angel Fire Hazard Mitigation Plan will be implemented, evaluated and enhanced over time.

According to planning guidance, the Plan must be actively monitored. Monitoring means tracking the implementation of the plan over time. To monitor the plan, Angel Fire needs to observe and check the methods and procedures, identified in the plan, for progress over next five years of approval. The Angel Fire Emergency Manager will be responsible for monitoring the plan and reporting to the HMPT on an annual basis as well as leading Plan maintenance, evaluation, and update activities, as described further in the following sections.

The policies and procedures identified in this plan for monitoring are (but are not limited to) the following:

- Plan Evaluation (Section 7.3)
- Plan Update (Section 7.3)
- Continued Public Participation (Section 7.5)
- Enhancement of identified Capabilities (Section 7.3)
- Participation in the NFIP (Section 5.1.2)
- Action Prioritization (Section 6.2)
- Administration of Identified Mitigation Actions (Section 7.3)
- Incorporation into other Planning Mechanisms (Section 7.2)

7.1 Implementing the Plan

The Village of Angel Fire will integrate this Plan into existing decision making processes or mechanisms. This includes integrating the requirements of the Plan into other planning documents; processes or mechanisms such as development plans, land use plans, continuity of operations plans, and capital improvement plans, when appropriate. The HMPT will be charged with monitoring, evaluating and implementing the Plan. It will also be responsible for ensuring that the goals and strategies of new and updated planning documents are consistent and do not conflict with the goals and actions of the Plan, and will not contribute to increased hazard risk for the planning area. Opportunities to integrate the requirements of this Plan into other planning mechanisms shall continue to be identified through future meetings of HMPT and through the five-year review process described herein.

7.2 Incorporation into Other Planning Mechanisms and Existing Programs

As part of the on-going planning process, the HMPT will continue to identify additional plans and programs that will augment or help support mitigation planning efforts. The HMPT will look to incorporate mitigation into additional existing planning mechanisms including updates to plans and ordinances identified in Section 2.2 of this plan.

The Village of Angel Fire has reviewed the documents shown in Section 2.2 and considered each document's planned future updates. When possible this mitigation plan will be used to help

guide planning efforts and updates for those plans. At the time this plan was written the status of those actions are as follows:

- ***2013 New Mexico State Hazard Mitigation Plan*** - A summary of the latest update of the State Mitigation Plan was used to inform this Plan, which is summarized in Section 2.5.
- ***2008 Colfax County Community Wildfire Protection Plan* (CWPP)** – Evaluated plan for wildfire risk assessment background information and mitigation project ideas. Captured appropriate information and project ideas for this plan.
- ***2007 Colfax County Local Hazard Mitigation Plan –*** The Plan provided a regional overview of resources, land use, infrastructure, and economic development for the county and local jurisdictions, as well as previously evaluated planning policies and procedures and mitigation actions.

The Village of Angel Fire acknowledges that it is necessary to ensure that future growth in the community should avoid or control the use of all areas containing known potentially hazardous environments. Further, hazard mitigation will not stop upon completion of each of the specific actions listed in this plan. Therefore, hazard mitigation will become an ongoing and coordinated effort. The following areas of consideration will take place as part of this effort.

Evaluation of declared emergencies and activations of area emergency operations centers. In the event that an emergency declaration is made within the Village of Angel Fire, an evaluation of the events leading to this declaration will be made in order to identify possible mitigation actions that can be taken to reduce or eliminate this hazard in the future. In addition, the activation of an emergency operations center within the village will require this same type of evaluation in order to identify possible mitigation actions that can be taken.

Incorporation into existing efforts. Successful efforts at eliminating or reducing the consequences of future hazard events cannot occur without controlling the growth of new development within known hazardous areas. As part of implementing the resolutions of the Village of Angel Fire Mitigation Plan, all proposed new development must be evaluated against identified hazard-prone areas. Therefore, the building permit approval system will include a review of all newly-proposed development projects to keep them from being built in known hazard-prone areas such as floodplains. If a proposed project falls within such an area, the permit may be disapproved or additional construction requirements may be established to eliminate any dangers that could be caused by the existence of the hazard.

In addition, Angel Fire's planning staff will ensure that all comprehensive plans that are developed based on the community's predicted growth patterns consider both hazard locations and the mitigating action plans to eliminate or reduce them. To accomplish this, the planning staff and the mitigation team will collaborate during the revision and updating of future comprehensive plans. Melding these two efforts will ensure that growth is steered away from identified hazard locations, wherever possible, and avoid increasing the potential damage risk they represent. When the hazard locations cannot be avoided, building codes and zoning codes can be utilized to minimize the danger.

Additional projects may also be developed by the cooperative works of the planning staffs and the mitigation planning team during the revision and updating process of the comprehensive plans. Projects identified in this manner will be included in the revision and updating of the Village of Angel Fire Mitigation Plan.

To address the concerns and desires of the general public, efforts will be made to obtain their input. Obtaining this input will be accomplished in the form of questionnaires and advertised public meetings. In addition, the comprehensive plan will be made available through public libraries and the internet. Contact numbers and addresses will be made available to the public so that input can be generated at any time. Questionnaires and public meetings will also be scheduled after the occurrence of a major disaster to provide an avenue for public input.

Additional Functions. In addition to incorporating the ideas of hazard mitigation into all planning efforts, other programs routinely take place in Angel Fire to provide for the public's general safety. These programs are forms of mitigation. The road departments at each government level, including the state, work to maintain a safe transportation system through such projects as repaving and maintenance of road signs.

Municipal, county, and state law enforcement of traffic regulations aids in maintaining safe transportation routes. Laws are in place concerning the illegal dumping of debris and restrictions on open burning. The New Mexico Department of Transportation further monitors and inspects commercial transports in an effort to ensure that hazardous material movement is conducted in compliance with mandated regulations.

Additionally, emergency operations plans are in place and exercised regularly to ensure that area response agencies coordinate their efforts during emergency situations. The emergency operations plans are reviewed annually and revised as necessary. Training for first responders is an ongoing project and further ensures that police, fire, and emergency medical personnel are kept up-to-date in their respective areas of expertise.

7.3 Monitoring, Evaluating, and Updating the Plan

It is critical that the Village of Angel Fire Hazard Mitigation Plan remains a living document, with the goal of continuing the process of eliminating or reducing potential threats and resulting damage due to existing hazards in the community. The HMP reflects what The Angel Fire community will do to protect itself from its unique hazards and threats within its available resources. The general success of the HMP is dependent upon a well-established planning process and well-constructed maintenance process. The formal adoption of the HMP by the Village of Angel Fire Commission is imperative to effectively execute the HMP and the continued planning process.

This HMP will be updated and maintained by Angel Fire Emergency Manager with support from the HMPT in order to continually address hazards and risks. The HMPT will continue to **meet annually** to oversee and review updates and revisions to the HMP. The committee will hold an **annual public forum** for the continual development and assessment of the HMP. During those meetings, the HMPT will:

- Report on usefulness of the Plan for each jurisdiction and their progress on mitigation actions
- Report on any input received from the public
- Discuss hazard events and observations
- Report on how the Plan has been incorporated into other planning mechanisms
- Discuss mitigation issues and ideas
- Work to secure funding and identify multi-objective, cost-share, and other opportunities for partnerships
- Discuss how to keep the attention of community leaders and the public on hazard mitigation problems and opportunities
- Discuss new sources for data to improve future updates
- Make recommendations on specific updates to the Plan

The exercise of evaluating the HMP will occur annually as the HMPT will assess goals and objectives of the current HMP and appraise the mitigation project's effectiveness to expected conditions using the following criteria:

- Evaluate the resulting benefit of all completed action plans.
- Evaluate the progress of action plans still being implemented.
- Evaluate public input relating to completed projects, ongoing projects, or developing trends or concerns within the mitigation process.
- Determine if new hazard threats have been identified and devise action plans accordingly.
- Revise, if necessary, the schedule of pending mitigation action plans.

The plan will be revised based on local, state, and national guidelines. As laws, government regulations, political, public, and financial changes occur; the HMP should be adjusted if affected by these changes. Additionally, the HMP should be analyzed following applicable disasters to update and add mitigation actions. This will ensure the survivability of the HMP. The HMPT should be informed and approve all changes. Updates requiring resolution will be forwarded to DHSEM upon approval. Changes to the HMP will be tracked. A system to track accomplishments and outstanding mitigation actions will be developed and maintained. Agencies, departments, and other partners who complete related mitigation actions are responsible for providing The Angel Fire Emergency Manager and the HMPT with a summary of actions undertaken. The annual HMPT review should allow for further evaluation and identification of completed projects.

7.4 5-Year Plan Effectiveness Review and Update

In addition, the HMP will be **re-evaluated every five years** and forwarded to the New Mexico State Department of Homeland Security and Emergency Manager (DHSEM) and the Federal Emergency Manager Agency (FEMA) for approval as required to remain eligible for Pre-Disaster Mitigation and Hazard Mitigation Grant Program funding. The plan update process shall begin three years into the current planning cycle to ensure the current plan does not expire. This process will determine whether there have been any significant changes that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified

hazard areas, an increased exposure to hazards, the increase or decrease in capability to address hazard risk, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan.

The Plan review provides Angel Fire officials and the HMPT with an opportunity to evaluate those actions that have been successful, and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The Plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. The Village of Angel Fire Emergency Manager will be responsible for reconvening the HMPT and conducting the 5 year plan review.

During the 5 year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks or hazards changed?
- Are current human and capital resources appropriate for implementing the Plan?
- Are there plan and mitigation action implementation obstacles such as social, technical, administrative, political, legal, economic, environmental, or coordination issues?
- Have new issues or needs been identified which are not adequately addressed in the Plan?
- Has there been a change in information, data, or assumptions from those on which the Plan is based?
- Have the outcomes occurred as expected?
- Are there errors, inaccuracies, or omissions made in the identification of issues or needs in the Plan?
- Did the identified agencies, individuals, and/or other partners participate in the plan implementation process as assigned?

Following the 5 year plan review and update, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the Plan will be submitted to the entire HMPT for review.

7.5 Continued Public Involvement

Input from the public is vital to an effective HMP. The Village of Angel Fire will continue their transparent government and all-inclusive public involvement efforts established in the development of this HMP by continuing to include public input in the ongoing hazard mitigation planning processes. The Village of Angel Fire will continue to ensure adequate public access to the HMP by posting the HMP on the Village of Angel Fire website. It will also be available from The Village of Angel Fire Emergency Manager upon request. An annual public meeting will be held to update residents and stakeholders on the progress of action items within the HMP or to hold workshops for updating the HMP. The annual public meeting will allow for a review process to assess existing goals and mitigation actions and to examine the action plan. Residents are also welcome to submit comments (by letter or electronically) to the Angel Fire Emergency Manager about the HMP at any time.

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APPENDIX A
Meeting Documentation

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APPENDIX B
Survey

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APPENDIX C
Plan Review Tool

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