

# Archuleta County Multi-Hazard Mitigation Plan

June 2018



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# 1 INTRODUCTION

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## 1.1 Purpose

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Archuleta County, Colorado, including the participating jurisdictions of the Town of Pagosa Springs, Pagosa Fire Protection District (FPD), and the Pagosa Area Water and Sanitation District (PAWSD) have prepared this local hazard mitigation plan to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make Archuleta County and participating jurisdictions eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) grants including the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) and Pre-Disaster Mitigation (PDM) program, as well as to make the County and its jurisdictions more disaster resistant.

The planning area geographic extent also includes southern Hinsdale County and southern Mineral County, which are within the County's Response Area. The plan covers hazards that might affect these areas, but each county has its own hazard mitigation plan. It is important to note that a portion of Archuleta County is Southern Ute Indian tribal lands; the Southern Ute Indian tribe is a sovereign nation and has its own Hazard Mitigation Plan. On these lands, this plan is only a resource to support the tribe's planning and operations.

Additionally, approximately 50% of the land in Archuleta County is managed by the U.S. Forest Service (USFS). Other federal land managers include the Bureau of Indian Affairs (BIA) and the Bureau of Land Management (BLM). While the federal government ultimately has jurisdiction in these parts of the County, the Archuleta County Hazard Mitigation Plan could also be used to support federal hazard mitigation efforts. In particular, the hazard profiles and risk assessment in the Hazard Mitigation Plan could be useful for supporting the federal government's efforts related to wildland fire mitigation and watershed protection. The USFS was an active partner during both the original development and update of this plan.

## 1.2 Background and Scope

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

Hazard mitigation is defined by FEMA as “any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event.” The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of \$4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents Archuleta County’s hazard mitigation planning process, identifies relevant hazards and risks, and identifies the strategy the County and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability.

This plan underwent a comprehensive update in 2017 in fulfillment of the five year update requirement. This plan was originally prepared in 2011-12, pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007. Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act, or DMA. While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the Archuleta County planning and response area is subject to many kinds of hazards, access to these programs is vital.

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

### 1.3 Multi-Jurisdictional Planning

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This plan is a multi-jurisdictional plan. The planning area encompasses all of Archuleta County, the incorporated Town of Pagosa Springs, Pagosa FPD, PAWSD, and the southern portions of Hinsdale County and Mineral County within the Archuleta County Emergency Management Response Area. This area also includes Southern Ute Tribal Lands. As such, the tribe has been an important partner in the planning process. All local units of government in the County were

invited to participate in the planning process. The decision whether or not to participate in this process was a local decision, based on local community needs. Local governments have the options to not prepare a plan, to prepare a stand-alone plan for their jurisdiction, or to participate in a multi-jurisdiction or county-wide plan. The following entities meet the definition of a local government per the DMA regulations and have opted to participate in this effort and are seeking FEMA approval of the 2017 updated version of this plan. Entities that participated in the plan are noted below. Additional detail about participation can be referenced in Chapter 3, and Appendix B and C.

### **Participating entities**

- Archuleta County
- Town of Pagosa Springs
- PAWSD
- Pagosa FPD

## **1.4 Plan Organization**

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The Archuleta County Multi-Hazard Mitigation Plan is organized as follows:

- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption
- Chapter 7: Plan Implementation and Maintenance

Appendix A includes further details on the hazard mitigation action items identified in Chapter 5 and is a key aspect of this plan.



# 2 COMMUNITY PROFILE

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## 2.1 Geography and Climate

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The Archuleta County Response Area, depicted in Figure 2.1, encompasses the entirety of Archuleta County, the Southern Ute Indian tribal lands, and the southern portions of Hinsdale and Mineral Counties. The northern border of the Response Area, which crosses through Hinsdale and Mineral Counties, is roughly coterminous with the Continental Divide. The Response Area's northern border deviates briefly from the Continental Divide in the southeastern part of Mineral County.

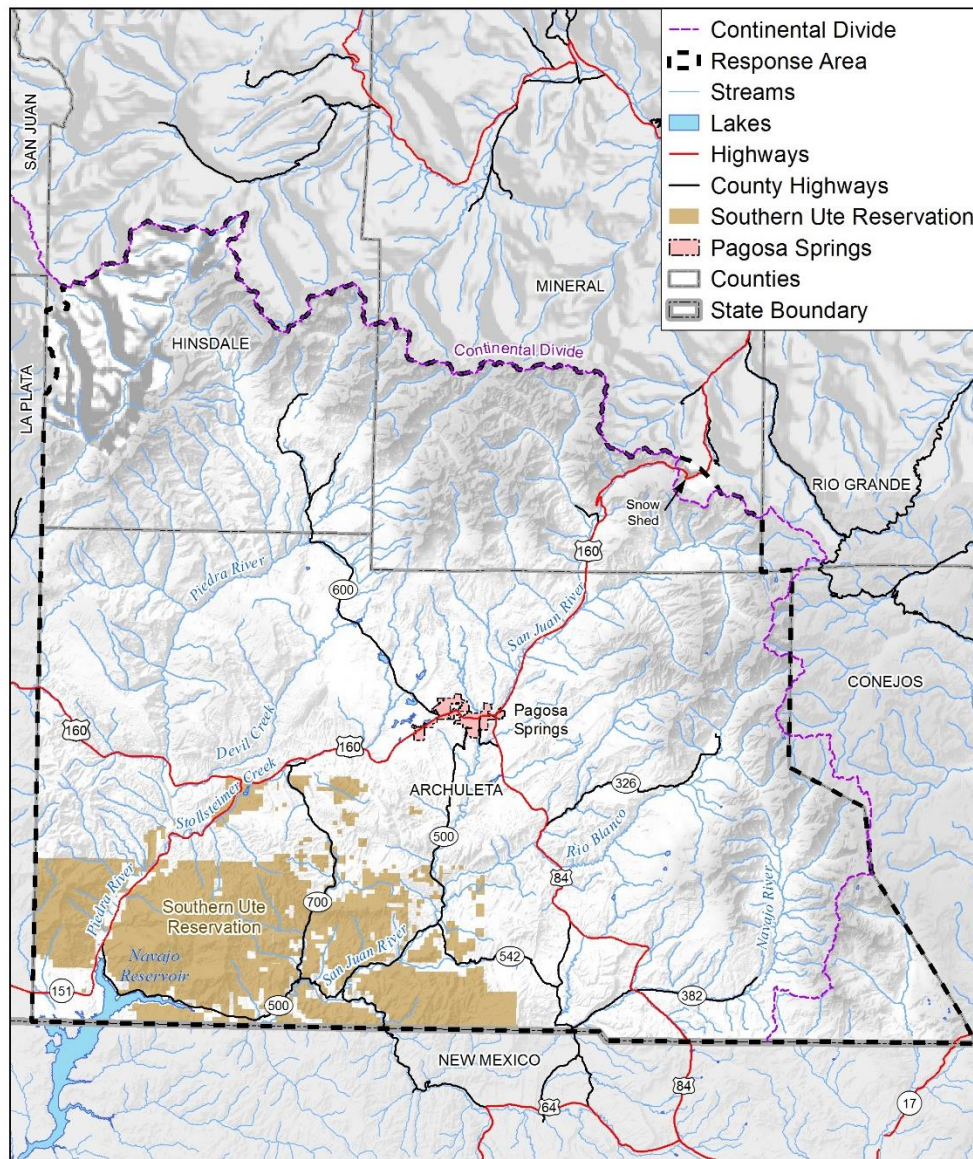
The Archuleta County Response Area is located in southwest Colorado near the headwaters of the San Juan River. The terrain in the Response Area ranges from the San Juan Mountains in the northern half of the Response Area to mesas and valleys in the southern part of Archuleta County. The Response Area is bordered by La Plata County to the west, the southern portions of Hinsdale and Mineral County to the north, Rio Grande County to the northeast, Conejos County to the east, and the state of New Mexico to the south. Archuleta County encompasses 1,364 square miles and includes the incorporated municipality of Pagosa Springs. Roughly 50% of the land in Archuleta County is public land managed by the U.S. Forest Service (USFS) and Bureau of Land Management (BLM). 15% belongs to the Southern Ute Indian Tribe, and the remaining 35% is privately owned. The portion of Hinsdale County covered by the Response area is 295.7 square miles. The Mineral County portion covers 222 square miles. The USFS manages the large majority of the land in these parts of the Response Area. Land stewardship in the Archuleta County Response Area is depicted in Figure 2.2.

The Archuleta County Response Area has four distinct seasons and averages 300 days of sunshine per year. In Archuleta County, the warmest month is July with an average high of 83 degrees and an average low of 45 degrees. The coolest month is January with an average high of 30 degrees and an average low of 4 degrees. Average annual precipitation is 17.35 inches per year, and average annual snowfall is 67.4 inches per year. Vegetation in the area consists of ponderosa pine and mixed coniferous forests. Most of the land in the County lies at an elevation of about 7,000 feet, but elevation overall varies from roughly 5,900 feet to over 13,300 feet at the highest point in the County.

Temperatures in the Mineral County portion of the Response Area tend to be much cooler due to the higher elevation. At Wolf Creek Pass in Mineral County, the average high temperature is in July at 65.8 degrees with an average low of 4.4 degrees in January. The elevation at Wolf Creek Pass is estimated at 10,857 feet. The average total annual precipitation at the Pass is 45.39 inches, and the average total annual snowfall is 435.6 inches according to the Western Regional Climate Center (WRCC).

The climate in southern Hinsdale County is generally cooler than that of Archuleta County and warmer than the climate in Mineral County. The average high temperature at the Palisade Lakes WRCC station is 78.3 degrees, occurring in July. January is typically the coolest month, with an average minimum temperature of 1.4 degrees. Southern Hinsdale County gets more precipitation per year than Archuleta County; the average total annual precipitation is estimated to be 21.99 inches with an average total annual snowfall estimate of 128.7 inches.

Figure 2.1. Archuleta County Emergency Response Area

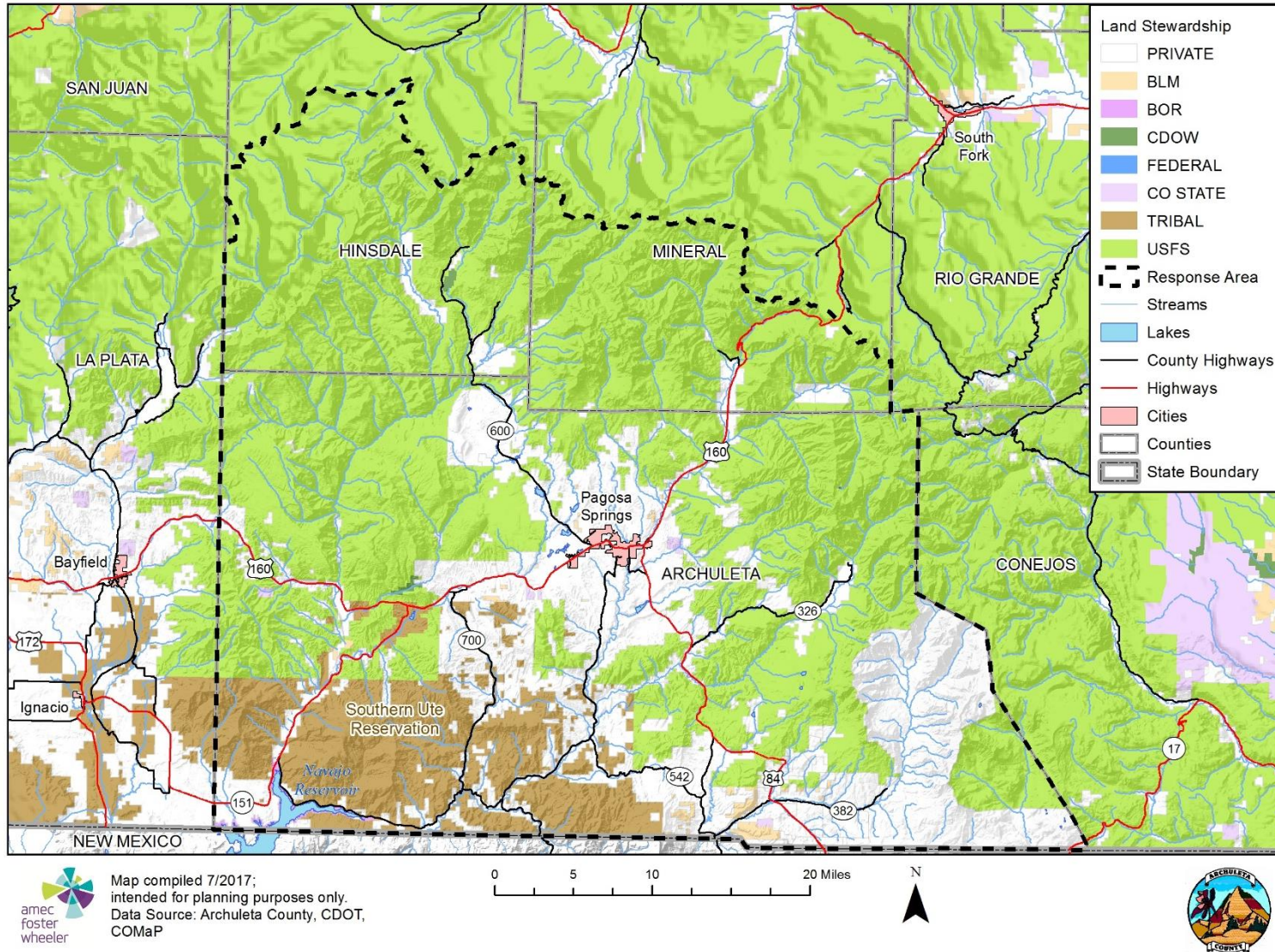


amec  
foster  
wheeler

Map compiled 7/2017;  
intended for planning purposes only.  
Data Source: Archuleta County, CDOT,  
HSIP Freedom NID



Figure 2.2. Archuleta County Response Area Land Stewardship



## 2.2 History

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The land that comprises Archuleta County was originally home to the Ancestral Puebloans, Ute, Navajo, and Apache. The area was later claimed by Spain. It then became part of the Territory of Northern Mexico after the Mexican Revolution. It became part of the U.S. and Utah Territory after the 1848 war with Mexico. Later, the Archuleta County area was absorbed into the Colorado Territory. Archuleta County as it is known today was created on April 14, 1885. The land area that makes up the County was originally part of Conejos County. Archuleta County was named for “J.M. Archuleta, the patriarch of one of the old Spanish families of New Mexico, and in honor of Antonio D. Archuleta, the [state] Senator from Conejos County at that time” (<http://www.sangres.com/colorado/archuleta/index.htm>). The Town of Pagosa Springs was incorporated on March 2, 1891. It was named after the hot springs in the area, “one of the largest and hottest natural springs in the world, and one which continues to be celebrated for its therapeutic powers” ([http://www.pagosa.com/pagosa\\_hot\\_springs.php](http://www.pagosa.com/pagosa_hot_springs.php)). According to the cultural historian of the Southern Ute Indian Tribe, Pah gosah is a Ute term that has been translated as “water that has a strong smell.”

Pagosa Springs evolved into lumber town with the arrival of the railroad. Pagosa Springs is the only incorporated community, but other populated areas include Arboles and Chromo. The Town of Pagosa Springs is a Home Rule Municipality.

## 2.3 Population

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Archuleta County has been steadily growing since 2010. The estimated 2010 county population was 12,084 people, and has increased by 7%; estimated to be 12,854 in 2016. The Town of Pagosa Springs is the County’s principal population center, comprising 14% of the total County population. Population estimates for the Town of Pagosa Springs and the unincorporated county are provided in Table 2.1 An estimated 30 people are at risk in southern Hinsdale County, and 21 people are at risk in southern Mineral County, based on HAZUS block level data that uses Census 2010 estimates. According to HAZUS, there were 87 housing units in southern Hinsdale County with an estimated value of \$35,235,000, and 57 housing units in Mineral County with an estimated value of \$22,259,000.

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Table 2.1. Archuleta County Population Estimates 2010 -2016

Jurisdiction	2010	2011	2012	2013	2014	2015	2016
Town of Pagosa Springs	1,721	1,708	1,720	1,723	1,741	1,761	1,838
Unincorporated Archuleta County	10,334	10,303	10,393	10,471	10,488	10,623	11,016
<b>Total Archuleta County</b>	<b>12,055</b>	<b>12,011</b>	<b>12,113</b>	<b>12,194</b>	<b>12,229</b>	<b>12,384</b>	<b>12,854</b>

Source: U.S. Census Bureau

Select 2015 American Community Survey demographic and social characteristics for Archuleta County are shown in Table 2.2.

Table 2.2. Archuleta County Demographic and Social Characteristics

Characteristic	Archuleta County	Town of Pagosa Springs
<b>Gender/Age</b>		
Male	50.9%	51.2%
Female	49.1%	48.8%
Under 5 years	4.9%	6.6%
65 years and over	21.1%	13.9%
Median Age (years)	49.6	33.5
<b>Race/Ethnicity (one race)</b>		
White	87.4%	78.1%
American Indian/Alaska Native	2.3%	0.0%
Asian	0.7%	0.5%
Black or African American	0.9%	1.6%
Hispanic or Latino (of any race)	18.5%	34.6%
<b>Education</b>		
High school graduate (includes equivalency), population 25 to 64 years	70.0%	75.3%

Source: U.S. Census Bureau, American Community Survey, 2015 <http://factfinder.census.gov/>

## 2.4 Government

The Board of Commissioners is the governing body for Archuleta County. Each of the three members serves a four-year term. They are elected from each of three districts, but by the County electorate as a whole. County government has very limited legislative power per state statute.

The Town of Pagosa Springs is a home rule municipality. The governing body of the Town is the Town Council and an elected Mayor. The Town Council consists of six members who serve four-year terms. The Town Council has power of appointment over the Town Manager, Town Attorney and Municipal Court judge. The Council also determines policy and budget for Pagosa Springs.

The southwestern portion of Archuleta County is within the Southern Ute Indian tribal lands. The Southern Ute Indian tribe is a sovereign nation and is working on its own hazard mitigation plan (HMP). Therefore, the tribe is not a participating jurisdiction in the Archuleta County HMP. However, the Southern Ute Indian Tribe is considered a stakeholder in the Archuleta County HMP planning process.

## 2.5 Economy

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Lumber and ranching were traditionally the most important economic activities in Archuleta County, but in the last few decades, recreation, tourism, and construction have taken the lead. According to the 2012 Economic Census, the industries that employed the most people in Archuleta County were retail trade (22.5 percent), accommodation and food services (19 percent), arts, entertainment, recreation (12.5 percent), health care and social assistance (10.9 percent), and construction (6.2 percent).

Select economic characteristics for Archuleta County from the 2012 Economic Census are shown in Table 2.3.

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Table 2.3. Archuleta County Economic Characteristics

Characteristic	Archuleta County	Town of Pagosa Springs
Families below poverty level	9.6%	20.2%
Individuals below poverty level	11.7%	21.6%
Median home value	\$264,200	\$190,800
Median household income	\$46,646	\$32,063
Per capita income	\$28,884	\$20,684
Population in labor force	5,999	892
Population employed	5,506	837
Unemployment	4.8%	4.0%
Total health care and social assistance receipts/revenue, 2012	15,812	Withheld
Total merchant wholesaler sales, 2012 (\$1,000) (c)	9,337	Withheld
Total retail sales, 2012 (\$1,000) (c)	130,827	114,240
Total annual payroll, 2012	88,016	--
Total employment, percent change 2014-2015	-0.6%	+1.7%

Source: U.S. Census Bureau, American Community Survey, 2015 <http://factfinder.census.gov/>

## 2.6 Mitigation Capabilities Assessment

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Combining the risk assessment with the mitigation capability assessment results in “net vulnerability” to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan. The HMPC used a two-step approach to conduct this assessment. First, an inventory of common mitigation activities was made through the use of a matrix. The purpose of this effort was to identify policies and programs that were either in place or could be undertaken, if appropriate. Second, the HMPC conducted an inventory and review of existing policies,

regulations, plans, projects, and programs to determine if they contribute to reducing hazard related losses.

## 2.6.1 Archuleta County Mitigation Capabilities

This section presents Archuleta County’s mitigation capabilities, as well as the capabilities of the Town of Pagosa Springs, Hinsdale County, and Mineral County, that are applicable to the planning area. This assessment describes existing capabilities, programs, and policies currently in use to reduce hazard impacts or capabilities that could be used to implement hazard mitigation activities. It addresses regulatory mitigation capabilities and administrative/technical mitigation capabilities for the participating jurisdictions.

### Archuleta County Regulatory Mitigation Capabilities

Table 2.4 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Archuleta County. Excerpts from applicable policies, regulations, plans, and programs descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.4. Archuleta County Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
Building Codes	Y	
Building Codes Year	Y	
BCEGS Rating	N	
Capital Improvements Program (CIP) or Plan	Y	
Community Rating System (CRS)	N	
Community Wildfire Protection Plan (CWPP)	Y	Archuleta County Community Wildfire Protection Plan (2008)
Comprehensive, Master, or General Plan	Y	Archuleta County Community Plan
Economic Development Plan	Y	
Elevation Certificates	Y	Development Services maintains
Erosion/Sediment Control Program	Y	
Floodplain Management Plan	N	
Flood Insurance study	Y	"FIS for Archuleta County, Colorado and Incorporated Areas" dated September 25, 2009
Growth management Ordinance	Y	Preferred Growth Scenarios in Community Plan
Hazard-Specific Ordinance or Plan (Floodplain, Steep Slope, Wildfire)	Y	Archuleta County Land Use Regulations, Section 10, updated 2015 Winter Storm Emergency Mitigation and Response Plan

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
		Extended Power Outage Plan Ordinance for the regulation of open burning (Ordinance No. 10-2017) Emergency Alert and Notification Plan
NFIP	Y	Since January 3, 1979
Site Plan Review Requirements	Y	Archuleta County Land Use Regulations, Section 5
Stormwater Program, Plan, or Ordinance	N	
Zoning Ordinance	Y	Archuleta County Land Use Regulations, Section 3

As indicated in the table above, Archuleta County has several plans and programs that guide the County’s mitigation of development in hazard-prone areas. Some of these plans and programs are described in more detail below.

***Archuleta County Community Plan, Updated 2017***

The Archuleta County Community Plan was prepared by a steering committee comprised of 13 individuals appointed by the County Commissioners. The Community Plan was developed to be used in the decision-making process regarding the physical, cultural, and socioeconomic development of the County over time. The plan’s goals provide general statements reflecting the desires of County residents regarding land use and development. These goals and associated action items also lay the groundwork for zoning and the land use decision-making process. The policies provide the County’s positions as they relate to the identified goals and establish guidelines for direction or action. The overall goal of the plan is to allow gradual, long-term population and economic growth within the County in a manner that does not harm the County’s scenery or character and residents’ way of life. To this end, the plan examines four different growth and land use scenarios based on development trends within the County since about 1980.

Elements of the plan were updated in 2008 and in 2011. Beginning in 2016, the Archuleta Planning Commission, with support from the Board of Commissioners, began a comprehensive, staff-level review of the Community Plan. The new edition includes a reformat, as the plan has been split into four sections and an appendix. Additional edits include clarifying Policies and Action Items to make the plan more current and useful, as well as updates to maps, and statistics. The update was adopted by the Planning Commission on October 11<sup>th</sup>, 2017.

***Archuleta County Community Wildfire Protection Plan, 2008***

The Archuleta County Community Wildfire Protection Plan (CWPP) was completed in 2008. It is an update to the 2001 Archuleta County Community Fire Plan. The CWPP outlines the County’s fire response capabilities and mitigation strategies. It includes a subdivision-level risk assessment which was used to inform the wildfire hazard risk assessment in Chapter 4 of this plan.



## **Archuleta County Land Use Regulations, Amended 2017**

The purpose of the Archuleta County Land Use Code is to promote the health, safety, and general welfare of the present and future inhabitants of Archuleta County by planning for and regulating the use of land so as to provide planned and orderly development and environmental protection in a manner consistent with constitutional rights. The regulations were originally adopted in May 2006, and were amended in April 2017. The intent of the code is to regulate development and activities in Archuleta County, to give special attention to hazardous areas, to protect lands from activities that would cause immediate or foreseeable material danger to significant wildlife habitats, to regulate the use of land on the basis of impact on the communities or surrounding areas, and to secure safety from fire and other damages, among other things.

## **Archuleta County Administrative and Technical Mitigation Capabilities**

Table 2.5 identifies the County personnel responsible for activities related to mitigation and loss prevention in Archuleta County.

Table 2.5. Archuleta County Administrative/Technical Mitigation Capabilities

<b>Personnel Resources</b>	<b>Y/N</b>	<b>Comments</b>
Emergency Manager	Y	Sheriff's Office – Division of Emergency Management: Director of Emergency Management and Deputy Director of Emergency Management
Floodplain Administrator	Y	Development Planning
Community Planning	Y	
Planner/Engineer (Land Development)	Y	Planning Department/County Engineer
Planner/Engineer/Scientist (Natural Hazards)	Y	County Engineer
Engineer/Professional (Construction)	Y	County Engineer, Building Department
Resiliency Planner	N	
Transportation Planner	N	
Full-Time Building Official	Y	Planning Department
GIS Specialist and Capability	Y	IS Department: GIS Specialist / Assessor's Office: GIS Specialist / Sheriff's Office: Director of Emergency Mgt.
Grant manager, Writer, or Specialist	Y	Department / Office Specific
Warning Systems/Services	Y	Reverse call-back and text messaging), Emergency Web Site, Twitter feeds, EAS, KWUF and KSUT
- General	Y	
- Flood	N	
- Wildfire	N	
- Tornado	N	
- Geological Hazards	Y	Monitoring of landslide areas by Xcel and CDOT

The following departments are involved in hazard mitigation in Archuleta County:

### ***Planning Commission***

The Planning Commission consists of five members and makes recommendations to the County's governing body concerning matters related to planning, zoning, and land use regulations.

### ***Development Services Department***

Development services includes the Building and Planning departments and is responsible for planning and implementation of zoning, building, and land use regulations.

### ***Public Works Department – County Engineer and Road and Bridge Department***

The Road and Bridge Department is responsible for the repair and maintenance of County roads within the planning area.

### ***Archuleta County Sheriff's Office – Division of Emergency Management***

The Division of Emergency Management serves all of Archuleta County and assists Hinsdale and Mineral Counties with emergency management and coordination in the southern portions of their counties. The division contributes to hazard mitigation and loss reduction through coordination, response, recovery, and planning for large emergencies in Archuleta County and other county-level incidents, including search and rescue and wildland fire response. The division provides for protection of life, health, safety, welfare, and property of the public and community as well as assists community members in solving problems related to emergency management. Emergency Management also coordinates training for the county in addition to Multi Agency Coordination (MAC), Joint Information System, Resource Management, and Incident Management. The division has three full time staff and two part time staff.

## **Floodplain Management Regulations and NFIP Participation**

Ordinance No. 2009-01 and Resolution 2010-46 detail the floodplain management regulations for the County. The purpose of these regulations is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas. These regulations apply to all areas of special flood hazards within the jurisdiction of Archuleta County identified in FEMA's September 25, 2009, flood insurance rate maps (FIRM). Archuleta County has participated in the National Flood Insurance Program (NFIP) since January 3, 1979, by administering floodplain management regulations that meet the minimum requirements of the NFIP. Much of the Special Flood Hazard Area (SFHA, base flood, 100-year flood or 1% annual chance flood) in the unincorporated county is mapped as Zone A (Approximate) and lack detailed studies with base flood elevations. Where base flood elevation (BFE) data is available, the first finished floor elevation must be 1 foot above the BFE. The county maintains a file of elevation certificates. More details on NFIP policies and claims in Archuleta County are included in **Chapter 4, Section 4.3.7 and 4.3.25.**

Table 2.6. Archuleta County Financial Capabilities

Financial Resources	Y/N	Comments
<b>Has the community used any of the following to fund mitigation?</b>		
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Feed	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone areas	N	
Stormwater service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

Table 2.7. Archuleta County Education and Outreach Capabilities

Education & Outreach	Y/N	Comments
Local citizen groups that communicate hazard risks	N	
Firewise	Y	Echo Canyon Ranch (2014) Loma Linda (2014) Timber Ridge Ranch (2016) Firewise of Southwest Colorado
StormReady	N	
Other	N	

## 2.6.2 Town of Pagosa Springs Mitigation Capabilities

### Town of Pagosa Springs Regulatory Mitigation Capabilities

Table 2.8 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Pagosa Springs. Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 2. 8. Town of Pagosa Springs Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
Building Codes	Y	See 2011 Pagosa Springs Land Use Code, Historic Buildings & District Guidelines
Building Codes Year	Y	2015
BCEGS Rating	N	
Capital Improvements Program (CIP) or Plan	Y	
Community Rating System (CRS)	N/A	
Community Wildfire Protection Plan (CWPP)	N	
Comprehensive, Master, or General Plan	Y	2011 Pagosa Springs Land Use and Development Code Pagosa Springs Comprehensive Plan, 2006 (update in 2017) Downtown Master Plan, 2008
Economic Development Plan	Y	
Elevation Certificates	Y	In 2011 Pagosa Springs Land Use Code
Erosion/Sediment Control Program	Y	In 2011 Pagosa Springs Land Use Code
Floodplain Management Plan	N	N
Flood Insurance study	Y	FIS for Archuleta County, Colorado and Incorporated Areas” dated September 25, 2009
Growth management Ordinance	Y	
Hazard-Specific Ordinance or Plan (Floodplain, Steep Slope, Wildfire)	Y	In 2011 Pagosa Springs Land Use Code, Article 6 Town to Pagosa Lakes Trail Master Plan, 2011 Pagosa Springs Streetscape, Furnishings, and Signage Plan, 2008
NFIP	Y	The Town of Pagosa Springs has participated in the National Flood Insurance Program (NFIP) since December 1, 1978
Site Plan Review Requirements	Y	In 2011 Pagosa Springs Land Use Code
Stormwater Program, Plan, or Ordinance	N	
Zoning Ordinance	Y	

As indicated in the table above, the Town of Pagosa Springs has several plans and programs that guide the City’s mitigation of development in hazard-prone areas. Some of the plans identified in Table 2.8 are described in more detail in the following paragraphs.

**Pagosa Springs Land Use Code, Updated 2011**

The purpose of the Pagosa Springs Land Use Code is to promote the health, safety, and general welfare of the present and future inhabitants of Archuleta County by planning for and regulating the use of land so as to provide planned and orderly development and environmental protection in

a manner consistent with constitutional rights. The intent of the code is to regulate development and activities in Pagosa Springs, to give special attention to hazardous areas, to protect lands from activities that would cause immediate or foreseeable material danger to significant wildlife habitats, to regulate the use of land on the basis of impact on the communities or surrounding areas, and to secure safety from floods, wildfires and other damages, among other things.

**Pagosa Springs Downtown Master Plan, 2008**

The Downtown Master Plan aims to encourage public and private investment that enables infill development and redevelopment. The Plan serves as a guide for public officials and provides direction for future land use policy decisions and design. The fundamental goals of the plan reflect the vision established by the Comprehensive Plan, valuing the town’s unique character, culture, sustainability, history and community heritage, local business diversification, housing availability, multi-modal and connective transportation options, and abundant parks and open space.

**Town of Pagosa Springs Administrative and Technical Mitigation Capabilities**

Table 2.9 identifies the Town personnel responsible for activities related to mitigation and loss prevention in the Town of Pagosa Springs.

Table 2.9. Town of Pagosa Springs Administrative/Technical Mitigation Capabilities

Personnel Resources	Y/N	Comments
Emergency Manager	Y	Archuleta County Sheriff's Office- Division of Emergency Management
Floodplain Administrator	Y	Building Official
Community Planning	Y	
Planner/Engineer (Land Development)	Y	
Planner/Engineer/Scientist (Natural Hazards)	Y	
Engineer/Professional (Construction)	Y	Building Official, not P.E
Resiliency Planner		
Transportation Planner		
Full-Time Building Official	Y	Building Department/Building Official
GIS Specialist and Capability	Y	Coordinated with Archuleta County
Grant manager, Writer, or Specialist	Y	
Warning Systems/Services	Y	Archuleta County Sheriff's Office- Division of Emergency Management
- General	Y	
- Flood	N	
- Wildfire	N	
- Tornado	N	
- Geological Hazards	N	

## Floodplain Management Regulations and NFIP Participation

The Town of Pagosa Springs has participated in the National Flood Insurance Program (NFIP) since December 1, 1978, by administering floodplain management regulations that meet the minimum requirements of the NFIP. Floodplain management regulations apply to all areas of special flood hazards within the town of Pagosa Springs, as identified in FEMA’s Flood Insurance Rate Maps, effective as of September 25, 2009. More details on NFIP policies and claims in Pagosa Springs are included in **Chapter 4, Section 4.3.7 and 4.3.25**.

Table 2.10. Town of Pagosa Springs Financial Capabilities

Financial Resources	Y/N	Comments
<b>Has the community used any of the following to fund mitigation?</b>		
Levy for Specific Purposes with Voter Approval	N	
Utilities Fees	N	
System Development Feed	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone areas	N	
Stormwater service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	

Table 2. 11. Town of Pagosa Springs Education and Outreach Capabilities

Education & Outreach	Y/N	Comments
Local citizen groups that communicate hazard risks	N	
Firewise	N	
StormReady	N	
Other	N	

### 2.6.3 Special Districts

The Archuleta County Response Area includes several special service districts that meet the definition of a local government under the Disaster Mitigation Act (DMA) 2000. These special districts include:

- Los Pinos Fire Protection District
- Upper Pine Fire Protection District
- Upper San Juan Hospital District

- Archuleta School District
- Piedra Park Metro Improvement District
- Aspen Springs Metropolitan District
- Alpha-Rockridge Metropolitan District
- Loma Linda Metropolitan District
- San Juan River Village Metropolitan District
- San Juan Water Conservation District
- Pagosa Area Water and Sanitation District (PAWSD)
- Pagosa Fire Protection District.

The PAWSD and Pagosa Fire Protection District participated in the 2011 and 2017 planning processes as participating jurisdictions in the plan. The Los Pinos Fire Protection District and Upper Pine Fire Protection District participated in the La Plata County Hazard Mitigation Plan. The other special districts mentioned previously did not choose to participate in this plan’s initial development or 2017 update; however, as special service districts that meet the DMA (2000) definition of a local government within Archuleta county, they have the option to become full participants during future updates of this plan.

### **Pagosa Area Water and Sanitation District (PAWSD) Capabilities**

PAWSD is a “quasi-municipal corporation and a political subdivision of the State of Colorado organized under Colorado Revised Statutes Title 32” (<http://www.pawsd.org/About-PAWSD.html>). The organization is governed by a Board of Directors with five members who are elected to serve four year terms. Members may serve no more than two consecutive terms barring voter approval to alter the term of office in one way or another. PAWSD is responsible for water diversion, storage and treatment in the San Juan River headwaters area. PAWSD is also responsible for wastewater collection and treatment. In regards to hazard mitigation capabilities PAWSD is involved in drought management planning. PAWSD studies current water demand and forecasts future demand to help determine water storage needs in the district. PAWSD then studies reservoir storage capacity and develops drought management projects based on forecasted future water demand. Through the mitigation planning process, the District has identified ways to improve capabilities, including updating the drought management plan. The PAWSD service area is divided into two districts: water only and water/sanitation. The boundaries of these districts are shown in Figure 2.3.

The following tables list the tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place by the Pagosa Area Water and Sanitation District.

Table 2.12. Pagosa Area Water and Sanitation District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
Building Codes	N/A	
Building Codes Year	N/A	
BCEGS Rating	N/A	
Capital Improvements Program (CIP) or Plan	N/A	
Community Rating System (CRS)	N/A	
Community Wildfire Protection Plan (CWPP)	N/A	
Comprehensive, Master, or General Plan	N/A	
Economic Development Plan	N/A	
Elevation Certificates	N/A	
Erosion/Sediment Control Program	N/A	
Floodplain Management Plan	N/A	
Flood Insurance study	N/A	
Growth management Ordinance	N/A	
Hazard-Specific Ordinance or Plan (Floodplain, Steep Slope, Wildfire)	N/A	
NFIP	N/A	
Site Plan Review Requirements	Y	Review site plans for water and sewer mains
Stormwater Program, Plan, or Ordinance	Y	Cross Connection Control Program
Zoning Ordinance	N/A	
Special Plans	Y	Source Water Protection Plan; 2006 Stollsteimer Creek Watershed Master Plan; 2008 Water Conservation Plan; 2018 Drought Management Plan

Table 2.13 Pagosa Area Water and Sanitation District Administrative/Technical Mitigation Capabilities

Personnel Resources	Y/N	Comments
Emergency Manager	N/A	
Floodplain Administrator	N/A	
Community Planning	N/A	
Planner/Engineer (Land Development)	N/A	
Planner/Engineer/Scientist (Natural Hazards)	Y	
Engineer/Professional (Construction)	Y	
Resiliency Planner	N/A	
Transportation Planner	N/A	
Full-Time Building Official	N/A	



<b>Personnel Resources</b>	<b>Y/N</b>	<b>Comments</b>
GIS Specialist and Capability	Y	
Grant manager, Writer, or Specialist	N	
Warning Systems/Services		
- General	N/A	
- Flood		
- Wildfire	N/A	
- Tornado	N/A	
- Geological Hazards	N/A	

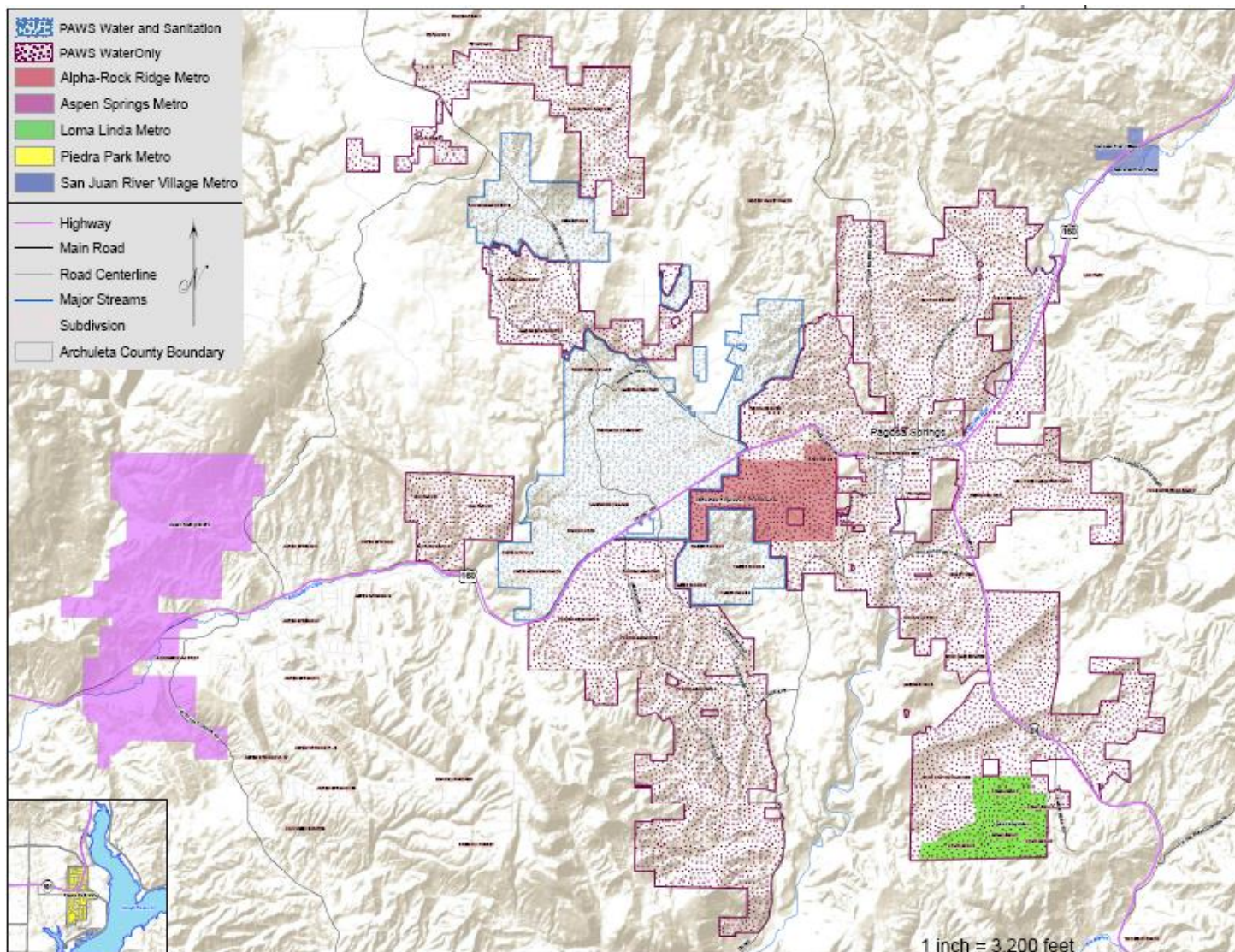
Table 2. 14 Pagosa Area Water and Sanitation District Financial Capabilities

<b>Financial Resources</b>	<b>Y/N</b>	<b>Comments</b>
Levy for Specific Purposes with Voter Approval	Y	Operating Mill Levy; Debt Service Mill Levy
Utilities Fees	Y	Raw Water Acquisition Fees
System Development Fees	N	
General Obligation Bonds to Incur Debt	N	
Special Tax Bonds to Incur Debt	N	
Withheld Spending in Hazard-Prone areas	N/A	
Stormwater service Fees	N	
Capital Improvement Project Funding	N	
Community Development Block Grants	N	
Other	Y	Capital Investment Fees; Equity by-in Fees

Table 2. 15 Pagosa Area Water and Sanitation District Education and Outreach Capabilities

<b>Education &amp; Outreach</b>	<b>Y/N</b>	<b>Comments</b>
Local citizen groups that communicate hazard risks	N/A	
Firewise	N/A	
StormReady	N/A	
Other	Y	Regular public meetings

Figure 2 .3. PAWSD and Other Special District Boundaries



Source: PAWSD

## Pagosa Fire Protection District (FPD) Capabilities

The Pagosa FPD provides fire protection and response for the Town of Pagosa Springs, the Pagosa Lakes Subdivisions, Aspen Springs Subdivision, south along Highway 84 to Loma Linda and Alpine Lakes Subdivisions, and the area around Chromo. The Pagosa FPD deals with the impacts of several types of hazards including fire, hazardous materials, rescue operations, natural disasters, technological disasters, and manmade disasters. The FPD’s capabilities to address these issues depend on the type of risk. The Pagosa FPD is capable of making an effective response to most types of fire, hazmat, and rescue hazards up to a certain point. In regards to natural hazards, the FPD generally does not have the capability to cope with the impacts of natural disasters apart from winter storms, thunderstorms, lightning, and high winds. In the event of a hazard situation, the FPD’s main station is equipped with backup power supply, apparatus-mounted generators, and small portable generators that could be used to support emergency needs during hazard incidents. However, the FPD does not have the capability to cope with communications outages. A map of the district boundary is provided below.

The following tables list the tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place by the Pagosa Fire Protection District.

Table 2.16. Pagosa Fire Protection District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
Building Codes	N/A	
Building Codes Year	N/A	
BCEGS Rating	N/A	
Capital Improvements Program (CIP) or Plan	N/A	
Community Rating System (CRS)	N/A	
Community Wildfire Protection Plan (CWPP)		
Comprehensive, Master, or General Plan	N/A	
Economic Development Plan	N/A	
Elevation Certificates	N/A	
Erosion/Sediment Control Program	N/A	
Floodplain Management Plan	N/A	
Flood Insurance study	N/A	
Growth management Ordinance	N/A	
Hazard-Specific Ordinance or Plan (Floodplain, Steep Slope, Wildfire)	N/A	
NFIP	N/A	
Site Plan Review Requirements	N/A	
Stormwater Program, Plan, or Ordinance	N/A	
Zoning Ordinance	N/A	

<b>Regulatory Tool (ordinances, codes, plans)</b>	<b>Y/N</b>	<b>Comments</b>
Fire District ISO	Y	4/10

Table 2. 17. Pagosa Fire Protection District Administrative/Technical Mitigation Capabilities

<b>Personnel Resources</b>	<b>Y/N</b>	<b>Comments</b>
Emergency Manager	N/A	
Floodplain Administrator	N/A	
Community Planning	N/A	
Planner/Engineer (Land Development)	N/A	
Planner/Engineer/Scientist (Natural Hazards)	N/A	
Engineer/Professional (Construction)	N/A	
Resiliency Planner	N/A	
Transportation Planner	N/A	
Full-Time Building Official	N/A	
GIS Specialist and Capability	N/A	
Grant manager, Writer, or Specialist	N/A	
Warning Systems/Services	N/A	
- General	N/A	
- Flood	N/A	
- Wildfire	N/A	
- Tornado	N/A	
- Geological Hazards	N/A	

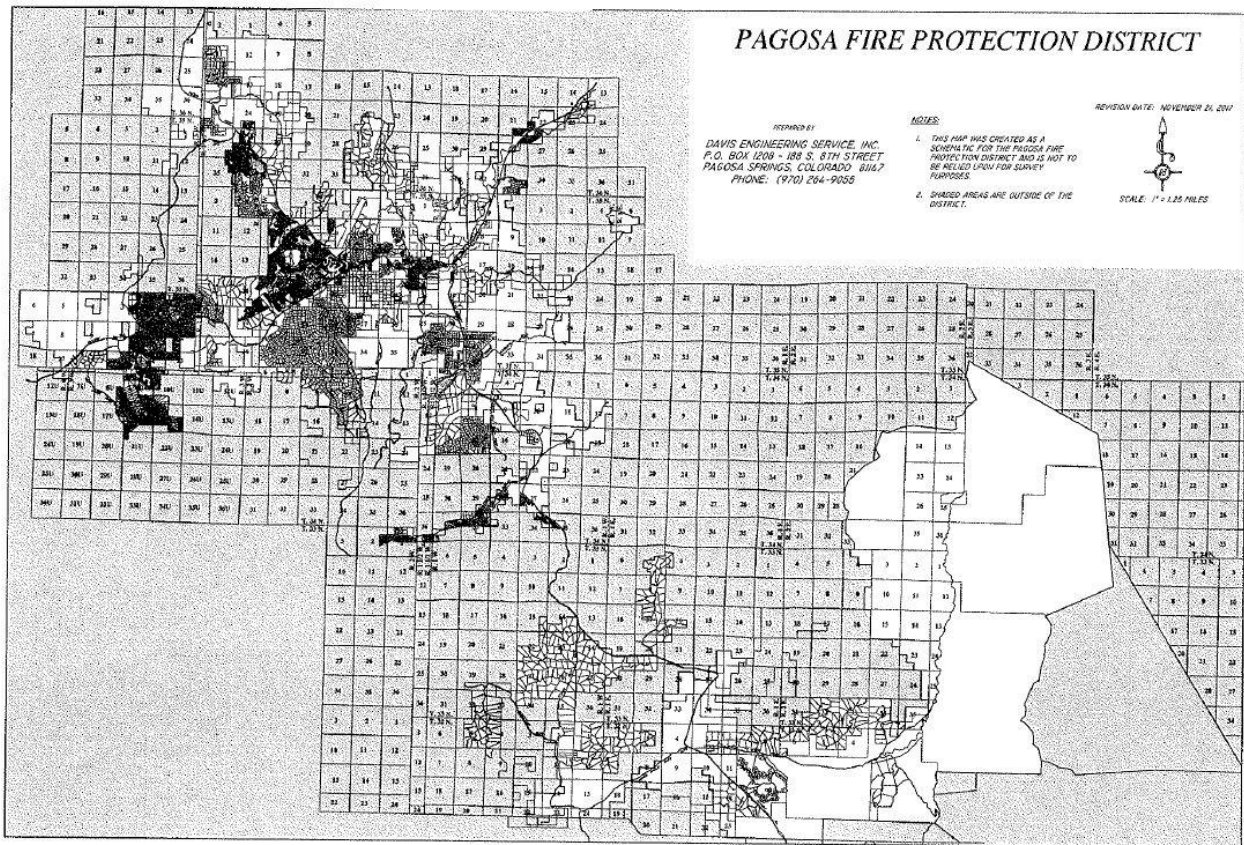
Table 2. 18. Pagosa Fire Protection District Financial Capabilities

<b>Financial Resources</b>	<b>Y/N</b>	<b>Comments</b>
Levy for Specific Purposes with Voter Approval	Y	
Utilities Fees	N/A	
System Development Fee	N/A	
General Obligation Bonds to Incur Debt	N/A	
Special Tax Bonds to Incur Debt	N/A	
Withheld Spending in Hazard-Prone areas	N/A	
Stormwater service Fees	N/A	
Capital Improvement Project Funding	N/A	
Community Development Block Grants	N/A	

Table 2. 19. Pagosa Fire Protection District Education and Outreach Capabilities

Education & Outreach	Y/N	Comments
Local citizen groups that communicate hazard risks	N/A	
Firewise	N	
StormReady	N/A	
Other	Y	Public outreach program – Monthly PSAs; Website has information on kids’ safety, wildland fire and winter fire safety; Public Education Events

Figure 2.4. Pagosa Fire Protection District Boundary



Source: PFPD

## **2.6.4 Other Mitigation Plans in the Archuleta Response Area**

### **Hinsdale County**

Hinsdale County has several plans that direct the County's actions related to hazard risk reduction and guide development in hazard-prone areas. Though Hinsdale County only covers a small portion of the total land in the planning area, it is important to acknowledge existing mitigation efforts and plans in place that could supplement this plan and support the implementation of identified action items. Some of these plans and programs are described in more detail below.

#### ***Hinsdale County Hazardous Mitigation Plan, 2014***

Developed in 2003, the Hinsdale County HMP was updated in 2014, aiming to protect the people, assets and resources. The plan identifies and evaluates the risk associated with many of the same hazards that are described in Chapter 4 of this plan; however, there are a few variances. The most notable difference in the plans is that Hinsdale County focuses more attention on human-related hazards, which are more limited in this plan. Despite having a significantly smaller population base (<800 people), the Hinsdale County plan examines the potential impacts of transportation accidents, technology failures/power outages, and acts of terrorism, whereas this plan only acknowledges human-health related hazards. Throughout the planning process, Hinsdale County emphasized the value of participation with surrounding jurisdictions, and in April 2014, Hinsdale established Mutual-Air agreements and Memorandum of Understandings (MOU's) with the surrounding areas; of which Archuleta County was included.

#### ***Hinsdale County Community Wildfire Protection Plan, 2010***

The Hinsdale County CWPP outlines the risk associated with the Wild Urban Interface (WUI) land, and defines the community's priorities for protection of life, property, and critical infrastructure in the hazard-prone areas. The Hinsdale County land included in this planning area is primarily owned by the US Forest Service, with some areas owned privately. The Piedra/Palisades WUI is located within the boundaries of this planning area, and includes 155 structures in a high-risk area. This document is useful for identifying specific action items that relate to fire hazard in the planning area and can supplement any projects described later in Chapter 5.

#### ***Mineral County Hazard Mitigation Plan, 2010 and 2016 update***

In 2010 Mineral County and the City of Creede developed a multi-hazard mitigation plan to reduce losses caused by natural hazards. Mineral County was one of five counties (Alamosa, Conejos, Mineral, Rio Grande, and Saguache) in the San Luis Valley preparing multi-hazard mitigation plans concurrently. The process was led by the Mineral County Emergency Manager. In addition to the individual county plans, the Emergency Managers and other stakeholders met collectively to strategize for regional mitigation efforts in the San Luis Valley. The plan was updated in 2016.

## ***Mineral County Community Wildfire Protection Plan, 2009***

The Mineral County Fire Protection District covers the northern part of Mineral County, which is not relevant to this plan and not in close proximity to the planning area. The ideas and actions generated from the Mineral CWPP can be used as a reference and example of best practices that are applicable for Archuleta's study area; however, the capabilities described, resources, and personnel will be different.

### **2.6.5 Stakeholder Agencies and Other Mitigation Partnerships**

#### **Colorado State Forest Service – Durango District**

The Colorado State Forest Service (CSFS) is a service and outreach agency in the Warner College of Natural Resources at Colorado State University. As the lead state agency for forestry and wildland fire expertise, CSFS foresters in 17 district offices throughout the state help landowners and communities accomplish sound forestry practices on their land. The CSFS also coordinates with other agencies to ensure that Colorado is prepared to respond to wildfires. Every year, the CSFS improves the health of approximately 25,000 acres of forest land, works with the state's 400 fire departments, and provides technical forestry assistance to more than 12,000 landowners to help them achieve their stewardship objectives.

The CSFS Durango District encompasses Archuleta, Dolores, La Plata, Montezuma, and San Juan Counties. The District office is located on the campus of Fort Lewis College in Durango, just north of the Center for Southwest Studies/Community Concert Hall complex. Areas of District emphasis include private and state land forest stewardship (i.e., Forest Agriculture Property Tax Classification Program, Tree Farm Program, NRCS EQIP Program, state land forest management, forest product utilization and marketing, and prescribed fire); wildfire education, prevention, and suppression (i.e., interagency coordination, fire training, equipment acquisition, community wildfire protection planning, wildfire hazard mitigation and fuels reduction, and land use planning); urban and community forestry; forest insect and disease identification, monitoring, and control; and conservation education.

#### **San Juan National Forest/USDA Forest Service**

San Juan National Forest/USDA Forest Service is a steward of the large majority of the land in the Response Area. As such they are active in wildfire mitigation and fuels treatment efforts. They were active participants in the development and update of the Archuleta County Hazard Mitigation Plan and are the lead entity on a new project to reduce wildfire hazards in the Upper Blanco Basin (see Appendix A).

## **FireWise of Southwest Colorado**

FireWise of Southwest Colorado’s mission is to inspire, motivate, educate and serve individuals, organizations and communities joining together to protect lives and property from wildfire. The council includes active chapters in Archuleta, La Plata, and Montezuma counties.

FireWise focuses on three basic areas:

- Education and Outreach
- Planning – development of subdivision-level Community Wildfire Protection Plans, or CWPPs, and
- Implementation - on-the-ground mitigation efforts

The organization has monthly meetings and has been active in promotion of workshops and educating homeowners in Archuleta County about FireWise techniques.

## **Pagosa Lakes Property Owners Association**

The Pagosa Lakes Property Owners Association (PLPOA) has been working closely with homeowners in Pagosa Lakes to facilitate creating defensible space around private homes and properties. The Association purchased a 160HP horizontal drum grinder circa 2016 with the assistance of a Department of Natural Resources grant and provided a brush collection area in Pagosa Lakes where residents could bring brush and limbs for chipping. PLPOA has assisted approximately 200 homeowners with achieving improved defensible space within two years (2016-2017) and have processed over 20,000 cubic yards of brush and limb material into usable mulch. The PLPOA has worked closely with FireWise of Southwest Colorado in developing fuel mitigation programs for owners and owner educational forums and resources.

## **Colorado Department of Transportation**

The Colorado Department of Transportation (CDOT) is a key partner in the mitigation of avalanche, rockfall and landslide hazards, as well as wildlife vehicle collisions and winter storm impacts, within the Archuleta County Response Area. CDOT is also a partner in mitigation of flood hazards at bridges and culverts on state highways. Improvement of the McCabe Creek crossing on Highway 160 in Pagosa Springs is identified as a needed mitigation project in Appendix A.



# 3 PLANNING PROCESS

**CFR Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:**

- 1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;**
- 2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and**
- 3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

**[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.**

## 3.1 Background on Mitigation Planning in Archuleta County

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The planning process and development of this plan was originally initiated in the spring of 2010 under the coordination of the Archuleta County Sheriff's Office, Division of Emergency Management. Funding was secured through a FEMA Pre-Disaster Mitigation planning grant to enable a consultant to be hired to facilitate the process and develop the plan. Amec Foster Wheeler Environment and Infrastructure (Amec Foster Wheeler) of Boulder, Colorado contracted with the County to provide professional planning services during the development of the original plan. A local avalanche hazard consultant was used to develop the avalanche hazard profile. In addition, an intern was used to research past hazard events and inform the hazard profiles. The development of the plan followed a structured planning process that involved various local government departments and other public and private stakeholders. The original plan was completed in 2012, approved by FEMA and adopted by the County in April.

The plan underwent a comprehensive update in 2017 to comply with the five-year update cycle required by the DMA 2000. The planning process followed during the update was similar to that used in the original plan development. Amec Foster Wheeler was procured to assist with the update in 2017. The process is described further in this section and documented in Appendix C.

### 3.1.1 2012 Plan Section Review and Analysis

During the 2017 update process, the HMPC updated each section of the previously approved plan to include new information and improve the organization and formatting of the plan's contents. The HMPC and Amec Foster Wheeler analyzed each section using FEMA's local plan update guidance to ensure that the plan met the latest requirements. Upon review the HMPC and Amec Foster Wheeler determined that nearly every section of the plan would need some updates to align with the latest FEMA planning guidance and requirements. The overall format and structure of the

plan did not change, but information within has been updated where appropriate or where available information permitted.

## 3.2 Local Government Participation

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The Disaster Mitigation Act (DMA) planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the Hazard Mitigation Planning Committee (HMPC),
- Detail areas within the planning area where the risk differs from that facing the entire area,
- Identify specific projects to be eligible for funding, and
- Have the governing board formally adopt the plan.

For the Archuleta County Multi-Hazard Mitigation Plan’s HMPC, “participation” meant:

- Attending and participating in the HMPC meetings,
- Providing available data requested of the HMPC,
- Reviewing and providing comments on the plan drafts,
- Advertising, coordinating, and participating in the public input process, and
- Coordinating the formal adoption of the plan by the governing boards.

Archuleta County’s Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers everything within Archuleta County’s Response Area, shown in Chapter 2 Community Profile. Unincorporated Archuleta County, the Town of Pagosa Springs, Pagosa Fire Protection District (FPD), and the Pagosa Area Water and Sanitation District (PAWSD) participated in the planning process and are seeking FEMA approval of this plan.

## 3.3 The 10 -Step Planning Process

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Archuleta County and Amec Foster Wheeler worked together to establish the planning process for Archuleta County’s plan update using the DMA planning requirements and FEMA’s associated guidance. The original FEMA planning guidance is structured around a four-phase process:

- 1) Organize Resources
- 2) Assess Risks
- 3) Develop the Mitigation Plan
- 4) Implement the Plan and Monitor Progress

FEMA’s March 2013 Local Mitigation Planning Handbook recommends a nine-step process within the original four phase process. Into this four-phase process, Amec Foster Wheeler integrated a more detailed 10-step planning process used for FEMA’s Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the funding eligibility requirements of the Hazard Mitigation Assistance grants (including Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, Flood Mitigation Assistance), Community Rating System, and the flood control projects authorized by the U.S.

Army Corps of Engineers (USACE). Table 3.1 summarizes the four-phase DMA process, the detailed CRS planning steps and work plan used to develop the plan, the nine handbook planning tasks from FEMA’s 2013 Local Mitigation Planning Handbook, and where the results are captured in the Plan. The sections that follow describe each planning step in more detail.

Table 3.1: Mitigation Planning Process Used to Update the Plan

FEMA 4 Phase Guidance	Community Rating System (CRS) Planning Steps (Activity 510) and Amec Foster Wheeler Work Plan Tasks	FEMA Local Mitigation Planning Handbook Tasks (44 CFR Part 201)	Location in Plan
Phase I: Organize Resources	Task 1. Organize Resources	1: Determine the Planning Area and Resources	Chapters 1, 2 and 3
		2: Build the Planning Team 44 CFR 201.6(c)(1)	Chapter 3, Section 3.1
	Task 2. Involve the public	3: Create an Outreach Strategy y 44 CFR 201.6(b)(1)	Chapter 3, Section 3.1, 3.3.1
	Task 3. Coordinate with Other Agencies	4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)	Chapter 3, Section 3.1, 3.3.1
Phase II: Assess Risks	Task 4. Assess the hazard	5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR	Chapter 4, Sections 4.1-4.4
	Task 5. Assess the problem	201.6(c)(2)(ii) & (iii)	Chapter 4, Sections 4.1-4.3
Phase III: Develop the Mitigation Strategy	Task 6. Set goals	6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(ii); and 44 CFR 201.6(c)(3)(iii)	Chapter 5, Section 5.1
	Task 7. Review possible activities		Chapter 5, Section 5.2
	Task 8. Draft an action plan		Chapter 5, Section 5.3
Phase IV: Adopt and Implement the Plan	Task 9. Adopt the plan	8: Review and Adopt the Plan 44 CFR 201.6(c)(3)	Chapter 6, Appendix E
		7: Keep the Plan Current	Chapter 7
	Task 10. Implement, evaluate, revise	9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)	Chapter 7

### 3.3.1 Phase 1: Organize Resources

#### Planning Step 1: Organize the Planning Effort

Amec Foster Wheeler worked with the Archuleta County Sheriff's Office – Division of Emergency Management to establish the framework and organization for the update of this Plan. Amec Foster Wheeler and the County Emergency Manager identified the key county, municipal, and other local government and initial stakeholder representatives. Invitations were emailed to invite them to participate as a member of the HMPC and to attend a kickoff meeting. Representatives from the following County and municipal departments and special districts participated on the HMPC and the development of the plan:

Archuleta County	Town of Pagosa Springs	Special Districts
Emergency Management	Administration	Pagosa FPD
Sheriff	Building Department	PAWSD
Public Works	Police Department	
Assessor		
Planning		
Health		
Building		
Administration		

A list of specific HMPC representatives is included in Appendix B. Other local, state, federal, and private stakeholders invited to participate in the HMPC are discussed under Planning Step 3.

During the plan update process, the HMPC communicated with a combination of face-to-face meetings, phone interviews, and email correspondence. Three planning meetings with the HMPC were held during the plan's development between May 2017 and September 2017. The meeting schedule and topics are listed in the following table. The kickoff meeting was offered as a webinar, meeting #2 was held at the Archuleta County Emergency Operations Center location in Pagosa Springs, and the final meeting held at the Board of County Commissioners building in Pagosa Springs. The sign-in sheets and agendas for each of the meetings are included in Appendix C.

Table 3.2: Schedule of HMPC Meetings

HMPC Meeting	Meeting Topic	Meeting Date
1	Kickoff Meeting: Introduction to DMA Planning and overview of Update Process, Hazard Identification Review MACs Meeting	May 11, 2017
2	Risk Assessment Summary/Goals Development	July 27, 2017
3	Mitigation Strategy Development	September 14, 2017

During the kickoff meeting, Amec Foster Wheeler presented information on the scope and purpose of the plan, participation requirements of HMPC members, and the proposed

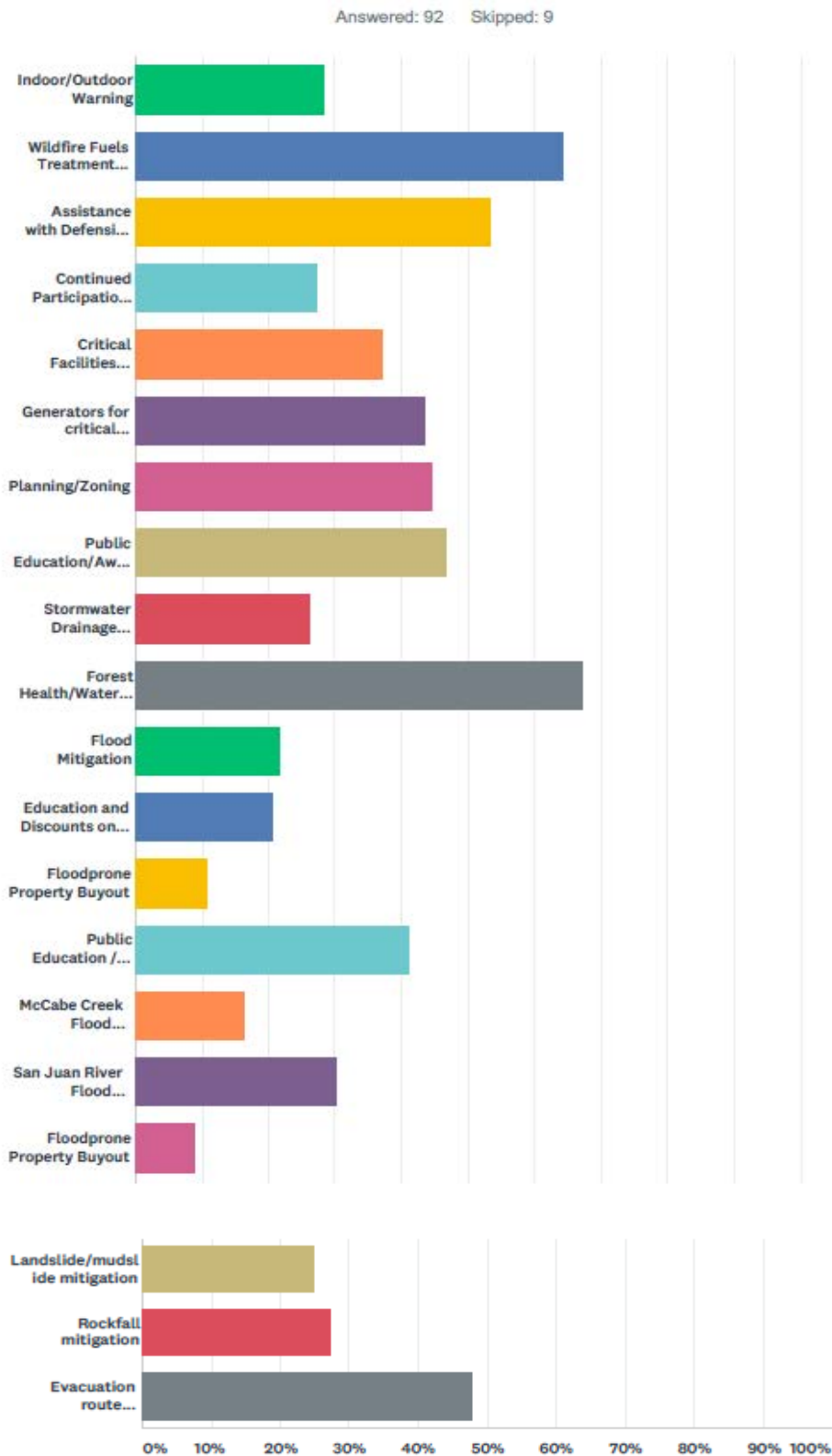
project work plan and schedule. This webinar was presented as part of an Archuleta County Multi-Agency Coordination System (MACS) group meeting. A plan for public involvement (Step 2) and coordination with other agencies and departments (Step 3) were discussed. Amec Foster Wheeler also revisited the hazard identification section of the plan with the HMPC members.

## Planning Step 2: Involve the Public

**Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.**

At the kickoff meeting, the HMPC discussed options for soliciting public input on the mitigation plan and developed an outreach strategy by consensus. Public and stakeholder input was done through a combination of a public meeting and an on-line survey. During the plan update's drafting stage, the HMPC provided links to a public survey via Survey Monkey. The survey was advertised by the County through social media, advertised in the Pagosa Sun 'Sun Flashes' which is an online version of the local newspaper, and emailed to a distribution list of the Pagosa Lakes Property Owners Association which includes over 2,000 property owners. It was also sent to the MACS group with encouragement to broadcast widely. The survey provided an opportunity for public input during the planning process, prior to finalization of the plan update. 101 people filled out the survey online. Responses reflect the public perception that the most significant hazards to be wildfire, followed closely by drought, lightning, and severe winter storm. Question 3 read: *The following types of mitigation actions may be considered in this plan. Please indicate all the types of mitigation actions that you think should have the highest priority in the Multi-Hazard Mitigation Plan. These results will be considered during the planning process.* As indicated by the survey excerpt below, the highest priority action items should include wildfire fuels treatment, forest health/watershed protection, assistance with defensible space, and generators for critical facilities. When asked if there were specific issues that the HMPC should consider, several respondents suggested fire mitigation actions, especially related to fuel management throughout the County. Further results of the public survey are provided in Appendix C.

Figure 3 .1. Archuleta County Public Survey Results, Question 3



As part of the planning process, a public meeting was held on September 14<sup>th</sup>, 2017 at the Board of County Commissioners Building in the Town of Pagosa Springs. Advertisements for the

meeting were placed in the *Pagosa Springs Sun* newspaper and website and the County's website. The ads encouraged residents to attend and learn about the hazards that could impact the County and how the plan could help reduce those impacts. Present at the meeting were two members of the public, two members of Archuleta County Sheriff's Office Division of Emergency Management, and a reporter from the *Pagosa Springs Sun*.

The public was given an opportunity to review and comment on the draft plan during January and early February 2018. Archuleta County made it available on the County website and a hardcopy was placed in the local library. The plan was advertised by the County through an advertisement in the *Pagosa Sun Newspaper* and online 'Sun Flashes' edition. The public was given a two-week period to review and provide comments. The draft plan was noted by the County Emergency Manager during a presentation to the Archuleta County Board of County Commissioners during the public review period. The public review did not produce many comments, but comments provided by the Pagosa Lakes Property Owners Association resulted in the inclusion of additional information regarding the Association in Chapter 2 and related mitigation efforts in the final plan. Record of public advertisements, public input, and sign-in sheets are on file with the County Emergency Management and Appendix C.

### **Planning Step 3: Coordinate with Other Departments and Agencies**

**Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process. (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

There are numerous organizations whose goals and interests interface with hazard mitigation in Archuleta County. Coordination with these organizations and other community planning efforts is vital to the success of this plan's update and implementation. The HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting state and federal agencies and power and communications organizations to participate in the process. Based on their involvement in hazard mitigation activities, their role in land stewardship in the County, status as a neighboring jurisdiction or jurisdiction within the County Response Area, or their role in public safety, representatives from the following agencies were invited to participate on the HMPC. These agencies regularly coordinate through participation on the Archuleta County MACs group:

- Neighboring communities
- Hinsdale County Emergency Management
- Mineral County Emergency Management
- La Plata County Emergency Management
- Southern Ute Indian Tribe
- Upper Pine Fire Protection District

#### Utility Providers and Local Business and Industry

- Centurytel
- Black Hills Energy
- Tri-State Electric Association
- La Plata Electric Association
- Chamber of Commerce
- KWUF
- PAWSD
- Pagosa Springs Sanitation General Improvement District (PSSGID)

#### State Agencies

- Colorado Division of Homeland Security and Emergency Management
- Colorado Department of Transportation
- Colorado State Forest Service
- Colorado Department of Transportation

#### Federal Agencies

- U.S. Forest Service
- U.S. Bureau of Reclamation
- U.S. Bureau of Indian Affairs
- National Weather Service

#### Local/Citizen/Other

- Archuleta School District
- Pagosa Lakes Property Owners Association
- American Red Cross
- San Juan Basin Public Health
- Pagosa Springs Medical Center

Many of these stakeholders participated in the process by attending HMPC meetings. They were also given an opportunity to review and comment on the draft plan.

#### ***Other Community Planning Efforts and Hazard Mitigation Activities***

Coordination with other community planning efforts is also paramount to the success of this plan. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability from natural hazards. Archuleta County uses a variety of comprehensive planning mechanisms, such as master plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

- Archuleta County Community Plan, 2017



- Archuleta County Community Wildfire Protection Plan, 2008
- Archuleta County Land Use Regulations, 2017
- Pagosa Springs Land Use Code, 2013
- Town of Pagosa Springs Economic Development Plan, 2005
- Archuleta County Community Development Action Plan 2012
- Hinsdale County Community Wildfire Protection Plan, 2010
- Hinsdale County Multi-Hazard Mitigation Plan 2011
- Mineral County Community Wildfire Protection Plan, 2009
- Mineral County Multi-Hazard Mitigation Plan, 2017

These documents and how they relate to hazard mitigation are summarized in section 2.6 Mitigation Capabilities Assessment. The assessment consisted of identifying the existing mitigation capabilities of participating jurisdictions. This involved collecting information about existing government programs, policies, regulations, ordinances, and plans that mitigate or could be used to mitigate risk to disasters. Participating jurisdictions collected information on their regulatory, personnel, fiscal, and technical capabilities, as well as ongoing initiatives related to interagency coordination and public outreach.

Other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. A list of references is included in Appendix D.

### **2012 Mitigation Plan Inclusion in Other Planning Mechanisms**

During the HMP update in 2017 the planning process was coordinated with the update of the County Comprehensive Plan. The County plan update formally acknowledged the HMP. Language added includes:

#### *Hazard Mitigation*

*In 2012, the multi-jurisdictional Archuleta County Multi-Hazard Mitigation Plan identified natural and man-made hazards potentially affecting the area, and proposed strategies to mitigate the effects of those hazards. High Significance hazards included: Drought, Flooding, Landslide/Rockfall/Debris Flow, Lightning, Severe Winter Storms, Wildland Fires, and Hazardous Materials Incident. Dam Failure was assessed as a Medium/High significance. This plan will be reviewed and updated in 2017-18.*

A specific policy was added: *Policy 2.9—Mitigate natural and made-made hazards to reduce risk.*

The 2012 plan is also referenced in a paragraph on mitigation planning in the Archuleta County Emergency Operations Plan.

### 3.3.2 Phase 2: Assess Risks

#### **Planning Steps 4 and 5: Identify the Hazards and Assess the Risks**

Chapter 4 is the result of a comprehensive effort to identify and document all the hazards that have, or could, impact the planning area. This chapter was updated to reflect recent hazard events and current assets within the County and jurisdictions. Where data permitted, Geographic Information Systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. The HMPC conducted a capability assessment update to review and document the planning area's current capabilities to mitigate risk and vulnerability from natural hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC can assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Chapter 4.

### 3.3.3 Phase 3: Develop the Mitigation Plan

#### **Planning Steps 6 and 7: Set Goals and Review Possible Activities**

Amec Foster Wheeler facilitated a brainstorming and discussion session with the HMPC during their second meeting to update the goals and objectives from the 2012 plan. During the third HMPC meeting Amec Foster Wheeler facilitated a discussion sessions with the HMPC around a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This included a review of progress on each action identified in the 2012 plan. Some new mitigation actions resulted from this process that were added to the plan in 2017. This process and its results are described in greater detail in Chapter 5.

#### **Planning Step 8: Draft an Action Plan**

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, Amec Foster Wheeler produced a complete first draft of the plan. This complete draft was shared electronically for HMPC review and comment. Other agencies were invited to comment on this draft as well. HMPC and agency comments were integrated into the second draft, which was advertised and distributed to collect public input and comments. Amec Foster Wheeler integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the Colorado Division of Homeland Security and Emergency Management (DHSEM) and FEMA Region VIII to review and approve, contingent upon final adoption by the governing boards of each participating jurisdiction.

### 3.3.4 Phase 4: Implement the Plan and Monitor Progress

#### **Planning Step 9: Adopt the Plan**

To secure buy-in and officially implement the plan, the plan was adopted by the governing boards of each participating jurisdiction on the dates included in the adoption resolutions in Appendix E.

#### **Planning Step 10: Implement, Evaluate, and Revise the Plan**

The HMPC developed and agreed upon an overall strategy for plan implementation and for monitoring and maintaining the plan over time. A discussion on the progress with implementation is included in Chapter 5. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in Chapter 7.

Finally, there are numerous organizations within the Archuleta County planning area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is paramount to the ongoing success of this plan and mitigation in Archuleta County and is addressed further in Chapter 7. An updated overall implementation strategy and maintenance and a strategy for continued public involvement are also included in Chapter 7.

## 4 RISK ASSESSMENT

**44 CFR Requirement 201.6(c)(2): [The plan shall include] a risk assessment that provides the factual basis for activities proposed in the strategy to reduce the losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.**

As defined by the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.”

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction’s potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

This risk assessment followed the methodology described in the FEMA publication *Local Mitigation Planning Handbook (March 2013)*, which breaks the assessment down to a four-step process:

- 1) Describe Hazards
- 2) Identify Community Assets
- 3) Analyze Risks
- 4) Summarize Vulnerability

Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Asset Inventory** discusses the County’s total exposure to natural hazards, considering assets at risk, critical facilities, and future development trends
- **Section 4.3 Hazard Profiles** discusses the threat to the planning area and describes previous occurrences of hazard events and the likelihood of future occurrences.
- **Section 4.4 Vulnerability by Hazard** assesses potential losses in more detail including estimates of buildings, populations, and critical facilities at risk by specific hazard.

## 4.1 Hazard Identification

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**Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.**

The Hazard Mitigation Planning Committee (HMPC) conducted a hazard identification study to determine the hazards that threaten the planning area.

### 4.1.1 Results and Methodology

Using existing hazards data, plans from participating jurisdictions, and input gained through planning and public meetings, the HMPC agreed upon a list of hazards that could affect Archuleta County. Hazards data was obtained from FEMA, the Colorado Division of Homeland Security and Emergency Management (including the State of Colorado Natural Hazards Mitigation Plan), the National Oceanic and Atmospheric Administration National Center for Environmental Information (NCEI – formerly referenced as the National Climatic Data Center or NCDC), the Spatial Hazard Events and Losses Database for the United States (SHELDUS), and many others. SHELDUS was originally a free resource but changed to a fee-based database circa 2013. The NCEI database was used as the primary resource for the 2018 update. The HMPC contributed a significant amount of research from historic local newspaper articles. Together, these sources were examined to assess the significance of these hazards to the planning area. The hazards evaluated in this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future.

The following natural hazards, listed alphabetically, were identified and investigated for the Archuleta County Multi-Hazard Mitigation Plan:

- Avalanche
- Dam Failure
- Drought
- Earthquake
- Extreme Cold
- Flooding
- Hail
- High Winds and Tornadoes
- Landslide/Rockfall/Debris Flow
- Land Subsidence
- Lightning
- Pandemic Disease
- Severe Winter Storm
- Volcano
- Wildland Fire

- Wildlife Hazards

Manmade hazards also exist in Archuleta County. Manmade hazards include:

- Hazardous Materials Incident
- Imminent Threat/Terrorism

Members of the HMPC used a hazards worksheet to identify and rate the significance of a variety of possible hazards. Significance was measured in general terms, focusing on key criteria such as the likelihood of the event, past occurrences, spatial extent, damage, and casualty potential. Table 4.1 represents the worksheet used to identify and rate the hazards, and is a composite that includes input from all the participating jurisdictions. Note that the significance of the hazard may vary from jurisdiction to jurisdiction. The most significant hazards, based on the subjective input from the team, listed alphabetically are floods, severe winter storms, and wildland fires. Drought, hazardous materials, landslide, and lightning were also ranked as high significance hazards based on the results of the risk and vulnerability assessment.

Part of the planning process involved issuing a public survey to assess the community’s perception of hazards. Discussed further in Chapter 3, the results indicate that drought, lightning, winter storms, and wildfire are the most significant, which aligns with the HMPC hazard identification.

Table 4.1 Archuleta County Hazards Identification Worksheet

Hazard	Likelihood of Event/Frequency	Hazard Extent	Potential Magnitude	Significance
Avalanche	Highly Likely	Limited	Limited	Medium
Dam Failure	Occasional	Significant	Limited	Medium/High
Drought	Likely	Extensive	Critical	High
Earthquake	Occasional	Extensive	Limited	Low
Extreme Temperatures	Likely	Extensive	Negligible	Low
Flooding	Likely	Significant	Critical	High
Hailstorm	Likely	Extensive	Negligible	Low
High Winds and Tornadoes	Occasional	Extensive	Negligible	Medium
Landslide/Rockfall/Debris Flow	Likely	Extensive	Critical	High
Land Subsidence	Likely	Significant	Limited	Low
Lightning	Highly Likely	Extensive	Limited	High
Pandemic Flu	Occasional**	Extensive	Critical	Medium
Severe Winter Storms	Highly Likely	Extensive	Limited	High
Volcano	Unlikely	Limited	Negligible	Low
Wildland Fires	Highly Likely	Significant	Critical	High
Wildlife	Highly Likely	Significant	Negligible	Low
Hazardous Materials Incident	Highly Likely	Limited	Limited	High

Hazard	Likelihood of Event/Frequency	Hazard Extent	Potential Magnitude	Significance
Imminent Threat/Terrorism	Occasional	Limited	Limited	Low
**Based on occurring anywhere in the United States				
<b>Likelihood of Event/Frequency</b> Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.		<b>Potential Magnitude</b> Catastrophic: More than 50% of area affected Critical: 25-50% of area affected Limited: 10-25% of area affected Negligible: Less than 10% of area affected <b>Significance</b> Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact		
<b>Hazard Extent</b> Limited: Less than 10% of planning area Significant: 10-50% of planning area Extensive: 50-100% of planning area				

The hazards discussed in this plan apply to Archuleta County’s entire emergency response area. This response area includes the southern portions of Hinsdale and Mineral Counties because the Pagosa Springs area is the nearest major population center to those areas. Archuleta County’s emergency personnel can provide a more timely response to those areas than Hinsdale and Mineral County’s emergency response personnel. The northern boundary of the response area coincides with the Continental Divide. Archuleta County’s response area is shown in Figure 2.1 in Chapter 2 Community Profile.

### Hazard Identification Changes from 2013 Plan

Since 2013, little has changed in the overall hazard identification and the significance ratings have remained the same. However, the analysis in the hazard profile sections highlights the increased awareness of the interconnectedness of many hazards. For example, growing concern about post fire debris flow is addressed in landslide and concern about hazardous trees being blown over in windstorms due to extensive beetle kill is noted in the wind hazard section.

#### 4.1.2 Excluded Hazards

Extreme heat is rarely an issue as highest temperatures only reach upper 90’s due to the higher elevation setting. The HMPC did note that periods of excessive heat occur which often result in drought and higher wildfire risk, thus extreme heat is discussed with the drought profile. This hazard should be re-evaluated during future updates if changing climate conditions exacerbates this hazard. The HMPC did not know of any past impacts or current concerns with expansive soils. If expansive soils are encountered they are typically mitigated in modern construction practices. Thunderstorm is not identified as an individual hazard, but is recognized for its role in the flooding, lightning, hail, and windstorm hazards.

### 4.1.3 Disaster Declaration History

One method the HMPC used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the planning area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government’s capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments’ capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors.

A USDA declaration will result in the implementation of the Emergency Loan Program through the Farm Services Agency. This program enables eligible farmers and ranchers in the affected county as well as contiguous counties to apply for low interest loans. A USDA declaration will automatically follow a major disaster declaration for counties designated major disaster areas and those that are contiguous to declared counties, including those that are across state lines. As part of an agreement with the USDA, the SBA offers low interest loans for eligible businesses that suffer economic losses in declared and contiguous counties that have been declared by the USDA. These loans are referred to as Economic Injury Disaster Loans.

Table 4.2 provides information on federal emergencies and disasters declared that included Archuleta County between 1953 and November 2010. Archuleta County has experienced five Presidential disaster declarations and eight other federal declarations, and four state emergency declarations. Most these declarations are associated with drought events. Note that in some these declarations Archuleta County was not declared alone, but was part of a statewide or regional declaration.

Table 4.2 Federal Disaster and Emergency Declarations : 1953 -2017

Event/ Hazard	Year	Declaration Type	Remarks/Description
Heavy Rains and Flooding	1970	Presidential—Major Disaster Declaration	\$3.3 million (2009 dollars) statewide
Flooding and Landslides	1973	Presidential—Major Disaster Declaration	\$4.7 million (2009 dollars) statewide
Drought	1977	Presidential—Emergency Declaration	\$4.8 million (2009 dollars) statewide
Drought	1989	USDA	
Drought	1996	USDA	



Event/ Hazard	Year	Declaration Type	Remarks/Description
Landslides/Rockfalls	1998	Governor's Declaration	Archuleta, Garfield, Mesa, Gunnison, Rio Blanco
Drought	2002	Presidential—Emergency Declaration	Statewide
Wildland fires	2002	Presidential—Emergency Declaration	Statewide
Drought/Insects	2003	USDA	Archuleta included
Snow Emergency	2003	Governor's Declaration	Statewide
Heat, high winds, insect pests, late freeze, drought	2006	USDA	Archuleta included
Severe Spring Snowstorm	2009	Governor's Declaration	Statewide
Severe Blizzard	2009	Governor's Declaration	Statewide
Drought	2011	USDA	
Drought, wind/high winds, heat/excessive heat	2012	USDA	
Drought, wind/high winds, fire/wildfire, heat/excessive heat, insects	2013	USDA	
Drought	2015	USDA	Archuleta included in addition to 12 other counties

Sources: Public Entity Risk Institute Presidential Disaster Declaration Site, [www.peripresdecusa.org/](http://www.peripresdecusa.org/), 2011 State of Colorado Multi-Hazard Mitigation Plan

## 4.2 Assets Inventory

### 4.2.1 Methodology

This vulnerability assessment is an attempt to quantify assets at risk, by jurisdiction where possible, to further define populations, buildings, and critical facilities at risk to hazards identified in this plan. The hazards included in this assessment are those that were considered medium or high in planning significance, based on HMPC input and the hazard profiles, and for which suitable information was available for analysis. The methods of analysis vary by hazard type and data available.

Data to support the vulnerability assessment was collected and compiled from the following sources:

- County GIS data (hazards, base layers, and assessor's data)
- Written descriptions of inventory and risks provided by participating jurisdictions
- Existing plans and studies
- Personal interviews with planning team members, hazard experts, and County and Town staff

As a starting point for analyzing the Planning Area's vulnerability to identified hazards, the HMPC used a variety of data to define a baseline against which all disaster impacts could be compared. If a catastrophic disaster was to occur in the Planning Area, this section describes significant assets exposed or at risk in the Planning Area. Data used in this baseline assessment included:

- Total assets at risk;
- Critical facility inventory;
- Cultural, historical, and natural resources; and
- Population growth and land use/development trends.

The vulnerability assessment first describes the assets in Archuleta County, including the total exposure of people and property; critical facilities and infrastructure; natural, historic, and cultural resources; and economic assets. Development trends, including population growth and land status, are analyzed in relation to hazard-prone areas. During the 2017 update the latest available parcel and critical facilities databases were used to reflect current development within the County. Next, where data was available, hazards are evaluated in more detail and potential losses are estimated.

This section assesses the population, structures, critical facilities and infrastructure, and other important assets in the Planning Area as an initial consideration of risk to hazards identified in this plan. It begins with an inventory of people and buildings (total exposure) in the County to provide a baseline for evaluating vulnerability by hazard.

### **Exposure/Potential Dollar Loss**

Assessments in this plan are based on building inventories from the Archuleta County's Assessor's Office and from HAZUS 4.0. The following tables shows the value of the buildings in Archuleta County from the Archuleta Assessor's Office (June 2017). The Assessor Data vintage is June 2017. GIS analysis utilized a combination of Address Points and Parcel Centroids to get the separate parcel and building counts. According to the assessor's data, the sum of the actual value improvements in the County is \$3,200,002,325 (total building exposure). Contents exposure is estimated as a percent of the improvement value (specifically, 50% of the improvement value for residential structures and 100% for non-residential structures), based on standard FEMA methodologies. The Archuleta School District provided building value data for its eleven buildings. These values are shown in Table 4.6.

Land values are not included in this analysis, because land remains following disasters, and subsequent market devaluations are frequently short-term and difficult to quantify. Additionally, state and federal disaster assistance programs generally do not address loss of land or its associated value.

Building exposure data for Hinsdale and Mineral County is shown in Table 4.7. This data was obtained from HAZUS 4.0 inventory which is based on 2010 Census block data.

Tab le 4. 3 Building Exposure by Jurisdiction (Assessor’s Office )

Jurisdiction	Building Count	Improvement Value (\$)	Contents Exposure* (\$)	Total Exposure (\$)
Town of Pagosa Springs	1,398	\$201,115,716	\$139,138,286	\$340,254,002
Unincorporated Areas	10,012	\$1,857,434,285	\$1,002,314,038	\$2,859,748,323
<b>Total County</b>	<b>11,410</b>	<b>\$2,058,550,001</b>	<b>\$1,141,452,324</b>	<b>\$3,200,002,325</b>

Source: Archuleta County Assessor’s Office

\* Estimated

Tab le 4. 4 Building Inventory Valuations by Property Type —Unincorporated Archuleta County

Occupancy Type	Parcel Count	Building Count	Improvement Value	Content Value	Total Value
Agricultural	357	934	\$90,773,710	\$90,773,710	\$181,547,420
Commercial	183	240	\$26,074,180	\$26,074,180	\$52,148,360
Exempt	93	198	\$0	\$0	\$0
Industrial	15	17	\$1,364,390	\$2,046,585	\$3,410,975
Mixed Use	51	136	\$25,045,620	\$25,045,620	\$50,091,240
Residential	6,898	8,331	\$1,711,604,885	\$855,802,443	\$2,567,407,328
Vacant	143	156	\$2,571,500	\$2,571,500	\$5,143,000
<b>Total</b>	<b>7,740</b>	<b>10,012</b>	<b>\$1,857,434,285</b>	<b>\$1,002,314,038</b>	<b>\$2,859,748,323</b>

Source: Archuleta County Assessor’s Office

\* Estimated

Tab le 4. 5 Building Inventory Valuations by Property Type —Town of Pagosa Springs

Jurisdiction	Occupancy Type	Parcel Count	Building Count	Improvement Value	Content Value	Total Value
Pagosa Springs	Agricultural	4	7	\$134,000	\$134,000	\$268,000
	Commercial	306	370	\$65,220,330	\$65,220,330	\$130,440,660
	Exempt	63	103	\$0	\$0	\$0
	Industrial	3	3	\$369,620	\$554,430	\$924,050
	Mixed Use	38	88	\$10,752,830	\$10,752,830	\$21,505,660
	Residential	656	786	\$124,324,480	\$62,162,240	\$186,486,720
	Vacant	38	41	\$314,456	\$314,456	\$628,912
<b>Total</b>		<b>1,108</b>	<b>1,398</b>	<b>\$201,115,716</b>	<b>\$139,138,286</b>	<b>\$340,254,002</b>

Source: Archuleta County Assessor’s Office

\* Estimated

Tab le 4. 6 Archuleta School District Building Inventory Valuations

Building Name	Building Value (\$)	Contents Value (\$)	Total Insured Value (\$)
Pagosa Springs Elementary	\$7,001,068	\$1,443,170	\$8,444,238
Pagosa Springs Intermediate	\$2,305,413	\$544,940	\$2,850,353
Pagosa Springs High School	\$14,663,648	\$2,199,547	\$16,863,195
Pagosa Springs Jr. High School	\$7,547,470	\$1,262,947	\$8,780,417

Building Name	Building Value (\$)	Contents Value (\$)	Total Insured Value (\$)
Administration Building	\$159,877	\$45,983	\$205,860
Bus Garage and Fuel Building	\$222,875	\$34,753	\$257,628
Boiler Building	\$22,376	\$50,000	\$72,376
Maintenance and Transportation	\$1,994,285	\$391,601	\$2,385,886
Sports Complex	\$373,308	\$55,996	\$429,304
Vocational Building	\$1,140,655	\$236,763	\$1,377,418
Radio Tower and Building	\$6,621	\$1,500	\$8,121
<b>Totals</b>	<b>\$35,437,596</b>	<b>\$6,237,200</b>	<b>\$41,674,796</b>

Source: Archuleta School District

Table 4.7 Response Area Building Exposure by County—Hinsdale County and Mineral County (HAZUS 4.0)

County	Building Count	Building Exposure (\$)	Building Content	Total Exposure (\$)
Hinsdale*	87	\$23,343,000	\$11,892,000	\$35,235,000
Mineral**	57	\$14,318,000	\$7,941,000	\$22,259,000
<b>Total</b>	<b>144</b>	<b>\$37,661,000</b>	<b>\$19,833,000</b>	<b>\$57,494,000</b>

Source: HAZUS 4.0

\* All residential except for one commercial building with a total value of \$854,00.

\*\*All residential property except for two commercial buildings with a total value of \$3.1M

## Critical Facilities, Infrastructure, and Other Important Community Assets

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA’s HAZUS-MH loss estimation software uses the following three categories of critical assets. Essential facilities are those that if damaged would have devastating impacts on disaster response and/or recovery. High potential loss facilities are those that would have a high loss or impact on the community. Transportation and lifeline facilities are a third category of critical assets. Examples of each are provided below.

### Essential Facilities

- Hospitals and other medical facilities
- Police stations
- Fire stations
- Emergency Operations Centers

### High Potential Loss Facilities

- Power plants
- Dams and levees
- Military installations
- Hazardous material sites
- Schools
- Shelters
- Day care centers
- Nursing homes
- Main government buildings

### **Transportation and Lifelines**

- Highways, bridges, and tunnels
- Railroads and facilities
- Airports
- Water treatment facilities
- Natural gas and oil facilities and pipelines
- Communications facilities

HMPC members were asked to identify the assets in their respective jurisdictions that they considered to be critical facilities or of importance/value. Table 4.8 displays the inventory of these assets in Archuleta County, by jurisdiction, as provided by the HMPC. Where known, hazards that threaten the asset have been noted by the HMPC. This has been supplemented with limited GIS-based critical facility data from HAZUS-MH, for purposes of analysis. Maps of critical facilities can be found in the flood and wildland fire vulnerability sections.

Archuleta County Sheriff’s Office – Division of Emergency Management identified several other critical facilities in addition to the assets listed in Table 4.8. These include grocery stores, radio and communication towers, the main fiber optic line, water supply pumps, power lines, and fuel storage facilities. Due to the lack of weather radar coverage, local weather stations, river gauges, and rain gauges are also considered critical. Some of the data concerning the location of critical utility facilities was determined to be sensitive in nature. Therefore, the utility providers did not release the data.

Critical facilities were also identified in southern Hinsdale and Mineral County using HAZUS. The two critical facilities identified in southern Hinsdale County include the Williams Creek Dam, rated as a high hazard dam, and a bridge. The bridge is not rated as scour critical. Five critical facilities were identified in Mineral County, including a waste water facility owned by the Wolf Creek Ski Company, the Alberta Park Dam, and three bridges. The Alberta Park Dam is rated as significant, but is on the opposite side of the Continental Divide from the Response Area. The three bridges in Mineral County are not scour critical.

Table 4.8 Archuleta County Asset Inventory

Name of Asset	Type	Jurisdiction	Hazard Specific Information
1   Pagosa SP CO Ute Electric	Electric Power	Pagosa Springs	1 percent flood
2   Pagosa SP CO Ute Electric	Electric Power	Pagosa Springs	1 percent flood
1st Street Bridge	Transportation	Pagosa Springs	flood and debris hazards
Archuleta County High School	School	Pagosa Springs	None
Archuleta County Sheriff	Police	Pagosa Springs	0.2 percent flood
KWUF 1400	Communications	Pagosa Springs	None
Pagosa SP	Electric Power	Pagosa Springs	1 percent flood
Pagosa Springs Education Center	School	Pagosa Springs	None
Pagosa Springs Elementary School	School	Pagosa Springs	None
Pagosa Springs High School	School	Pagosa Springs	None
Pagosa Springs Intermediate School	School	Pagosa Springs	None
Pagosa Springs Junior High School	School	Pagosa Springs	None
Pagosa Springs Police and Town Hall	Police/Government	Pagosa Springs	Possibly vulnerable to > 0.2 Percent flood, access may be limited
San Juan National Forest, Pagosa Springs Office	Police	Pagosa Springs	None
Community Center	Vulnerable Facility	Pagosa Springs	Possibly vulnerable to > 0.2 Percent flood
Hot Springs Resort	Vulnerable Facility	Pagosa Springs	1 percent flood
Senior Housing at 9th and Apache	Vulnerable Facility	Pagosa Springs	1 percent flood
County Courthouse	Essential Facility/Sheriff Office/Government	Pagosa Springs	Possibly vulnerable to > 0.2 Percent flood
Archuleta County Emergency Operations Center / Nick's Hanger	EOC / Communications / Essential Facility	Unincorporated	None
CO State Patrol Field Office	Police	Archuleta	None
Fitz Properties, Inc.	Wastewater Facility	Archuleta	1 percent flood
KWUF-FM CH 292	Communications	Archuleta	None
Lake Capote Wastewater Facility	Wastewater Facility	Archuleta	None
Our Savior Lutheran School	School	Archuleta	None
Pagosa	Electric Power	Archuleta	None
Pagosa Area Water and Sanitation Dist.	Water Facility	Archuleta	None
Pagosa Area Water and Sanitation Dist.	Wastewater Facility	Archuleta	None
Pagosa Area Water and Sanitation Dist.	Wastewater Facility	Archuleta	None
Pagosa Springs Sanitation Dist.	Wastewater Facility	Archuleta	None
Station #1	Fire	Archuleta	None
Station #2	Fire	Archuleta	None
Station #3	Fire	Archuleta	None

Name of Asset	Type	Jurisdiction	Hazard Specific Information
Station #4	Fire	Archuleta	None
Station #5	Fire	Archuleta	None
Station #6	Fire	Archuleta	None
Archuleta County Combined Dispatch	LAW/Fire/EMS/EM/SAR	Pagosa Springs	
Oakbrush Communications Site	Communications	Archuleta	
Reservoir Hill Communications Site	Communications	Archuleta	
Sandoval Communications Site	Communications	Archuleta Southern Ute Indian Tribe	
Lobo Communications Site	Communications	Mineral	
Devil Mountain Communications Site	Communications	Archuleta	
Downtown Hwy 160 Bridge	Transportation	Pagosa Springs	
Piedra Hwy 160 Bridge	Transportation	Archuleta	
City Market	Food/Fuel	Pagosa Springs	
Giant	Fuel	Pagosa Springs	
Conoco – Uptown	Fuel	Pagosa Springs	
Conoco – Downtown	Fuel	Pagosa Springs	
Shell	Fuel	Pagosa Springs	
Sonoco	Fuel	Pagosa Springs	
Everyday	Fuel	Pagosa Springs	
Geothermal System	Heating	Pagosa Springs	
All cell towers	Communications	Archuleta / Mineral / Pagosa Springs	
Transmission Lines	Power	Archuleta / Mineral / Pagosa Springs	
Inter-state Gas Lines	Natural Gas	Archuleta / Mineral	
Archuleta County Airport	Transportation	Archuleta	
Hwy 160	Transportation	Archuleta / Mineral / Pagosa Springs	
San Juan National Forest	Recreation	San Juan National Forest	
All Government Rain Gauges	Warning Systems	Archuleta / Hinsdale / Mineral / Pagosa Springs	
All Government Stream Gauges	Warning Systems	Archuleta / Mineral / Pagosa Springs	
All Government Weather Stations (Including SNOTEL and RAWS)	Warning Systems	Archuleta / Hinsdale / Mineral / Pagosa Springs	

Name of Asset	Type	Jurisdiction	Hazard Specific Information
Broadband Data Systems (wired / wireless)	Communications	Archuleta / Hinsdale / Mineral / Pagosa Springs	
Archuleta County Shop / Road and Bridge / Planning	Essential Facility	Archuleta	
Archuleta County Fair Grounds	Essential Facility	Archuleta	

Source: HMPC, HAZUS

## Natural, Historic, and Cultural Assets

Assessing the vulnerability of Archuleta County to disaster also involves inventorying the natural, historical, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

### Natural Resources

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as attenuates and stores floodwaters.

Many natural resources exist in Archuleta County. This includes wetlands, endangered species, and imperiled plant communities. Also, the scenery itself, and access to the scenic backcountry, are economic drivers for the County and Pagosa Springs.

A significant natural resource is the geothermal resources found in the area. This resource provides heating for some of downtown Pagosa Springs. The Pagosa Hot Springs Resort is a significant tourist draw and economic driver within the County. Some of the lower pools at the resort are vulnerable to flooding from the San Juan River.

### Wetlands

Wetlands are a valuable natural resource for communities, due to their benefits to water quality, wildlife protection, recreation, and education, and play a key role in hazard mitigation. Wetlands



reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water. They also provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation are vital.

### Endangered Species

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by law and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

According to the U.S. Fish and Wildlife Service, as of November 2010, there are ten Federal endangered, threatened, recovering, or candidate species in Archuleta County. These species are listed in Table 4.9 along with state listed species. State special concern is not a statutory category, but suggests a species may be in danger.

Other significant wildlife species with limited suitable habitat include elk or wapiti, mule deer, black bear, and mountain lion.

Table 4.9 Select List of Important Species Found in Archuleta County

Common Name	Scientific Name	Type of Species	Status
Arctic peregrine falcon	Falco peregrines tundrius	Bird	Recovery
Mexican spotted owl	Strix occidentalis lucida	Bird	State Threatened
Mountain Plover	Charadrius montanus	Bird	Proposed Threatened
Southwestern willow flycatcher	Empidonax traillii extimus	Bird	State Endangered
Yellow-billed cuckoo	Coccyzus americanus	Bird	Federal Candidate
Colorado pikeminnow*	Ptychocheilus lucius	Fish	Federal Endangered
Razorback sucker*	Xyrauchen texanus	Fish	Federal Endangered
Pagosa skyrocket	Ipomopsis polyantha	Flowering plant	Proposed Endangered
Black-footed ferret	Mustela nigripes	Mammal	Experimental population, non-essential
Canada lynx	Lynx canadensis	Mammal	Federal Threatened

Source: Endangered, Threatened, Proposed, and Candidate Species Colorado Counties (November 2010), U.S. Fish and Wildlife Service Mountain-Prairie Region, [www.fws.gov/mountain-prairie/endspp/](http://www.fws.gov/mountain-prairie/endspp/); Natural Diversity Information Source of the Colorado Division of Wildlife, <http://ndis.nrel.colostate.edu/>

\* Water depletions in the Upper Colorado River and San Juan River Basins, may affect the species and/or critical habitat in downstream reaches in other states.

Note: State status information is from the NDIS, which does not track county occurrence of fish or insects at this time.

## Historic and Cultural Resources

There are many important historic resources within Archuleta County. A historic property not only includes buildings or other types of structures, such as bridges and dams, but also includes prehistoric or Native American sites, roads, byways, historic landscapes, and many other features. Given the history of the County, these types of historic properties exist; some are inventoried and listed in this plan.

Information about historic assets in Archuleta County came from local sources as well as two historic inventories:

- The **National Register of Historic Places** is the Nation’s official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.
- The Colorado State Register of Historic Properties is a listing of the state’s significant cultural resources worthy of preservation for the future education and enjoyment of Colorado’s residents and visitors. Properties listed in the Colorado State Register include individual buildings, structures, objects, districts, and historic and archaeological sites. The Colorado State Register program is administered by the Office of Archaeology and Historic Preservation within the Colorado Historical Society. Properties listed in the National Register of Historic Places are automatically placed in the Colorado State Register.

Table 4.10 lists the properties and districts in Archuleta County that are on the Colorado State Register of Historic Properties. Those properties that are also on the National Register of Historic Places are indicated with an asterisk.

Table 4.10 Archuleta County Historic Properties /Districts in State and National Registers

Property	Jurisdiction	Location	Date Listed
Chimney Rock National Monument	Chimney Rock	San Juan National Forest	10/12/2012
Labo del Rio Bridge*	Arboles	County Rd. F50	6/24/1985
Chimney Rock Archaeological Area*	Chimney Rock	San Juan National Forest	8/25/1970
Chromo School	Chromo	US Hwy 84	6/12/1996

Denver & Rio Grande Western Railroad San Juan Extension*	Cumbres Pass	Antonita to Chama, New Mexico over Cumbres Pass	1/16/1973
La Casa Ruibalid	Pagosa Springs	County Rd. 335	6/14/1995
Pagosa Hot Spring	Pagosa Springs	Light Plant Rd.	8/14/1991

Sources: Directory of Colorado State Register Properties, [www.coloradohistory-oahp.org/programareas/register/1503/](http://www.coloradohistory-oahp.org/programareas/register/1503/); National Register Information System, [www.nr.nps.gov/](http://www.nr.nps.gov/)

\*On both the Colorado State Register of Historic Properties and the National Register of Historic Places  
n=national

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for this regulation.

Given the 50-year threshold for buildings to be eligible for consideration as a historic resource, many of the buildings in downtown Pagosa Springs and elsewhere in the County are potentially eligible for consideration. Several of the buildings in this area were built several decades ago and serve as important cultural and historic resources for the community. In addition to preserving such resources, joining a historic register can also provide tax incentives and preservation assistance. A list of locally designated historic properties is displayed below in Table 4.11.

Table 4. 11 Locally Designated Historic Properties and Districts

Property	Location	Date Listed
Water Treatment Plant	92 1 <sup>st</sup> St.	1999
Goodman's Department Store	404 Pagosa St.	2001
Metropolitan Hotel	418 Pagosa St.	2002
Liberty Theatre	418 Pagosa St.	2002
Phillips' House	138 Pagosa St.	2002
Warr House	121 Lewis St.	2003
Hatcher Nossaman House	274 Pagosa St.	2004
Hatcher Hardware	468 Pagosa St.	2004
Citizen's Bank	474 Pagosa St.	2004
Immaculate Heart of Mary's	451 Lewis St.	2004
Colton Building	101 Pagosa St.	2005
Old County Jail	380 Lewis St.	2006
Dr. McKinley's Residence	380 Lewis St.	2006
Pagosa Springs Cemetery	X.S. 10 <sup>th</sup> St.	
Historic Business District	From 4 <sup>th</sup> to 5 <sup>th</sup> St. and San Juan St. to Lewis St.	

## Cultural Assets

Archuleta County’s cultural assets include those associated with the Southern Ute Indian Tribal lands. Due to the sensitive nature of this information it is not disclosed in this plan. The Tribe has a separate hazard mitigation plan specific to the reservation.

## Economic Assets

Archuleta County’s spectacular scenery is its primary economic asset. Much of Archuleta County’s economy is tourism-based due to Archuleta’s location in the San Juan Mountains of southwest Colorado. Tourists often flock to the county in the winter months during ski season, which coincides with avalanche and severe winter storm season. However, tourism is also common in the summer and fall months when hikers, fishers, and hunters come to the area. This places people at risk during flood and wildland fire season. Flooding could cause a short-term negative economic impact. A large wildland fire could impact the scenic view-shed and have longer term negative economic and environmental impacts. The Pagosa Hot Springs are a popular tourist draw, and are vulnerable to flood.

## 4.2.2 Development Trends

As part of the planning process, the HMPC looked at growth and development trends. These trends are examined further in the context of each significant hazard, and how the changes in growth and development affect loss estimates and vulnerability.

According to the U.S. Census Bureau, the 2016 estimate population of Archuleta County was 12,854. This is a 6 percent increase from the 2010 population of 12,084. Table 4.12 shows the total population, number of housing units, and percent change for each by jurisdiction between 2010 and 2016.

Table 4.12 Maximum Population and Housing Units by Jurisdiction

Jurisdiction	2010 Pop.	2016 Pop. Estimate	# Change	% Change	2010 Housing Units Estimate	2015 Housing Units*	# Change	% Change
Town of Pagosa Springs	1,727	1,838	111	6.0%	945	1,063	118	12.5%
Unincorporated Areas	10,357	11,016	659	6.4%	7,817	8,879	1,062	13.6%
<b>Total County</b>	<b>12,084</b>	<b>12,854</b>	<b>770</b>	<b>6.4%</b>	<b>8,762</b>	<b>9,942</b>	<b>1,180</b>	<b>13.5%</b>

Source: U.S. Census Bureau.

\* Housing unit numbers are calculated from the most recent available data, provided by the American Community Survey 2011-2015 estimates.

As indicated above, Archuleta County has grown in recent years. There is a disproportionate increase in the number of housing units compared to the population growth, which reflects the rising trend of second home development.

Growth is projected to continue through 2035 at an average rate of 3.08 percent over every five-year period. Table 4.13 shows the population projections for the County through 2035.

Table 4.13 Population Projections for Archuleta County, 2010-2035

	2010	2020	2025	2030	2035
Population	12,744	17,805	20,866	24,110	27,330
Percent Change (%)		+3.5	+3.2	+2.9	+2.5

Sources: Colorado Department of Local Affairs Demography Section, [www.dola.colorado.gov/dlg/demog/](http://www.dola.colorado.gov/dlg/demog/)

According to the 2001 Archuleta County Community Plan, future growth is projected to occur in areas that are expected to be annexed by the Town of Pagosa Springs over the next few decades. Currently, most of the County’s population is in the existing incorporated areas and the Pagosa Lakes subdivisions around Pagosa Springs, referred to as the Pagosa Hub area in the Community Plan. Growth is restricted due to the large amount of public land in the County. Roughly one-third of Archuleta County is privately owned, while the remaining two-thirds are held by federal, state, and tribal governments.

According to a summary of the Archuleta County building permit statistics, the number of building permits was typically in the range of 150-300 from 2008-2017. The number of building permits has increased from 149 in 2009 to 291 in 2017, likely due to improved economic conditions.

## 4.3 Hazard Profile

**Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the...location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.**

The hazards identified in Section 4.1 Hazard Identification are profiled individually in this section. Much of the profile information came from the same sources used to initially identify the hazards.

### 4.3.1 Profile Methodology

Each hazard is profiled in a similar format that is described below:

#### Hazard/Problem Description

This subsection gives a generic description of the hazard and associated problems, followed by details on the hazard specific to Archuleta County.

## Past Occurrences

This subsection contains information on historic incidents, including impacts where known. The extent or location of the hazard within or near the Archuleta County Planning Area is also included here. Information provided by the HMPC is included here along with information from other data sources.

## Geographical Area Affected

This subsection discusses which areas of the County are most likely to be affected by a hazard event. Affected areas outside of the County but within the Archuleta County response area are also noted in this subsection.

## Potential Magnitude

This subsection discusses the potential magnitude of impacts from a hazard event. Magnitude classifications are as follows:

- **Catastrophic**—More than 50 percent of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50 percent agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.
- **Critical**—25 to 50 percent of property severely damaged, and/or facilities are inoperable or closed for at least 2 weeks. 10-50 percent agricultural losses. Injuries and/or illnesses result in permanent disability and some fatalities. Moderate indirect impacts.
- **Limited**—10 to 25 percent of area affected. Some injuries, complete shutdown of critical facilities for more than one week, more than 10 percent of property is severely damaged.
- **Negligible**—Less than 10 percent of area affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10 percent of property is severely damaged.

## Frequency/Likelihood of Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrences is categorized into one of the following classifications:

- **Highly Likely**—Near 100 percent chance of occurrence in next year, or happens every year.
- **Likely**—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less.
- **Occasional**—Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Unlikely**—Less than 1 percent chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

The frequency, or chance of occurrence, was calculated where possible based on existing data. Frequency was determined by dividing the number of events observed by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. Stated mathematically, the methodology for calculating the probability of future occurrences is:

$$\frac{\text{\# of known events}}{\text{years of historic record}} \times 100$$

This gives the percent chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period which equates to 10 percent chance of that hazard occurring any given year. The potential for climate change to alter the likelihood or intensity of the hazard is briefly discussed in this section, if applicable to the hazard

### 4.3.2 Avalanche

#### Hazard/Problem Description

An avalanche is a mass of snow sliding down a mountainside. An avalanche occurs when the stress (from gravity) trying to pull the snow downhill exceeds the strength (from bonds between snow grains) of the snow cover. There are four factors that contribute to an avalanche: a steep slope, a snow cover, a weak layer in the snow cover, and a trigger. About 90 percent of all avalanches start on slopes of 30-45 degrees; about 98 percent of all avalanches occur on slopes of 25-50 degrees. Avalanches release most often on slopes above timberline that face away from prevailing winds (leeward slopes collect snow blowing from the windward sides of ridges). Nevertheless, avalanches can run on small slopes well below timberline, such as gullies, road cuts, and small openings in the trees. Very dense trees can anchor the snow to steep slopes and prevent avalanches from starting; however, avalanches can release and travel through a moderately dense forest.

Avalanche hazards occur predominantly in the mountainous regions of Colorado above 8,000 feet. The clear majority of avalanches occur during and shortly after winter storms, during the winter and spring months between November and April. The most avalanche-prone months are, in order, February, March, and January. Avalanches caused by thaw occur most often in April (Source: Colorado Avalanche Information Center). The avalanche danger increases with major snowstorms and periods of thaw. About 2,300 avalanches are reported to the Colorado Avalanche Information Center in an average winter. More than 80 percent of these occur during or just after large snowstorms.

An increase in backcountry recreation (skiers and snowmobilers) in recent years has led to more people being in avalanche-prone areas. Another trend among backcountry skiers and snowboarders is traveling into steeper and more “extreme” terrain, which tends to be more avalanche-prone. Additionally, new snowmobile models make it easier to access hazardous areas in the backcountry,

and their bigger size and weight increases the likelihood of triggering an avalanche. The planning area is known for its outdoor recreation opportunities, including skiing at Wolf Creek. Thus, avalanches pose a very real threat to people in the planning area.

This hazard generally affects a small number of people, such as the participants in backcountry recreation discussed above. Events have occurred in similar areas in Colorado and elsewhere where ten or more snowmobilers have been trapped and/or killed in a single avalanche event. Motorists along highways are also at risk of injury and death due to avalanches. Road and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches. Road closures can last several days until crews can clear debris safely. Recognizing areas prone to avalanches is critical in determining the nature and type of development allowed in each area.

### Past Occurrences

Avalanches occur naturally every winter in Archuleta County. This discussion focuses on those avalanches that have collided with people or property. In the past, winter backcountry use has been fairly limited in the County. There was little mining activity in Archuleta County, so Archuleta County escaped the numerous fatalities in much of Colorado associated with winter mining activities in the 1800's.

According to NCEI and the Colorado Avalanche Information Center, three avalanches caused property damage between 2002 and 2007, and seven resulted in fatalities. These events are shown below in Table 4.14.

Table 4. 14 Archuleta County/Wolf Creek Pass Avalanche History

Date	Fatalities	Injuries	Property Damage
3/31/2002	0	0	\$500
3/22/2003*	1	0	0
2/8/2005	0	1	\$5,000
3/13/2007	0	0	\$1,000
11/22/2011*	1	0	0
2/16/2012*	1	1	0
3/30/2012	1	0	0
1/27/2013	0	1	0
2/2/2013	1	2	0
1/6/2015	1	0	0
2/2/2016*	1	0	0
<b>TOTAL</b>	<b>7</b>	<b>5</b>	<b>\$6,500</b>

Source: Colorado Avalanche Information Center and NCEI

\* Wolf Creek area

On March 22, 2003, nine people were driving snowmobiles just below the 12,000-foot level in the La Plata Mountains when one of the snowmobiles got stuck at a location behind the others. Another snowmobiler who came back to help triggered the avalanche which came down from a higher elevation of the mountain and engulfed the stuck snowmobiler. The victim was not recovered in



time to be revived. The location of the avalanche was about 14 miles south of Rico on Burro Mountain. The avalanche was 700 feet wide and fell 800 vertical feet.

According to the Department of Transportation, on March 30, 2012, a skier in a group of four decided to ski down a southeast aspect near Ophir Pass during a sunny and relatively warm afternoon. This skier initiated a wet slab avalanche that broke loose at about the 12,800-foot level and traveled over one mile with a path width of up to 500 feet. The skier was carried by the avalanche a total distance of about 4200 feet down a vertical elevation drop of about 1500 feet. Although the skier had an avalanche beacon, he was not found and uncovered from the avalanche debris until about 35 minutes after he was buried.

Colorado Avalanche Information Center (CAIC) notes that three backcountry skiers were caught in an avalanche near Wolf Creek Pass in the Gibbs Creek Drainage on February 16, 2012. The avalanche released on a west facing slope near treeline. The slide was 3 feet deep, 600 feet wide, and ran 600 feet vertically. One skier was uninjured. The second was injured and required evacuation. The third was killed in the accident.

On January 6, 2015, two cross country skiers were traversing the northwest side of Kendall Mountain when an avalanche was triggered. The snow layer fractured at the 11,300-foot layer, a short distance above one skier who was quickly swept several hundred feet down a 42-degree slope into a grove of trees. The skier caught in the avalanche came to a stop against a tree and was partially buried. That skier did not survive.

An avalanche in the winter of 2007 trapped two vehicles on Highway 160 near Wolf Creek Pass. CDOT workers were eventually able to free the two vehicles and reopen the road. A few days later, another slide in the same area trapped a pickup truck. Again, road crews could free the vehicle. No one was injured in either incident.

There are 24 avalanche runout zones on the Archuleta side of Wolf Creek Pass. Beyond the threat to back country recreationalists, avalanche events have disrupted transit along Wolf Creek Pass. During the winter of 2016-2017, there were three closures of Wolf Creek Pass. Two of these closures lasted for eight hours while the other lasted 24 hours.

### **Geographical Area Affected**

The San Juan Mountains form the dramatic scenery in northern and eastern Archuleta County. Due to the steep mountainous terrain, high elevations, and winter snows in Archuleta County, there are avalanches every winter.

The geographic extent of avalanches in the Archuleta County response area is **limited**. There are several steep slopes with potential to trigger small avalanches in Pagosa Springs, the most active being the shale bank adjacent to the Junction Restaurant parking lot near the junction of State Highways 160 and 84. The north-facing slope on Reservoir Hill above the San Juan River and the

shale bank along South 6<sup>th</sup> Street are the other two. The shale banks along the San Juan River upstream of town are also very active during most winters.

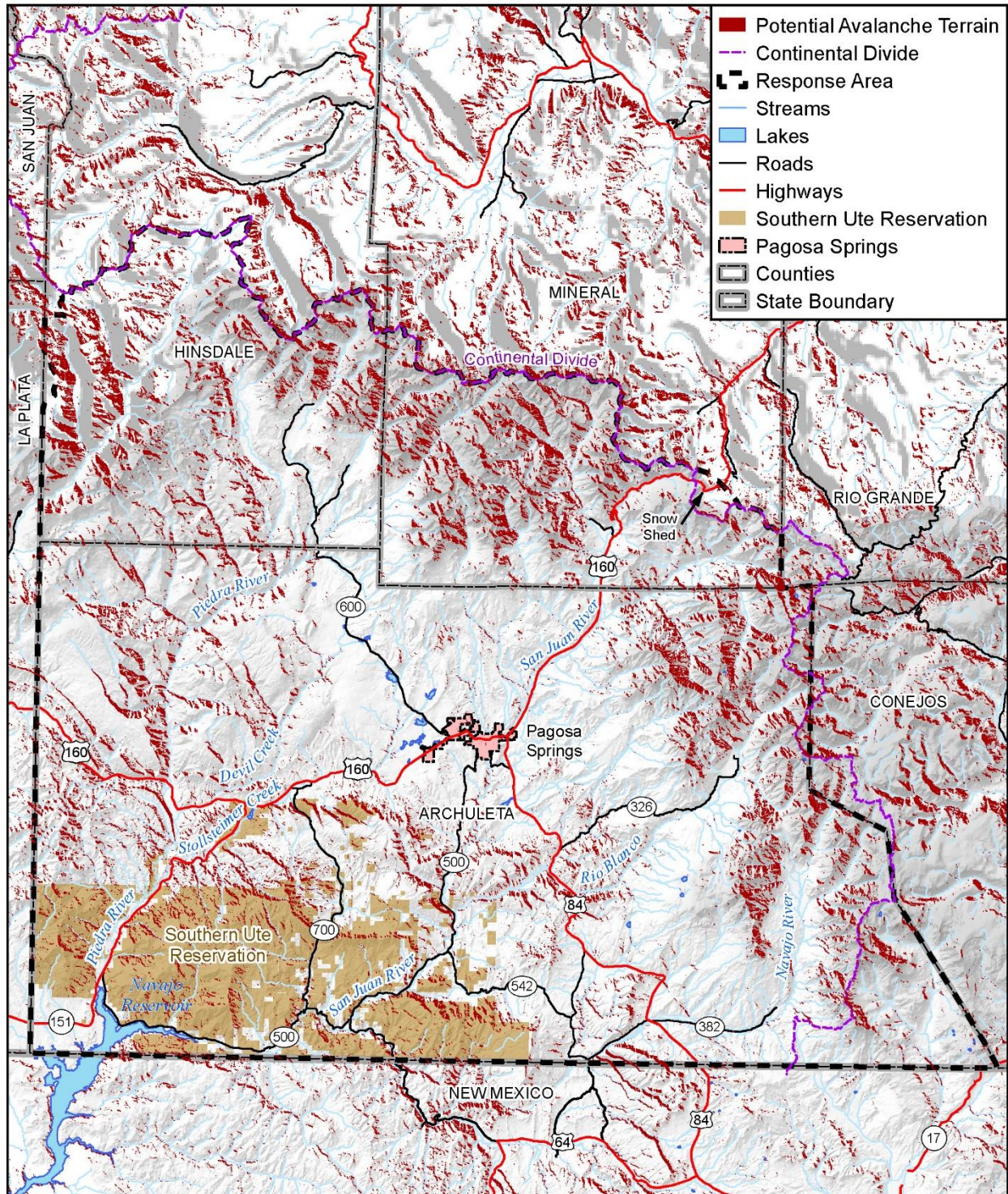
Until recently, the most likely location in Archuleta County response area for avalanche encounters was on State Highway 160's corridor over Wolf Creek Pass in Mineral County. Avalanches sometimes close State Highway 160 over Wolf Creek Pass. The closures inconvenience travelers and commerce, but avalanche control work done by CDOT serves to minimize life safety impacts. However as recreational backcountry winter-use increases in Archuleta County, we may see an increase in avalanche encounters. Avalanches pose a serious threat to backcountry recreationists.

Figure 4.1 represents slopes with potential for avalanches in the County response area. The layer was developed in house by the Archuleta Sheriff's Office using typical parameters for avalanche terrain common in the San Juan Mountains of Colorado:

- Slopes of 30 to 35 degrees
- North to East Aspect, where most wind loading occurs from prevailing snowstorms on southwest flow

The terrain meeting these criteria was extracted from the 10-meter National Elevation Dataset using GIS. The results were then converted into polygons representing the hazardous terrain. The results are approximate and may not represent hazardous avalanche runout zones or areas that could be prone to slides on southern and western aspects.

Figure 4 .1. A va lan ch e Terrain in Archuleta Response Area



Map compiled 1/2012; intended for planning purposes only.  
 Data Source: Archuleta County GIS, CDOT, NHD,  
 Earth Data Analysis Center



## Potential Magnitude

Overall, avalanche impacts would likely be **limited** in Archuleta County, with 10-25 percent of the planning area affected. However, a road closed due to avalanche activity can result in serious transportation disruptions due to the limited number of roads in the County. State Highway 160 at Wolf Creek Pass sometimes experiences avalanche closures, thus obstructing all access to the County from the east. Backcountry avalanche incidents involve search and rescue teams and resources, which can put these personnel in areas of risk.

## Frequency/Likelihood of Occurrence

**Highly Likely**—A 100 percent chance of occurrence in next year, or happens every year. Avalanches that result in death or injury happen less frequently, approximately every 10 years.

In the future the likelihood and nature of avalanches may be affected by climate change. As winter is taking longer to descend, weaker snow accumulates at the very bottom of the snow pack. As more snow piles on top of the weak layer, and temperatures remain warm, the upper, moisture-laden layers become vulnerable to sliding, and create a delicate situation. More extreme precipitation events that deposit large amounts of snow in a short period of time could also periodically increase the potential for large avalanches.

### 4.3.3 Dam Failure

#### Hazard/Problem Description

Dams are manmade structures built for a variety of uses, including flood protection, power, agriculture, water supply, and recreation. Dams typically are constructed of earth, rock, concrete, or mine tailings.

Dam failures and releases from dams during heavy rain events can result in downstream flooding. Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. Two factors that influence the potential severity of a full or partial dam failure are the amount of water impounded and the density, type, and value of downstream development and infrastructure. The speed of onset depends on the type of failure. If the dam is inspected regularly then small leaks allow for adequate warning time. Once a dam is breached, however, failure and resulting flooding occurs rapidly. Dams can fail at any time of year, but the results are most catastrophic when the dams fill or overtop during winter or spring rain/snowmelt events.

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

Dam failures are often the result of prolonged rainfall and overtopping, but can happen in any conditions due to erosion, piping, structural deficiencies, lack of maintenance and repair, or the gradual weakening of the dam over time. Other factors that can lead to dam failure include earthquakes, landslides, improper operation, rodent activity, vandalism, or terrorism.

The Colorado Division of Water Resources Dam Safety Branch assigns hazard ratings to large dams within the State. Two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in three categories that identify the potential hazard to life and property:

- High hazard (Class I) indicates that a failure would most probably result in the loss of life
- Significant hazard (Class II) indicates a failure could result in appreciable property damage
- Low hazard exists where failure would result in only minimal property damage and loss of life is unlikely.

Privately owned Class I and II dams are required by Colorado regulations to have Emergency Action Plans (EAPs) in place. Federally-owned Class I dams are also required to have EAPs by federal regulations. According to the 2013 State Hazard Mitigation Plan, all high-hazard dams in Colorado have EAPs in place, which provide for the emergency response procedures in the event of a dam emergency event.

### **Past Occurrences**

Colorado has a history of dam failure, with at least 130 known dam failures since 1890 (Flood Hazard Mitigation Plan for Colorado, 2004). The Lawn Lake Disaster of 1982 caused four deaths and over \$31 million in property damage when a privately-owned dam failed on Forest Service Property above the Town of Estes Park. The San Juan Mountains above Silverton experienced a dam failure flood, of sorts, when a natural lake (Lake Emma) was completely drained on June 4, 1979 by a series of abandoned mine tunnels beneath the lake. There has been no history of dam failure in Archuleta County.

### **Geographical Area Affected**

The geographic extent of dam failure in the Archuleta County response area is **significant**. According to the National Inventory of Dams, Archuleta County has 21 registered dams, including three high hazard and six significant hazard dams. The three high hazard dams within Archuleta County include Hatcher, Mountain View, and Stevens Dam. Stevens Dam was originally rated as a significant hazard but was upgraded when the dam was enlarged. Additionally, Williams Creek dam, a high hazard dam in Hinsdale County, and Alberta Park dam (below the ski area on the edge of the response area), a significant hazard dam in Mineral County, could also impact the planning area, though most of the impacts of the Alberta Park dam would be outside of the response area. Lake Capote Dam, also known as Pargin Dam, is located in the Southern Ute tribal lands. Lake Capote has a known seep which has been investigated by engineers from the Bureau of Reclamation and the Department of Interior. The dam is understood to be structurally sound by

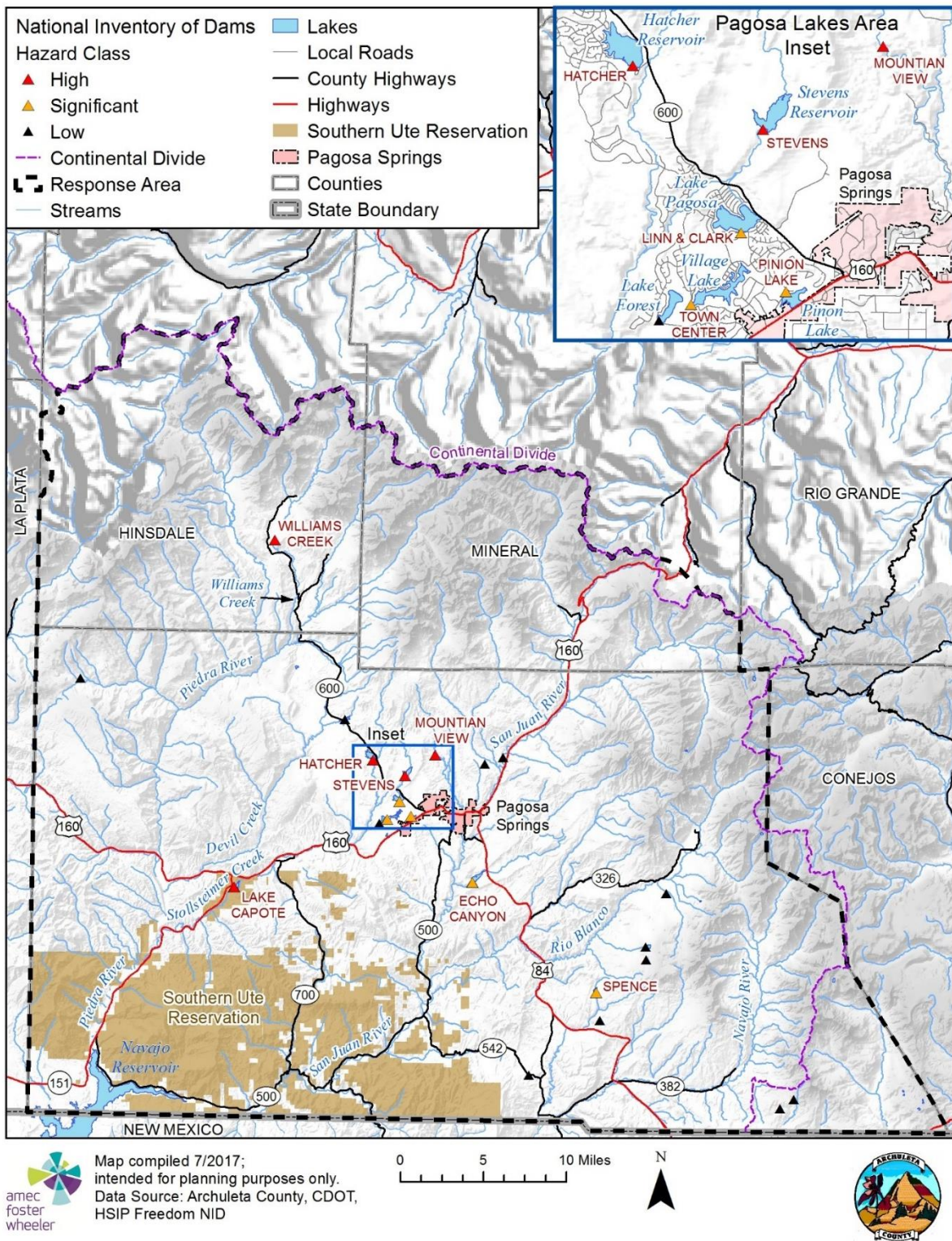
professional dam designers and builders. Thus, there is no immediate concern of dam failure. The dam is constantly monitored to insure public safety downstream. There are several man-made lakes in the most heavily populated areas of the County. Stevens and Hatcher lie on two of these lakes, and Mountain View lies a few miles to the northwest. Mountain View Dam could impact downtown Pagosa Springs. Several significant hazard dams are located in the same area. If the dams on these lakes failed, the greatest impacts would be in the Pagosa Lakes subdivisions west of Pagosa Springs. The high and significant hazard dams in the planning area are described below in Table 4.15, and their location is illustrated in Figure 4.2.

Table 4.15 High and Significant Hazard Dams in Response Area

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Lake Capote	BIA; Southern Ute Indian Tribe	Stollsteimer Creek	High	Blanco, NM	40	Y
Hatcher	Pagosa Lakes Property Owners Association	Martinez Creek-Tr	High	Pagosa Springs	60	Y
Williams Creek	Colorado Parks & Wildlife	Williams Creek	High	Piedra	26	Y
Mountain View	Hidden Valley Ranch Association	Hidden Valley	High	Pagosa Springs, CO	5	Y
Stevens	Pagosa Area Water & Sanitation District	Dutton Creek	High	Pagosa Springs	60	Y
Linn And Clark	Pagosa Lakes Property Owners Association	Stevens Draw	Significant	Pagosa Springs	0.0	Y
Spence	Alpine Lakes Ranch Ditch Co.	Spence Creek	Significant	Dulce, NM	20	Y
Echo Canyon	Colorado Parks & Wildlife	Echo Canyon	Significant	Trujillo	10	Y
Pinon Lake	Fairfield Pagosa	Martinez Creek-Tr	Significant	Blanco, NM	58	Y
Town Center	Pagosa Lakes Property Owners Association	Stevens Draw	Significant	Pagosa Springs	0.0	Y

Source: National Inventory of Dams

Figure 4 .2. Dams in Archuleta County



## Potential Magnitude

Overall, dam failure impacts would likely be **limited** in Archuleta County, with 10-25 percent of the planning area affected. Roads closed due to dam failure floods could result in serious transportation disruptions due to the limited number of roads in the County. The most serious impacts would be in the Pagosa Lakes subdivisions area.

Specific impacts and downstream areas are analyzed in the Emergency Action Plans for Stevens Dam, Lake Capote Dam (a.k.a. Pargin Dam), Williams Creek Dam, and Echo Canyon Dam. These plans are on file at the Archuleta County Emergency Manger's office. According to HMPC members, Lake Capote recently updated and edited the Emergency Action Plan. Due to the sensitive nature of this information it is not replicated in this publicly available plan.

The potential magnitude of a dam failure in the planning area could change in the future; the hazard significance of certain dams could increase if development occurs in inundation areas.

## Frequency/Likelihood of Occurrence

The HMPC estimates that the likelihood of dams failing in Archuleta County is **occasional**. The structural integrity of dams depends on regular inspections and maintenance, which do not always happen. Additionally, snowmelt flooding can exceed the capacity and strength of dams, causing them to fail. Archuleta County's dams will continue to be tested by snowmelt, heavy rains, and other types of floods every year. Thus, dam failures could possibly threaten Archuleta County. There are no official recurrence intervals calculated for dam failures, so estimating the frequency of occurrence of dam failure is extremely difficult.

With a potential for increase in extreme precipitation events, climate change may result in large floods that could stress dams and this potentially increase the risk of dam failure.

### 4.3.4 Drought

#### Hazard/Problem Description

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

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



can be a short-term event over several months or a long-term event that lasts for years or even decades.

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

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

Due to Colorado’s semiarid conditions, drought is a natural but unpredictable occurrence in the state. However, because of natural variations in climate and precipitation sources, it is rare for all of Colorado to be deficient in moisture at the same time. Single season droughts over some portion of the state are quite common.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Colorado are those related to water intensive activities such as agriculture, wildland fire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. An ongoing drought may leave an area more prone to beetle kill and associated wildland fires. Drought conditions can also cause soil to compact, increasing an area’s susceptibility to flooding, and reduce vegetation cover, which exposes soil to wind and erosion. A reduction of electric power generation and water quality deterioration are also potential problems. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

The onset of drought in western Colorado mountainous counties is usually signaled by a lack of significant winter snowfall. Archuleta County receives most of its precipitation as snow in the higher elevations between November and April. Hot and dry conditions that persist into spring, summer, and fall can aggravate drought conditions, making the effects of drought more pronounced as water demands increase during the growing season and summer months.

### **Past Occurrences**

Colorado has experienced drought in 2011-2013, 2000-2006, 1996, 1994, 1990, 1989, 1979-1975, 1965-1963, 1957-1951, 1941-1931, and 1905-1893 (Source: Colorado Drought Mitigation and Response Plan, 2010). The most significant are listed in Table 4.16. Although drought conditions can vary across the state, it is likely that Archuleta County suffered during these dry periods.

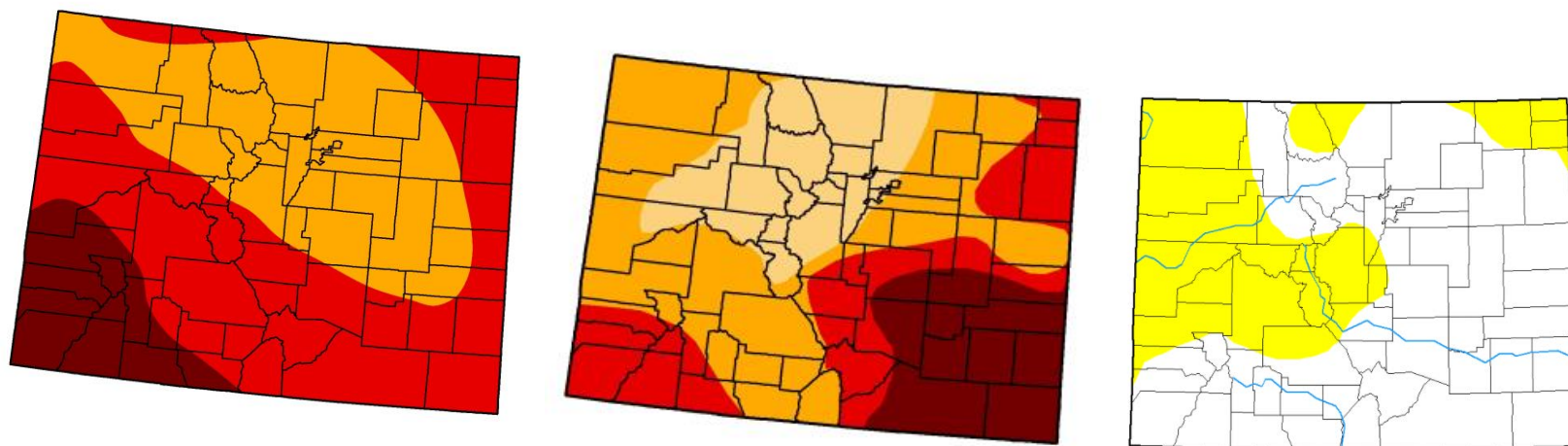
Table 4. 16 Historical Dry and Wet Periods in Colorado

Date	Dry	Wet	Duration (years)
1893-1905	X		12
1905-1931		X	26
1931-1941	X		10
1941-1951		X	10
1951-1957	X		6
1957-1959		X	2
1963-1965	X		2
1965-1975		X	10
1975-1978	X		3
1979-1999*		X	20
2000-2006*	X		6
2011-2013	X	X	3

Source: McKee, et al. \*modified for the Colorado State Drought Plan in 2010 based on input from the Colorado Climate Center

Southwestern Colorado and Archuleta County were impacted by the multi-year drought that began in 1997 and continued into 2004. The summer of 2002 was particularly severe and negatively affected local agriculture and irrigation. The wildland fires that burned that summer had a negative impact on the air quality in the region. Additionally, 2012 and 2013 brought drought conditions throughout the state, and information based on the U.S. Drought Monitor indicates that approximately 50% of Colorado was already under drought conditions by the beginning of 2012. By the end of May 2012, minimal snow accumulation and above average temperatures lead to a statewide drought and streamflows measured only slightly better compared to the extreme drought years of 1934, 1954, 1977 and 2002 (Ryan and Doesken, 2013). Figure 4.1 compares the severity of the drought in southwest Colorado in June 2002 with the severity of the drought in June 2013, and then current conditions. The maps illustrate significantly improved conditions in Archuleta County from exceptional drought conditions across the entire planning area in 2002 to virtually no drought conditions in July 2017.

Figure 4 .3. U.S. Droug ht Mon itor for Color ad o, Ju ne 18, 2002 (left) vs. Ju ne 25, 2013 (ce nter), vs. Ju ly 11, 2017 (righ t)



State drought conditions (percent area)

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
06/18/02	0.00	100.00	100.00	100.00	61.67	13.34
06/25/13	0.00	100.00	100.00	75.28	39.21	17.54
07/11/17	66.84	33.16	0.00	0.00	0.00	0.00

***Intensity:***

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Source: National Drought Mitigation Center

More recently, Archuleta, Mineral, and Hinsdale counties were included in USDA Secretarial Disaster Declaration for a drought in 2011, 2012, 2013, and 2015.

NCEI lists all the drought events for the County, however, there are no identified associated economic losses (property damage or crop damage).

The National Drought Mitigation Center developed the Drought Impact Reporter in response to the need for a national drought impact database for the United States. Information comes from the public who visit the website and submit a drought-related impact for their region, members of the media, and members of relevant government agencies. The database is being populated beginning with the most recent impacts and working backward in time.

The Drought Impact Reporter contains information on 125 drought impacts from droughts that affected Archuleta County between 1990 and 2010. The list is not comprehensive. Most of the impacts, 45, were classified as “agriculture.” Other impacts include “social” (54) (comprised of “relief, response & restriction”, “tourism & recreation”, and “society & public health”), “water supply & quality” (13), “plants and wildlife” (2), and “fire” (18). These categories are described as follows:

- **Agriculture**—Impacts associated with agriculture, farming, and ranching. Examples include damage to crop quality, income loss for farmers due to reduced crop yields, reduced productivity of cropland, insect infestation, plant disease, increased irrigation costs, cost of new or supplemental water resource development, reduced productivity of rangeland, forced reduction of foundation stock, closure/limitation of public lands to grazing, high cost/unavailability of water for livestock, and range fires.
- **Water/Energy**—Impacts associated with surface or subsurface water supplies (i.e., reservoirs or aquifers), stream levels or streamflow, hydropower generation, or navigation. Examples include lower water levels in reservoirs, lakes, and ponds; reduced flow from springs; reduced streamflow; loss of wetlands; estuarine impacts; increased groundwater depletion, land subsidence, reduced recharge; water quality effects; revenue shortfalls and/or windfall profits; cost of water transport or transfer; cost of new or supplemental water resource development; and loss from impaired navigability of streams, rivers, and canals.
- **Plants and Wildlife**—Impacts associated with wildlife, fisheries, forests, and other fauna. Examples include loss of biodiversity of plants or wildlife; loss of trees from urban landscapes, shelterbelts, wooded conservation areas; reduction and degradation of fish and wildlife habitat; lack of feed and drinking water; greater mortality due to increased contact with agricultural producers, as animals seek food from farms and producers are less tolerant of the intrusion; disease; increased vulnerability to predation; migration and concentration; and increased stress to endangered species.
- **Fire**—Impacts associated with wildland fires that occur during drought events. The relationship between fires and droughts is very complex. Not all fires are caused by droughts and serious fires can result when droughts are not taking place.

- **Social**—Impacts associated with the public, or the recreation/tourism sector. Examples include health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations, reduced firefighting capability, etc.), loss of human life (e.g., from heat stress, suicides), public safety from wildland fires, increased respiratory ailments; increased disease caused by wildlife concentrations, population migrations, loss of aesthetic values; reduction or modification of recreational activities, losses to manufacturers and sellers of recreational equipment, and losses related to curtailed activities.
- **Other**—Drought impacts that do not easily fit into any of the above categories.

Table 4.17 provides more information on the distribution of impacts associated with each classification. This data indicates agriculture and social impacts were reported most frequently.

Table 4.17 Drought Impacts in Archuleta County from 1990-2017

Category	Impact Count
Agriculture	45
Fire	18
Plants and Wildlife	10
Social--	54
- Relief, Response, & Restrictions	44
- Society & Public Health	20
- Tourism and Recreation	8
Water Supply & Quality	13
Other—	2
- Energy	1
- Business & Industry	1

Beyond the impacts addressed by the Drought Monitor, Archuleta County also experienced significant impacts for recreation and tourism. Lower moisture levels result in less snowfall, which discourages visitors from engaging in snow sports. During drought years, ski ticket sales drop significantly leading to reduced park visitation, in addition to delayed opening for ski resorts, and an increase in costly artificial snow generation. Beyond winter recreation, a diminished snow pack will also lower the runoff levels, which affects white water rafting, kayaking, and tubing. Historically, drought has impacted the Navajo Reservoir and inhibited boat access.

### Geographical Area Affected

The entire County is at risk to drought conditions including the populated areas of local water supplies for the Town of Pagosa Springs (domestic needs) and widespread areas of the County (agricultural needs). Therefore, the spatial extent rating for drought in Archuleta County is **extensive**.

The impacts will vary throughout the County, but a severe drought will affect the entire economy, particularly the tourism, recreation, and agricultural industries. Drought is one of the few hazards that has the potential to directly or indirectly impact each and every person within Archuleta County, as well as adversely affect the local economy. The impacts would be water restrictions associated with domestic supplies, agricultural losses and economic impacts associated with those

losses, economic impacts to tourism and recreation industries, increased wildland firefighting costs, and increased costs for water.

### **Potential Magnitude**

Overall, drought impacts could be **critical** in Archuleta County, with 25 to 50 percent of the planning area affected and 10 to 50 percent agricultural losses. The magnitude of a drought's impact will be directly related to the severity and length of the drought. Secondary effects include increased susceptibility to wildland fires and pine beetle infestations. Fire restrictions in the County and on Public Lands impact agriculture, construction, and outdoor recreation with economic consequences.

### **Frequency/Likelihood of Occurrence**

**Likely**—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less. Historical drought data for the planning area indicates there have been 6 significant droughts in the last 60 years (1950-2010). This equates to a drought every 10 years on average or a 10 percent chance of a drought in any given year, which corresponds to a likely occurrence rating.

A 2010 drought vulnerability study prepared by the CWCB looked at the potential for climate change to alter drought recurrence, length, and intensity. This study builds upon information obtained in Phase I of the CWCB's Colorado Water Availability Study. Based on these studies the average length of the observed drought in the San Juan basin is four years. Average drought in the San Juan Basin is anticipated to be 5.1 years based on an alternate historical hydrology, and increases slightly to 5.2-5.9 years based on various projected climate change scenarios. The chance of exceeding the drought longer than the observed record is high, from 75 to 88 percent. Thus, the potential likelihood and intensity of drought in southwest Colorado could increase in the future due to climate change. While there is a large amount of uncertainty regarding future climate scenarios and how these may translate to physical conditions, current climate is not stationary and that planning efforts should consider this uncertainty.

## **4.3.5 Earthquake**

### **Hazard Problem/Description**

An earthquake is caused by a sudden slip on a fault, which is a plane of weakness in the earth's crust. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. The amount of energy released during an earthquake is usually expressed as Richter or Moment magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking, typically the greatest cause of losses to structures during

earthquakes, at any given location on the surface as felt by humans and defined in the Modified Mercalli Intensity Scale. Table 4.18 features abbreviated descriptions of the 12 levels of intensity.

Table 4.18 Modified Mercalli Intensity (MMI) Scale

MMI	Felt Intensity
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III	Felt noticeably indoors. Standing automobiles may rock slightly.
IV	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually destruction. Waves are seen on the ground surface. Objects are thrown in the air.
Source: Multi-Hazard Identification and Risk Assessment, FEMA 1997	

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Damage and life loss can be particularly devastating in communities where buildings were not designed to withstand seismic forces (e.g., historic structures). Other damage-causing effects of earthquakes include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, rock falls, liquefaction, fires, dam failure, and hazardous materials incidents.

Part of what makes earthquakes so destructive is that they generally occur without warning. The main shock of an earthquake can usually be measured in seconds, and rarely lasts for more than a minute. Aftershocks can occur within the days, weeks, and even months following a major earthquake.

By studying the geologic characteristics of faults, geoscientists can often determine when the fault last moved and estimate the magnitude of the earthquake that produced the last movement. Because the occurrence of earthquakes is relatively infrequent in Colorado and the historical

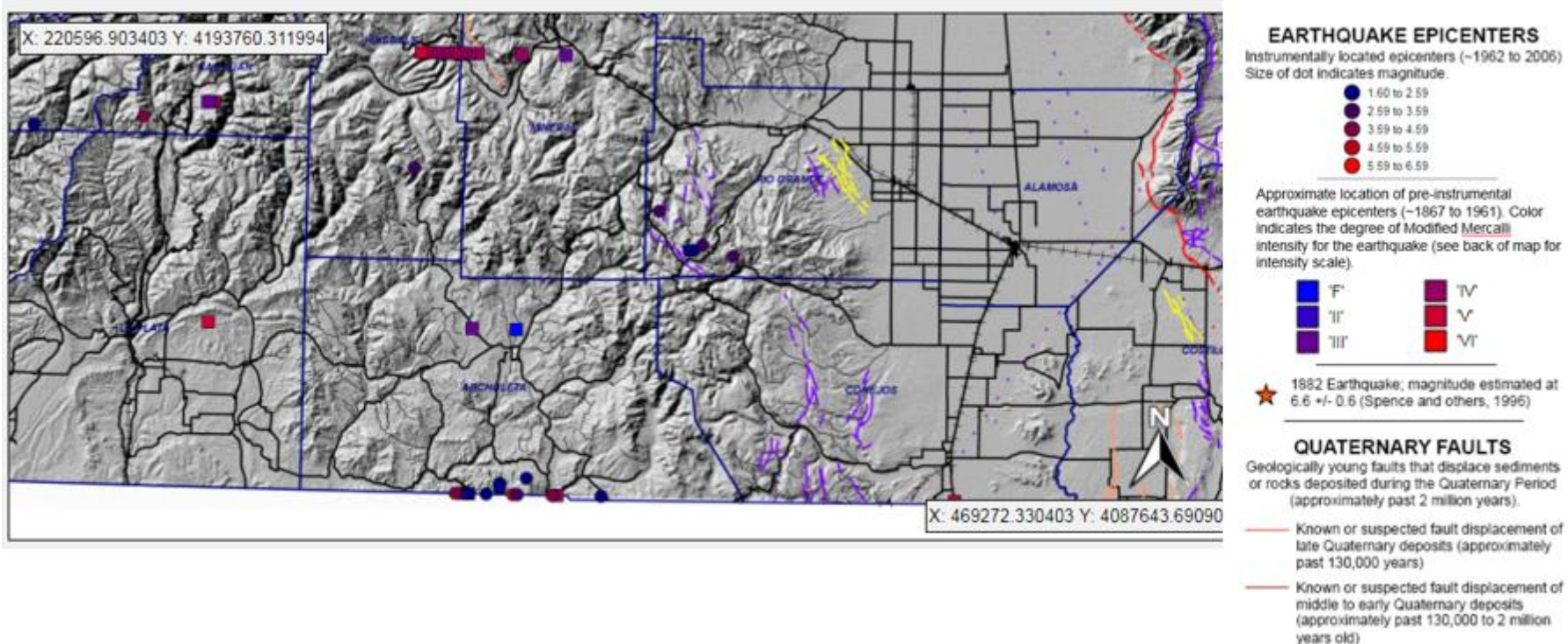
earthquake record is short, accurate estimations of magnitude, timing, or location of future dangerous earthquakes in Colorado are difficult to estimate.

### **Past Occurrences**

Although not as frequent or as large as California, Colorado has experienced earthquakes in its relatively brief period of historic record. Colorado's Earthquake and Fault Map developed by the Colorado Geological Survey in 2007 depicts the location of historic epicenters and potentially active faults. An excerpt of this map displaying Archuleta County and vicinity is shown in Figure 4.4.



Figure 4 .4. Earthquake Hazard Map Showing Southwestern Colorado

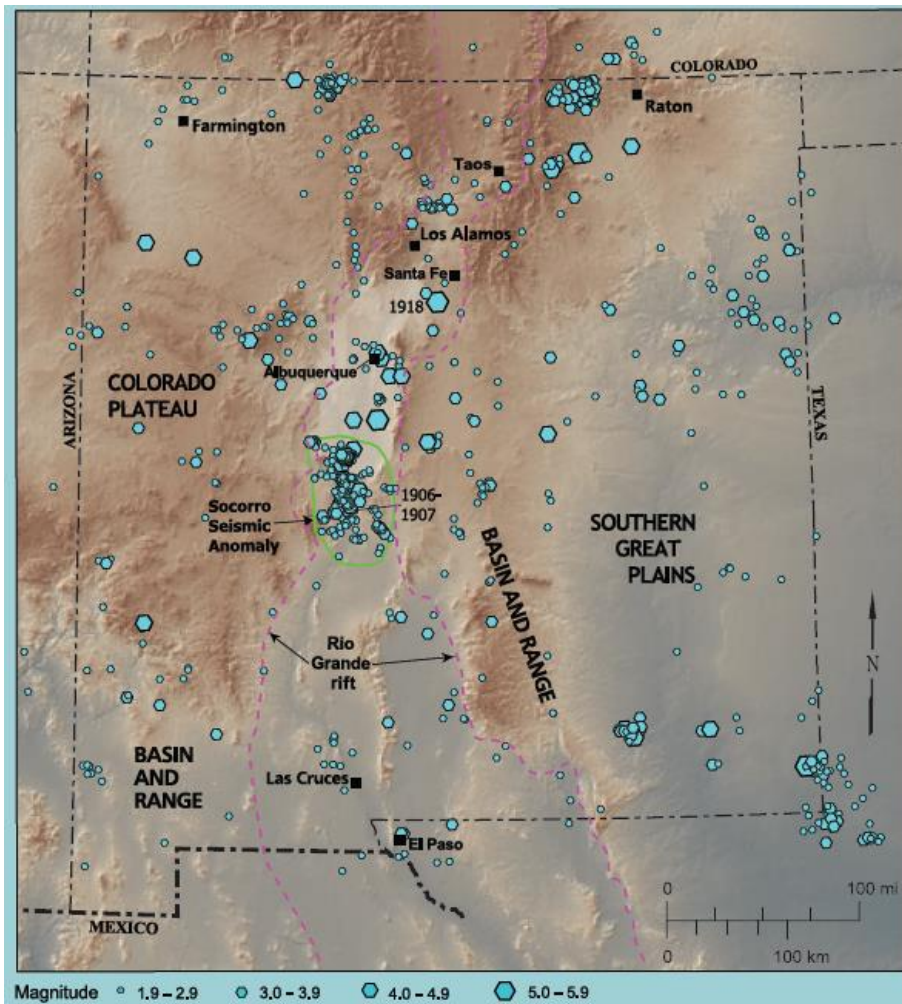


Source: Colorado Geological Survey

The strongest earthquakes experienced in the County occurred in 1882 and 1966. The series of earthquakes on the Colorado–New Mexico border south of Pagosa Springs were related to a 5.5 mainshock at Dulce, New Mexico on January 23, 1966 and its sequence of aftershocks. Seismic activity at Dulce may possibly be related to the Archuleta Anticlinorium, a structure which forms the eastern margin of the Colorado Plateau (Source: Colorado Earthquake Information, 1867-1996, Colorado Geological Survey). As of December 2010, the Dulce earthquake remains the largest within the vicinity of Archuleta County. The February 12, and May 12, 1882 Pagosa Springs earthquakes had a felt Intensity of IV.

Figure 4.5 shows historic seismicity in New Mexico from 1869 to 2008, based on data from the United States Geological Survey (USGS) and New Mexico Tech, which also shows the Dulce New Mexico and a cluster of smaller earthquake epicenters near the Colorado-New Mexico border near Archuleta County.

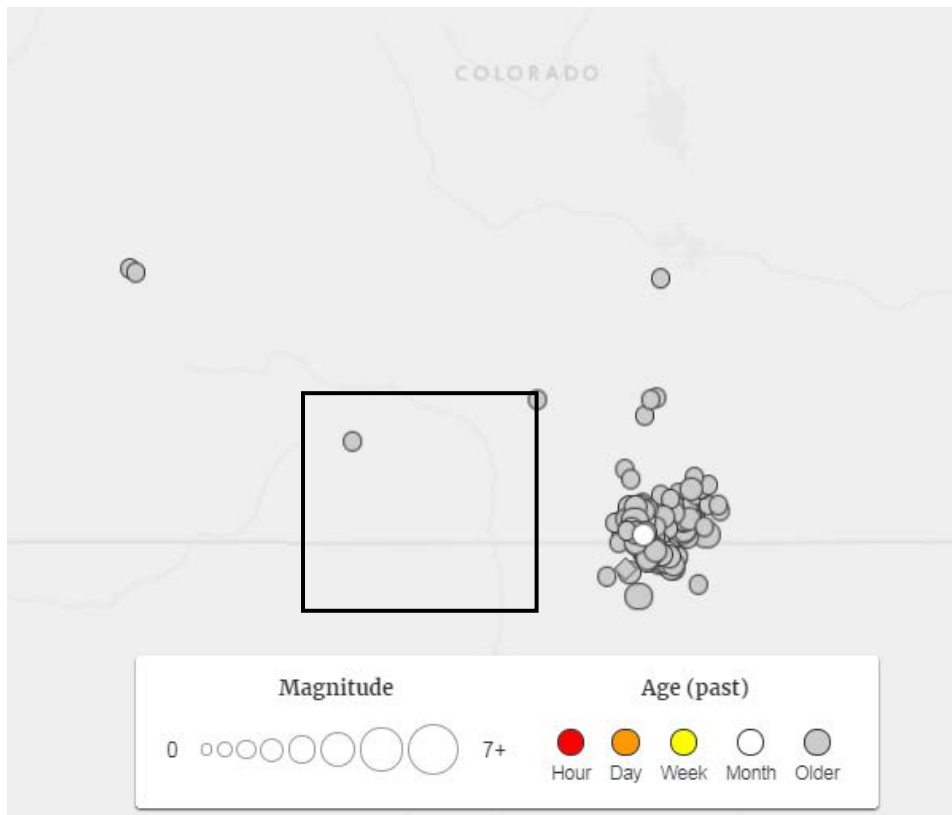
Figure 4 .5. Historic Seismicity in New Mexico : 1869 -2008



Source: New Mexico Bureau of Geology and Mineral Resources Earth Matters Report Volume 9, No. 1 [http://geoinfo.nmt.edu/publications/periodicals/earthmatters/9/EMv9n1\\_09.pdf](http://geoinfo.nmt.edu/publications/periodicals/earthmatters/9/EMv9n1_09.pdf)

A search of an online USGS database was used to research additional instrumentally recorded events within the Archuleta County response area. The search extent was defined by an area box with the southwest corner in Farmington, New Mexico, and the northeast corner in Pueblo, Colorado. Since 2010 there have been 166 quakes recorded by the USGS, of which 28 were rated with a magnitude 3.5 or higher, displayed in Figure 4.6. A description of the top three magnitude events is detailed below.

Figure 4 .6. Recen t Recorded Earthquakes in Southern Colorado, 2010-2017



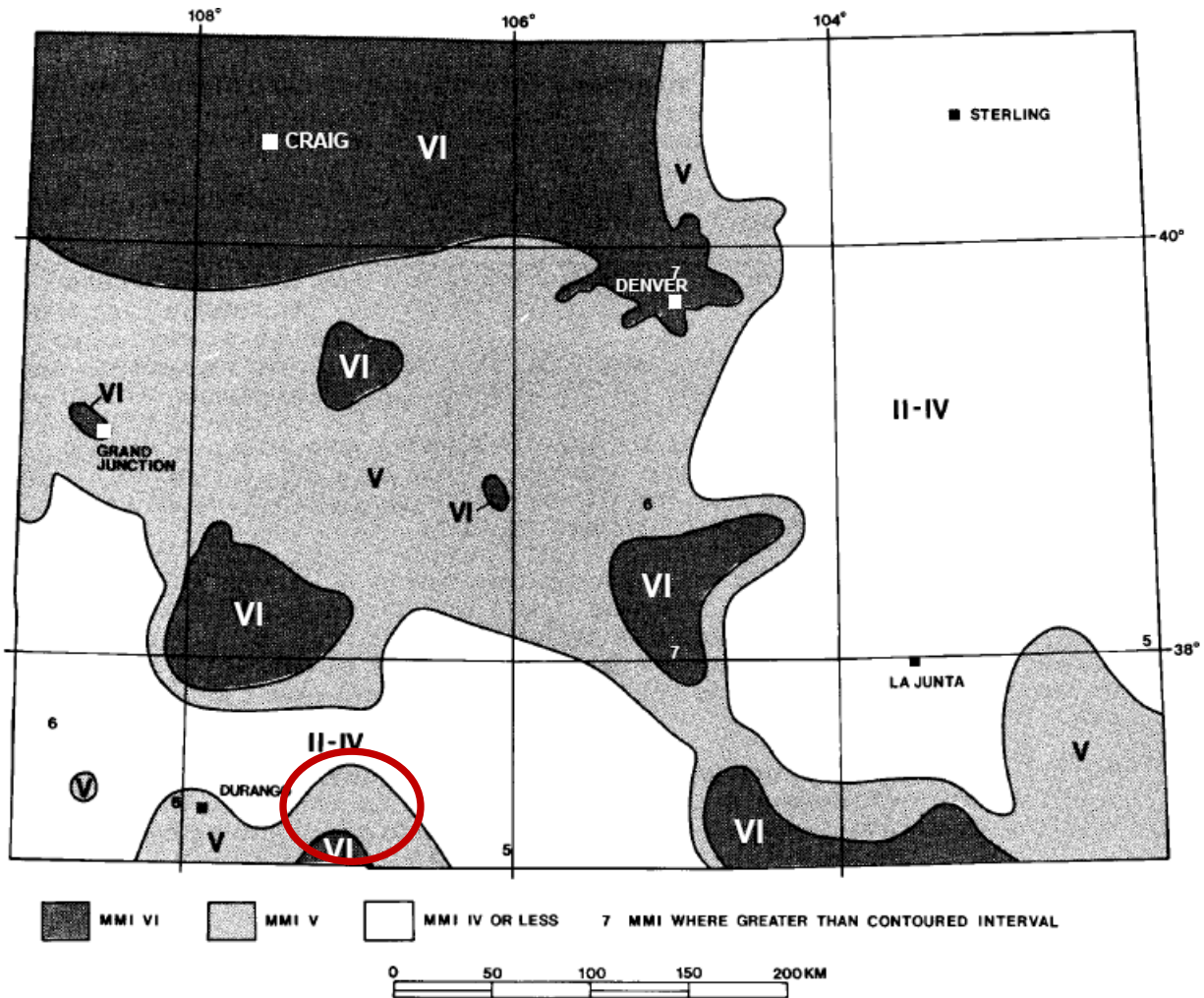
Source: USGS

Black square indicates planning area

- On August 23, 2011, a magnitude 5.3 earthquake occurred as part of a seismic swarm. A swarm is a set of shocks where more than one earthquake occurs at nearly the same location within a period of several days. This event was preceded by a magnitude 4.7 quake the day before. The shock of August 2011 occurred as the result of normal faulting, at a shallow depth of focus. The preliminary location, depth, and style of faulting for the 2011 earthquake are very similar to earthquakes in a previously-cited 2001 swarm.
- On December 23, 2016, a magnitude 4.2 quake occurred 27km N of Cimarron, New Mexico.

Maximum historical earthquake Intensities felt in Colorado are shown in Figure 4.7. This map includes past earthquakes that have affected neighboring Hinsdale County, including an Intensity VI event on August 3, 1955 in Lake City.

Figure 4 .7. Maximum Historical Earthquake Intensities in Colorado



Source: Colorado Earthquake Information, 1867-1996, Colorado Geological Survey; Red oval indicates approximate location of Archuleta County

### Geographical Area Affected

The geographic extent of earthquakes in the planning area is **extensive**. All of Archuleta County, including Pagosa Springs, could be impacted by earthquakes, but the south central portion of the County is likely to have the potential for higher ground shaking relative to other parts of the county, based on a limited number of historic events.

Geological research indicates that faults capable of producing earthquakes are prevalent in Colorado. There are about 90 potentially active faults in Colorado with documented movement

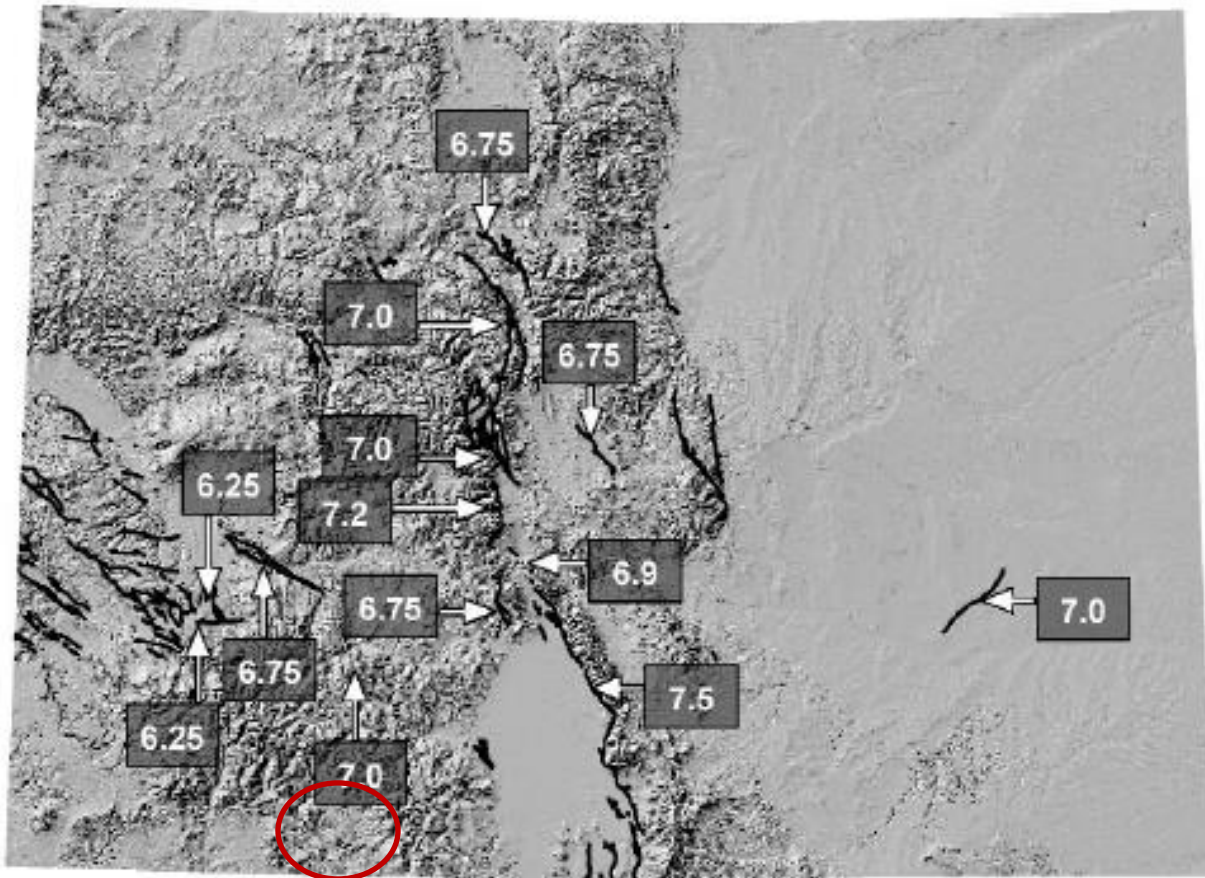
within the last 1.6 million years. The map in Figure 4.8 indicates the potentially active faults in Colorado.

Faults are classified based on the time frame of their latest suspected movement (in order of activity occurrence, most recent is listed first):

- **H**—Holocene (within past 15,000 years)
- **LQ**—Late Quaternary (15,000-130,000 years)
- **MLQ**—Middle to Late Quaternary (130,000 – 750,000 years)
- **Q**—Quaternary (approximately past 2 million years)
- **LC**- Late Cenozoic (approximately past 23.7 million years)

No potentially active faults have been identified within Archuleta County. However, this does not mean that no potentially active faults *exist* in the Archuleta County response area. The earthquake hazards in Colorado are not well identified or understood. Since earthquakes are a low frequency event in Colorado, there is less funding and interest for earthquake studies in comparison to more seismically active areas of the country. The Cannibal fault in Hinsdale County is the closest Late Quaternary fault that has been identified (Source: State of Colorado Natural Hazards Mitigation Plan 2004 Earthquake Evaluation Report).

Figure 4 .8. Potenti ally Active Faults in Colorado with Maximum Credible Earthquake Determinations from the Colorado Geological Survey



Red oval is approximate location of Archuleta County (Source: CGS RockTalk Pub Volume 5, No. 2 April 2002)

### Potential Magnitude

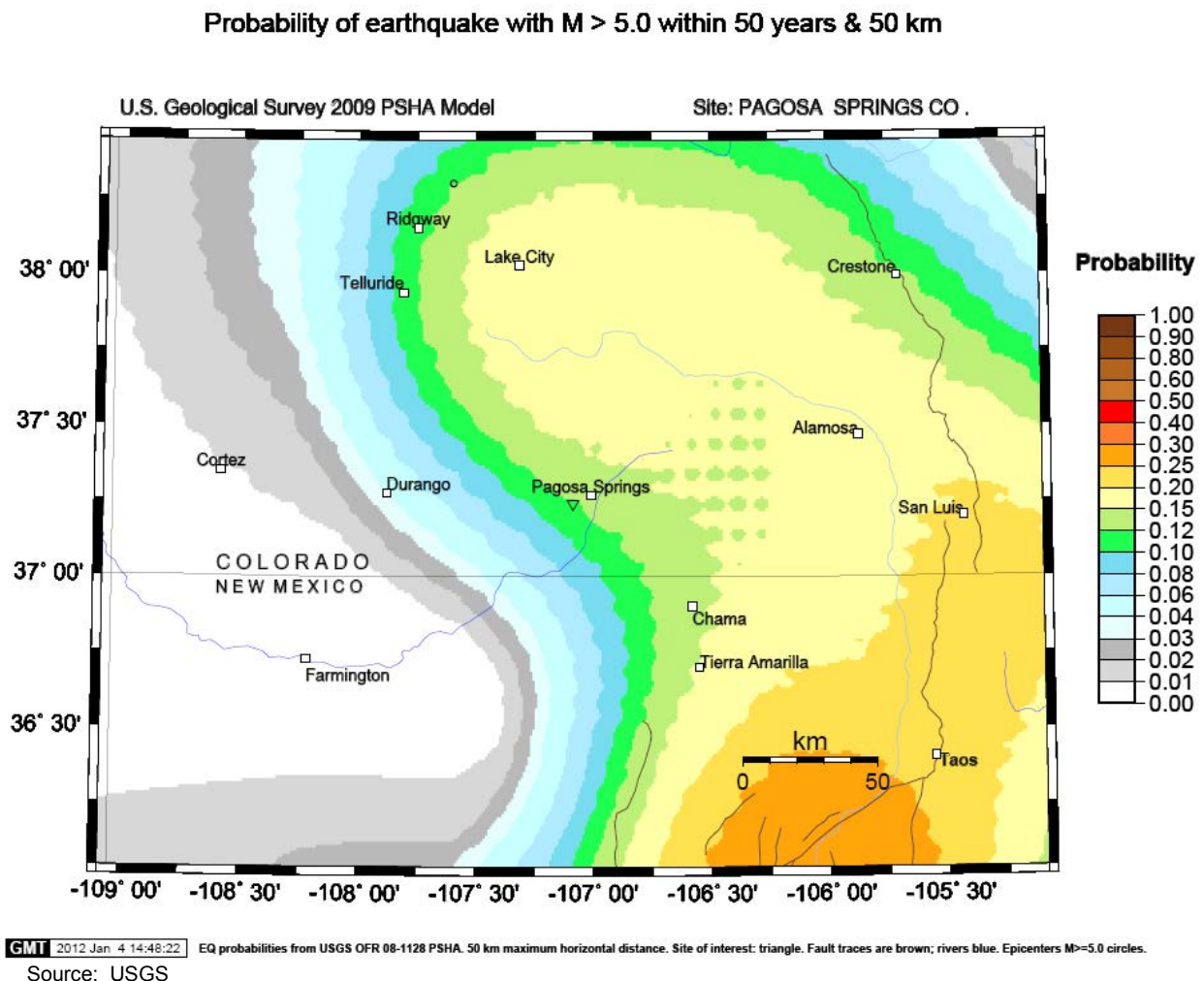
Due to the lack of potentially active faults in the planning area there has been no HAZUS studies conducted by the Colorado Geological Survey. A probabilistic HAZUS earthquake scenario was performed as part of this mitigation plan development and the results can be referenced in the Section 4.2 Assessing Vulnerability. According to that analysis, which was a worst case probabilistic scenario, there is the potential for 19% of the total number of buildings in the County to be affected, roughly 1,597 buildings experiencing at least moderate damage. The Town of Pagosa Springs, due to the older building stock as well as being a population center, could endure the greatest losses if a significant earthquake were to occur. Overall, earthquake impacts in Archuleta County could be **limited**, with 10 to 25 percent of the planning area affected. Due to the low probability of a damaging earthquake occurring, as discussed below, the planning significance of earthquakes is considered low by the HMPC.

## Frequency/Likelihood of Occurrence

**Occasional**—Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Research based on Colorado’s earthquake history suggests that an earthquake of 6.3 or larger has a one percent (1 percent) probability of occurring each year somewhere in Colorado (Charlie, Doehring, Oaks Colorado Earthquake Hazard Reduction Program Open File Report 93-01, 1993). Figure 4.9 from the USGS shows the probabilistic seismic hazard analysis (PSHA) that a magnitude 5 or greater earthquake will occur in the next 50 years in southwest Colorado. Most of Archuleta County is in the 15-20 percent probability range.

Figure 4 .9. Proba bility of Mag nitud e 5 or Great er Earthq ua ke in 50 ya rs



## 4.3.6 Extreme Temperatures

### Hazard/Problem Description

Extreme temperature events, both cold and hot, can have severe impacts on human health and mortality, natural ecosystems, agriculture, and the economy. Temperature extremes – both cold and hot – cause more deaths every year than any other disaster, including hurricanes.<sup>1</sup>

#### **Extreme Cold**

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. On average, January is the coolest month. The average last freeze/frost day in Archuleta County is May 29.

Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities. Extreme cold temperatures can destroy crops and cause utility outages, leaving people without water or power until the utility companies are able to restore service.

What constitutes extremely cold temperatures varies across different areas of the United States, based on normal climate temperatures for the time of year. In Colorado, cold temperatures are normal during the winter. When temperatures drop at least 20 degrees below normal winter lows, the cold is considered extreme and begins to impact the daily operations of the county. Extreme cold/wind chill impacts inanimate objects, plants, animals, and water supplies.

The effects of extremely cold temperatures are amplified by strong to high winds that can accompany winter storms. Wind-chill measures how wind and cold feel on exposed skin and is not a direct measurement of temperature. As wind increases, heat is carried away from the body faster, driving down the body temperature, which in turn causes the constriction of blood vessels, and increases the likelihood of severe injury or death to exposed persons. Animals are also affected by wind-chill; however, cars, buildings, and other objects are not.

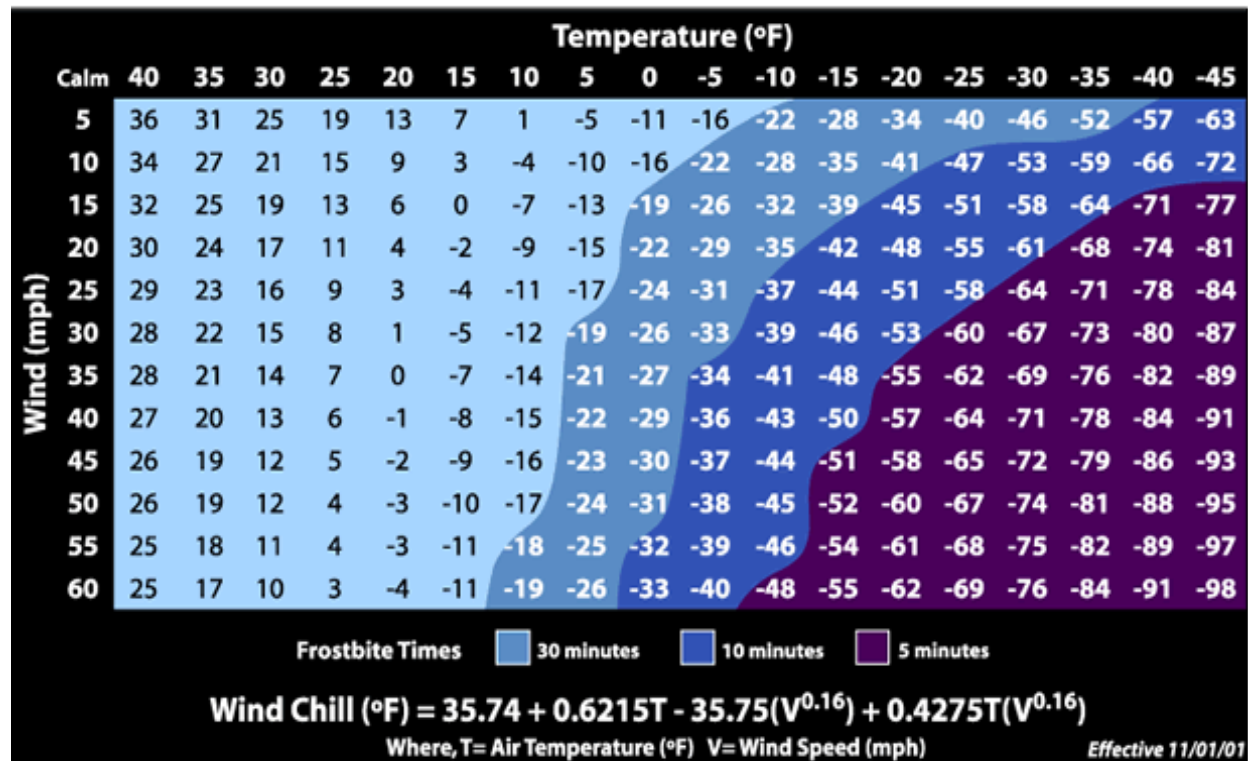
In 2001, the National Weather Service updated the wind-chill temperature index to take advantages of advances in science and computer modeling technology (see Figure 4.10). This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

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<sup>1</sup> Kevin A. Borden and Susan L. Cutter “Spatial Patterns of Natural Hazards Mortality in the United States.” *International Journal of Health Geographics* 2008, 7:64. Available online at <http://www.ij-healthgeographics.com/content/7/1/64> last accessed July 13, 2009.



Figure 4 .10. National Weather Service Wind Chill Chart



Source: National Weather Service, [www.nws.noaa.gov/om/windchill/index.shtml](http://www.nws.noaa.gov/om/windchill/index.shtml)

The NWS will issue a Wind Chill Advisory for Archuleta County when wind and temperature combine to produce wind chill values of -18 to -24°F.

**Extreme Heat**

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Extreme heat is most likely to occur in the summer months of June, July, and August. On average, July is the warmest month.

Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornadoes, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

Heat disorders generally have to do with a reduction or collapse of the body’s ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for

fluids and salt lost through perspiration, the temperature of the body’s inner core begins to rise and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails.

Extreme heat does not present the same level of threat to Archuleta County as extreme cold does. The average elevation in the County is high enough that temperatures generally do not reach extreme highs. In the future, climate change may alter this trend, making extreme heat a more relevant hazard to the planning area. For now, extreme heat will not be profiled to the same extent as extreme cold in this plan.

### Past Occurrences

According to SHELDUS data, ten damaging extreme cold weather events occurred in Archuleta County between 1960 and 1989. These events took place because of winter weather, but their primary feature was extreme cold. Therefore, they are profiled in Table 4.19 in this section rather than Section 4.3.14 Severe Winter Weather. Despite the SHELDUS data and Archuleta County’s natural propensity for cold weather, an NCEI query in 2017 returned no results involving extreme cold.

Table 4.19 Extreme Cold Events: 1960-1989 \*

Date	Deaths	Injuries	Damage**
4/30/1960	0	0	\$793
1/8/1962			\$7,936
1/10/1963	0	0	\$79
4/20/1967	0	0	\$793
10/13/1969	0	0	\$793
5/20/1974	0	0	\$333
4/18/1978	0	0	\$3,125
1/30/1985	0.08	0	\$793
1/31/1985	0	0	\$793
2/1/1989*	0	0.32	\$158,730
<b>TOTALS</b>	<b>0.08</b>	<b>0.32</b>	<b>\$174,172</b>

Source: SHELDUS

\*Extent of Record

\*\*Dollar value based on year of event

The Colorado Department of Public Health & Environment tracks the number of hospitalizations due to extreme cold on the Colorado Health Information Dataset. Between 2000 and 2014, less than 5 people were hospitalized due to extreme cold in Archuleta County. These rates are considered lower than the rate for the state. Statewide statistics indicate that 1,657 people were hospitalized for extreme cold injuries during this time, with an occurrence rate of 2.3 per 100,000.

The region with the highest rate is the San Luis Valley (4.1 per 100,000), while the Foothills region is the lowest occurrence rate areas, with rates of 1.4 per 100,000. <sup>2</sup>

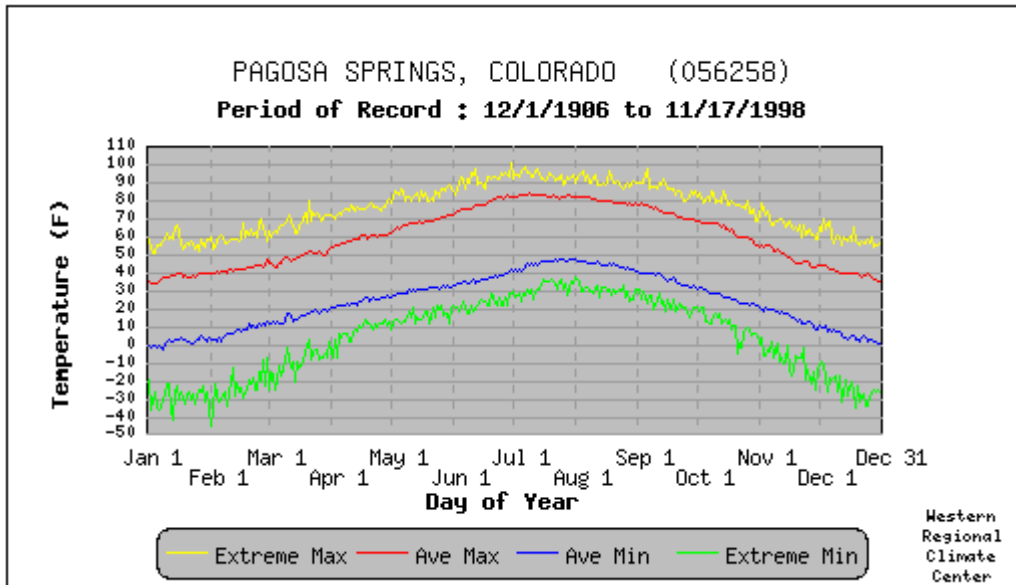
Data was obtained from three Western Regional Climate Center stations in the Archuleta County response area: Pagosa Springs, Ignacio, and Wolf Creek Pass 1E. The Ignacio station data was used in the Archuleta County HMP to provide insight on average weather conditions in the southwestern part of Archuleta County. However, the Ignacio station is located in La Plata County, west of Archuleta County. This station was chosen over the Arboles station, located in southwestern Archuleta County, because of its more extensive and up-to-date data set. Table 4.20 contains temperature summaries for the three stations. Temperature summary information is limited for the study area and more recent data does not exist for the aforementioned stations. The following information is included in this report to provide a general understanding of the climatic fluctuations and implications of highly variant elevation. Figure 4.10-4.12 graph the daily temperature averages and extremes recorded over several decades at these two weather stations.

Table 4.20 Archuleta County Temperature Summaries

Station	Winter <sup>1</sup> Average Minimum Temperature	Summer <sup>1</sup> Average Maximum Temperature	Maximum Temperature	Minimum Temperature	# Days >90°F	# Days <32°F/ Year
Pagosa Springs <sup>2</sup>	4.4°F	80.3°F	101°F June 30, 1934	-46°F February 1, 1951	3.2	240.9
Wolf Creek Pass 1E <sup>3</sup>	5.57°F	63.5°F	81°F September 14, 1990	-40°F February 5, 1982	0	252.8
Ignacio <sup>4</sup>	10.0°F	84.4°F	102°F July 8, 1966	-38°F February 8, 1933	18.8	210.0
Source: Western Regional Climate Center, <a href="http://www.wrcc.dri.edu/">www.wrcc.dri.edu/</a> <sup>1</sup> Winter: December, January, February; Summer: June, July, August <sup>2</sup> Period of record 1906-1998 <sup>3</sup> Period of record 1957-2001 <sup>4</sup> Period of record 1909-1993						

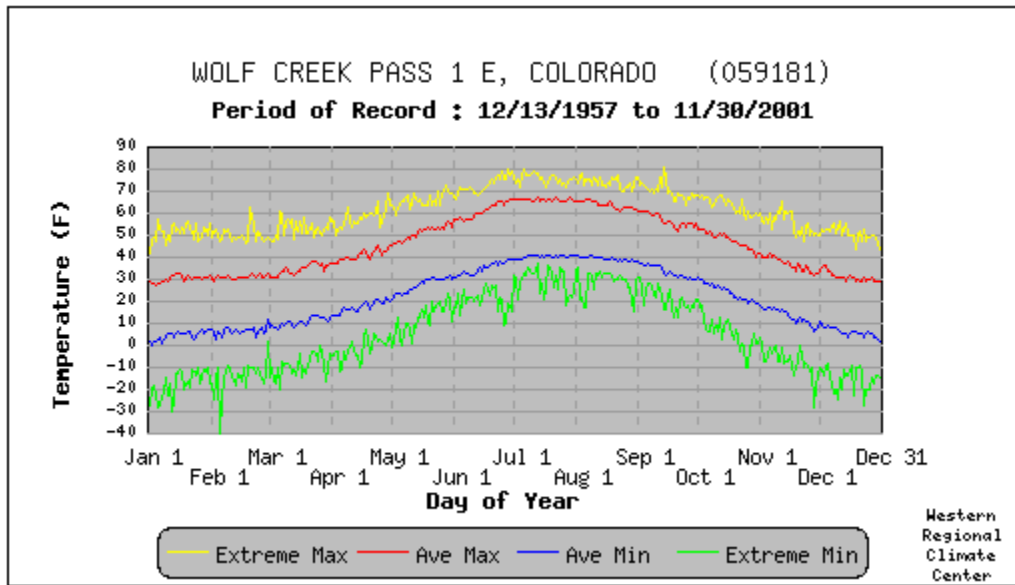
<sup>2</sup> Colorado Health Information Dataset, *Injury Hospitalization Statistics*. Available online at <http://www.cdphe.state.co.us/cohid/injury.html> accessed July 18, 2017.

Figure 4 .11. Pagosa Station Daily Temperature Averages and Extremes : 1906-1998



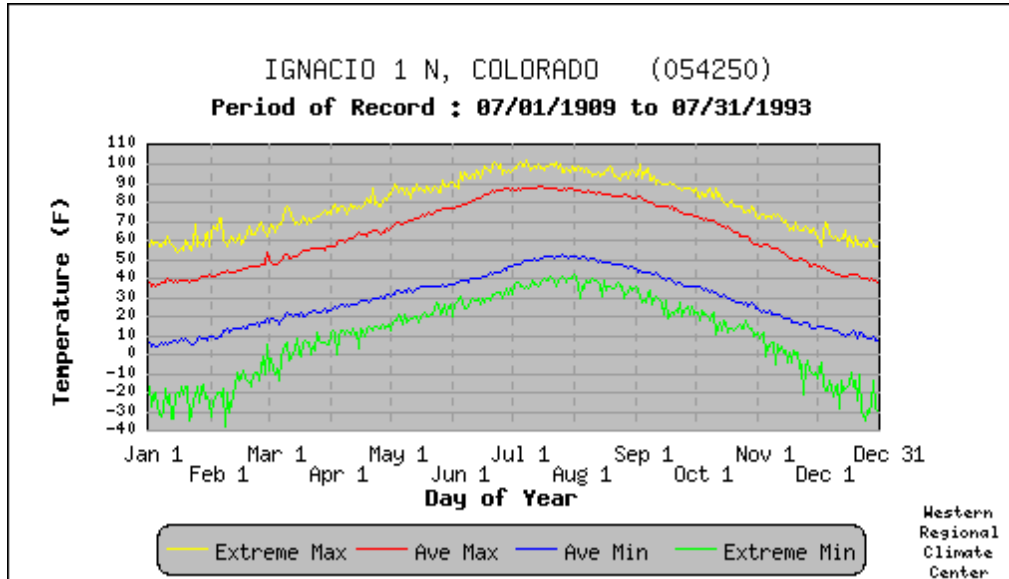
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

Figure 4 .12. Wolf Creek Pass 1E Daily Temperature Averages and Extremes : 1957-2001



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

Figure 4 .13. Ignacio Station Daily Temperature Averages and Extremes: 1909 -1993



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

### Geographic Area Affected

The geographic extent rating for this hazard is **extensive**. Extreme cold temperatures can impact the entire planning area.

### Potential Magnitude

To calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it reflects common occurrence. Based on SHELDUS records, the event of record for extreme cold in Archuleta County occurred in February 1989. This event resulted in \$158,730 in damages (in 1989 dollars).

Calculating the average annual damage from extreme cold is another method used in assessing potential magnitude. This is done by dividing the total damages by the number of years in the period of record. The period of record varies from hazard to hazard. Most NCEI or SHELDUS hazard records begin in the 1950s, 1960, or 1993. Despite the SHELDUS data and Archuleta County's natural propensity for cold weather, an NCEI query in 2017 returned no results involving extreme cold. According to SHELDUS, ten extreme cold events caused a total of \$174,172 in damages over a 50-year span between 1960 and 2010. This averages out to \$3,483 in damages per year. Therefore, Archuleta County could expect to sustain approximately \$3,483 in damages from extreme cold in any given year.

Overall, extreme temperature impacts would likely be **negligible** in Archuleta County, with less than 10 percent of the planning area affected and minimal impact to quality of life and critical facilities or services. Extreme cold can occasionally cause problems with communications facilities. Pagosa Springs has frequent problems with frozen water lines. Extreme cold can also impact livestock and even crops if the event occurs during certain times of the year.

### **Frequency/Likelihood of Occurrence**

According to SHELDUS data, there were 10 damaging extreme cold events in Archuleta County over a 29-year period between 1960 and 1989. We can calculate the probability of an extreme cold event occurring in the County in any given year:

$$(10 \div 29) \times 100\% = 34\%$$

Therefore, there is a 34% chance that a damaging extreme cold event will impact Archuleta County in any year. This corresponds to a probability of future occurrences rating of **likely**. The HMPC also estimated the extreme temperature events are **likely** to occur in the planning area in any given year. Despite the relative lack of reported events, it is important to consider that this does not necessarily indicate a lack of frequency or likelihood of occurrence. Given Archuleta County's typical climate, extreme cold events may largely be accepted as a normal part of life by residents. Therefore, events may not be reported to the extent that they would be in other locations.

## **4.3.7 Flooding**

### **Hazard/Problem Description**

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

The potential for flooding can change and increase through various land use changes and changes to land surface. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining watersheds or natural drainage channels. These changes are commonly created by human activities. These changes can also be created by other events such as wildland fires. Wildland fires create hydrophobic soils, a hardening or "glazing" of the earth's surface that prevents rainfall from being absorbed into the ground, thereby increasing runoff; erosion, and downstream sedimentation of channels.

Archuleta County is susceptible to the following types of flooding:

- Rain in a general storm system
- Rain in a localized intense thunderstorm
- Melting snow
- Rain on melting snow
- Ice Jams
- Dam failure
- Urban stormwater drainage
- Rain on fire damaged watersheds

Slow rise floods associated with snowmelt and sustained precipitation usually are preceded with adequate warning, though the event can last several days. Flash floods are more typical in the County. Flash floods, by their nature, occur very suddenly but usually dissipate within hours. Even flash floods are usually preceded with warning from the National Weather Service in terms of flash flood advisories, watches, and warnings.

The average total annual precipitation near Pagosa Springs is roughly 20 inches. The average total annual snowfall is 82 inches, although this number is significantly higher in areas such as Wolf Creek Pass. According to the Colorado Climate Center, the average annual snowfall at Wolf Creek Pass is estimated to be over 400 inches (<http://climate.colostate.edu/climateofcolorado.php>). The Wolf Creek Ski Area website claims that this number is closer to 465 inches. Generally, the flood season extends from late spring and early summer, when snowmelt runoff swells rivers and creeks, to fall. Much of the rainfall occurs with thunderstorms during April to August. Archuleta County is affected by a seasonal wind shift and moisture increase known as the “southwest monsoon.” The monsoon typically begins every year in mid-July and ends by mid-August but has been known to vary in duration and intensity. During La Nina years the monsoon can be particularly wet and enduring. This seasonal rainfall is the most common cause of flooding in Archuleta County. The fall months can also be wet and rainy in southwest Colorado, with one of the worst floods on the San Juan River occurring in October.

The San Juan River and its tributaries are Archuleta County’s primary flood hazards. Among the tributaries are McCabe Creek, the Rio Blanco, Stollsteimer Creek, and the Piedra River. The San Juan River originates in the San Juan Mountains and flows southwesterly through the middle of Pagosa Springs. Flooding along the San Juan typically occurs during the fall and is caused by long rainstorms. Flooding may also occur during the spring due to snowmelt runoff. Localized thunderstorms during the summer monsoons can also result in flooding in the planning area.

Stakeholder comments during a review of the original development of this plan suggested that future updates to the plan may want to include more details and research on the conditions that typically result in dangerous flood conditions in the County. These conditions may include researching thresholds such as percent of average snowpack, snow water equivalent, or rainfall amounts/rates that may result in flooding. Snowmelt driven flooding alone is typically rare in

Colorado and extremely dependent on temperature fluctuations. Rainfall on melting snow during the months of April-June certainly has the potential to exacerbate flood conditions. Historic incidents noted below indicates an event in May 2005 associated with snowmelt, but more damaging floods have occurred in the Fall and mid-summer months.

### **Past Occurrences**

Archuleta County and the Town of Pagosa Springs have witnessed several major floods on the San Juan River and its tributaries. Some of the more noteworthy floods and more recent floods are profiled in the following text.

- **October 4, 1911** – Pagosa Springs was subjected to massive flooding in October 1911. To date, this is the most severe flooding event ever to occur in the County. This flood was likely a 0.2% annual chance event, or 500-year flood. A localized rainstorm stalled over Pagosa Springs for 24 hours. The soil was already saturated, and the water level in the San Juan rose to 17.8 feet. A *Pagosa Springs Sun* article from the time reported that the river was flowing at an estimated 20 miles per hour. Every highway bridge in the County was washed out, and a large section of the Rio Grande Railroad track was severely damaged. Major utility companies and houses were literally washed off their foundations. The Water Works plant and pipelines supplying the town with water were washed away, forcing locals to use the river itself for their water supply. At the time, Pagosa Springs largely depended on its logging operation to fuel the local economy. The flood inflicted major damage on the saw mill, effectively putting it out of commission. Other businesses were located away from the river banks, but the overall damage to the town caused great injury to Pagosa Springs' economy. Two people died after being swept away in the floodwaters. Damages are estimated at \$1 million in 1912, which equates to over \$22 million today.
- **June 29, 1927** – An estimated 1% annual chance flood event occurred in 1927. The event washed out two bridges after the San Juan reached a flood stage of 13.5 feet in Pagosa Springs.
- **August 31, 1967** – A cloudburst caused McCabe Creek to overtop its banks. The flood washed mud and debris up around several homes.
- **May 22, 2005** -- Warm spring temperatures resulted in rapid melting of snowpack which caused flooding along the Rio Blanco River near Pagosa Springs. After years of drought and a lack of flushing flows, debris buildup in rivers and creeks enhanced flooding. Flood waters inundated 4 homes with water up to 12 inches above the foundation on some homes. Portions of County Roads 335, 337, and 339 were flooded with water up to 16 inches deep in places. Flood waters damaged County Road 326 and washed out a culvert. One person is believed to have fallen over a cliff into the swollen river and drowned. The person was not found. Property damages are estimated to be close to \$50,000.
- **August 7, 2005** – Flash flooding occurred along the Rio Blanco following heavy rainfall. The flooding deposited mud, boulders, and other debris downstream, and water six inches deep flowed across County Road 326.



- **April 17, 2010** – Following heavy rainstorms, flooding along Stollsteimer Creek washed out part of the road along County Road 359. The ground was already saturated from previous rains.
- **July 10, 2013**—A large flash flood occurred in Andrews Drive tributary near Arboles, causing flood damages to several properties. Peak discharge was measured at 690 cubic feet per second (cfs), classifying this event as a hyper-concentrated flow. This event is considered one of the largest known floods for a drainage basin of its size in southwestern Colorado. Using regional-regression methods developed by the USGS, the event has been determined as having a recurrence interval of about 650 years. There are two 4-foot diameter culverts under Andrews Drive; both of which are designed to hold up to 170 cfs, and thus were exceeded by the July 10<sup>th</sup> event. The flow contained copious amounts of debris, and sediment ranging from silt to large boulders (many 3 feet in diameter or larger). This event brought to light the geologic conditions that increase the area’s susceptibility to flash flooding. Andrews Drive tributary has larger floods than most nearby basins due to substantial amounts of poorly vegetated, steep hillslopes that have very low infiltration rates and very high rainfall-runoff potential, which exacerbate rainfall runoff. Unlike riverine channels where flooding is associated with magnitude and depth of flood waters on the valley floor, flood hazards on alluvial fans (shallow-depth, high velocity flow) are uncertain. (Source: 2016 Study by Bob Jarrett for Archuleta County).
- **July 15, 2014** – Heavy rainfall resulted in flash flooding in and near Pagosa Springs. High volumes of flowing water (up to 18 inches deep) ran across Highway 160 and other major areas of town. The river gauge in the San Juan River within Pagosa Springs measured a stage rise of just over 3 feet in less than 1.5 hours. Numerous residences and businesses faced significant damages totaling \$250,000.

Figure 4 .14. April 17, 2010 Flood and Culvert Washout Along Stollsteimer Creek



Source: HMPC

The NCEI and SHEL DUS include 11 significant flood events between 1972 and 2017. These incidents are noted in Table 4.21.

Table 4.21 NCEI and SHEL DUS Archuleta County Flood Records, 1972- 2017

Location or County	Date	Type	# of Deaths	# of Injuries	Damages
Gato	7/16/2014	Flash flood	0	0	\$25,000
Pagosa Springs	7/15/2014	Flash flood	0	0	\$250,000
Chimney Rock	4/17/2010	Heavy rain/riverine	0	0	\$5,000
Pagosa Springs	8/7/2007	Flash flood	0	0	\$0
Archuleta County	5/30/2005	Flash flood	0	0	\$50,000
Chimney Rock	7/26/2000	Flash flood	0	0	\$0
Chromo	7/7/1998	Flash flood	0	0	\$1,000
Archuleta County	6/30/1984	Flash flood	0	0	\$344,827
Archuleta County	7/12/1981	Urban/small stream flood	0	0	\$41,667
Archuleta County	6/7/1979	Urban/small stream flood	0	0	\$793
Archuleta County	10/20/1972	Flash flood	0	0	\$166,667
<b>TOTALS</b>			<b>0</b>	<b>0</b>	<b>\$884,954</b>

Source: NCEI Database,

Despite the frequency and ferocity of the flood events, loss of life from flooding in Archuleta County has been rare. According to historical record, the 1911 flood is the only known flood to have claimed any lives which does not take into account the potential fatality in the May 2005 flood.

### Geographical Area Affected

Most of the planning area lies within the San Juan River basin. The San Juan River’s headwaters originate in the San Juan Mountains, and the River’s drainage area upstream of Pagosa Springs is roughly 300 square miles. The River then flows in a southwesterly direction through Archuleta County before flowing into Navajo Reservoir and eventually into New Mexico. It joins the Colorado River in Utah.

The San Juan River and its tributaries are the main sources of flood problems for the planning area. The San Juan’s tributaries include the Rio Blanco, McCabe Creek, and Stollsteimer Creek. These rivers and creeks are highly subject to snowmelt and rainfall flooding. The smaller channels can quickly become overwhelmed and overtop their banks.

The geographic extent rating for flooding in Archuleta County is **significant**, meaning that a flood event could impact 10-50% of the planning area. As DFIRM was not available for these counties the 100-year flood as modeled by a FEMA HAZUS study have been used to show the approximate locations of flood hazards in southern Mineral and Hinsdale counties. The blue shading on these figures represents different flood zones as defined by FEMA. The various zones are defined in Table 4.22.

Tab le 4. 22 FEMA Flood Zone Definition s

Zone	Definitions
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. The ‘E” stands for Engineering Study and represents areas where base flood elevations have been determined. AE zones are now used on new format FIRMs instead of A1-A30 Zones.
AO	River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these flood zones.
HAZUS 100 year	Areas with a 1% annual chance of flooding based on HAZUS modeling by FEMA. Used where DFIRM does not exist. Results are approximate and should be used with caution.
Shaded Zone X or 0.2%	Areas with a 0.2% annual chance of flooding; also referred to as the 500-year floodplain.

Source: <https://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=floodZones&title=FEMA%2520Flood%2520Zone%2520Designations>

In addition to flood hazards delineated by the FEMA flood zones, the HMPC has noted the following areas of concern:

- The East Fork and Rio Blanco campsites.
- McCabe culvert under Highway 160 at Pagosa Springs; still undersized, requiring \$9 million in funding for necessary CDOT improvements.
- The Rio Blanco; two non-conforming RV parks and a mix of temporary and permanent occupancies.
- Development pressures in the San Juan floodplain; lots of non-conforming buildings that were constructed before NFIP participation
- Rumbaugh/Horse Gulch; debris stuck in culvert caused flooding; needs maintenance.
- Many properties in the planning area are second homes, which are less likely to have a mortgage. Without a mortgage, there is no requirement for flood insurance, leaving these structures and home owners more vulnerable.

### **Potential Magnitude**

Magnitude and severity can be described or evaluated in terms of a combination of the different levels of impact that a community sustains from a hazard event. Specific examples of negative impacts from flooding on Archuleta County span a comprehensive range and are summarized as follows:

- Floods cause damage to private property that often creates financial hardship for individuals and families;
- Floods cause damage to public infrastructure resulting in increased public expenditures and demand for tax dollars;
- Floods cause loss of personal income for agricultural producers that experience flood damages;
- Floods cause loss of income to businesses relying on recreational uses of County waterways;
- Floods cause emotional distress on individuals and families; and
- Floods can cause injury and death.

The magnitude and severity of the flood hazard is usually determined by not only the extent of impact it has on the overall geographic area, but also by identifying the most catastrophic event in the previous flood history. Sometimes it is referred to as the “event of record.” The flood of record is almost always correlated to a peak discharge at a gage, but that event may not have caused the worst historic flood impact in terms of property damage, loss of life, etc. The October 4, 1911 flood is the flood of record for Archuleta County. This event resulted in the deaths of two people and an estimated \$22 million in damages (in 2010 dollars). There is potential for larger floods to occur in the region.

In recent years, NCEI notes that Archuleta County experienced 2 floods and 4 flash floods between 2000 and 2017. These events generated \$330,000 in property damages, which equates to an average of \$19,411 per year.

The impact of a flood event can vary based on geographic location to waterways, soil content and ground cover, and construction. The extent of the damage of flooding ranges from very narrow to widespread based on the type of flooding and other circumstances such as previous rainfall, rate of precipitation accumulation, and the time of year.

The HMPC estimates that the potential magnitude for a flood event in Archuleta County is **critical**. An event of critical magnitude would result in multiple severe injuries, complete shutdown of critical facilities and services for at least two weeks, and severe damage to more than 25% of property in the planning area. Roads closed due to floods can result in serious transportation disruptions due to the limited number of roads in the County. Mud and debris flows often accompany floods.

### **Frequency/Likelihood of Occurrence**

According to the 2009 Flood Insurance Study, “history has shown that major flooding, with moderate damage has occurred at 50-year intervals, while minor flooding and flash floods have occurred approximately every 6 years” (pg. 7). This is consistent with data based on local historic records, NCEI and SHELDUS. Given 6 flood events in the past 17 years (2000-2017), a flood occurs somewhere in the County about 2.8 years. The probability that a flood event will occur in any given year is 36%. This corresponds to a probability rating of **likely**. Flooding potential can also increase due to wildfires removing vegetation in a watershed.

## **4.3.8 Hailstorm**

### **Hazard/Problem Description**

Hailstorms are any storm events where hailstones fall. Hailstones, often abbreviated to ‘hail,’ form when updrafts carry raindrops into extremely cold areas of the atmosphere where the drops freeze into ice. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. The process of falling, thawing, moving up into the updraft, and refreezing before falling again may repeat many times, increasing the size of the hailstone. Usually hailstones are less than 2” in diameter, but have been reported much larger and may fall at speeds of up to 120 mph. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. These events are often associated with thunderstorms that may also cause high winds and tornadoes. Hail causes nearly \$1 billion in damage to crops and property each year in the United States. Hail is also one of the requirements which the National Weather Service uses to classify thunderstorms as ‘severe.’ If hailstones of more than one inch in diameter are produced in a thunderstorm, it qualifies as severe.

The National Weather Service classifies hail by diameter size and corresponding everyday objects to help relay scope and severity to the population. Table 4.23 indicates the hailstone measurements utilized by the National Weather Service.

Table 4. 23 Hailstone Measurements

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

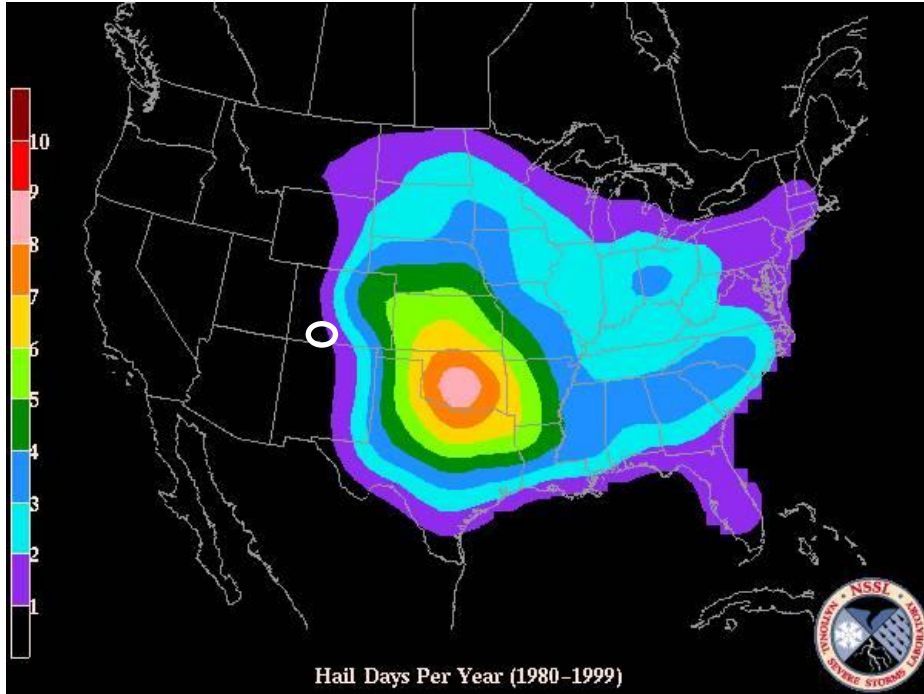
Source: National Weather Service

There is no clear distinction between storms that do and do not produce hailstones. Nearly all severe thunderstorms probably produce hail aloft, though it may melt before reaching the ground. Multi-cell thunderstorms produce many hailstones, but not usually the largest hailstones. In the life cycle of the multi-cell thunderstorm, the mature stage is relatively short so there is not much time for growth of the hailstone. Supercell thunderstorms have sustained updrafts that support large hail formation by repeatedly lifting the hailstones into the very cold air at the top of the thunderstorm cloud. In general, hail 2 inches (5 cm) or larger in diameter is associated with supercells (a little larger than golf ball size which the NWS considers to be 1.75 inch.). Non-supercell storms can produce golf ball size hail.

In all cases, the hail falls when the thunderstorm’s updraft can no longer support the weight of the ice. The stronger the updraft the larger the hailstone can grow. Nebraska, Colorado, and Wyoming usually have the most hailstorms of anywhere in the country. The area where these three states meet – “hail alley,” averages seven to nine hail days per year. The reason why this area is so prone to hail is that the freezing levels (the area of the atmosphere at 32 degrees or less) in the high plains are much closer to the ground than they are at sea level, where hail has plenty of time to melt before reaching the ground.

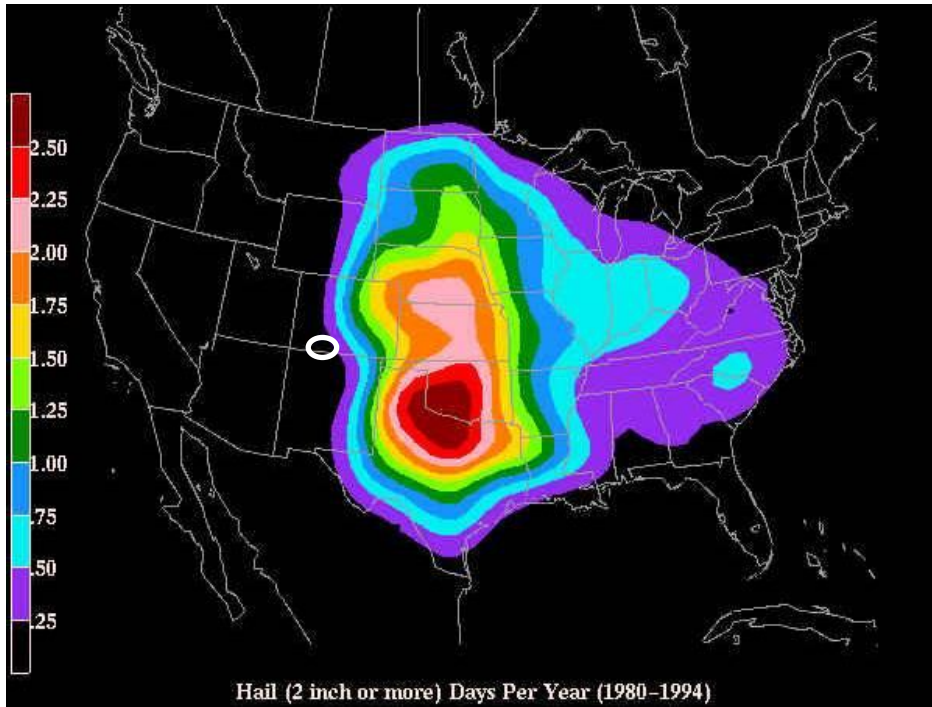
When viewed from the air, it is evident that hail falls in paths known as hail swaths. They can range in size from a few acres to an area 10 miles wide and 100 miles long. Piles of hail in hail swaths have been so deep, a snowplow was required to remove them, and occasionally, hail drifts have been reported. Figure 4.15 shows the average number of days of hail per year in the United States, with the planning area indicated by a white oval. Figure 4.15 shows the average number of days of severe hail (over two inches in diameter) per year in the United States, again with the planning area outlined in a white oval.

Figure 4 .15. Average Number of Days of Hail per Year



Source: NOAA National Severe Weather Laboratory

Figure 4 .16. Average Days of Large Hail in the Planning Area



Source: NOAA National Severe Weather Laboratory

## Geographical Area Affected

Hailstorms occur during severe storms, which are regional in nature. However, just as the amount of precipitation in the form of snow or rain may vary significantly within a single storm, so may the amount, size, and duration of hail within a severe storm. This can have a wide range of impacts. In general, hail can fall anywhere in Colorado. As described in the *hazard/problem description* section, the area where Wyoming, Nebraska, and Colorado meet is known as “Hail Alley.” This region is battered by more hailstorms than any other part of the United States. While Archuleta County is not in “Hail Alley”, damaging hailstorms can still occur anywhere in the planning area. Based on this information, the geographic extent rating for hailstorms is **extensive**.

## Past Occurrences

No significant hailstorms have occurred in the planning area based on the criterion that a significant hailstorm generates hailstones of one inch or more in diameter. However, an NCEI query returned two hailstorm events that did meet the previous three-quarter inch diameter standard used by the National Weather Service prior to the one-inch diameter threshold. Therefore, there have been two significant hailstorms in Archuleta in the last 11 years, which equates to a damaging hailstorm about every 5 years. Highlights from the history are below. Table 4.24 presents an historical overview of damaging hailstorms. Sustained damages and the size of hailstones were provided when known. The data were derived from the monthly Storm Data reports generated and released by the National Oceanic and Atmospheric Administration’s National Climatic Data Center. A SHELDUS query returned no results relating to hailstorms. The table below represents hailstorms that have caused damage, injuries, or loss of life.

Table 4.24 Significant Hailstorms in Archuleta County: 1999-2017\*

Date	Location	Hailstone Size (inches)	Estimated Property Damage*	Estimated Crop Damage*
4/25/1999	Pagosa Springs	0.75	\$0	\$0
8/10/2004	Pagosa Springs	0.88	\$0	\$0
4/15/2012	Pagosa Springs	1.00	\$0	\$0
9/22/2013	Arboles	1.25	0	\$0
9/29/2014	Pagosa Springs	1.75	\$12,000	\$0
8/20/2016	Stevens Airport	1.00	\$0	\$0
<b>TOTALS</b>			<b>\$0</b>	<b>\$0</b>

Source: NCEI

\* Damage estimates limited or unavailable

## Potential Magnitude

According to national databases, there have been two hail events in Archuleta County, with events occurring approximately every 5 years. To calculate a potential magnitude rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an



anticipated worst-case scenario, and in others, it reflects common occurrence. However, neither of the hailstorm events profiled in Table 4.24 inflicted any damage according to NCEI, so it is not possible to calculate the potential magnitude based on previous damages. The HMPC considers that hailstorms are more likely to have a **negligible** potential magnitude.

### **Frequency/Likelihood of Occurrence**

According to NCEI data, there were 4 notable hailstorms in Archuleta County over a 10-year period between 2007 and 2017. Using the methodology described in Section 4.3.1, we can calculate the probability of a severe hailstorm occurring in the County in any given year:

$$(4 \div 10) \times 100\% = 40\%$$

Therefore, there is an 40% chance that a damaging, severe hailstorm will hit Archuleta County in any given year. This corresponds to a probability of future occurrences rating of **likely**. It is important to note that this calculation pertains to *severe* hailstorms only.

## **4.3.9 High Winds and Tornadoes**

For planning purposes, tornadoes, windstorms, and thunderstorm winds are combined into one profile. Although the hazard rankings among the three weather events vary, the hazards that they create and the mitigation actions for addressing those hazards are similar.

### **Hazard/Problem Description**

#### ***High Winds***

High winds, often accompanying severe thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. Windstorms in Archuleta County are typically straight-line winds. Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 miles per hour that represent the most common type of severe weather and are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase. One type of straight-line wind is the downburst, which can cause damage equivalent to a strong tornado and can be extremely dangerous to aviation.

#### ***Tornadoes***

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes are the most powerful storms that exist. They can have the same pressure differential that fuels 300-mile-wide hurricanes across a path less than 300 yards wide.

Closely associated with tornadoes are funnel clouds, which are rotating columns of air and condensed water droplets that unlike tornadoes, do not contact the ground.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. Table 4.25 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at various levels of intensity. Table 4.26 shows the wind speeds associated with the Enhanced Fujita Scale ratings. The Enhanced Fujita Scale’s damage indicators and degrees of damage can be found online at [www.spc.noaa.gov/efscale/ef-scale.html](http://www.spc.noaa.gov/efscale/ef-scale.html).

Table 4.25 Original Fujita Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damages
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, [www.spc.noaa.gov/faq/tornado/f-scale.html](http://www.spc.noaa.gov/faq/tornado/f-scale.html)

Table 4.26 Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF-0	65-85
EF-1	86-110
EF-2	111-135
EF-3	136-165
EF-4	166-200
EF-5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, [www.spc.noaa.gov/faq/tornado/ef-scale.html](http://www.spc.noaa.gov/faq/tornado/ef-scale.html)

Tornadoes form when cool, dry air sits on top of warm, moist air. In Colorado, this most often happens in the spring and early summer (i.e., May, June, and July) when cool, dry mountain air rolls east over the warm, moist air of the plains during the late afternoon and early evening hours. However, tornadoes are possible anywhere in the state, at any time of year and at any point during the day.

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, most injuries and deaths result from flying debris. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response. Tornadoes which affect the developed portions of Archuleta County are more likely to cause high dollar damage amounts, even if they are comparatively smaller, than tornadoes which strike in more remote parts of the County.

### Past Occurrences

According to SHELDUS and NCEI, there were 42 notable wind events and one tornado between 1960 and April 2017. These events are captured in Table 4.27. Winter winds can also cause damage and induce avalanches. See Table 4.28 in Section 4.3.14 Severe Winter Storms for more information about wind events associated with winter weather.

Table 4.27 Archuleta County Wind Events: 1960-2017

Date	Deaths	Injuries	Estimated Property Damage	Estimated Crop Damage
4/16/1960	0	0.08	\$793	\$0
4/7/1961	0	0	\$294	\$0
1/8/1962	0	0	\$7,936	\$0
1/8/1962	0.16	0	\$7,936	\$0
4/7/1962	0	0.02	\$781	\$0
4/21/1963	0	0	\$294	\$0
6/17/1964	0	0	\$79	\$0

Date	Deaths	Injuries	Estimated Property Damage	Estimated Crop Damage
1/7/1969	0.08	0.96	\$19,230	\$0
4/6/1969	0	0.02	\$79	\$0
10/11/1969	0	0.03	\$793	\$793
4/14/1970	0	0	\$79	\$0
11/30/1970	0	0	\$793	\$0
3/17/1971	0	0	\$79	\$0
5/19/1974	0	0	\$294	\$0
6/8/1974	0	0	\$79	\$0
11/24/1975	0	0	\$21	\$0
11/30/1975	0	0	\$2,173	\$0
2/17/1976	0	0	\$1,785	\$0
4/18/1978	0	0	\$17	\$178
11/26/1983	0	0	\$7,936	\$0
4/19/1984	0	0	\$793	\$0
9/24/1986	0	0.02	\$7,936	\$0
5/6/1988	0	0	\$7,936	\$7,936
2/1/1989	0	0	\$793	\$0
5/2/1991	0	0	\$1,923	\$0
2/14/1995	0	0	\$6,666	\$0
4/24/1997	1	1	\$4,500	\$0
4/28/1997	1	1	\$5,000	\$0
5/5/1997	0	1	\$300	\$0
4/2/1999	0	0	\$500	\$0
4/18/2000	0	0	\$78,947	\$0
4/20/2001	0	0	\$2,055	\$0
7/31/2001	0	0	\$10,000	\$0
2/15/2006	0	0	\$2,000	\$0
4/5/2006	0	0	\$8,000	\$0
6/14/2006	0	0	\$15,000	\$0
6/6/2007	0	0	\$2,000	\$0
2/16/2011	0	0	\$0	\$0
12/31/2011	0	0	\$0	\$0
12/21/2014	0	0	\$0	\$0
2/18/2016	0	0	\$0	\$0
3/5/2017	0	0	\$0	\$0
<b>TOTALS</b>	<b>2.24</b>	<b>4.13</b>	<b>\$205,820</b>	<b>\$8,907</b>

Source: SHELDUS

The National Climatic Data Center Storm Events Database did not have any records of high wind events in the planning area other than the tornado. That event is described here:

- **April 25, 1999**—The first documented tornado in Archuleta County ripped up several large pine trees and tossed them into power lines. Many Archuleta County residents were without power for about an hour and a half as a result.

According to the HMPC, a second tornado occurred near Chromo in 2008.

The HMPC noted in 2017 that wind related blowdown hazards were also noted as increasing due to beetle-killed trees. Two incidents, including a fatality and injury were noted as occurring in 2016-2017.

### **Geographical Area Affected**

The spatial extent rating for both tornadoes and other high wind hazards is **extensive**. Windstorms could occur anywhere in Archuleta County. The unpopulated high country areas will experience the highest wind events. Tornadoes could also potentially occur anywhere in the planning area.

### **Potential Magnitude**

To calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it reflects common occurrence. Based on SHELDUS and NCEI records, the event of record for damaging winds in Archuleta County occurred on April 18, 2000. This event resulted in \$78,947 in damages (in 2000 dollars).

Calculating the average annual damage from damaging winds is another method used in assessing potential magnitude. According to SHELDUS and NCEI, there were 42 notable wind events and one tornado between 1960 and April 2017, causing \$208,820 in property damages and \$8,907 in crop damages.

Overall, windstorm or tornado impacts in Archuleta County would likely be **negligible**, with less than 10 percent of the planning area affected. The impact to quality of life or critical facilities and functions in the affected area would be minimal. Injuries or deaths are possible due to wind thrown trees in the backcountry, made more susceptible to blow-down from beetle kill.

### **Frequency/Likelihood of Occurrence**

Using the formula described in Section 4.3.1, the likelihood that a damaging high wind event will occur in any given year is 74%. This corresponds to a **likely** probability of occurrence. In terms of frequency, damaging high wind events seem to occur roughly every 18 months to two years.

Tornadoes could **occasionally** occur in Archuleta County. Two events over a 50-year span of time yield a 4% chance that a tornado will occur in the planning area in any given year.

There presently is not enough data or research to quantify the magnitude of change that climate change may have related to tornado frequency and intensity. Because of uncertainty with the

influence of climate change on tornadoes, future updates to the mitigation plan should include the latest research on how the tornado hazard frequency and severity could change.

### **4.3.10 Landslide/Rockfall/ Debris Flow**

#### ***Landslide***

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

In this chapter, the discussion of landslides is more extensive than that of rockfall or debris flow. The primary reason is availability of information. Landslides in the planning area have a more detailed history of record than rockfall or debris flow. Additionally, landslides potentially present a very serious threat to the planning area. Debris flow and rockfall, though still dangerous, are not as significant to the Archuleta County response area.

#### ***Rockfall***

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

Spring is typically the landslide/rockfall season in Colorado as snow melts and saturates soils and temperatures enter freeze/thaw cycles. Rockfall and landslides are influenced by seasonal patterns, precipitation and temperature patterns. Earthquakes could trigger rockfalls and landslides too.

#### ***Debris Flows***

Debris flows are among the most destructive geologic processes that occur in mountainous areas. A debris flow is a mass of water and earth materials that flows down a stream, ravine, canyon, arroyo, or gulch. Technically if more than half of the solids in the mass are larger than sand grains

(e.g., rocks, stones, boulders) the event is called a debris flow, otherwise it is called a mudslide or mudflow. For the purposes of this plan the term debris flow is meant to be a global term to include mudslides/mudflows. Many of Colorado's older mountain communities built in major mountain valleys are located on or near debris fans. A debris fan is a conical landform produced by successive mud and debris flow deposits, and the likely spot for a future event.

Debris flows can occur rapidly with little warning during torrential rains. Debris and mudflows generally occur with floods and downpours associated with the late summer monsoon season.

The debris flow problem can be exacerbated by wildland fires that remove vegetation that serves to stabilize soil from erosion. Heavy rains on the denuded landscape can lead to rapid development of destructive mudflows. Neighboring La Plata County experienced damaging mudflows in the area burned by the Missionary Ridge Fire in 2002.

The Colorado Geological Survey (CGS) classified the debris flow hazards into the following three zones:

- **Very High Hazard Zone**— This is the zone of greatest hazard. It is estimated that in this area the greatest impact from, and most frequent exposure to, debris flows and floods occurs. The zone is characterized by steep slopes, deposits of large boulders (greater than two feet in diameter), tree scars and burial, channels, levees, and lobes. Damage in this zone could include structural damage, such as buildings being moved off their foundations, walls, and windows being broken, large accumulations of debris being piled in and around buildings, trees being toppled or severely damaged, and severe mud and water damage. Plugs of debris should be expected in this zone, and loss of life is possible.
- **High Hazard Zone**— This is the zone of high hazard. This zone is subject to debris flows and floods, but does not experience the maximum impact of the events. However, events may be just as frequent as in the Very High Hazard Zone. The zone is generally characterized by moderate to steep slopes, boulders, levees, lobes, tree scars and burial, and channels. Damage in this zone could include moderate damage to structures resulting from the pounding of boulders and logs, broken windows, basements filled with mud and debris, piles of debris in and around structures and in yards and streets, and severe mud and water damage.
- **Moderate to Low Hazard Zone**— This hazard zone is usually subjected primarily to mud and water flooding because of debris-flow events. This zone is characterized by low to moderate slopes, and deposits of abundant mud, and minor debris (small boulders, one foot or less and logs). Damage is usually comparatively minor, consisting of mud and water damage to outer walls of buildings, basements, and yards.

## Past Occurrences

Two major active landslides exist in Archuleta County: the East Fork Landslide, which is located roughly three miles upstream from the confluence of the West Fork and East Fork of the San Juan River, and the Jackson Mountain Landslide located along Highway 160 a few miles northeast of Pagosa Springs.

The East Fork landslide has had periodic movement in the past, but on May 2, 2008 the slide area had its largest single movement to date. The movement severed an 8-inch natural gas pipeline owned by Xcel Energy, which is what first tipped off the company that the slide had occurred. Archuleta County emergency services personnel, Forest Service staff, and Xcel Energy assessed the damage. Xcel staff installed a new temporary natural gas pipeline that was easier to access, relocate, and repair in the event of continued movement. At the time, the slide area was moving at roughly four feet per day. It is estimated that the slide moved a total of 50 feet down the slope of the mountain toward the river. In February 2006, the same slide had another movement that also severed the natural gas pipeline.

As the slide area descended toward the East Fork, concerns arose over the slide creating a natural dam. If this were to happen, water would build up behind the dam until it eventually breached. Studies on the issue revealed that much of Pagosa Springs would be inundated. Given the size of the slide area, it is highly unlikely that man-made solutions would be able to stop the slide from damming the river. However, for this scenario to occur, the slide rate would have to either increase significantly or the amount of sediment moved by the river day to day would have to fall below the rate at which sediment from the slide is falling into the river. A hydrologist with the Pagosa Ranger District said that, although possible, this scenario is unlikely. Figure 4.17 shows the eastern edge of the May 2008 slide. The toe of the landslide as it approaches the San Juan River is visible in Figure 4.18. Figure 4.19 clearly shows the sediment from the landslide muddying the waters of the East Fork of the San Juan River.

In 2010 the Federal Highways Administration did a construction project on the East Fork Slide to reduce the chances of future movement. Extensive subsurface drains were installed within the slide and a rock buttress was installed at the toe of the slide. Since 2010, the East Fork landslide has not seen recent movement and is being closely monitored by Xcel Energy due to the gas line that feeds the San Luis Valley.

The Jackson Mountain Landslide is roughly five miles east of Pagosa Springs. The slide area measures roughly 2,000 feet wide by one-half mile long. It is caused by erosion from the San Juan River, which lies at the toe of the slide area. This slide has been active since at least the 1970s. Periodically, the slide severed Highway 160 near mile marker 150 to 151, resulting in road closures and utility disruptions from ruptured water and gas pipelines. An underground pipeline was replaced with an above-ground pipeline that is easier to access, relocate, and repair in the event of another slide movement. Mitigation has helped Jackson Mountain at the crossing with Highway 160. However, HMPC members have noted that a problem spot has recently occurred in a new location, affecting the water and gas line corridor. Figure 4.20 shows the toe of the Jackson Mountain Landslide as it is eroded by the San Juan River. The above-ground pipeline is also visible in this image. Figure 4.21 illustrates the slope instability of the slide area. Note that several trees in the slide area have been nearly uprooted and now stand at sharp angles. Figure 4.22 provides an aerial view of the Jackson Mountain slide. The pipeline is visible in the middle of the photograph.



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Figure 4 .17. East Fork Landslide : May 2008 Movement



Source: Colorado Geological Survey, East Fork Landslide Report May 18, 2008

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Figure 4 .18. Toe of the East Fork Landslide



Source: Archuleta Sheriff's Office – Division of Emergency Management (taken May 16, 2008)

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Figure 4.19. Sediment from the East Fork Landslide at the confluence of the East and West Fork of the San Juan River



Source: Archuleta Sheriff's Office – Division of Emergency Management (taken May 16, 2008)

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Figure 4 .20. Toe of the Jackson Mountain Landslide and Above-Ground Pipeline



Source: MWH Americas, Inc., Final Report for the Snowball Pipeline Replacement Evaluation in the Vicinity of U.S. Highway 160 Jackson Mountain Landslide

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Figure 4 .21. Jackson Mountain Landslide Slope Instability



Source: MWH Americas, Inc., Final Report for the Snowball Pipeline Replacement Evaluation near U.S. Highway 160 Jackson Mountain Landslide

Figure 4 .22. Jackson Mountain Landslide Aerial View



Source: Archuleta Sheriff's Office – Division of Emergency Management (taken May 16, 2008)

### Geographic Area Affected

Figure 4.23 shows the location of the potential landslide hazards in the response area, which is **extensive**. The two major landslide hazards in the planning area are marked on the map by yellow circles. The East Fork slide area is roughly twelve miles northeast of Pagosa Springs in the San Juan National Forest. It lies two miles east of Highway 160 along the East Fork Road (NFSR 667). The slide is about 35 acres in size. The toe of the landslide has been reinforced to keep it from sliding into the East Fork of the San Juan River, and the slide has been monitored with sensors since the 2008 event. The East Fork Landslide belongs to an older system of landslides in that same area.

The Jackson Mountain Landslide is roughly five miles east of Pagosa Springs. The slide area measures approximately 2,000 feet wide by one-half mile long. The Jackson Mountain Slide is nearer to Pagosa Springs while the East Fork Landslide lies near the Archuleta-Mineral County border. There are other landslide areas in the response area that could be problematic as well, including a slide on the Sheep Creek trail.

Additional problem areas include:

- Highway 160: MM 146 and MM 147
- Highway 160: Wolf Creek Pass, MM 158-165
- Highway 160: Yellow Jacket Pass
- CR 151 MM 114 and MM117
- CR 335- Lower Blanco culverts plugged with mud, rock, and shale
- CR 500
- Area behind high school affected from landslide in Spring 2017.

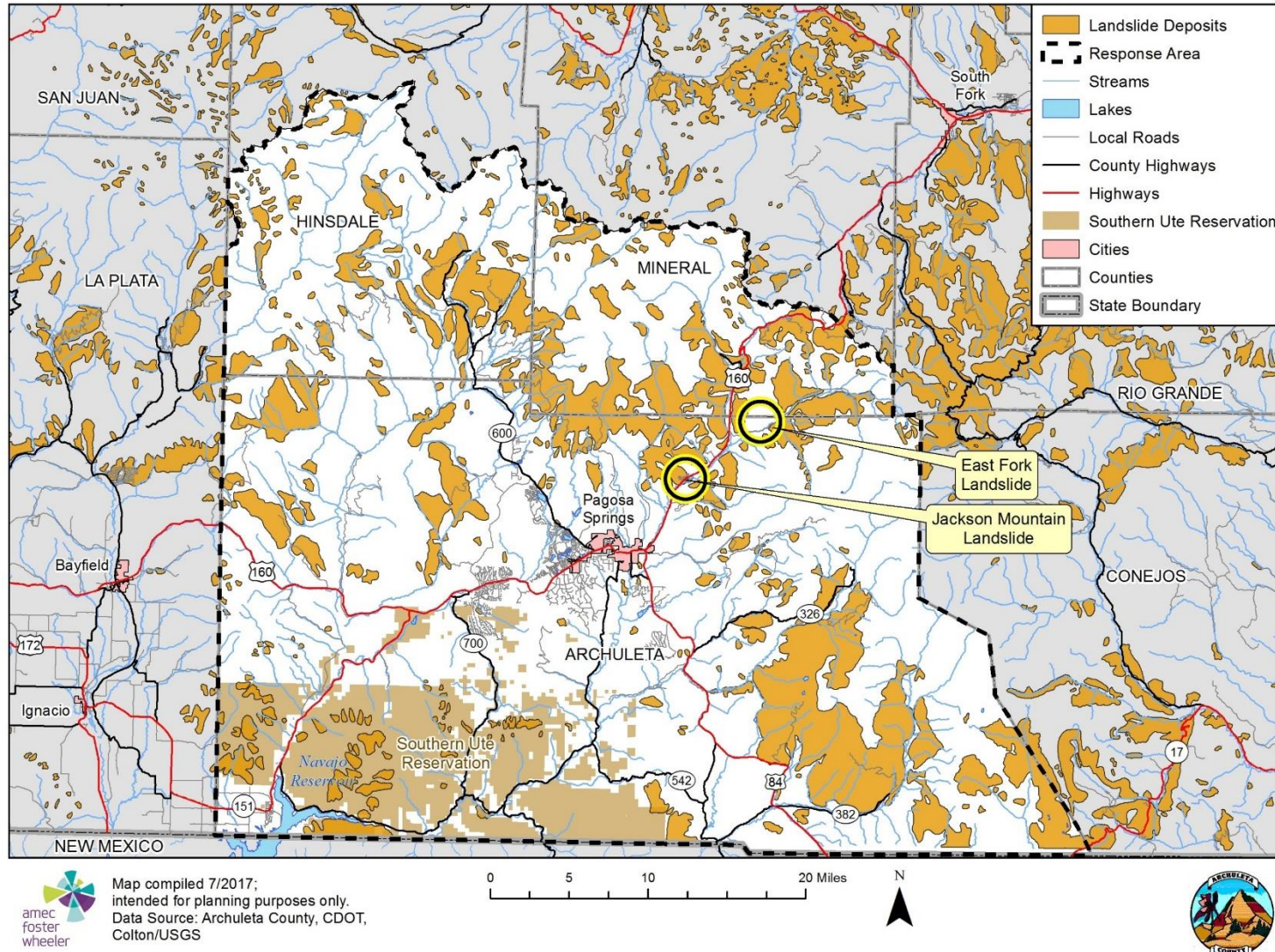
CDOT identified 756 sites throughout the State that have ongoing issues with rockfall. There are 15 such sites in the planning area: 7 in Archuleta County along Highway 160 and 8 in Mineral County on Wolf Creek Pass. CDOT identifies these areas using the Colorado Rockfall Hazard Rating System (CRHRS) which combines traffic data, geology information, and slope measurements to determine a hazard ranking score. Table 4.28 below details the 15 rockfall hazards in the planning area by mile marker and lists each site’s overall hazard ranking out of the 756 rockfall hazard areas in the State.

Table 4.28 Rockfall Hazard Areas and Rankings in Archuleta County Response Area

County	Route	Beginning Mile Marker	Ending Mile Marker	Hazard Rank
Archuleta	Highway 160	115.603	115.663	46
Archuleta	Highway 160	116.757	116.819	116
Archuleta	Highway 160	115.982	116.079	131
Archuleta	Highway 160	114.719	114.787	389
Archuleta	Highway 160	115.505	115.586	479
Archuleta	Highway 160	116.462	116.500	649
Archuleta	Highway 160	116.359	116.423	666
Mineral	Highway 160	161.289	161.360	31
Mineral	Highway 160	159.193	159.771	45
Mineral	Highway 160	159.116	159.193	281
Mineral	Highway 160	161.000	161.119	320
Mineral	Highway 160	160.759	160.917	358
Mineral	Highway 160	161.193	161.266	397
Mineral	Highway 160	161.676	161.728	714
Mineral	Highway 160	161.557	161.600	714

Source: Colorado Department of Transportation

Figure 4 .23. Landslide Deposits in the Archuleta County Planning Area



## Potential Magnitude

The potential magnitude of landslide impacts in Archuleta County could be **critical**. The East Fork landslide specifically is prone to disrupting utility lines in the area, including the interstate natural gas pipeline. The interstate pipeline supplies all central Colorado with natural gas. If the East Fork landslide broke this pipeline, municipalities such as Gunnison and Salida would not have enough natural gas for heating. This would be particularly serious in the winter months when many Coloradoans use natural gas to heat their homes. Impacts on this gas transmission line would be minimal to the Archuleta County response area itself. The most severe impacts to the Pagosa Springs area would result from the damming of the East Fork of the San Juan if the East Fork landslide mass fell into the river. If this were to happen, water would build up behind the dam until it eventually breached. Studies on the issue revealed that much of Pagosa Springs would be inundated. Figure 4.24 shows where the San Juan River is constricted by boulders from the landslide, causing the River to widen upstream of the constriction. The difference in the width of the channel above and below the point of constriction and the damage to trees on the slide area is apparent in this image.

The Jackson Mountain Slide ruptured the Snowball water pipeline several times in the past 10-20 years. The Snowball pipeline supplies a portion of Pagosa Springs' municipal water and is the only source of water for the Snowball Water Treatment Plant and District 2 of the Pagosa Area Water and Sanitation District. Disruption of this water supply line could also be critical for the Pagosa Springs area. The financial impact of the Jackson Mountain Slide has been substantial. According to the HMPC, roughly \$6 million has been spent on stabilizing the slide area and repairing the stretch of Highway 160 affected by the slide. This part of the Highway has been repaved repeatedly to the point that the asphalt is 27 vertical feet thick, the accumulation of one repaving after another.

Overall, rockfall impacts would likely be **negligible** in Archuleta County, with less than 10 percent of the planning area affected. However, rockfalls elsewhere have caused severe injury or even death. In the Archuleta County response area, this risk is higher for motorists traveling along Highway 160 in the rockfall hazard areas identified previously.

The HMPC estimates that the potential magnitude of debris flow would be **limited**.



Figure 4 .24. Con str iction of the San Ju an River by the Toe of the Eas t Fork Land slide



Source: Colorado Geological Survey, East Fork Landslide Report May 18, 2008

### Frequency/Likelihood of Occurrence

Landslides are **likely** to occur in the planning area, meaning these hazards have between a 10 and 100 percent chance of occurrence in next year, or have a recurrence interval of 10 years or less. The Jackson Mountain slide area shows activity approximately every ten years according to the 2002 Colorado Landslide Hazard Mitigation Plan. It has been monitored with sensors since 2008 and has not shown movement since (as of 2017). The potential for landslide movement typically increases during a wet year.

Rockfall also has a **likely** occurrence rating. Three sites in the planning area on Highway 160 are ranked in the top 50 in the State for frequent rockfall issues.

The HMPC estimates that debris flows could occur **occasionally**, but this likelihood can increase following wildfires.

Climate change projections for more intense precipitation events has the potential to increase landslide incidence, particularly debris flows. With increases in heavy precipitation events, Archuleta County could have an elevated risk of landslide and debris flow occurrence in the future.

### 4.3.11 Land Subsidence

#### Hazard/Problem Description

The Colorado Geological Survey defines land subsidence as the sinking of the land over manmade or natural underground voids. Subsidence occurs naturally and through man-driven or technologically exacerbated circumstances. Natural causes of subsidence occur when water in the ground dissolves minerals and other materials in the earth, creating pockets or voids. When the void can no longer support the weight of the earth above it, it collapses, causing a sinkhole depression in the landscape. Often, natural subsidence is associated with limestone erosion, but may also occur with other water-soluble minerals. Man-driven or technology-exacerbated subsidence conditions are associated with the lowering of water tables, extraction of natural gas, or subsurface mining activities. As the underground voids caused by these activities settle or collapse, subsidence occurs on the surface. According to CGS records, there are 24 known historic coal mines in Archuleta County. Past coal and other mining activities have created surface subsidence in some areas and created the potential for subsidence in other areas. Any area where past sub-surface mining was documented has some risk of subsidence; however, tracking these areas is difficult. CGS has historic mine maps for most of these 24 mines, yet it is unclear whether some of these maps refer to the same mines despite having different names. According to CGS records, there are no known historic coal mines or associated subsidence events in southern Hinsdale and Mineral Counties.

#### Past Occurrences

Records of previous subsidence occurrences are difficult to track, as there is no coordinating or monitoring agencies for this hazard. However, records from the Colorado Geological Survey indicate that 14 mine subsidence events occurred in Archuleta County between 1983 and 2003. The date of occurrence for all but five of these events is unknown. These events are profiled in Table 4.29.

Table 4.29 Mine Subsidence Events

Date	Comments
8/11/1983	Open portal with falling roof and walls, gob pile, trash
1/12/1984	Moore #1 (Coalmount) Collapsed-Concretesoil, subsoil Backfill No survey report found for this site.
11/12/1986	Mine opening (room collapse)
6/24/2003	Stabilize undercuts prior to machine loading 6 miles; 1st right on Beaver Meadows Rd. from US 160 oval
Unknown	Completed by Pioneer Construction 37° 18' 2.223" N, 107° 29' 8.242" W identified on USFS west of Shamrock
Unknown	Shamrock Mines: Subsidence Inventory - 9 pits between Shamrock Mines 1 & 2
Unknown	Shamrock Mines: Subsidence Inventory - 9 pits between Shamrock Mines 1 & 2
Unknown	Shamrock Mines: Subsidence Inventory - 9 pits between Shamrock Mines 1 & 2

Date	Comments
Unknown	Several Subsidence pits located between the Triple S mine and Shamrock Mines 1 & 2
Unknown	(No comments)
Unknown	(No comments)
Unknown	(No comments)
Unknown	(No comments)

Source: Colorado Geological Survey

### Geographic Extent

Areas of Archuleta County at higher risk for subsidence are shown in Figure 4.25 on the map of inactive coal mines in Colorado. These areas are primarily located in the southern half of the County, in the Southern Ute Reservation, along Highway 160 near the Archuleta-La Plata County border, and along Highway 84. Based on this map and oral communication with the Colorado Geological Survey there is little potential for coal mine subsidence in southern Mineral or Hinsdale counties. Figure 4.26 and Figure 4.27 show the mapped locations of subsidence events related to coal mining, coal mine shafts, historic coal mines, and coal mine adits. Based on this information, the geographic extent rating for subsidence is **significant**.

Figure 4 .25. Locations of Inactive Coal Mines in Colorado

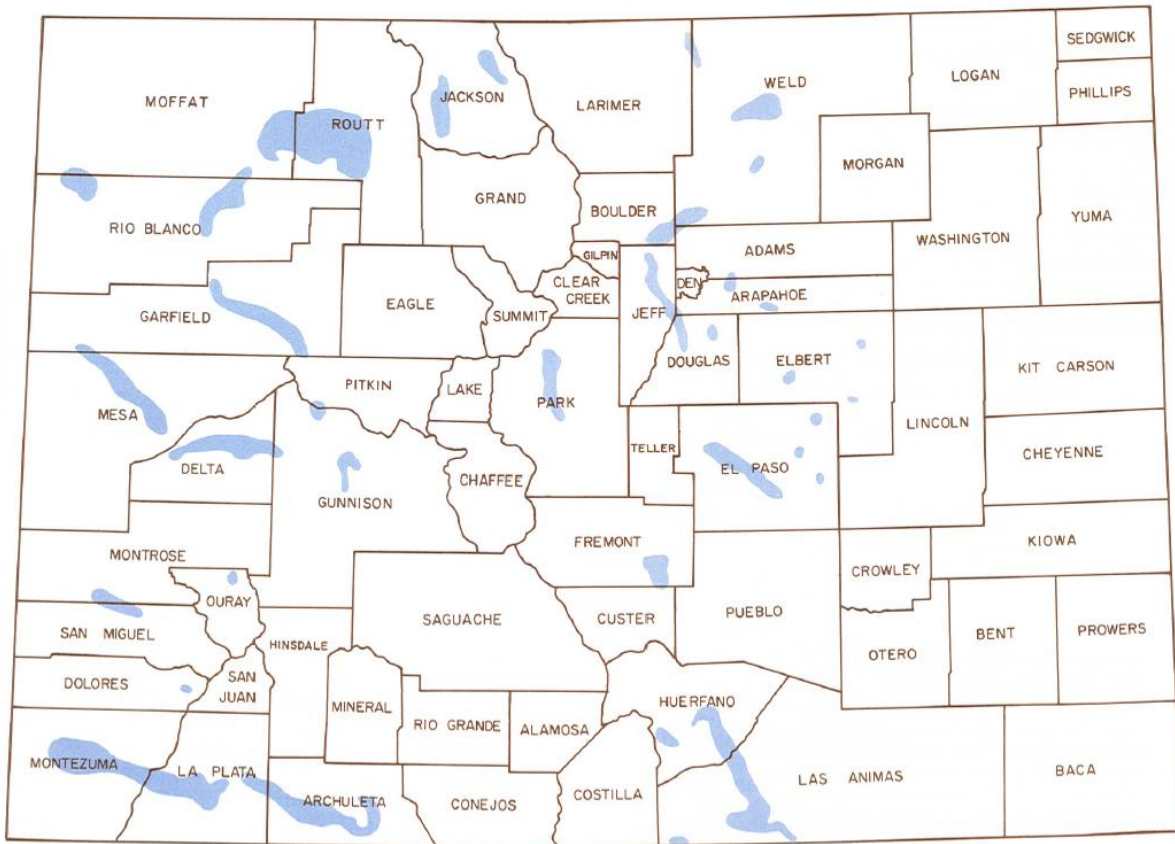


Figure 5. General locations of Inactive Coal Mines in Colorado.

Source: J.E. Turney, *Subsidence above Inactive Coal Mines: Information for the Homeowner*, Special Publication No. 26, Colorado Geological Survey and Colorado Mined Land Reclamation, 1985.

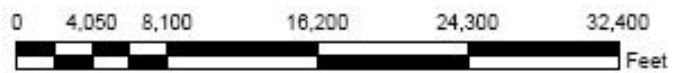
Figure 4 .26. Historic Coal Mines, Shafts, Adits and Subsidence Events in Western Archuleta County



**Legend**

- ◆ Subsidence\_Events\_Coal
- CoalMineShafts
- CoalMinesHistoric
- CoalMineAdits

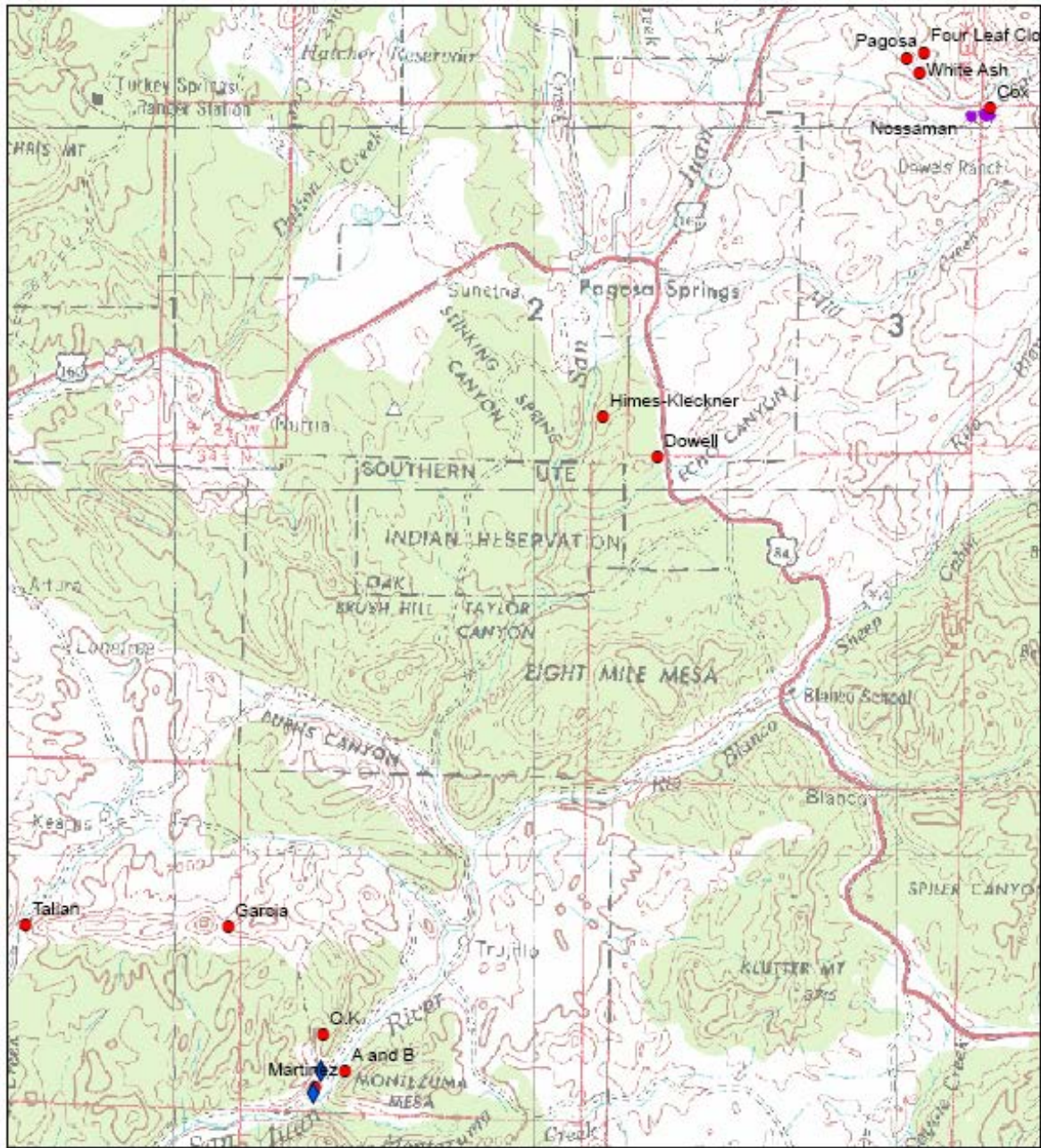
Historic coal mines, shafts, adits and subsidence events  
Western Archuleta County, CO



1 inch = 8,000 feet

Source: Colorado Geological Survey

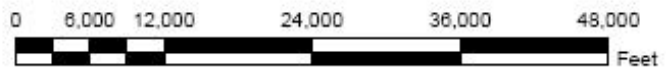
Figure 4.27. Historic Coal Mines, Shafts, Adits and Subsidence Events in Central Archuleta County



**Legend**

- ◆ Subsidence\_Events\_Coal
- CoalMineShafts
- CoalMinesHistoric
- CoalMineAdits

Historic coal mines, shafts, adits  
and subsidence events  
Central Archuleta County, CO



1 inch = 12,000 feet

Source: Colorado Geological Survey

## Potential Magnitude

The greatest dangers associated with subsidence are related to property damages incurred by the hazard. There are minimal risks to injury and death from unexpected subsidence or accidental exposure to it, but the risk is possible. No injuries or deaths related to subsidence have been reported in the planning area.

To calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it reflects common occurrence. In this case, there is no event of record for the County related to subsidence.

Using typical damages caused by subsidence as a point of reference, the planning area could potentially experience damage to houses, critical facilities, and other structures. Given the limited number of roads in the County, subsidence along Highway 160 could affect transportation and delivery of services to the planning area. Subsidence may also result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate natural processes of subsidence, or incur subsidence over manmade voids. Fluctuations in the level of underground water caused by pumping or by injecting fluids into the earth can initiate sinking to fill the empty space previously occupied by water or soluble minerals. The consequences of improper use of land subject to ground subsidence can be excessive economic losses, including the high costs of repair and maintenance for buildings, irrigation works, highways, utilities, and other structures. This results in direct economic losses to citizens as well as indirect economic losses through increased taxes and decreased property values.

Based on these factors, the magnitude severity ratings for subsidence are considered **limited**, based on the dollar amount of property damage incurred. Land use planning should consider the subsidence hazard in development reviews to avoid building structures in hazard areas.

## Frequency/Likelihood of Occurrence

Records from the Colorado Geological Survey indicate that 14 mine subsidence events occurred in Archuleta County. The date of occurrence for all but four of these events is unknown. This absence of data on dates of occurrence must be taken into consideration when evaluating the frequency or likelihood of future occurrences. For the purposes of this plan, the four events with known occurrence dates will be used to calculate a likelihood and frequency rating for the purposes of this plan. Four events occurred between 1983 and 2010, yielding an average annual occurrence of one subsidence event every six or seven years. The probability that a subsidence event will occur in any given year is 14.8%, which corresponds to a probability rating of **likely**.

## 4.3.12 Lightning

### Hazard/Problem Description

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes with an average of about four. The length and duration of each lightning stroke vary, but typically average about 30 microseconds.

Lightning is one of the more dangerous weather hazards in the United States and in Colorado. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes wildland fires and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be more than \$6 billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

Intracloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel can be visible for many miles.

Although it is not as common, cloud-to-ground lightning is the most damaging and dangerous form of lightning. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat. Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

The ratio of cloud-to-ground and intracloud lightning can vary significantly from storm to storm. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth. Using a network of lightning detection systems, the United States monitors an average of 25 million strokes of lightning from the cloud-to-ground every year.

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

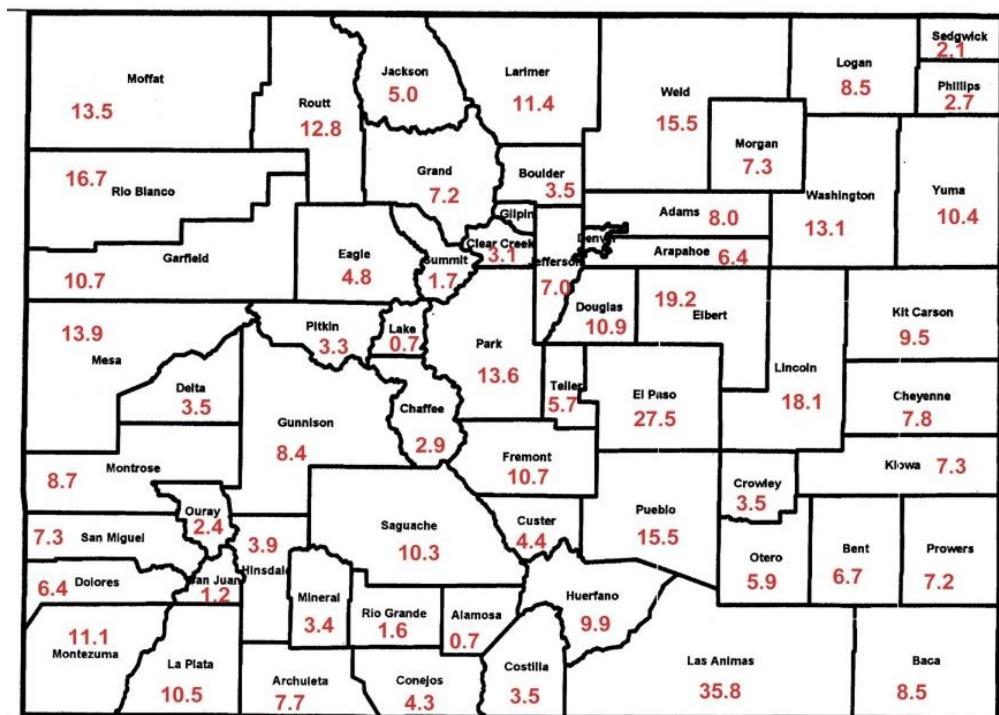


## Past Occurrences

Data from the National Lightning Detection Network ranks Colorado 32nd in the nation (excluding Alaska and Hawaii) with respect to the number of cloud-to-ground lightning flashes with an average number of 517,957 flashes per year (based on data collected between 2007 and 2016). Figure 4.28 shows the estimated number of cloud-to-ground lightning flashes (in thousands) by Colorado county per year.

Archuleta County has an average of 7,700 flashes per year. Mineral County averages 3,400 lightning flashes per year, and an average of 3,900 flashes occur in Hinsdale County each year. It is important to note that these Hinsdale and Mineral County lightning flash totals apply to the entire land area in the two counties. In terms of the Archuleta County Response Area, the total average yearly number of flashes in southern Hinsdale and Mineral County will be lower.

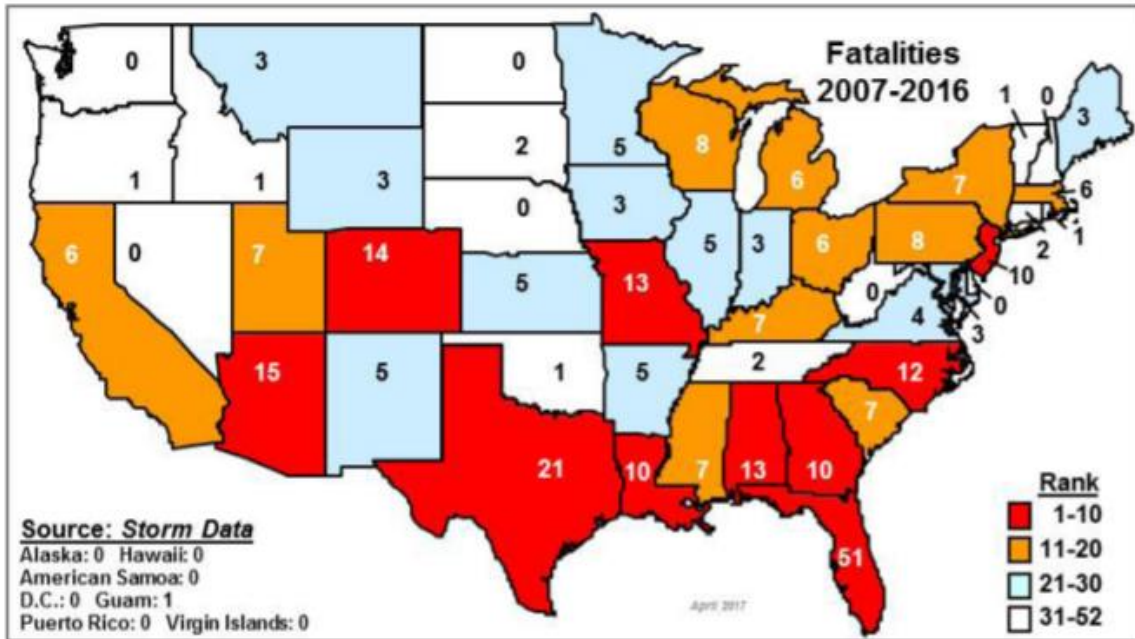
Figure 4.28. Cloud-to-Ground Lightning Flashes in Colorado per Year (in thousands ), 1996-2004



Source: National Weather Service, [www.crh.noaa.gov/pub/?n=ltg/cg\\_county\\_co.php](http://www.crh.noaa.gov/pub/?n=ltg/cg_county_co.php)

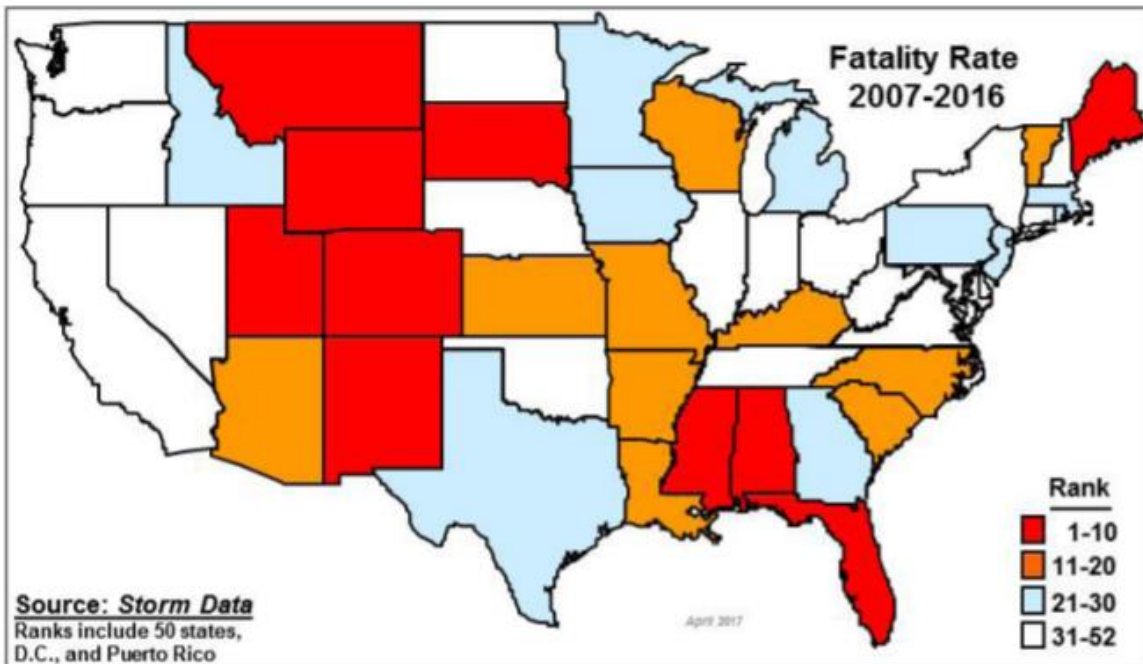
Figure 4.29 shows state-by-state lightning deaths between 2007 and 2016. Colorado is ranked 4<sup>th</sup>, with 14 deaths. Florida is ranked #1 (70 deaths), followed by Texas (21), and Arizona (15). As seen in Figure 4.32, when weighing fatality statistics with the state population, Colorado surpasses Texas, and Arizona, with 0.27 deaths per million people. In 2006, there were 5 lightning deaths and 15 reported lightning injuries in Colorado. None of these were in Archuleta. In an average year in Colorado, 3 people are killed and 13 are injured.

Figure 4 .29. Lightning Fatalities in the United States : 2007 -2016



Source: National Weather Service, [www.lightningsafety.noaa.gov/](http://www.lightningsafety.noaa.gov/)

Figure 4.30. Lightning Fatalities Weighted by Population by State: 2007 -2016



Source: National Weather Service, [www.lightningsafety.noaa.gov/](http://www.lightningsafety.noaa.gov/)

According to the National Climatic Data Center Storm Event Database, there were ten notable lightning events, causing damage, injury, or death, in Archuleta County between 1998 and 2017:

- **April 7, 1998**—A lineman was struck by lightning and sustained minor burns while repairing a street light. He was in an elevated basket when a nearby lightning strike sent a charge to the streetlight on which he was working. That same day, lightning struck a tree and a nearby house caught on fire. Property damage was estimated at \$40,000 (in 1998 dollars).
- **July 24, 1998**—Lightning activity caused several small wildland fires near Pagosa Springs in addition to causing minor damage to one house. A radio broadcasting station was also struck and received extensive damage to a broadcasting communications tower and the station’s electronic equipment. Damages were estimated at \$12,000 (in 1998 dollars).
- **July 28, 1998**—Lightning struck nearby a radio station again, destroying a computer. \$500 in property damages were sustained (in 1998 dollars).
- **April 25, 1999**—Roughly 900 homes and businesses lost power for five hours when lightning struck a substation near Pagosa Springs. According to NCEI, the event caused \$500 in damages (in 1999 dollars).
- **June 26, 2000**—A house and several trees caught on fire following several lightning strikes. Damages were estimated at \$40,000 (in 2000 dollars).
- **July 7, 2000**—Near Chromo, a man fishing along the Navajo River was injured by lightning. He survived but suffered significant burns.
- **September 8, 2000**—Lightning caused \$50,000 in damages (in 2000 dollars) after starting a fire in a garage/workshop in Pagosa Springs. The structure and its contents were completely destroyed.
- **July 15, 2001**—A man fishing on Lake Pagosa sustained burn injuries when lightning struck his fishing pole and traveled down through the man’s body. Damages were estimated at \$300 (in 2001 dollars).
- **June 30, 2008** -- Lightning struck a power supply and left about 550 customers without power for several hours. Electrical crews had to use a backhoe to get at equipment damaged by the strike.

A SHELDUS query indicated that ten damaging lightning events have occurred in Archuleta County between 1960 and 2001. Eight of these events correspond to the NCEI results described above. SHELDUS data indicated that two damaging lightning events also occurred in the 1960s. On August 10, 1960 lightning caused \$1,198 in property damage. A second event took place on August 5, 1964. According to SHELDUS, this second event resulted in 0.1 injuries. SHELDUS sometimes averages regional events, thereby yielding an inaccurate picture of what occurred in a specific county. This is likely the case with the second event. Damaging lightning events are profiled in Table 4.30.

Table 4. 30 Damaging Lightning Events: 1960 -2001 (SHELDUS)

Date	Deaths	Injuries	Damage*
8/1/1960	0	0	\$161
8/5/1964	0	0.1	\$0
4/7/1998	0	1	\$40,000
7/24/1998	0	0	\$12,000
7/28/1998	0	0	\$500
4/25/1999	0	0	\$500
6/26/2000	0	0	\$40,000
7/7/2000	0	1	\$0
9/8/2000	0	0	\$50,000
7/15/2001	0	1	\$250
06/20/2008	0	0	\$10,000
<b>TOTALS</b>	<b>0</b>	<b>3.1</b>	<b>\$153,411</b>

Source: SHELDUS and NCEI

\*Damage dollar value based on year of event

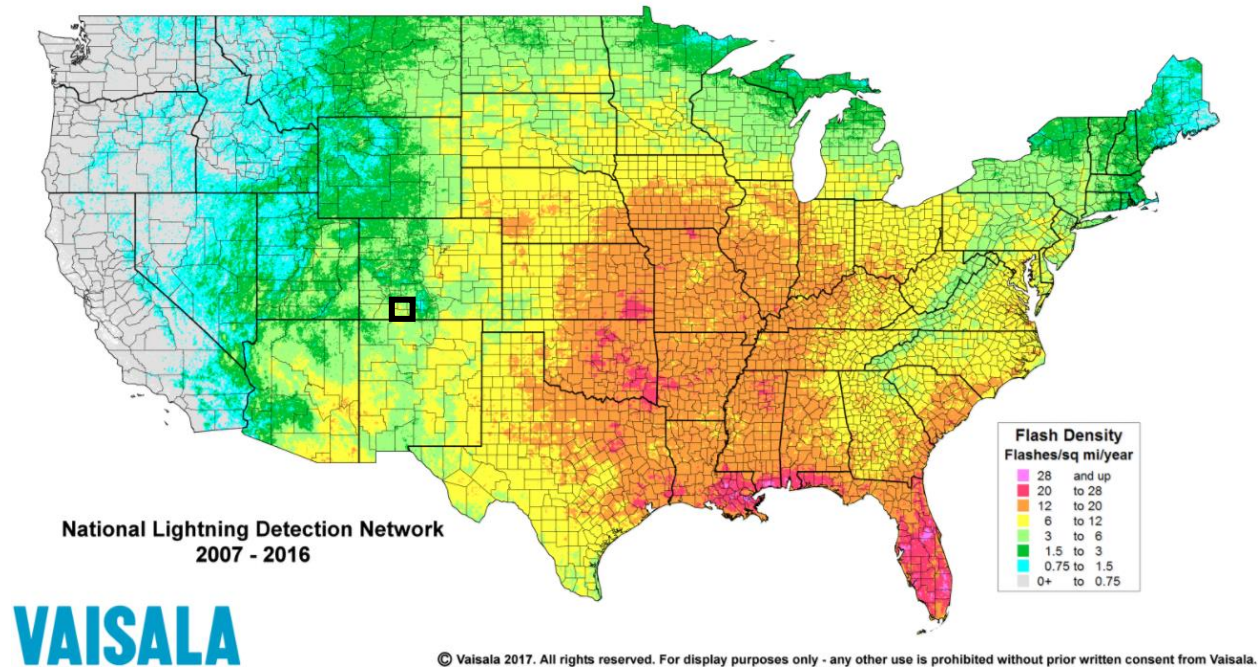
It should be recognized that NCEI and SHELDUS data is not completely comprehensive and does not capture all the lightning events in the planning area. HMPC members have noted that in recent years, three homes were struck by lightning.

### Geographical Area Affected

The geographic extent for lightning may be examined in two ways. In one regard, ‘lightning’ is a regional hazard measured by the possible places of occurrence. In the other, ‘lightning incidents’ refer to single-point occurrences and are measured according to density. Acknowledging that lightning may occur anywhere in Colorado or in Archuleta County is important, but does not provide particularly insightful information. Examining the density of the lightning flashes may yield more useful information, particularly when the impacts of the hazard are examined. Figure 4.31 indicates that, for the most part, Colorado experiences an average density rating. Therefore, while 100% of the planning area is vulnerable to lightning strikes, the density of these single-point occurrences is limited.

The HMPC has recommended the geographic extent rating to be **extensive** since it can occur anywhere in the planning area.

Figure 4.31 . Cloud-to-Ground Lightning Density: 2007 -2016



Source: <http://www.vaisala.com>  
Black box indicates planning area extent

### Potential Magnitude

Lightning can cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. It also causes wildland and structural fires. Damage from lightning occurs in four ways:

- Electrocution, severe electrical shock, and burns of humans and animals
- Vaporization of materials in the path of the strike
- Fire caused by the high temperatures associated with lightning
- Power surges that can damage electrical and electronic equipment

When people are struck by lightning, the result is deep burns at the point of contact (usually on the head, neck, and shoulders). Approximately 70 percent of lightning survivors experience residual effects such as vision and hearing loss or neuropsychiatric issues. These effects may develop slowly and only become apparent much later. Death occurs in 20 percent of lightning strike victims.

Lightning strikes cause intense but localized damage. In contrast to other hazards, lightning does not cause widespread disruptions with the community. Structural fires, localized damage to buildings, damage to electronics and electrical appliances, and electrical power and communications outages are typical consequences of a lightning strike. Additionally, indirect

fatalities may result via electrocution when a person steps from a vehicle into standing water that was previously “charged” by a live power-line that was knocked loose by a lightning strike.

The indirect social and economic impacts of lightning damage are typically associated with the loss of electrical power. Since society relies heavily on electric power, any disruption in the supply, even for a short time period, can have significant consequences. Wildland fires can also be an indirect result of a lightning strike.

Based on the data from SHELDUS, Archuleta County’s average annual loss from lightning is \$2,868. The event of record occurred on September 8, 2000, when lightning caused a house and garage to catch on fire, destroying the contents inside. The event resulted in an estimate \$50,000 in damages in 2000 dollars. Other events that caused similar amounts of damage were also fire-related.

Past events in Archuleta County indicate that the potential magnitude of lightning events will likely be **negligible**. However, the HMPC feels that the significance of lightning is **high** due to its potential for causing wildland fires, power outages, and injuries or deaths.

#### **Frequency/Likelihood of Occurrence**

It is certain that lightning will occur every year in Archuleta County, but not all strikes will be damaging or fatal. The methodology described in Section 4.3.1 can be used to calculate the likelihood that damaging lightning events will occur in the future. Given that SHELDUS returned a longer record of events, SHELDUS data will be used. Dividing the number of damaging events (10) by the available historic record (2010–1960=50), then multiplying by 100 to calculate the probability percentage yields a 20% probability that a damaging lightning event will occur in any given year in Archuleta County. Therefore, the likelihood of occurrence is **likely**—10-100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.

With additional heat in the atmosphere storms are projected to become more severe in the future, and thus lightning may become more prevalent.

### **4.3.13 Pandemic Disease**

#### **Hazard/Problem Description**

##### ***Pandemic Influenza***

A pandemic is a global disease outbreak. A pandemic flu is a virulent human flu that causes a global outbreak, or pandemic, of serious illness. A flu pandemic occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in very brief time. The U.S. Centers for Disease Control and Prevention has been working closely with other countries and the World Health Organization to strengthen

systems to detect outbreaks of influenza that might cause a pandemic and to assist with pandemic planning and preparation.

Most recently, health professionals are concerned by the possibility of an avian (or bird) flu pandemic associated with a highly pathogenic avian H5N1 virus. Since 2003, avian influenza has been spreading through Asia. A growing number of human H5N1 cases contracted directly from handling infected poultry have been reported in Asia, Europe, and Africa, and more than half the infected people have died. There has been no sustained human-to-human transmission of the disease, but the concern is that H5N1 will evolve into a virus capable of human-to-human transmission.

An especially severe influenza pandemic could lead to elevated levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines.

### **Past Occurrences**

There were three acknowledged pandemics in the twentieth century:

- **1918-19 Spanish flu (H1N1)**—This flu is estimated to have sickened 20-40 percent of the world’s population. Over 20 million people lost their lives. Between September 1918 and April 1919, 500,000 Americans died. The flu spread rapidly; many died within a few days of infection, others from secondary complications. The attack rate and mortality was highest among adults 20-50 years old; the reasons for this are uncertain. It is likely that the Spanish flu impacted Archuleta County given the nature of that particular strain, but exact impacts are unknown.
- **1957-58 Asian flu (H2N2)**—This virus was quickly identified due to advances in technology, and a vaccine was produced. Infection rates were highest among school children, young adults, and pregnant women. The elderly had the highest rates of death. A second wave developed in 1958. In total, there were about 70,000 deaths in the United States. Worldwide deaths were estimated between 1 and 2 million.
- **1968-69 Hong Kong flu (H3N2)**—This strain caused approximately 34,000 deaths in the United States and more than 700,000 deaths worldwide. It was first detected in Hong Kong in **early 1968 and spread** to the United States later that year. Those over age 65 were most likely to die. This virus returned in 1970 and 1972 and still circulates today.
- **2009 H1N1 flu**—The 2009 H1N1 virus was first detected in the US in April 2009. It is now believed that the outbreak began in either Mexico or somewhere in Asia. The World Health Organization officially declared a pandemic on June 11, 2009. Testing of the strain indicated that it did not contain markers associated with high deaths rates or increased risk of severe disease. About 70 percent of people who have been hospitalized with this 2009 H1N1 virus have had one or more medical conditions previously recognized as placing people at “high risk” of serious seasonal flu-related complications. This included pregnancy, diabetes, heart

disease, asthma, and kidney disease. Young children were also at high risk of serious complications from 2009 H1N1, just as they are from seasonal flu. The elderly were not disproportionately affected by this strain, which is rare for most flu viruses. And while people 65 and older were the least likely to be infected with 2009 H1N1 flu, if they got sick, they were also at “high risk” of developing serious complications from their illness. The World Health Organization (WHO) declared the pandemic to be officially over in June 2010. The WHO estimated that over 18,000 people died of the H1N1 strain world-wide. This number could potentially be much higher. Deaths related to this particular strain of the virus could have gone unconfirmed or unreported. Nevertheless, this number is lower than the 250,000 to 500,000 people around the world who die of seasonal flu strains each year. In 2009, one person in Archuleta County was hospitalized for H1N1.

### **Geographical Area Affected**

**Extensive** - the entire County and population could potentially be affected by a pandemic flu outbreak.

### **Potential Magnitude**

Overall, the impacts from a pandemic flu outbreak in Archuleta County could be **critical**, with 25-50 percent of the planning area’s population affected. The elderly and infants would likely be impacted the most. Local medical facilities could be rapidly overwhelmed. The medical facilities of neighboring jurisdictions would most likely be overwhelmed as well and unable to provide assistance to Archuleta County.

Over half of the houses in the County are owned by second homeowners who come to the area seasonally. Depending on the time of year, the number of people in the planning area who could be affected by a flu pandemic could increase or decrease.

### **Frequency/Likelihood of Occurrence**

**Occasional**— Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Based on four worldwide outbreaks that affected the United States between 1918 and 2010, a 92-year period, a pandemic outbreak occurs on average about every 23-25 years.

## **4.3.14 Severe Winter Storm**

### **Hazard/Problem Description**

Winter storms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be



lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damage can be repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

Winter storms in Archuleta County, including intense winds and blizzard conditions, can result in property damage, localized power and phone outages, and closures of streets, highways, schools, businesses, and nonessential government operations. People can also become isolated from essential services in their homes and vehicles. A winter storm can escalate, creating life threatening situations when emergency response is limited by severe winter conditions. Other issues associated with severe winter weather include hypothermia and the threat of physical overexertion that may lead to heart attacks or strokes. Snow removal costs can also impact budgets significantly. Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack melts too quickly. Avalanche danger is greatly increased during and immediately after heavy snowfall.

## Past Occurrences

Several major winter storms and blizzards have occurred in the planning area over the past several decades. Profiles of some of the more severe storms were obtained from articles from the *Pagosa Springs Sun*, HMPC records, and interviews with residents of Archuleta County. A few of the most memorable storms are discussed below:

- **Winter of 1932-33**—According to local accounts, the snow reached as much as seven or eight feet high during the winter of 1932-33. Dozens of cattle and sheep died that winter from exposure and starvation. Families were essentially snowed in as roads became completely impassible. Temperatures fell as low as 47 to 56 degrees below zero. Two miners were killed during a snow slide near Summitville on January 19.
- **Winter of 1949**—January and February of 1949 brought several heavy snows to Archuleta County. According to the *Pagosa Springs Sun*, the winter of 1949 brought a total of 47 nights of below zero temperatures to the planning area.
- **Winter of 1957**—A snowstorm in the first week of 1957 had widespread effects on the planning area. Several avalanches and heavy snows hindered road crews from clearing away the snow to reopen Wolf Creek Pass. Pagosa Springs was without power for several hours when downed power lines and a fire in the Western Colorado Power Company's plant forced

electricity providers to ration electric power. Several other snowstorms followed during that winter, leaving Pagosa Springs isolated and virtually paralyzed. One avalanche nearly buried a State Highway Department camp near Wolf Creek Pass, rendering the crew unable to continue clearing the roads until their equipment and machinery could be recovered.

- **December 2007**—A winter storm brought extremely wet and heavy snow to the County in December 2007. Over the course of nearly three days, the snow caused power outages across the County. Power poles and electrical lines became overloaded with snow, and many people across the planning area lost power as a result. The 115-kilovolt Tri-State transmission line was knocked out by the storm, leaving the entire County without power. Outages in specific areas lasted several hours due to the remote locations of certain transmission lines that are only accessible by foot.
- **November 2016** – A strong and moist upper level trough brought a series of heavy snowfall that affected most mountain areas and higher elevation valleys. Generally, 8 to 16 inches were measured across the study area, but some areas recorded over 25 inches.
- **January 2017** – An atmospheric river event followed by cold fronts produced snowfall throughout western Colorado. Pagosa Springs measured 5 to 7 inches, however, locally higher amounts included 53 inches at the Spud Mountain SNOTEL site.

The following data was obtained from three Western Regional Climate Center stations in the Archuleta County area: Pagosa Springs, Ignacio, and Wolf Creek Pass 1E. Table 4.31 contains snowfall and snow depth summaries for the three stations. Figure 4.32 through Figure 4.37 show Pagosa Springs, Ignacio and Wolf Creek Pass stations daily snowfall and snow depth averages and extremes.

Table 4.31 Archuleta County Snowfall and Snowdepth Summaries <sup>1</sup>

Station	Average Annual Snowfall	Snowiest Month/Average Snowfall	Highest Monthly Snowfall	Highest Seasonal Snowfall
Pagosa Springs <sup>2</sup>	116.4	January/30.5	217 January 1937	490.7 1937
Wolf Creek Pass <sup>3</sup>	435.6	March/77.8	209 February 1980	460 1980
Ignacio <sup>4</sup>	38.4	January/10.6	44.6 January 1957	71.8 1952

Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

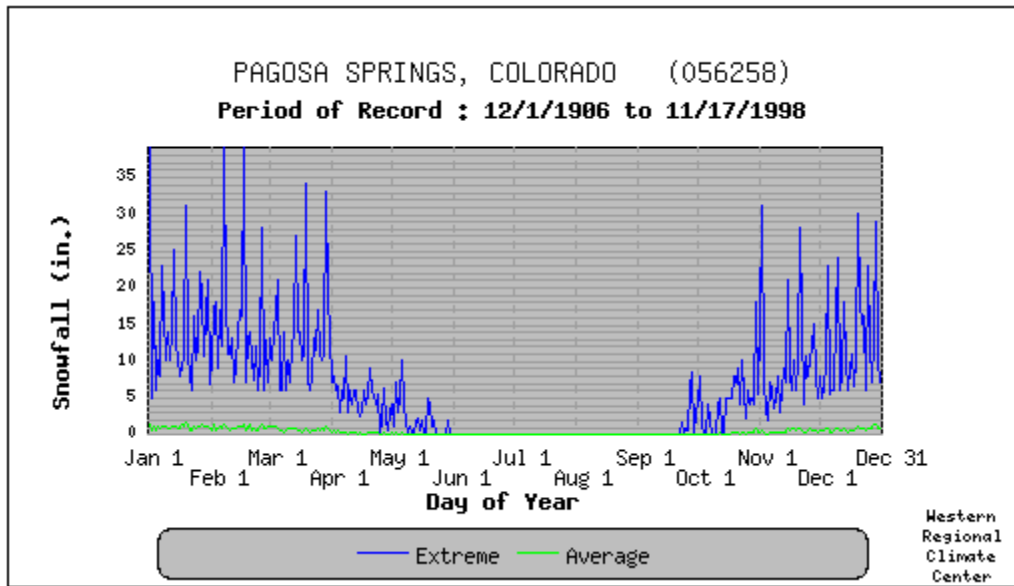
<sup>1</sup>All snowfall and snow depths are reported in inches

<sup>2</sup>Period of record December 1, 1906-November 17, 1998

<sup>3</sup>Period of record December 13, 1957-November 30, 2001

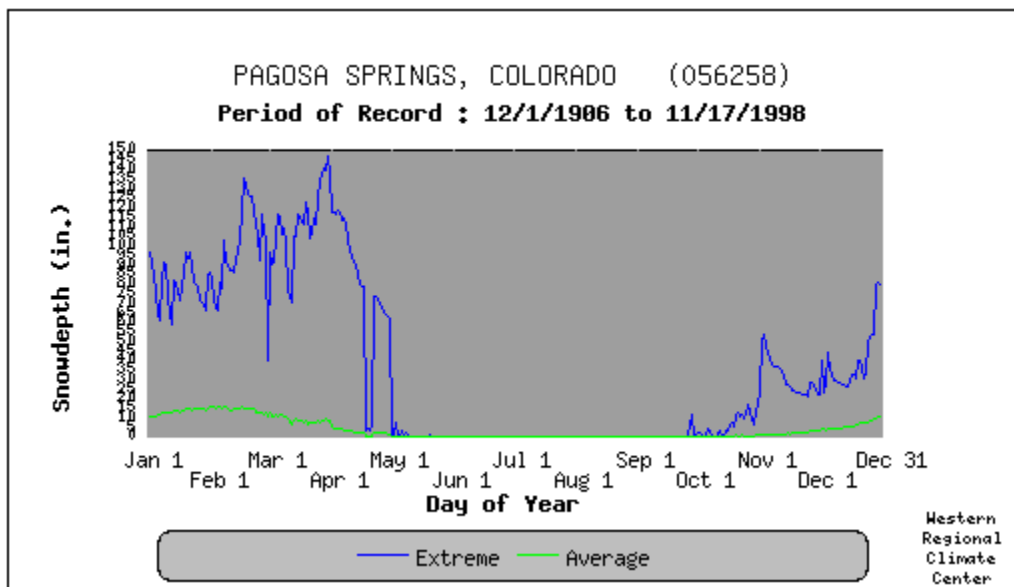
<sup>4</sup>Period of record July 1, 1909-July 31, 1993

Figure 4.32. Pagosa Springs Station Snowfall Average and Extreme: 1906-1998



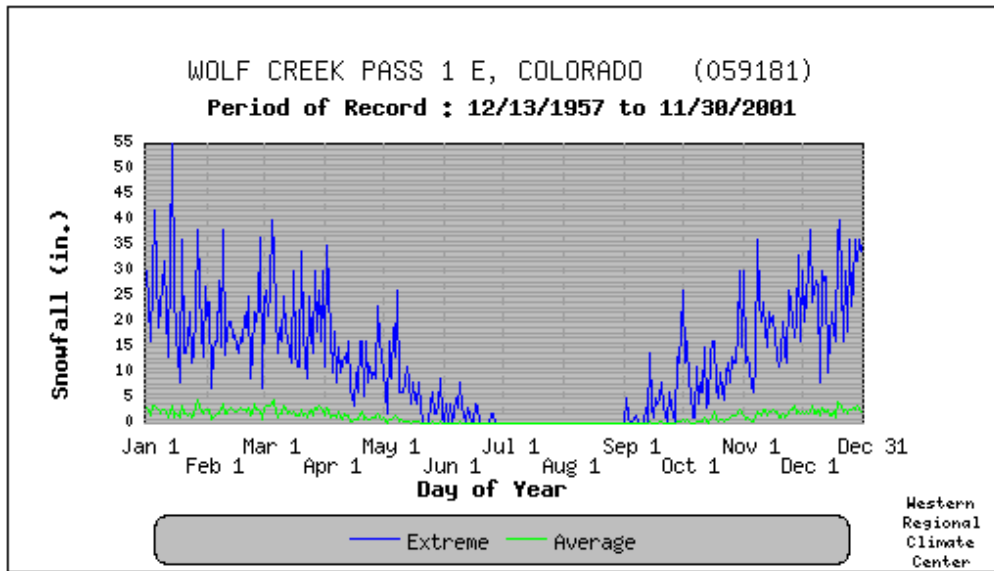
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

Figure 4.33. Pagosa Springs Station Snow Depth Average and Extreme: 1906-1998



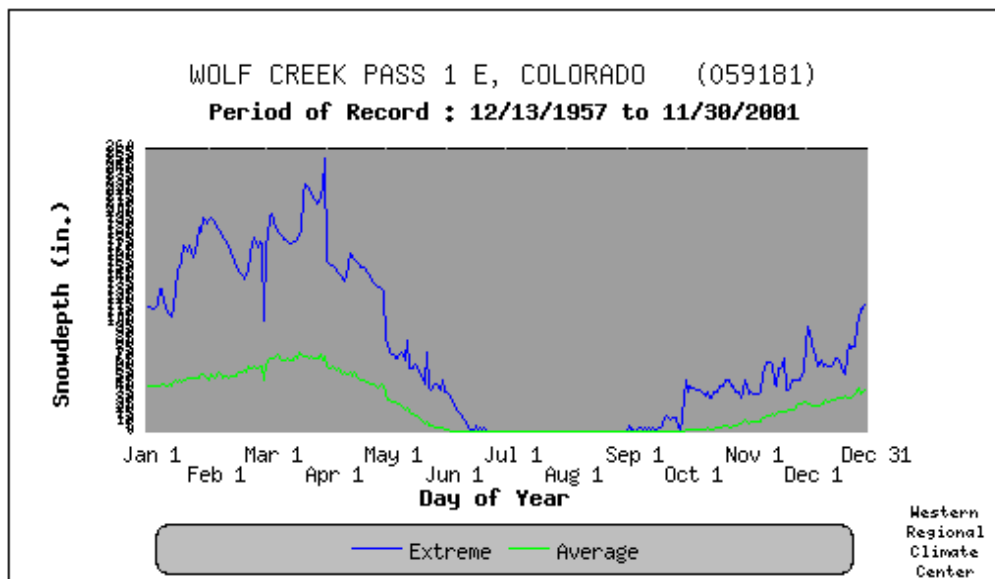
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

Figure 4.34. Wolf Creek Pass 1 E Station Snowfall Average and Extreme: 1957-2001



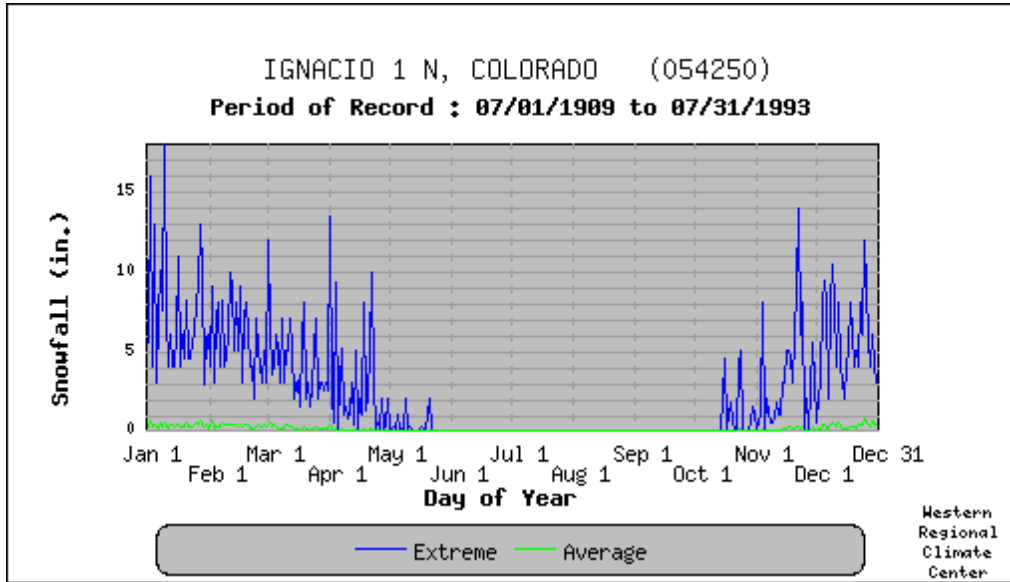
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

Figure 4.35. Wolf Creek Pass 1 E Station Snow Depth Average and Extreme : 1957-2001



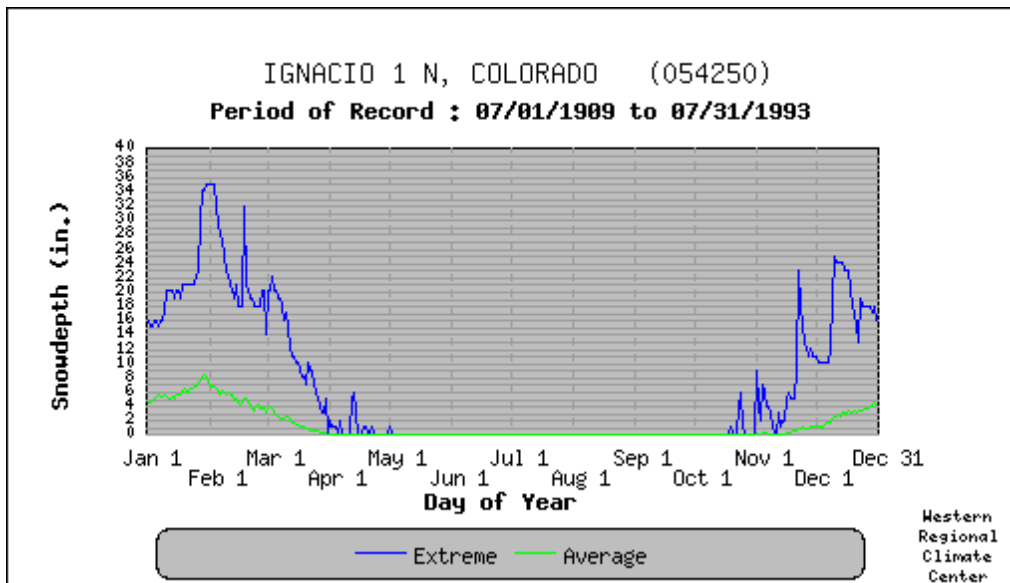
Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

Figure 4 .36. Ign ac io Station Sno wfall Averag e and Extreme : 1909 -1993



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

Figure 4 .37. Ign ac io Station Sno w Depth Averag e and Extreme : 1909 -1993



Source: Western Regional Climate Center, [www.wrcc.dri.edu/](http://www.wrcc.dri.edu/)

According to SHELDUS, there were 36 notable winter weather events between 1960 and December 2007. These events are captured in Table 4.32. Events that are primarily related to extreme cold are profiled in Section 4.3.6 Extreme Cold. An NCEI query returned over 100 winter weather events from 2007-2017, however, none of these events were linked to property or crop damage estimates.

Table 4. 32 Archuleta County Winter Weather Events, 1960-2007 (SHELDUS)

Date	Details	Total Property and Crop Damage
1/14/1960	Snow	\$12
9/2/1961	Snow	\$2,631
1/8/1962	Cold, snow, and wind	\$7,936
9/15/1965	Heavy snow	\$294
10/15/1965	Heavy snow	\$333
4/18/1966	Snow and cold	\$8,015
12/13/1967	Snow	\$294
1/25/1969	Snow	\$27
10/11/1969	Snow	\$1,587
10/29/1969	Snow	\$135
3/1/1970	Heavy Snow	\$312
9/16/1971	Snow and cold	\$793
6/8/1974	Snow, wind, rain	\$79
11/24/1975	Heavy snow, wind	\$21
2/19/1976	Winter storm	\$0
12/5/1978	Heavy snow, cold	\$0
12/17/1978	Ice, heavy snow	\$0
11/19/1979	Blizzard	\$793
3/4/1981	Heavy snow	\$13
2/1/1982	Snow, cold	\$79
12/23/1982	Blizzard	\$801,587
3/14/1983	Heavy snow	\$793
11/26/1983	Snow, wind	\$7,936
12/20/1983	Severe storm, snow	\$1,851
4/19/1984	Snow/wind	\$793
10/10/1986	Snow	\$932
2/1/1989	Snow	\$793
3/2/1992	Heavy snow	\$1,063
1/10/1993	Heavy snow	\$2,777
2/8/1995	Heavy snow	\$40,697
2/20/1996	Heavy snow	\$0
12/8/1998	Winter storm	\$15,000
10/18/2005	Winter weather/mix	\$384
11/30/2007	Blizzard	\$1,428
12/1/2007	Blizzard	\$1,428
<b>Total</b>		<b>\$908,752</b>
Source: SHELDUS, <a href="http://www.cas.sc.edu/geog/hrl/SHELDUS.html">www.cas.sc.edu/geog/hrl/SHELDUS.html</a>		

## Geographical Area Affected

**Extensive** - The entire County is susceptible to severe winter storms.

## Potential Magnitude

According to the Western Regional Climate Center, Wolf Creek Pass has the highest average annual snowfall in the State at 434.8 inches. Wolf Creek also holds the record for the maximum winter snowfall at 807 inches. This extreme amount of snowfall can potentially increase the risk that avalanches will occur in the planning area. Avalanches or heavy snowfall can force road closures, leaving residents of the planning area stranded and interrupting the transport of supplies and services into the area for an extended period.

It is difficult to calculate a reasonable average annual loss estimate, as the damage noted in SHELDUS may reflect only a fraction of the total event damage and may be not specific to Archuleta County. However, based on the information in the table above, the average annualized loss is \$18,175.

Overall, severe winter storm impacts could be **limited**. The residents appear to take the weather in stride as part of mountain living. Most problems with winter storms are related to vehicle accidents. The highest risk will be to travelers that attempt to drive during adverse conditions. Economic impacts occur because of power outages and closing Highway 160 for snow removal and avalanche control.

## Frequency/Likelihood of Occurrence

The HMPC estimates that severe winter storms or blizzards are **highly likely** to occur in any given year. More damaging severe storms may have a slightly lower frequency of occurrence. Based on the data presented above, it is **likely** that a damaging winter storm will occur. According to the SHELDUS data table, damaging severe winter storms occur about every two years (46-year period of record divided by 24 events).

Climate change has the potential to exacerbate the severity and intensity of winter storms, including potential heavy amounts of snow. A warming climate may also result in warmer winters, the benefits of which may include lower winter heating demand, less cold stress on humans and animals, and a longer growing season. However, these benefits are expected to be offset by the negative consequences of warmer summer temperatures.

## 4.3.15 Volcano

### Hazard Problem/Description

A volcano is a mountain formed by the eruption of subsurface material including lava, rock fragments, ash, and gases, onto the earth's surface. Volcanoes produce a wide variety of hazards that can damage and destroy property and cause injury and death to people caught in its path.

Hazards include those related to volcanic activities such as: eruption columns and clouds, volcanic gases, lava/pyroclastic flows, volcanic landslides, and mudflows or debris flows (called lahars). Large explosive eruptions can cause damage several hundred miles away from the volcano, primarily from ashfall.

Based on the evidence of past activity, volcanoes can be considered “active”, “dormant”, or “extinct.” “Active” volcanoes usually have evidence of evidence of eruption during historic times. Volcanoes have a wide degree of variability in their eruptions, from mild lava flows to large explosions that eject tons of material and ash into the air. The degree of volcano hazard depends largely on if the volcano has a reasonable probability of erupting, the nature of the eruption, and the associated hazards that may be triggered.

### **Past Occurrences**

There are 20 active or potentially active volcanoes in the United States. The most volcanically active regions in the U.S. are in Alaska, Hawaii, California, Oregon, and Washington. The closest areas of potentially active volcanoes and volcanic hazards are in New Mexico (Figures 1 and 2). Northern New Mexico volcanic centers that have potential volcanic hazards include, from north to south: the Raton-Clayton, Taos, the Jemez, and Zuni-Bandera volcanic fields. The only volcano in Colorado that has erupted during the Holocene (during the last 11,000 years) is Dotsero Volcano, which last erupted approximately 2,200 years ago and consists of a maar volcano, basaltic lava flows, and scoria cones (Smithsonian Global Volcanism Program, 2010). Dotsero is considered a moderate-threat volcano (Ewert et al., 2005) because explosive eruptions could eject enough ash into the air to pose a threat to aviation. However, given the type of volcanism and its location in north-central Colorado, Dotsero is too distant to pose a hazard to the county of Archuleta.

Although hot springs are often associated with young volcanic activity, the hot spring activity at Pagosa Springs is not considered to be associated with a volcanic heat source. Rather there is evidence that thermal waters are heated during circulation into sedimentary horizons of the Colorado Plateau and deeper circulation into Precambrian basement rocks (Pearl et al., 1978; Galloway, 1980; Goff, 1994).

The only potential volcanic hazard to Archuleta County would be from ashfall from a distant, large explosive eruption. Hazards from volcanic ashfall include:

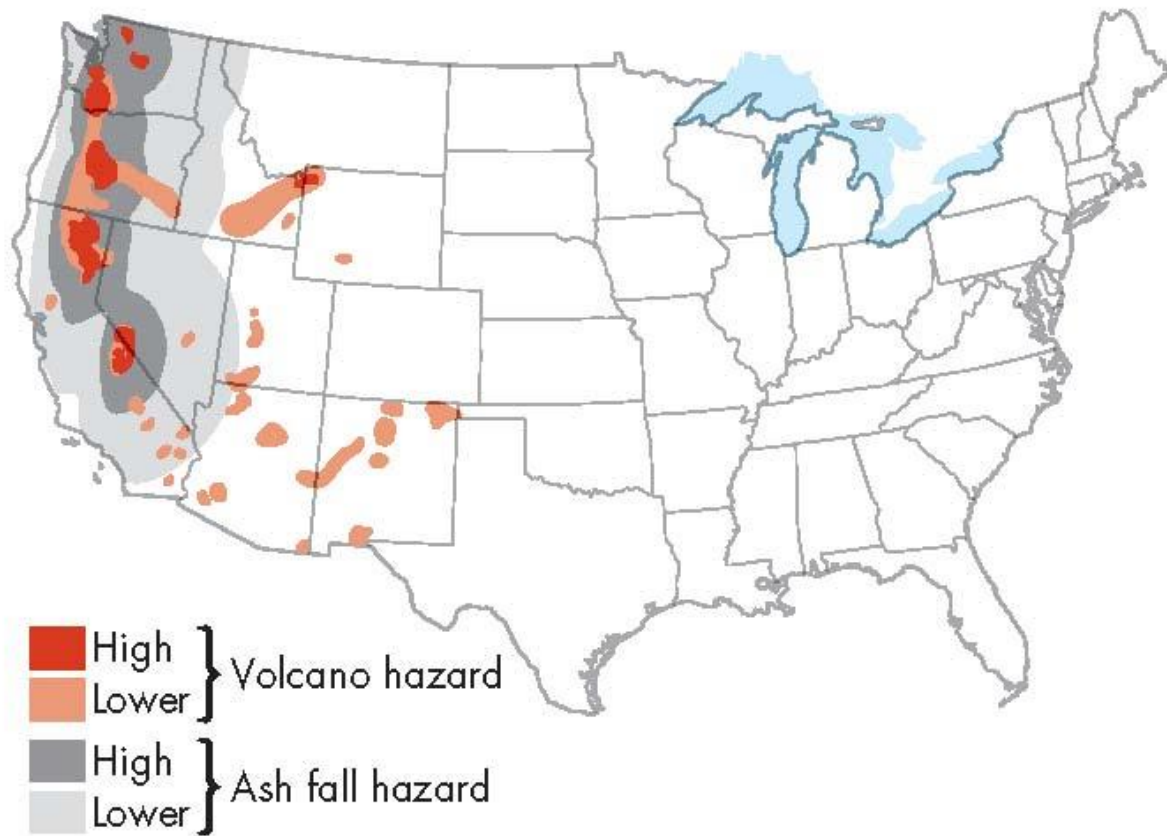
- Short-circuits and failure of electronic components, especially high-voltage circuits and transformers (wet ash conducts electricity).
- Eruption clouds and ashfall commonly interrupt or prevent telephone and radio communications.
- Volcanic ash can cause internal-combustion engines to stall by clogging air filters and damage the moving parts. Engines of jet aircraft have suddenly failed after flying through clouds of even thinly dispersed ash.



- Roads, highways, and airport runways can be made treacherous or impassable because ash is slippery and may reduce visibility to near zero.
- Ash also clogs filters used in air-ventilation systems to the point that airflow often stops completely, causing equipment to overheat.
- Crop damage can range from negligible to severe, depending on the thickness of ash, type and maturity of plants, and timing of subsequent rainfall.
- Like airborne particles from dust storms, forest fires, and air pollution, volcanic ash poses a health risk, especially to children, the elderly, and people with cardiac or respiratory conditions, such as asthma, chronic bronchitis, and emphysema (USGS, 2004).

Many geologically recent large explosive eruptions (e.g., Mt. St. Helens, WA; Yellowstone, WY; Long Valley Caldera, CA; Valles Caldera, NM) have distributed ash over a large area of the U.S., including the area of Archuleta, Colorado (Figure 3). The amount of ashfall deposits from a distant eruption in Archuleta County would likely be less than 5 cm thick (Figure 1). The most likely source of a nearby explosive eruption is the Jemez Mountains, located approximately 70 miles south of Archuleta County in northern New Mexico. Voluminous explosive eruptions at 1.6 and 1.2 million years ago formed the Valles Caldera and erupted over 90 cubic miles of ash and rock, forming the Bandelier tuff. Ash from this eruption traveled hundreds of miles. The most recent volcanic eruptions in the Jemez Mountains were approximately 50,000 years ago (Reneau et al., 1996), and deposited significant ashfall in eastern New Mexico and several decimeters of ashfall in Santa Fe (Wolff et al., 2010). Based on temporal and petrologic patterns of volcanism and seismologic data indicating a low-velocity zone at depth, Wolff and Gardner (1995) suggest that the most recent eruption in the Jemez Mountains may be the beginning of a new cycle of volcanic activity rather than the end of the last cycle of activity. The San Juan volcanic field, located in the San Juan Mountains of southwestern Colorado, is an area of Oligocene to Pliocene volcanic activity, and is not considered to be a volcanic hazard. Older large explosive eruptions formed numerous calderas in the San Juan volcanic field.

Figure 4.38. Volcanic Hazards in the United States based on activity during the last 15,000 years (U.S. Geological Survey)



Red and orange areas show higher and lower risk of local volcanic activity including lava flows, ashfall, lahars, and debris avalanches; whereas gray shaded areas show regions at risk of receiving 5 cm or more of ashfall from large explosive eruptions (as compiled by Mullineaux, 1976).

Figure 4.39. Locations of potentially active and active volcanoes with respect to major population centers in the western United States (modified from Wright and Pierson, 1992)

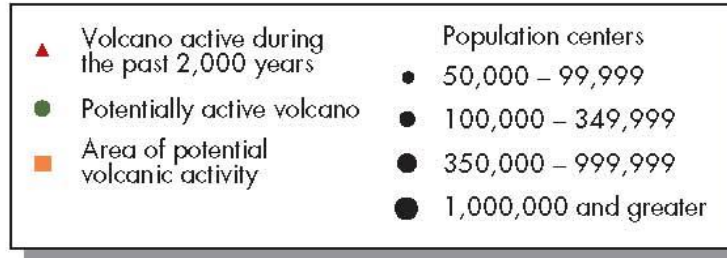
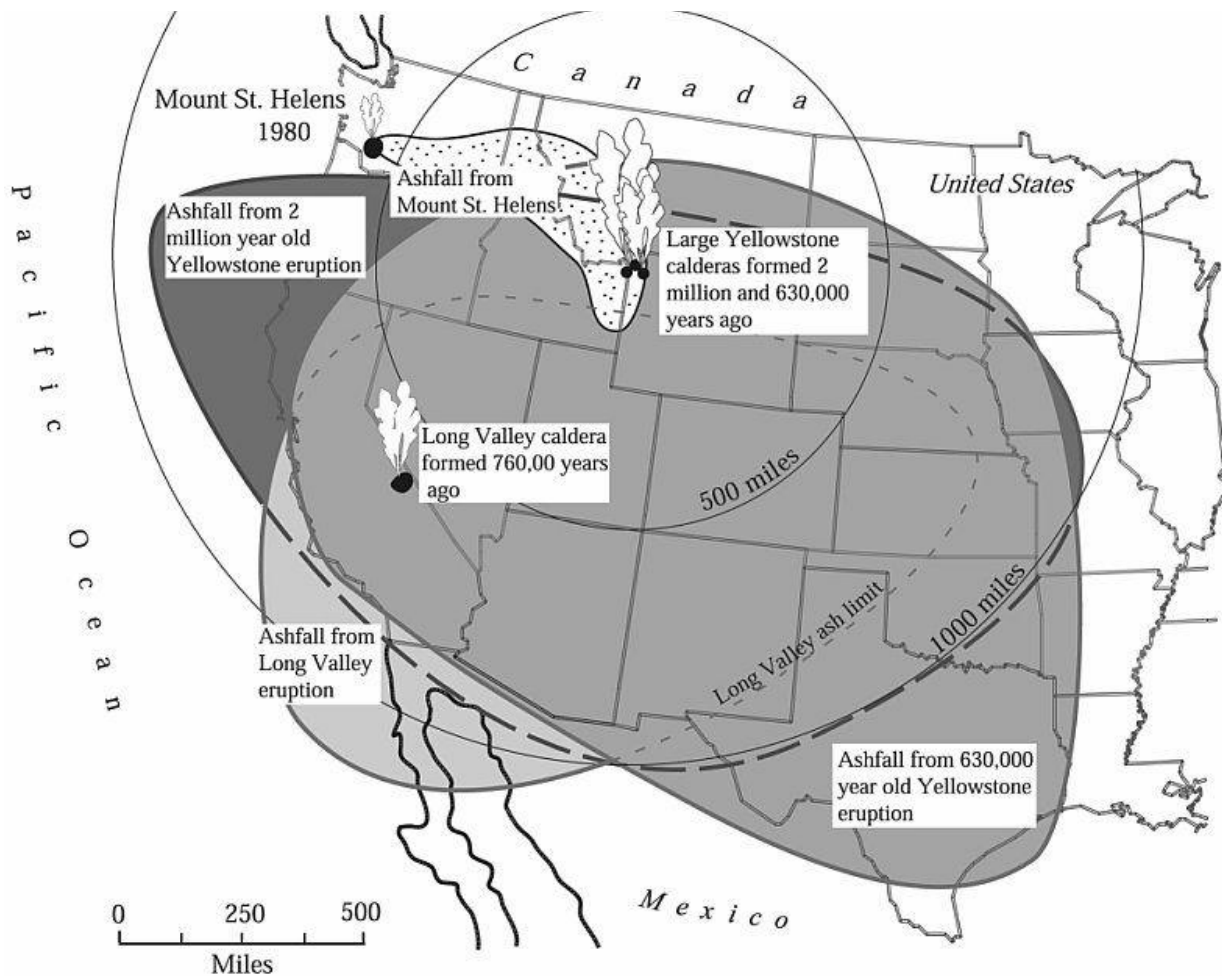


Figure 4.40. Areas of the United States that once were covered by volcanic ash from major eruptions



Ashfall distribution from Yellowstone's giant eruptions 2 million and 630,000 years ago, compared with ashfall from the 760,000-year-old Long Valley caldera eruptions at Mammoth Lakes, California, and the 1980 eruption of Mount St. Helens, Washington (adapted from Sarna-Wojcicki, 1991).

### Geographical Area Affected

**Limited:** There are no sources of volcanic hazards in Archuleta County, Colorado. However, Archuleta County could be affected by ashfall from explosive eruptions at distant active and potentially active volcanoes in the western U.S., especially nearby northern New Mexico.

### Potential Magnitude

Based on the information provided in this profile, the potential magnitude of the volcanic hazard is considered **negligible**.

## Frequency/Likelihood of Future Occurrence

**Unlikely:** The closest source of ashfall from an explosive eruption is the Jemez Mountains in northern New Mexico, 70 miles south of Archuleta. Based on historic data (most recent volcanic activity in the Jemez ended approximately 50,000 years ago), it is highly unlikely that volcanic activity will resume any time soon. An explosive eruption from the Cascade Range, Yellowstone, or the Long Valley Caldera is much more likely, but would likely result in less than 5 cm of ashfall deposits and would pose a minimal hazard to Archuleta.

### 4.3.16 Wildland Fire

#### Hazard/Problem Description

Wildland fires are an ongoing concern for Archuleta County. The predominant values at risk are the population, residences, and businesses of the wildland-urban interface (WUI) communities. Habitat, watersheds, travel corridors, infrastructure systems, and cultural and natural resources are among the extensive list of additional significant values at risk within the county.

Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in the air. These conditions, when combined with high winds and the impacts of seasonal or prolonged drought and frost killed brush increase the potential for a wildland fire to occur. A fire along the urban/rural interface can result in major losses of property and structures. Limited access in some parts of the County complicates evacuation and control options and constitutes serious life risk to residents and firefighters alike.

In wildland fire vernacular, hazard is described in terms of fuel characteristics, i.e. the vegetation available to combustion. Risk is considered in terms of probability and analyzed through historic fire records, while values at risk are determined by potential loss in a wildland fire. Fire danger refers to a combination of fuel moisture and weather conditions that combine with topography and other fuel characteristics to determine fire behavior as manifested in fire intensity and rate of spread.

- **Fuel**— Vegetative fuels are characterized by size, vertical arrangement, continuity, and quantity and are often classified in terms of fire behavior fuel models (FBFM). These fuel characteristics determine responsiveness to weather conditions and ignition. Fuel sources are diverse and include ground fuels (roots, duff), surface fuels (forest litter, dead and down twigs and branches, grass, shrubs), and aerial fuels (the canopies of forest and brush). Manmade structures and other associated combustibles are also considered fuel sources. Light surface and canopy fuels, such as cured grasses and drought stressed tree crowns, burn quickly and serve as a catalyst for rapid fire spread.
- **Topography**—An area's terrain and land slopes affect its susceptibility to wildland fire spread. Fire intensities and rates of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The natural arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.

- **Weather**—Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildland fire. High temperatures and low relative humidity dry out the fuels that feed the wildland fire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most influential weather factor for fire intensity and the direction and rate of fire spread. Winds can be significant at times in Archuleta County. In addition to high winds, wind shifts can occur suddenly due to frontal passage, temperature changes, or the interaction of wind with topographical features such as slopes or steep hillsides. Seasonal and episodic drought effects fuels' availability for combustion.
- **Ignitions**—Wildland fires are ignited by natural causes, predominately lightning, or human causes. Federal agencies categorize human caused in terms of equipment, smoking, campfires, debris burning, railroads, and arson. Human caused ignitions are associated with travel corridors, population centers, recreational use, and commercial activities. A concern in Archuleta County is that structure fires in rural areas may be sources of wildland fires, as response times can be significant in the more remote areas of the County.

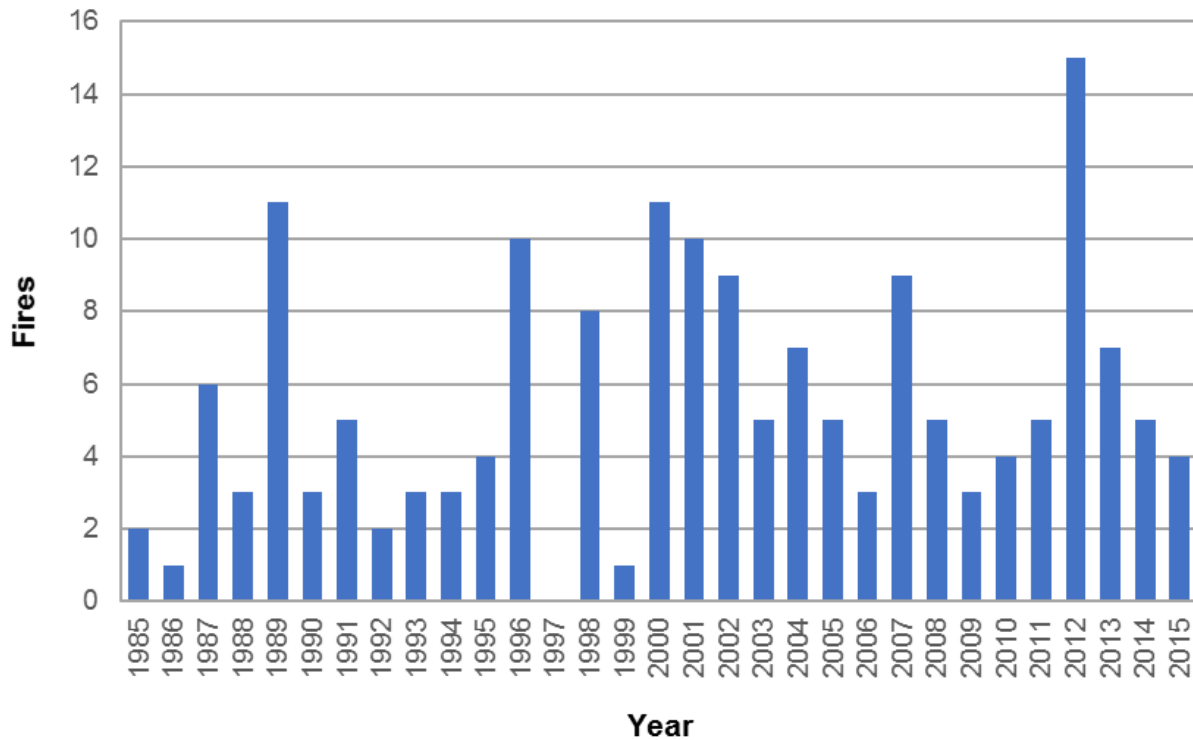
An additional hazard associated with wildfire is debris flow. Wildfires could potentially result in the destabilization of pre-existing deep-seated landslides over long time periods. Post-fire geologic hazards can occur in the years immediately after wildfires catalyzed by high intensity rainfall events. Debris flows are particularly hazardous because they can occur with little warning, can exert great impulsive loads on objects in their paths, can strip vegetation, decrease soil strength, destroy root systems, block drainage ways, damage structures, and endanger human life. See **4.3.10 Landslide/Rockfall/Debris Flow** for further description and analysis.

### **Past Occurrences**

An analysis of historic fire records helps to define the area's fire season and patterns of fire occurrence over time and by jurisdiction. The most comprehensive fire data was available from the Departments of Agriculture and Interior as processed by the United States Geological Survey (USGS: [http://wildland.fire.cr.usgs.gov/fire\\_history/data.html](http://wildland.fire.cr.usgs.gov/fire_history/data.html)). Some local fire data were available for the last decade.

Archuleta County is 1,356 acres in size. While there are 5,837 acres of Bureau of Land Management (BLM) land in the county, these are managed in concert with the USFS lands through the San Juan Public Lands Center. Fire occurrence since 2001 has been consistent in respect to jurisdiction, but not necessarily proportional to area. The land area of Hinsdale County within the Archuleta County Response Area covers 188,858 acres. Approximately 96% of this area is managed by the USFS. The Colorado Division of Wildlife (CDOW) manages 0.3% of the land, and the remaining 4% is privately owned. The total acreage in the portion of Mineral County that falls within the Archuleta County Response Area is 143,402. The USFS manages 95% of this area, while private ownership accounts for the remaining 5%.

Figure 4.41 . Number of Wildland Fires \* in Archuleta County by Year: 1985-2015



\* Fires >10 acres  
 Source: Federal Wildfire Occurrence Data, 2015

While wildland fire potential can persist throughout the year, over 93% of wildland fires in Archuleta County occur from May through September with 76% occurring in June, July, and August. This well-defined fire season is helpful for planning suppression resource availability. Identifying the fire season also helps define which weather and fuel moisture records should be used to model wildland fire behavior.

Wildland fire occurrence depends on the coincidence of an ignition source and a receptive fuel. As such, fire occurrence is typically associated with year to year fuel moisture and weather conditions and can appear rather stochastic. This can be seen when looking at fire occurrence for the last decade, where there seems to be no discernable pattern of fire occurrence over time or by jurisdiction. However, the federal fire data for the three decades appear to reveal significant trends, with fire occurrence increasing over time. While annual fire occurrence hovered near twenty for most of the 1980's, the last decade had only a single year with less than forty fires. The average annual fire occurrence on federal lands within Archuleta County has increased from twenty-eight in the 1980's, to forty-four in the 1990's, and seventy-three in the last decade.

The cause of wildland fire ignition can help guide prevention activities. While human caused ignitions during the same three decades do not exactly mirror total fire occurrence on a year by year basis, there is a similar overall upward trend (Table 4.33). Years with a high percentage of human ignitions are sometimes a function of few lighting fires (e.g. 1984, 1985, 1999) and

sometimes reflect a jump in the number of human ignitions (e.g. 1998, 2008). It is significant that humans frequently account for over 40% of ignitions in Archuleta County (Figure 4.33).

Table 4.33 Human Caused Ignitions in Archuleta County by Decade and Acres Burned

Decade	Number of Wildfires*	Number of Human Caused Ignitions	Percent of Fires Caused by Humans	Average Acres Burned per Year
1980s	26	11	42%	105
1990s	40	19	48%	5,568
2000s	63	40	63%	9,973
2010s	40	16	40%	14,934

\*Fires >10 acres

Source: Federal Wildland Fire Occurrence Database

Table 4.34 Fire Activity by Decade

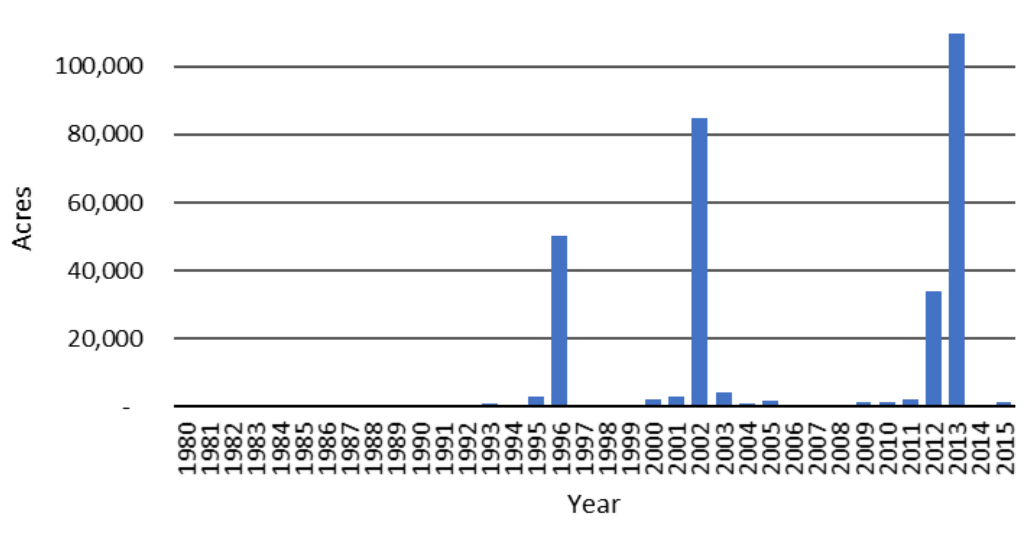
Decade	Average Number of Wildland Fires per Annum	Average Number of Human Caused Ignitions per Annum	Average Acres Burned per Annum
1980s	28	8	79
1990s	44	16	236
2000s	73	19	1139

Source: Federal Wildland Fire Occurrence Database

A single large fire driven by a wind event can tremendously skew an analysis of fire size, as the 1996 Dipping Vat Fire (aka Archuleta Mountain Fire) does in this case. This should not obscure the fact that there has been a general trend of increasing acres burned per annum. If we exclude the 16,456-acre Dipping Vat of 1996, the average annual acres burned on federal lands within Archuleta County has increased from seventy-nine in the 1980's, to 236 in the 1990's, and 1139 in the last decade.



Figure 4.42. Acres Burned in Archuleta County by Year



Source: Federal Wildland Fire Occurrence Database

The Dipping Vat Complex and the Bolt Fire are among the larger fires within Archuleta County in recent decades and illustrate the potential for large fires in the area. For example, though the Dipping Vat Complex burned no structures, its suppression still required the sustained efforts of over 1,000 fire personnel and multiple aircraft to contain it at a cost exceeding an estimated \$3 million. This cost does not include recovery and rehabilitation. In contrast, the Rio Blanco fire of 2005 was managed for resource benefit and allowed to burn, eventually growing to more than 1200 acres.

The Missionary Ridge Fire that originated in neighboring La Plata County is especially instructive when considering values at risk in the WUI. This 71,000-acre blaze was the result of a human ignition. The fire burned 56 homes, 27 other buildings, and forced the evacuations of more than eighteen subdivisions over the course of three weeks. While the total cost of this fire exceeded \$152 million, the heaviest toll was the loss of firefighter Alan Wyatt who was killed by a falling tree. The significance and potential impact of the wildland fire hazard in this area should not be underestimated.

In recent years, the Weber Fire of 2012 started on June 22, 6 miles south of Mancos. This human caused event instigated the evacuation of several subdivisions and lead to numerous road closures. Additionally, a communications tower was temporarily off line as power to the facility was interrupted by the fire. The event lasted for over 2 weeks, resulted in \$15,000 of property damage, and burned over 10,000 acres on both private and public land.

In June 2013, the West Fork Fire burned over 58,500 acres northeast of Pagosa Springs. This fire involved in a complex of wildfires surrounding Wolf Creek Pass. Other fires in this series include the Papoose Fire south of Creede, and the Windy Pass Fire near Wolf Creek ski area. The West

Fork Fire was significantly exacerbated by high winds and tree mortality associated with the spruce beetle. South Fork and Wagon Wheel Gap were evacuated, and Highway 160 and State Highway 149 were closed west of South Fork.

Table 4.35 Significant Wildland Fires in Archuleta County 1989 – 2017

Fire Name	Acres Burned	Date
Windy Pass Fire	1,417	06/13/2013
West Fork Fire	58,576	06/05/2013
Weber Fire	10,000	06/22/2012
Little Sand Fire	24,931	05/14/2012
Sambrito 2 Fire	535 (Half in Archuleta)	08/24/2011
Devil Creek Fire	234	07/17/2003
Bolt Fire	2,160	07/15/2003
Missionary Ridge Fire	71,000 (330 ac in Archuleta)	06/09/2002
Cabezzone Fire	796	08/02/2000
Cabezzone South Fire	330	06/08/2000
Dipping Vat (Mt. Archuleta) Fire	16,456 (started in NM)	06/10/1996
Snow Springs #2 Fire	406	04/27/1996
Vigil Mesa Fire	200	1989

Source: Archuleta County CWPP (2008, amended 12/2011), NCEI

### Urban Fire History

The populated areas of Archuleta County are not only at risk from wildland fires, but there is also a substantial history of urban conflagration in Pagosa Springs. A series of fires from 1919 to 1943 significantly impacted the Town’s business district. In May of 1919 one fire burned four businesses including the telephone building. A second fire six months later swept through the offices of the USFS, the Red Cross, and several local government and court offices. Fortunately, many of the irreplaceable public records were saved.

In 1921, at least nine businesses were damaged or destroyed, prompting the town to adopt an ordinance allowing only “fire proof” masonry and steel construction in the business district. This fire was initially almost brought under control after four businesses burned, but the failure of the water supply system resulted in the additional losses.

Nine businesses and an apartment building were damaged or destroyed during the 1943 fire that consumed a downtown block within twenty minutes. There was one fatality and four serious injuries during this incident. Mutual aid was provided by the USFS, Durango, and Monte Vista. Many of the effected businesses quickly reopened in temporary locations.

This history highlights several key points. The local fire service has a strong history in the area, repeatedly preventing the loss of the entire town, a very real possibility in the early twentieth century. The limits of the municipal water distribution system have proven a key factor in past fire suppression operations. There has been a demonstrable local need for continuity of government and business planning, and a history of success in this area through ad hoc methods.

### **Forest Health Issues**

The majority of the county's WUI is in the Gambel oak, ponderosa pine, and dry mixed conifer vegetation. These vegetation communities are adapted to frequent fire occurrence and are more out-of-sync with their natural fire cycles due to fire exclusion as compared to the more moist aspen and mixed conifer of the upper elevations. It is estimated that approximately 85% percent of these are in condition class 3 or in a state of "high departure" from historic conditions (USFS, 10-Year Strategy: Pagosa Ranger District, undated). As a result, the most hazardous fuels are in all likelihood concentrated around the highest value areas.

The forests of southwest Colorado have also been subjected to numerous insect infestations over the past decade. Prior to 2004 the Ips beetle impacted piñon pine. The spruce bark beetle is heavily impacting the Mineral County and moving throughout Archuleta County. Outbreaks of spruce budworm and the Douglas fir beetle, frost kill in oak brush, as well as a general decline in aspen health are also taking a significant toll on the local forests.

### **Geographical Area Affected**

**Significant:** The net result of a history of fire exclusion and the decline in forest health is a more volatile fuel bed throughout the county. Virtually all vegetation communities and elevations have been affected to some extent. There are discernable trends for increases in ignitions, acres burned, and population, making the potential loss from wildland fires a significant concern.

Most of fires larger than fifty acres have occurred in the predominately light fuels of the southwest corner of the county as seen in Figure 4.43 below. Further study would be required to determine if this is a result of fuels, wind patterns, access, suppression response, or a combination of factors. The entire county is susceptible to wildland fire resulting from lightning or human cause. Figure 4.44 illustrates the highest wildland fire hazard areas based on fuels, aspect, and slope in relation to the location of the County's population.

Figure 4.43. Archuleta County Wildland Fire Occurrences Greater than 10 Acres, 1980-2015

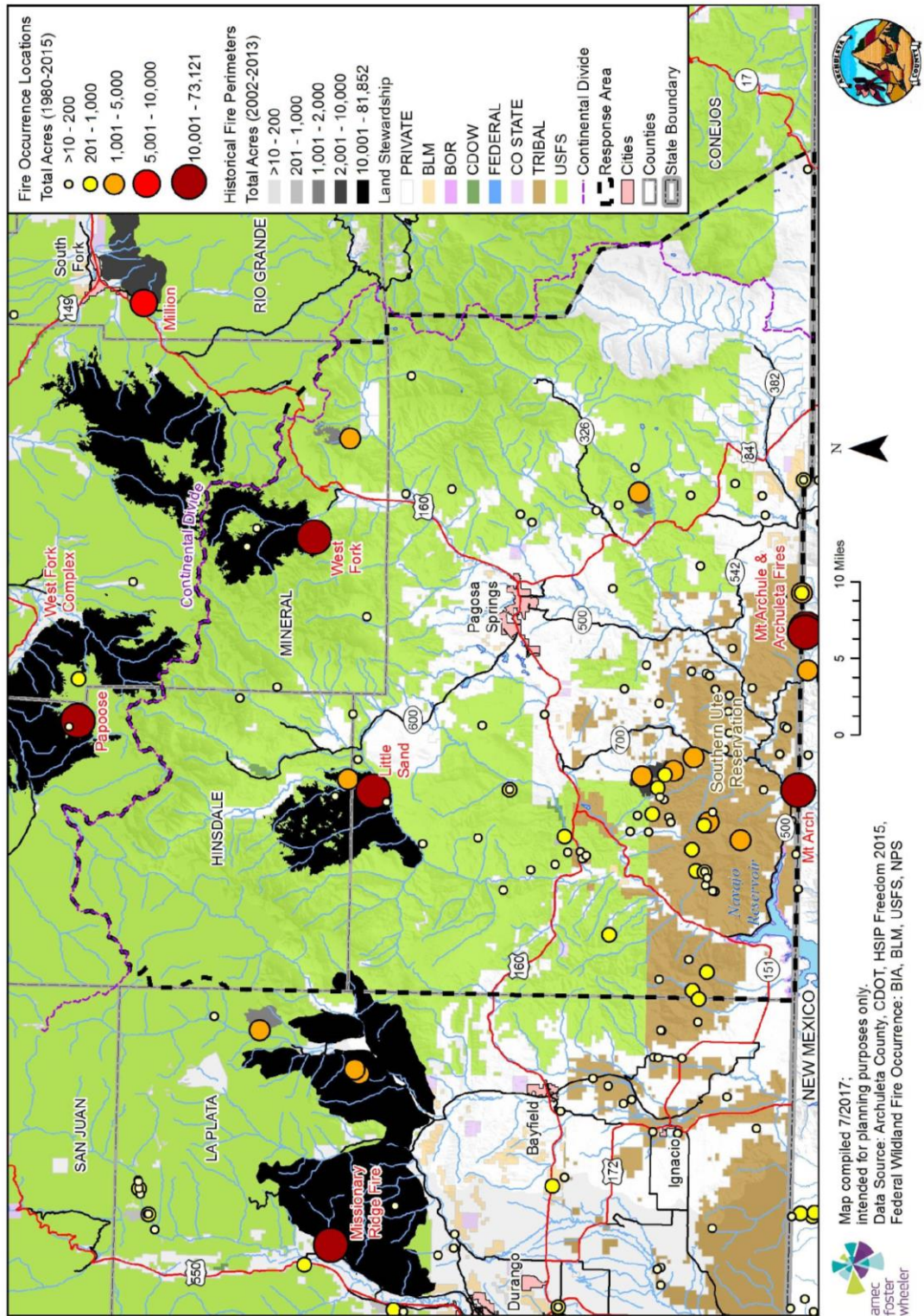
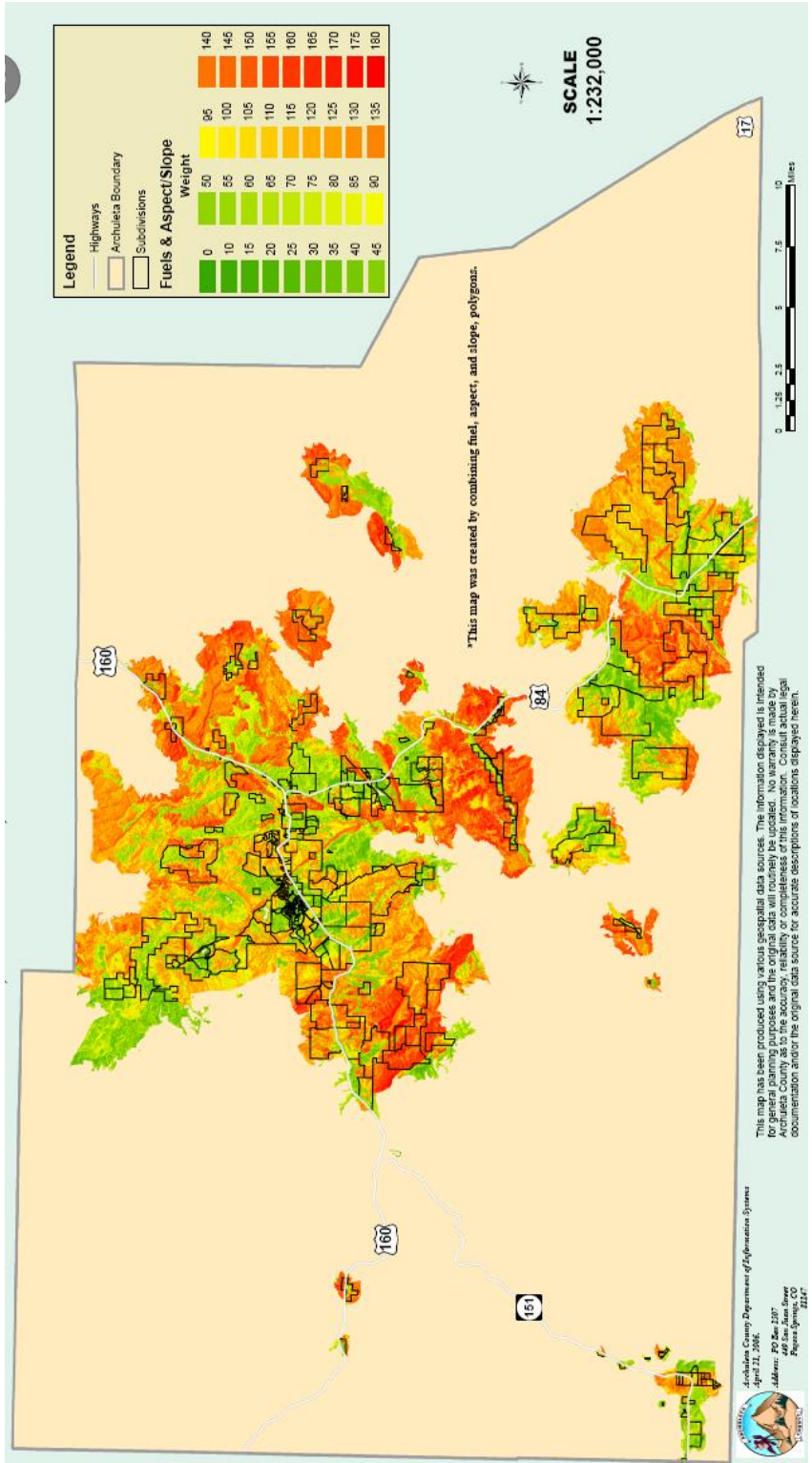


Figure 4 .44. Archuleta County Community Combined Fuels, Aspect, and Slope Polygons



## Potential Magnitude

The potential magnitude of a wildland fire in the Archuleta County response area could be **critical**. It is a practical certainty that wildland fires will occur every summer in Archuleta County. The alignment of ignition, fuel and weather conditions, and values at risk that will produce a catastrophe is impossible to predict. But, as fuels become more hazardous and the county more populous, the potential for significant loss continues to increase.

Wildland fire poses a major public safety hazard in Archuleta County. Life safety and human health are serious concerns due to most of the County being considered a wildland urban interface area, and high influx of visitors during the prime wildland fire months. Wildland fire has the potential to cause widespread and severe damage to watersheds and property in the planning area. Although a natural process, wildland fires can mar scenic view-sheds, potentially reducing property values and negatively impacting the tourism-based economy. Fires can be intensified by drought, as was observed during the 2002 drought.

In addition to direct costs from wildland fire, the cost of a fire's impacts and rehabilitation can also be substantial. As an example, the Missionary Ridge Fire of 2002 was approximately \$1,280 per acre while the total costs, including impacts and rehabilitation, nearly doubled to over \$2,160 per acre (Kurt Makes et al. Journal of Testing and Evaluation, March 2007). Loss estimates from wildland fires are discussed further in the wildland fire vulnerability section.

## Frequency/Likelihood of Occurrence

**Highly Likely**— It is a virtual certainty that wildland fires will occur in Archuleta County every year. However, most are of low significance with limited extent and magnitude. A large-scale fire of 1,000 acres or greater has approximately a 10% chance of occurring in any given year, according to estimates from the USFS. The extent of such a fire would likely still be limited, affecting 10% to 25% of the planning area. The significance of a 1,000+ acre fire would range from medium to high, depending on where the fire was located. A fire of 10,000 acres in size or more is even less likely to occur in any given year, but the impact would be much greater. The number, extent, and severity of these fires are subject to numerous climatic, weather, and stochastic factors. Historic trends and the condition of the local forests indicate that the occurrence of a large fire is a matter of time.

There is extensive evidence that wildfires across the western United States have been increasing and will likely continue to increase in the future. A 2006 study found a fourfold increase in the number of wildfires since 1986 compared to the 1970–1986 period, with a six-fold increase in burned acreage. Those results were attributed to a 78-day increase in active wildfire season and a fivefold increase in average fire duration. Much of that, in turn, can be attributed to earlier snowmelt and hotter summertime temperatures. Tree-ring records of fire scars and debris found in alluvial fans show that warmer and drier periods are associated with more frequent and severe wildfires. Given that climate projections indicate continued advance in snowmelt timing and increasing summer temperatures, wildfire conditions across the West are likely to worsen in the

future. More intense wildfires can produce highly erodible soils that can lead to increased sediment loading in reservoirs and streams, damaging water infrastructure and degrading water quality.

### **4.3.17 Wildlife Hazards**

#### ***Hazard/Problem Description***

##### ***Wildlife-Vehicle Collisions and Wildlife Encounter Issues***

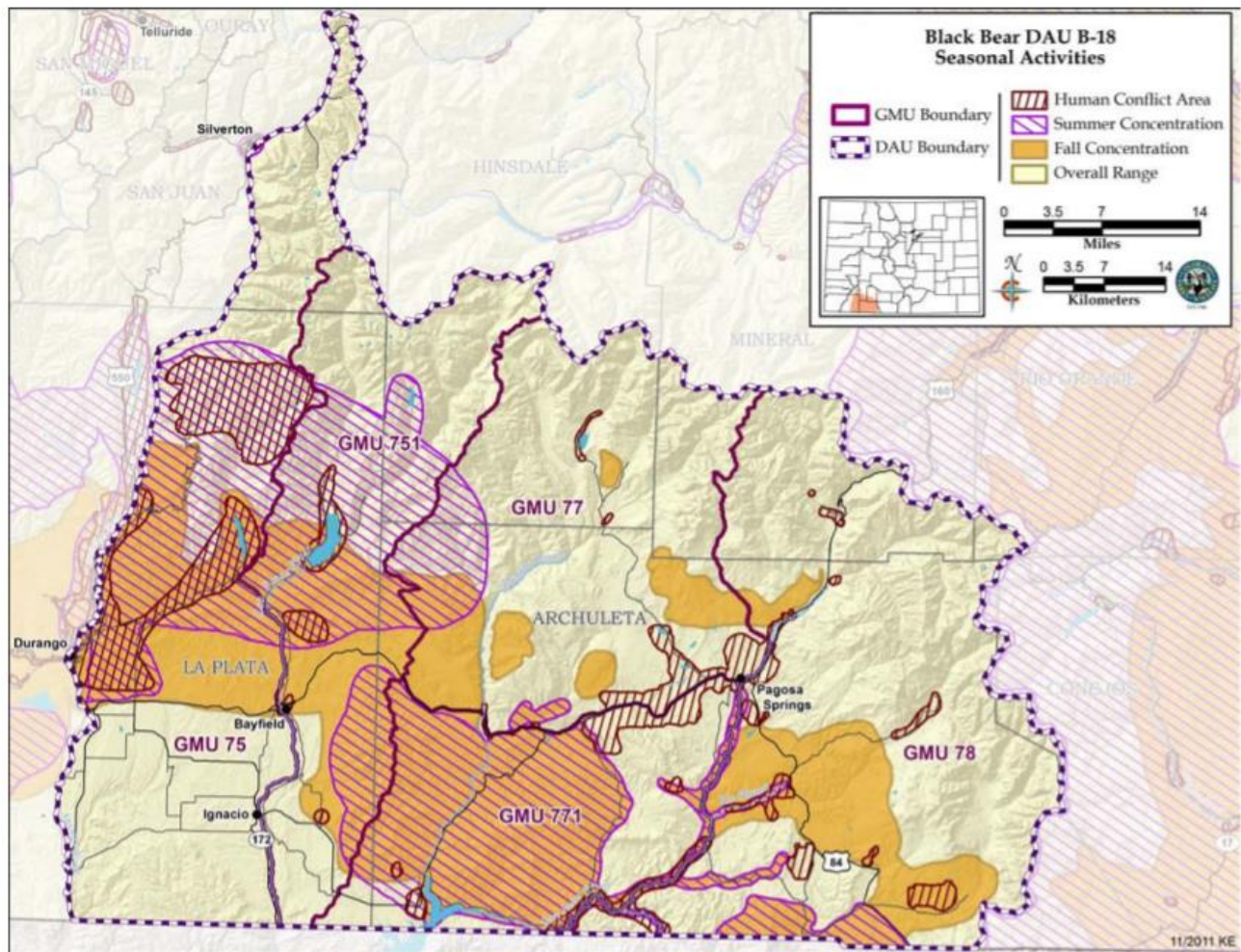
Although traffic in the planning area is relatively low, animal-vehicle collisions are a prominent issue to discuss. Most animal-vehicle collisions (AVCs) in the area involve deer. Other large wildlife in the area include lynx, big horn sheep, mountain lions, elk, and black bears.

Traffic in the area increases seasonally during ski season. If the proposed Village at Wolf Creek were completed, CDOT estimates that the rate of traffic could increase from roughly 2,000 vehicles a day to 20,000 during the peak recreational season. This could increase exposure to wildlife-vehicle hazards in the County.

##### ***Wildlife-Human Hazards***

In addition to wildlife-vehicle collisions, residents of the planning area also face wildlife encounters. Bears are known for clawing utility poles and getting into garbage cans. People also need to be wary in the Pagosa Junction and Juanita areas along County Roads 500 and 551. The autumn concentration area for black bears is expansive and covers much of the County, especially in the south and the west. Much of this area is public lands, so outdoor recreationalists in these areas need to be especially alert during the fall when bears are foraging for food to sustain them during hibernation. CDOT/USFS GIS data indicates that the human conflict areas for mountain lions and black bears are mainly in the Pagosa Springs area. During the summer, black bear territory tends to be relegated to the southwestern portion of the County. Figure 4.45 below identifies the black bear concentration areas, highlighting the human conflict area surrounding Pagosa Springs, as well as the fall concentration that extends from southeastern Hinsdale County to the southeast corner of Archuleta County.

Figure 4.45. Seasonal Black Bear Activity in Response Area



Source: Colorado Parks and Wildlife, 2013

Although the mountain lion-human conflict area is centered in Pagosa Springs, the mountain lion territorial range extends over the entire County. Elk migration corridors exist along Highway 160 on either side of Pagosa Springs and along much of Highway 84. Mule deer migration corridors are mapped along Highway 84 near Pagosa Springs and along most of Highway 160 and 151 in the western half of the County. The mapped migration corridors for elk in Archuleta County are much larger.

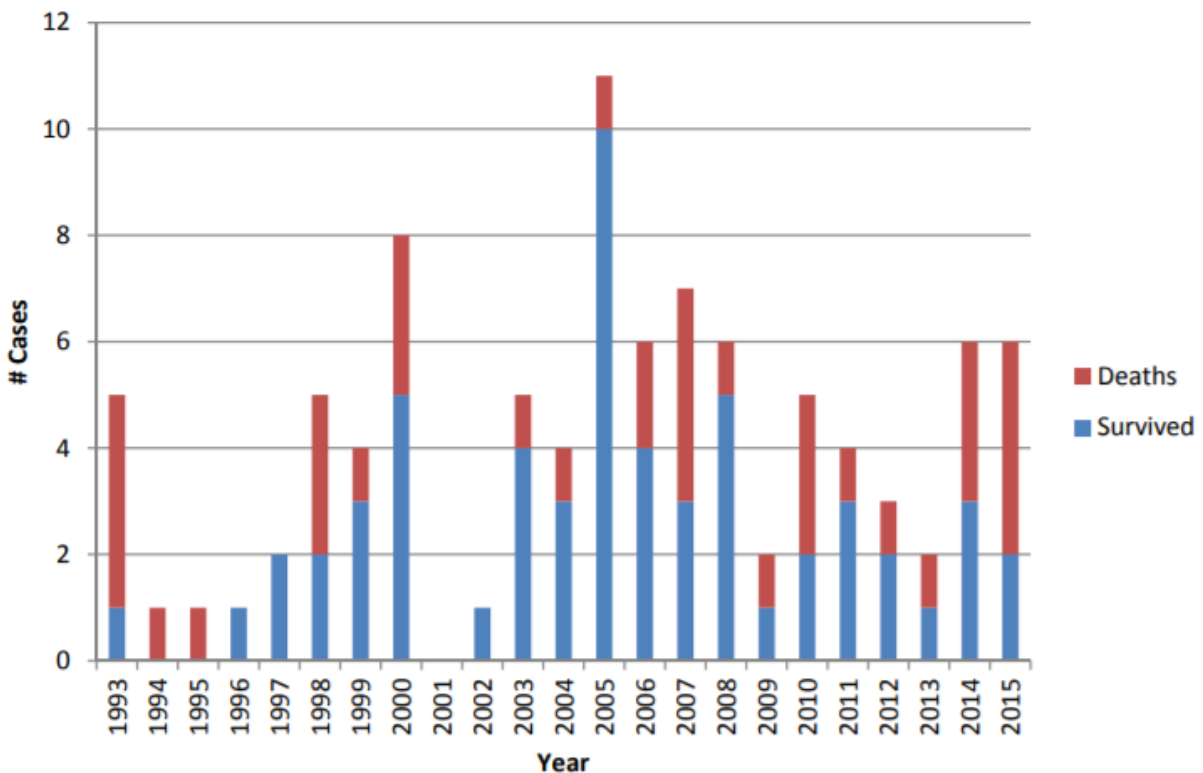
### **Hantavirus**

Wildlife can also carry diseases that are extremely dangerous to humans. Hantavirus has been an issue in Colorado, especially in the four corners region. Although it is not difficult to come into contact with surfaces and materials that could transmit hantavirus, there are fortunately very few cases per year.



Hantavirus is included in this profile as it is carried by wildlife, namely deer mice. Hantavirus pulmonary syndrome (HPS) is transmitted in the saliva, urine, and feces of mice infected with the virus. People contract HPS by breathing in the freshly aerosolized virus. This is done by coming in direct contact with infected rodents or by disturbing mice nests or surfaces contaminated with rodent excreta. HPS is not transmissible from person to person. The disease can be fatal to humans. The HPS incubation time may last two to four weeks before symptoms present. Symptoms resemble the flu with fever, chills, and muscle ache. For a very brief period, the infected person begins to feel better. Within 24-48 hours, the individual develops shortness of breath and may even suffer respiratory or renal failure. According to the Colorado Department of Public Health and Environment, there were 95 cases of HPS in Colorado between 1993 and 2015. The fatality rate among these cases was 40%. In 2015 alone, six confirmed cases of HPS were reported in Chaffee, Custer, Garfield, La Plate, Phillips, and Weld County. Hantavirus involving the kidneys can respond to treatment given in hospitals, although the chance of death persists. There is no effective treatment for hantavirus infections involving the lungs. Figure 4.46 illustrates the number of HPS cases in Colorado between 1993 and 2008, as well as the fatality rate among those cases.

Figure 4.46. Colorado HPS Cases by Year and Outcome: 1995-2015



Source: Colorado Department of Public Health and Environment, Disease Control and Environmental Epidemiology Division

## Past Occurrences

### *Wildlife-Vehicle Collisions*

Wildlife-vehicle collisions are, unfortunately, an often-unavoidable part of life in rural areas. As the population of the planning area has grown over the past several years, the incidence of WVCs has increased accordingly. Fortunately, the number of fatalities from this hazard has been relatively small. Table 4.36 shows the number of property damage only events (PDOs) (refers to events in which no injuries or fatalities occurred), injuries, and fatalities from wildlife-vehicle collisions in Archuleta County between 1994 and 2014.

Table 4.36 Wildlife-Vehicle Collisions: 1994 -2014

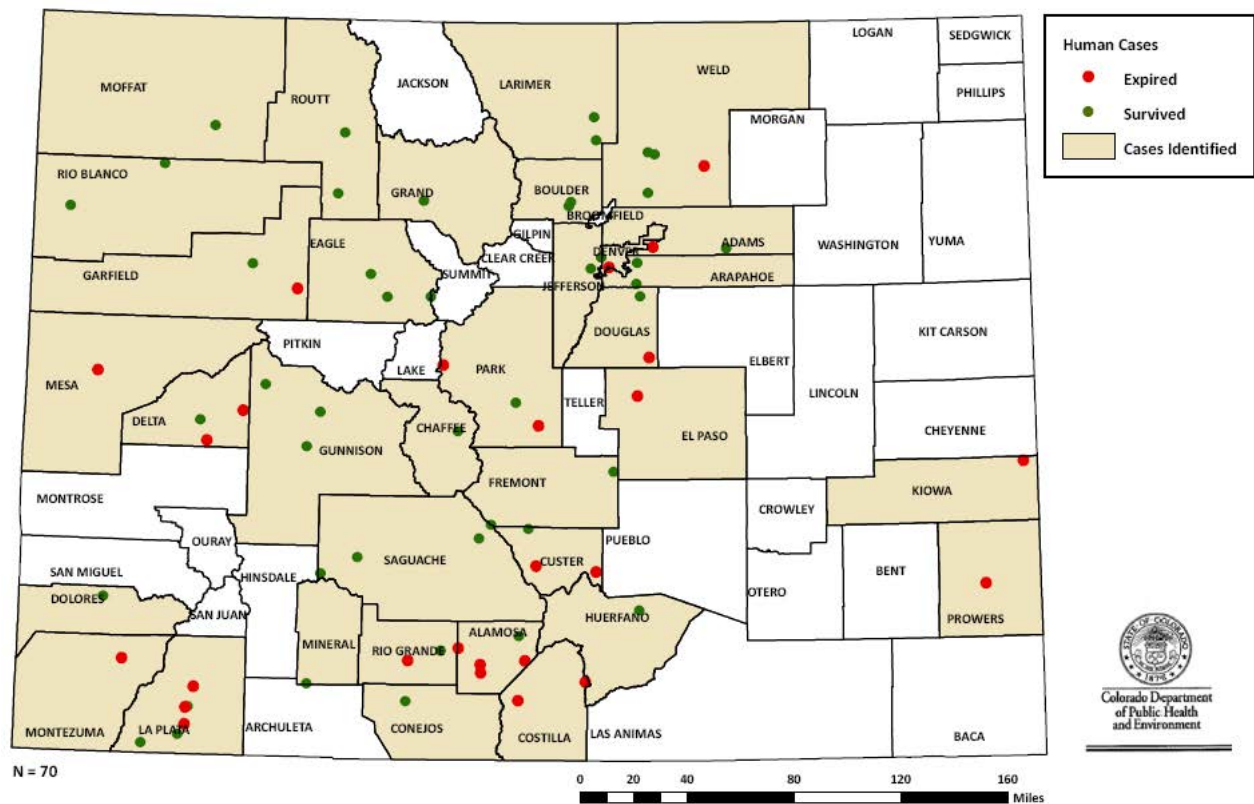
<b>Year</b>	<b>PDO</b>	<b>Injuries</b>	<b>Fatalities</b>	<b>Total</b>
1994	0	0	0	0
1995	9	1	0	10
1996	17	4	0	21
1997	14	5	0	19
1998	24	3	0	27
1999	26	5	1	32
2000	30	2	0	32
2001	50	12	0	62
2002	86	6	0	92
2003	73	10	0	83
2004	82	7	1	90
2005	56	7	0	63
2006	25	3	0	28
2007	59	8	0	67
2008	48	5	0	54
2009	48	7	0	55
2010	48	6	0	54
2011	63	5	0	68
2012	68	8	0	76
2013	59	6	0	65
2014	81	7	0	88
<b>TOTALS</b>	<b>966</b>	<b>117</b>	<b>2</b>	<b>1086</b>
Source: Colorado Department of Transportation				

## Hantavirus

According to the Colorado Department of Public Health and Environment, 70 cases of hantavirus were reported in Colorado between 1985 and 2009. None of these cases were in Archuleta County, but nearly all the neighboring counties reported at least one case of HPS. It is difficult to determine whether any deaths in the County prior to 1985 were related to hantavirus because the disease was primarily identified as a public health issue in 1993. Additionally, HPS symptoms are like the flu, which could make it more difficult to diagnose a person's illness as HPS specifically. Perhaps other illnesses and fatalities in the planning area were caused by HPS in the past, but this is not known for certain.

The entire County and population are at risk of contracting HPS. According to the CDC, "over half of the confirmed cases have been reported from areas outside the Four Corners area" and "about three-quarters of patients with HPS have been residents of rural areas" (<http://www.cdc.gov/ncidod/diseases/hanta/hps/noframes/caseinfo.htm>). Most people contract the disease in their own homes. Figure 4.49 illustrates the geographical spread of hantavirus cases across Colorado between 1985 and 2009.

Figure 4 .47. Colorado Human Hanta virus Pulmonary Syndr ome Cases: 1985 -2009



NOTE: The locations of all points on this map have been slightly altered from their true location in order to protect the identity of individuals.

Source: Colorado Department of Public Health and Environment, Disease Control and Environmental Epidemiology Division

## Geographical Area Affected

The geographic extent of wildlife hazards in the Archuleta County response area is **significant**.

## Potential Magnitude

### *Wildlife-Human Hazards*

The impacts of wildlife-human hazards in Archuleta County would likely be **negligible**. Less than 10 percent of the planning area would be affected by any single event. Generally, only a few people are affected by a wildlife hazard at any one time, although injuries or death are possible. It is unlikely that critical facilities and services would be impacted.

### *Hantavirus*

Overall, hantavirus impacts to Archuleta County would likely be **negligible**, with less than 10% of the planning area's population affected.

## Frequency/Likelihood of Occurrence

### *Wildlife-Human Hazards*

Vehicular accidents or encounters involving wildlife are **highly likely** to occur in any given year in Archuleta County. According to the CDOT data described in Table 4.36, a total of 559 wildlife-vehicle accidents occurred between 1994 and 2006. 559 events over a 12-year span of time averages out to roughly 46 events per year. This equates to a 100% probability that a wildlife-vehicle crash will occur in the planning area during any year.

### *Hantavirus*

The likelihood or frequency of hantavirus infections cannot be calculated for Archuleta County specifically because no reported cases have occurred in the planning area. However, given 70 Colorado cases over a 25-year span (2010-1985=25), the likelihood that a hantavirus case will occur in the State in any given year is 100%. Many of the past cases were located in the southwestern part of the state, so it is **likely** that a hantavirus case will occur in Archuleta County.

## 4.3.18 Hazardous Materials Incident

### Hazard/Problem Description

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

A transportation incident refers to accidental and uncontrolled releases of chemicals or other hazardous materials during transport (i.e., highways, pipelines, and airways). A fixed-facility incident is an uncontrolled release of chemicals or other potentially hazardous materials from a facility. Fixed facilities include companies that store hazardous waste at their facility and all hazardous waste sites. Begun in 1988, the Toxics Release Inventory (TRI) is a federal program established by the U.S. Environmental Protection Agency that contains information on releases of nearly 650 chemicals and chemical categories from industries including manufacturing, metal and coal mining, electric utilities, and commercial hazardous waste treatment, among others. TRI facilities are required to file reports of their disposal or other environmental releases as well as other waste management quantities of regulated chemicals if they manufacture, process, or otherwise use more than the established threshold quantities of these chemicals. Archuleta County has no reported TRI data.

Highway 160 is an authorized hazardous materials route. Fuel trucks traveling over Highway 160 are of concern to the County, though myriad materials apart from radioactive substances are transported through the planning area. Since Archuleta County is surrounded by mountains and diverse terrain, transportation of hazardous materials is at higher risk to accidents on high mountain passes with severe weather conditions and ice, wildlife, and debris on the roadways.

**Note:** The TRI does not cover all toxic chemicals that have the potential to adversely affect human health or the environment. The data does not include emissions from mobile sources nor releases of pesticides, volatile organic compounds, or fertilizers from many nonindustrial sources.

### Past Occurrences

According to the National Response Center, Archuleta County typically experiences one or two hazardous materials incidents each year. This record of events suggests that Archuleta County’s primary hazardous materials concern is transportation accidents involving trucks carrying hazardous materials such as fuel. Highway 160 can be particularly dangerous to travel during winter months when the roads can be snowy and icy. Inappropriate storage of hazardous materials on private and commercial property also seems to be an issue. Table 4.37 catalogues hazardous materials events reported in Archuleta County from 2000 to 2017.

Table 4.37 Hazardous Materials Incidents in Archuleta County, 2000-2017

Incident Date	Description of Incident	Type of Incident	Nearest City	Location	Materials
1/2/2015	Tractor trailer truck rolled onto its side at a turn resulting in a spill of diesel fuel.	Mobile	Pagosa springs	MP 160.6	Oil, diesel

Incident Date	Description of Incident	Type of Incident	Nearest City	Location	Materials
12/11/2015	A reported 100 gallons of diesel discharged from the saddle tank of a tractor trailer truck, due to a truck rollover. No injuries, fires or water impact involved.	Mobile	N/a	Highway 84 at road mm13	Oil, diesel
1/30/2014	A single vehicle accident involving a tractor trailer, where there was a discharge of 10 gallons of diesel fuel from the saddle tank onto the roadway and ditch.	Mobile	Pagosa springs	Hw 160 MP 133.5	Oil, diesel
1/27/2013	A pleasure craft sank due to unknown causes. There is no visible sign of sheening now.	Vessel	Arboles	Navajo state park	Oil, diesel
5/4/2013	A release of an unknown product from a tanker truck that rolled over, there were no fatalities.	Mobile	Pagosa springs	On hw 160 east about mp 126	Unknown material
5/4/2013	A discharge of an unknown amount of gasoline from a truck, the cause was due to a traffic accident, caller also stated that there was one injury reported with no fatalities.	Mobile	Pagosa springs	Hw 160 mp 126	Gasoline: automotive (unleaded)

Incident Date	Description of Incident	Type of Incident	Nearest City	Location	Materials
8/17/2011	Caller stated that there was a release of 50 gallons of diesel fuel from the saddle tank of the vehicle, the cause was due to a crash, there were no injuries and no fatalities.	Mobile	Pagosa Springs	Hw Milepost 8 On Hw 84	Oil, Diesel
6/8/2011	Caller stated this a spill of waste oil at an auto repair facility. The surface inside the facility near the spill is saturated with waste oil.	Fixed	Pagosa Springs	1435 East Hwy 160	Waste Oil
9/30/2010	Due to a single vehicle crash, there was a spill of materials from the saddle tank of a tractor trailer truck.	Mobile	Pagosa Springs	Highway 160	Oil, Diesel
11/29/2010	A hydraulic oil discharge due to a broken fitting on a pump. Caller stated the material is believed to be a biodegradable oil.	Fixed	Allison	Fosset Gulch Rd	Hydraulic Oil
1/12/2009	Diesel fuel spilled onto the pavement and possibly into a ravine leading into the San Juan national forest from the saddle tank of an overturned tractor trailer.	Mobile	Pagosa springs	Wolf creek pass	Diesel fuel
9/13/2008	County landfill caught on fire and released toxic fumes.	Fixed	Pagosa springs	Mile marker 9 on county road 500	Toxic fumes
9/8/2008	Release of diesel fuel from tractor trailer truck due to transport accident (single vehicle accident)	Mobile	Pagosa springs	Hwy 160, close to wolf creek summit	Diesel fuel

Incident Date	Description of Incident	Type of Incident	Nearest City	Location	Materials
9/21/2007	A county landfill leaked and released material into a river every time it rained over a span of about 25 years.	Fixed	Pagosa springs	Archuleta county landfill, county rd 500	Landfill runoff
8/21/2007	Individual was dumping in the area and releasing materials into the ground	Fixed	Pagosa springs		N/a
4/6/2006	Release of materials into ground from tractor trailer transport accident	Mobile	Pagosa springs	On highway 84	N/a
1/25/2006	Gasoline leaked from damaged sailboat into marina	Vessel	Arboles	County road 982	Boat fuel
5/4/2005	Private owner's storage tank leaked flammable liquids onto the ground	Storage tank	Pagosa springs	Aspen springs subdivision	Flammable liquids
3/10/2005	Anti-freeze stored in unsecured container on private property	Storage tank	Pagosa springs		Anti-freeze
6/27/2003	Tanker truck carrying liquid nitrogen rolled over. No hazardous materials were released in the incident	Mobile	Pagosa springs	Hwy 160 near mp 132	
10/11/2002	Pipeline spilling sewage into San Juan river	Pipeline	Pagosa springs	Hwy 160 and 1 <sup>st</sup> street	Sewage
10/13/2000	Dump truck went into a ditch. The fuel tank ruptured and diesel spilled onto a driveway	Mobile	Pagosa springs		Diesel fuel
5/5/2000	Material spilled from a supply hose from a gravity feed fuel tank due to a broken fitting	Fixed	Arboles	County road 982	Fuel

Source: National Response Center, [www.nrc.uscg.mil/](http://www.nrc.uscg.mil/)

## County Landfill Fires

A deep-seated fire in the county landfill has been an ongoing problem for several years. Flare ups from the fire's resulting smoke can be a potential health hazard. Options investigated to extinguish the fire have been prohibitively expensive.

## Geographical Area Affected

**Limited:** Unincorporated and incorporated areas along Highway 160 are the most probable potential sites of hazardous materials transportation accidents.



## Potential Magnitude

Overall, impacts from a hazardous materials incident in Archuleta County would likely be **limited**, with 10-25 percent of the area affected. However, it is important to note that two schools and the county court house are located along Highway 160 and are therefore directly exposed to the dangers of hazardous materials incidents.

## Frequency/Likelihood of Occurrence

The potential for a hazardous materials incident in the planning area is very real. Highway 160 has several sharp curves and narrow passages in places, making it a potential dangerous route for trucks transporting hazardous materials. According to NRC records, 23 hazardous materials incidents occurred in Archuleta County between 2017 and 2000 (data for 2004 and 2001 could not be obtained). Twenty-three events over a 17-year span yields a 100% probability that a hazardous materials incident will occur in Archuleta County in any given year. This corresponds to a frequency/likelihood rating of **highly likely**.

### 4.3.19 Imminent Threat/Terrorism

#### Hazard/Problem Description

Imminent threat includes the potential for violent attacks, including but not limited to domestic and international terrorism. The Federal Bureau of Investigation (FBI) defines terrorism as “the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.” The threat of terrorism, both international and domestic, is ever present, and an attack is likely to occur when least expected. Terrorism is a growing threat worldwide that must be addressed through security and awareness. Needs associated with terrorism include training and equipping of local emergency response personnel in cooperation with state and federal agencies.

Terrorism exists in many forms, but eco-terrorism specifically is the most concerning to Archuleta County. Eco-terrorism is a form of domestic terrorism that the FBI defines as “the use or threatened use of violence of a criminal nature against innocent victims or property by an environmentally-oriented, subnational group for environmental-political reasons, or aimed at an audience beyond the target, often of a symbolic nature.” According to the Southern Poverty Law Center, extremists within the environmental and animal rights movements have committed thousands of violent criminal acts in recent decades, more than those from any other radical sector. These acts have included arsons, fire bombings, assaults, and attacks on animal-based businesses and laboratories. The leading ecoterrorist groups are the Animal Liberation Front and the Earth Liberation Front. Since 1996, these groups have had committed more than 600 criminal acts, causing more than \$43 million in damage nationwide.

There is potential for eco-terrorism to occur in the Archuleta County response area. Archuleta County is well-known for its unadulterated natural beauty. This is a major source of pride for

many of the local communities. For the past several years, a proposal has been in development to construct a ski resort at the current Wolf Creek Ski area in Mineral County. Many people are highly concerned about the impact that this development, known as the Village at Wolf Creek, would have on the area's ecosystems and wildlife. It is likely that the Village would also increase the amount of traffic and the number of people living in the County by an estimated 8,000-10,000 individuals. For these and other reasons, many individuals within Archuleta County and surrounding areas believe very strongly that the Village should not be built. If the proposal for the Village were approved, there is a possibility of eco-terrorism from some of the more vehement anti-development individuals.

Imminent threats to public safety are a growing concern worldwide that must be addressed through security and awareness. Needs associated with imminent threats include training and equipping of local emergency response personnel in cooperation with state and federal agencies.

Imminent threats may also include cyber terrorism, or cyber security incidents more generally. Cyber-security incidents are a growing concern as many energy delivery systems are managed by computers. There are many threats, some more serious than others. For example, many power plants and other infrastructure are remotely controlled by supervisory control and data acquisition (SCADA) systems. SCADA systems are vulnerable to attack through hackers who could access the system and sabotage the target facility.

Some examples of how computers and systems could be affected by a cyber security incident—whether because of improper cyber security controls, manmade or natural disasters, or malicious users wreaking havoc—include the following:

- Denial-of-service: This refers to an attack that successfully prevents or impairs the authorized functionality of networks, systems, or applications by exhausting resources. This type of attack could shut down a government agency's website, thereby preventing citizens from accessing information or completing transactions. This type of attack could also impede business operations or critical services such as emergency medical systems, police communications, or air traffic control.
- Malware, worms, and Trojan horses: These spread by email, instant messaging, malicious websites, and infected non-malicious websites. Some websites will automatically download the malware without the user's knowledge or intervention. This is known as a "drive-by download." Other methods will require the users to click on a link or button.
- Botnets and zombies: A botnet, short for robot network, is an aggregation of compromised computers that are connected to a central "controller." The compromised computers are often referred to as "zombies." These threats will continue to proliferate as the attack techniques evolve and become available to a broader audience, with less technical knowledge required to launch successful attacks. Botnets designed to steal data are improving their encryption capabilities and thus becoming more difficult to detect.

- “Scareware” - fake security software warnings: In this type of scam cyber criminals use pop-up warnings telling users that their system is infected. Many users are then lured into downloading and paying for unnecessary software to "protect" their system.

### **Past Occurrences**

In 2009, an individual committed an act of domestic terrorism within the planning area. This individual’s house was foreclosed, prompting him to manufacture pipe bombs with the intent to use the explosives at the nearest Wells Fargo in an act of revenge. The Farmington Bomb Squad was called in to handle the event. The individual ended up killing himself, and no other people were physically harmed in the incident. In 2011, a bomb threat was received in the area of the county court house.

### **Geographical Area Affected**

**Limited:** Potential ecoterrorist activity within the Archuleta County response area would most likely be concentrated near the Wolf Creek Ski Area. Given the event in 2009 described in *Past Occurrences*, it is possible that additional acts of domestic terrorism could occur in the future in the planning area. Other potential terrorist target sites include active mines, high hazard dams, power grids, substations, and communications facilities.

### **Potential Magnitude**

Overall, terrorism impacts in Archuleta County would likely be **limited**, with 10-25 percent of the area affected.

### **Frequency/Likelihood of Occurrence**

**Occasional** - Between 1% and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

## 4.4 Vulnerability by Hazard

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**Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction’s vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.**

**Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.**

**Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.**

**Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.**

The HMPC conducted a vulnerability assessment to describe the impact that hazards would have on the County and participating jurisdictions. The vulnerability assessment quantifies assets at risk to hazards and estimates potential losses, to the extent possible. This vulnerability assessment followed the methodology described in the FEMA publication *Local Mitigation Planning Handbook*.

### 4.4.1 Avalanche

Overall, public safety is the primary concern regarding avalanche hazards and vulnerability. Building impacts are negligible. Backcountry recreationalists, road crews, and motorists along Highway 160 are the most at risk to avalanche dangers. However, a road closed due to avalanche activity can also result in serious transportation disruptions due to the limited number of roads in the County. State Highway 160 at Wolf Creek Pass sometimes experiences avalanche closures, thus obstructing all access to the County from the east. Backcountry avalanche incidents involve search and rescue teams and resources, which can put these personnel in areas of risk.

Rising numbers of outdoor enthusiasts may lead to an increase in fatal avalanche occurrences. Beyond backcountry skiing, there has been a growing interest in other forms of recreation, and an introduction of new toys that are bigger, heavier, and intensify avalanche susceptibility.

Based on the information collected for the hazard profile, avalanche has had a significant impact in Archuleta County with a high likelihood of occurrence. Nevertheless, it is only a problem in the

unincorporated County, as the municipalities do not have avalanche-prone areas. In the Archuleta County response area, the greatest risk is in Mineral County along Highway 160.

At the time this plan was developed, and during the 2017 update, there were not any structures located in identified avalanche hazard areas. It is public safety that is threatened by this hazard. Those most vulnerable include individuals recreating in and traveling through or under avalanche hazard areas. While road closures help to mitigate impacts to travelers on the State Highway 160 corridor over Wolf Creek Pass, Colorado Department of Transportation snowplow drivers can still be exposed while clearing roads of snow or avalanche debris. Additionally, avalanches inside and outside of the County can disrupt transportation in and out of the County, which could result in a wide range impacts, as further discussed in the hazard profile. The keys to limiting impacts to individuals recreating in the area are knowledge and awareness of the hazard and being properly equipped for self-rescue, if necessary, with tools such as locator beacons, shovels, and probes.

#### **4.4.2 Dam Failure**

Specific details regarding the population, property, critical infrastructure or community resources affected by potential dam failures will not be discussed in this plan due to homeland security reasons. Aspects of each participating jurisdiction (County, Pagosa Springs, Pagosa Fire Protection District and PAWSD) could be impacted by dam failure, depending on the dam. In general, public safety is the primary concern. Several high and significant hazard dams are in the Pagosa Lakes subdivisions, the most populated area in Archuleta County. Mountain View Dam has the potential to impact McCabe Creek and downtown Pagosa Springs. Additionally, roads closed due to dam failure floods could result in serious transportation disruptions due to the limited number of roads in the County. A road closure could seriously impede response and recovery operations and hinder people from evacuating the affected area.

Specific impacts and downstream areas are analyzed in the Emergency Action Plans (EAPs) for Stevens Dam, Lake Capote Dam (a.k.a. Pargin Dam), Williams Creek Dam, and Echo Canyon Dam. These plans are on file at the Archuleta County Emergency Management office. This information is not included in the HMP because it can be referenced in the individual EAPs and is considered sensitive information.

The vulnerability to dam failure could increase if development occurs in inundation areas downstream of dams. Often these inundation areas are not shown on plat or planning maps. This type of development can change the designation of a dam from low to high hazard.

#### **4.4.3 Drought**

Based on Archuleta County's past multi-year droughts and Colorado's drought history, it is evident that all of Archuleta County is vulnerable to drought. Aspects of each participating jurisdiction (County, Pagosa Springs, Pagosa Fire Protection District and PAWSD) could be impacted by drought. However, the impacts of future droughts will vary by jurisdiction. The 2013 Colorado Drought Plan identifies Archuleta County as having high vulnerability to drought in the

socioeconomic sector. This is often true of counties with little economic diversity or high rates of population growth. According to the 2013 Colorado Drought Plan, “economic diversity is important because if one aspect of the economy (for example, recreation) is suffering due to drought conditions, other aspects that are not as hard hit may be able to keep the overall economy functioning.”

The County’s economy is largely dependent on tourism, recreation and, to a lesser extent, agriculture. The tourist industries in Archuleta County are highly vulnerable to drought. A lack of precipitation can impact skiing, white water activities, fishing, hunting, and more. Drought can also exacerbate the potential occurrence and intensity of wildland fires. The wildland areas of the County will see an increase in dry fuels, beetle kill, and associated wildland fires and some loss of tourism revenue. The agricultural areas of the County will experience hardships, including agricultural losses, associated with a reduction in water supply. Water supply issues for domestic needs will be a concern for the entire County and PAWSD during droughts.

The decline in tourism and agricultural revenues could also impact the rest of the County’s economy. According to the 2013 State of Colorado Drought Mitigation and Response Plan, “the multiplier effect of decreased business revenue can impact the entire economy. When an individual loses or decreases their income all of the goods and service providers they usually support will also be impacted.”

While widespread, the losses associated with drought are often the most difficult to track or quantify. While FEMA requires the potential losses to structures to be analyzed, drought does not normally have a structural impact. The most significant impacts are to water intensive activities such as agriculture, wildland fire protection, municipal usage, commerce, tourism, and wildlife preservation. Reduction of electric power generation from hydroelectric facilities, which could suffer lost revenue, and water quality deterioration can also occur during droughts.

Drought normally does not impact structures and can be difficult to identify specific hazard areas. Population growth can place a greater demand on limited water resources, but growth rates in the County and participating jurisdictions are not expected to significantly increase exposure to the drought hazard soon.

#### **4.4.4 Earthquake**

Earthquakes represent a low probability, but potentially high consequence hazard for Archuleta County. Colorado has a relatively short historic record of earthquakes, which makes for a limited data set when making assumptions based on past events. Specific details about the earthquake potential in Archuleta County and Colorado in general remain largely unknown. Due to the lack of potentially active faults in the planning area there has been no HAZUS studies conducted by the Colorado Geological Survey. Using Hazus-MH 4.0, a 2,500 year probabilistic earthquake scenario was performed as part of this mitigation plan update and the results can be referenced in the table below. This scenario considers worst-case ground shaking from a variety of seismic

sources. As shown in the probabilistic scenario results, there is the potential for 18% of the total number of buildings in the County to be affected, roughly 1,299 buildings experiencing moderate or more extensive damage. The Town of Pagosa Springs, due to the older building stock as well as being a population center, could endure the greatest losses if a significant earthquake were to occur. PAWSD could experience impacts to district infrastructure, However, due to the low probability of a damaging earthquake occurring, the planning significance of earthquakes is considered low by the HMPC.

Table 4. 38 HAZUS-MH Earthquake Loss Estimation 2,500 -Year Scenario Results

Type of Impact	Impacts to County
Total Buildings Damaged	Slight: 1,494 Moderate: 972 Extensive: 297 Complete: 30
Building and Income Related Losses	\$107.6 million 72% of damage related to residential structures 21% of loss due to business interruption
Total Economic Losses (includes building, income and lifeline losses)	\$147 million
Casualties (based on 2 a.m. time of occurrence)	Without requiring hospitalization: 11 Requiring hospitalization: 2 Life threatening: 0 Fatalities: 0
Casualties (based on 2 p.m. time of occurrence)	Without requiring hospitalization: 13 Requiring hospitalization: 2 Life threatening: 0 Fatalities: 1
Casualties (based on 5 p.m. time of occurrence)	Without requiring hospitalization: 10 Requiring hospitalization: 2 Life threatening: 0 Fatalities: 0
Damage to Transportation and Utility Systems and Essential Facilities	Some damage to utility pipeline systems, No damage shown to essential facilities
Displaced Households	19
Shelter Requirements	12
Source: Hazus-MH 4.0	

### Analyzing Development Trends

Any new construction built to code in the County should generally be able to withstand earthquakes, but the potential for nonstructural damage will increase with new development. Continued growth of population in the County could potentially expose more people to earthquakes and their related hazards.

#### 4.4.5 Extreme Cold

The impacts of extreme cold can be widespread, affecting population, property, and critical facilities and functions. While everyone is vulnerable to extreme cold/wind chill events, some populations are more vulnerable than others. Extreme cold/wind chill pose the greatest danger to outdoor laborers, such as highway crews, police and fire personnel, and construction. The elderly, children, people in poor physical health, and the homeless are also vulnerable to exposure. Lower-income populations can also face increased risk from extreme cold if they do not have access to adequate heating. Overall, the population has a medium exposure to severe cold.

Extreme cold/wind chill presents a minimal risk to the structures of Archuleta County. Property damage occurs occasionally when water pipes freeze and break. Homes without adequate insulation or heating may put owners at a higher risk for damages or cold-related injury. In cases of periods of prolonged cold, water pipes may freeze and burst in poorly insulated or unheated buildings. Vehicles may not start or stall once started due to the cold temperatures and the risks of carbon monoxide poisoning or structure fires increases as individuals attempt to warm cars in garages and use space heaters. Stalled vehicles, or those that fail to start, may result in minor economic loss if individuals are unable to commute between work, school, and home. Driving conditions may deteriorate if extreme cold/wind chill prolongs icy road conditions, which will impact commutes and emergency response times as well. Landscaping and agricultural products may be damaged or destroyed by unseasonable occurrences of extreme cold/wind chill, causing plants to freeze and die. This may increase the indirect vulnerabilities to severe cold by causing greater economic costs and losses for the year. The overall vulnerability of general property is low.

To assist in assessing the potential financial impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it reflects common occurrence. Based on SHELDUS records, the event of record for extreme cold in Archuleta County occurred in February 1989. This event resulted in \$158,730 in damages (in 1989 dollars).

Calculating the average annual damage from extreme cold is another method used in assessing potential magnitude. This is done by dividing the total damages by the number of years in the period of record. The period of record varies from hazard to hazard. Most NCEI or SHELDUS hazard records begin in the 1950s, 1960, or in 1993. According to SHELDUS, ten extreme cold events caused a total of \$174,172 in damages over a 50-year span between 1960 and 2010. This averages out to \$3,483 in damages per year. Therefore, Archuleta County could expect to sustain roughly \$3,483 in damages from extreme cold in any given year.

Overall, extreme temperature impacts would likely be **negligible** in Archuleta County, with less than 10 percent of the planning area affected and minimal impact to quality of life and critical facilities or services. Extreme cold can occasionally cause problems with communications



facilities. Pagosa Springs has frequent problems with frozen water lines. Extreme cold can also impact livestock and even crops if the event occurs during certain times of the year.

## 4.4.6 Flooding

### Flooding

Potential losses to Archuleta County from a 100-year and 500-year flood were analyzed by using the digital flood insurance rate map (DFIRM) with parcel data provided by the Archuleta County Assessor's Office. Below is a discussion of the methodology, including limitations, assumptions, and observed trends of the methodology's results.

#### ***Analysis Using FIRM Floodplain with Parcel Data***

A flood vulnerability assessment was performed for Archuleta County using Geographic Information Systems (GIS). The county's parcel layer and associated assessor's building improvement assessed value data, as well as point locations of buildings, were provided by the county and were used as the basis for the inventory. Archuleta County's Digital Flood Insurance Rate Map (DFIRM) was used as the hazard layer. DFIRM is FEMA's flood risk data that depicts the 1% annual chance (100-year) and the 0.2% annual chance (500-year) flood events. Flood zones A, AE, AH and AO are variations of the 1% annual chance event and were combined into a single zone for purposes of this analysis. Archuleta County's DFIRM was published in April 2008.

The flood zones were overlaid in GIS on the building point data to identify structures that would likely be inundated during a 1% annual chance and 0.2% annual chance flood event. Building improvement values for those points were then extracted from the parcel/assessor's data and summed for the unincorporated county and for the Town of Pagosa Springs. Contents values were estimated for the buildings based on their occupancy type, based on FEMA values. This includes 100% of the structure value for commercial and agricultural structures, 50% for residential structures, and 100% for industrial structures. Building and contents values were totaled, and a 20% loss factor was applied to the totals, also based on FEMA depth damage functions, assuming a two-foot-deep flood.

Table 4.39 identifies an estimated 249 parcels and 338 buildings in the 1% annual chance flood zone. The total improved market building value in that flood zone is \$52.7 million; the sum of building and contents value in that flood zone is estimated to be \$84.5 million. Assuming a two-foot-deep flood, losses could be on the order of \$16.9 million from the 1% annual chance flood event in Archuleta County.

As presented in Table 4.40, there are 67 additional buildings in the 0.2% annual chance flood zone; these occupy 58 of Archuleta County's parcels. Note that the 0.2% annual chance flood zone within the County has not been comprehensively mapped and is primarily represented near Pagosa Springs and on the Rio Blanco River. Table 4.41 shows the combined loss estimate from the 1 percent annual chance and the 0.2% annual chance flood events. There is a total of 405 buildings

that occupy 307 parcels in the combined flood zones. The total improved market building value in those two flood zones is \$62.7 million; the sum of building and contents value in the flood zones is \$100.9 million. Assuming a two-foot flood depth, there could be an estimated \$20.2 million in losses from the 0.2% annual chance flood event.

Most of estimated damage resulting from a 1% annual chance and a 0.2% annual chance flood event would occur in Unincorporated Archuleta County, along the San Juan River, the Rio Blanco River, and the Navajo River. Thirty eight percent of the County’s loss estimate for those flood events reflects loss to structures in Pagosa Springs; this damage would result from flooding of the San Juan River and McCabe Creek. Within Pagosa Springs there are 126 structures within the 1% annual chance floodplain.

Flood hazards in southern Hinsdale and Mineral County were identified using data from the 2010 update to the Colorado Flood Mitigation Plan. Specifically, FEMA used HAZUS-MH MR2 to model the 100-year floodplain in each of the 64 counties in Colorado. According to the 2010 Colorado Flood Mitigation Plan, a stand-alone annex to the Colorado Natural Hazard Mitigation Plan, “The HAZUS-MH flood model results included analysis for each of the 64 counties modeling streams draining a 10-square mile minimum drainage area, using 30 meter (1 arc second) Digital Elevation Models (DEM). Hydrology and hydraulic processes utilize the DEMs, along with flows from USGS regional regression equations and stream gauge data, to determine reach discharges and to model the floodplain. Losses are then calculated using HAZUS-MH national baseline inventories (buildings and population) at the census block level” (pg. 50). Based on this study, no properties were identified in the floodplains in either southern Hinsdale or Mineral County.

Table 4.39 100-Year Flood Loss Estimation

Jurisdiction	Occupancy Type	Parcel Count	Building Count	Improvement Value	Content Value	Total Value	Loss Estimate
Pagosa Springs	Commercial	8	9	\$2,303,240	\$2,303,240	\$4,606,480	\$921,296
	Exempt	9	11	\$0	\$0	\$0	\$0
	Mixed Use	2	3	\$1,060,530	\$1,060,530	\$2,121,060	\$424,212
	Residential	80	94	\$15,063,670	\$7,531,835	\$22,595,505	\$4,519,101
	Vacant	7	9	\$76,620	\$76,620	\$153,240	\$30,648
	<b>Total</b>	<b>106</b>	<b>126</b>	<b>\$18,504,060</b>	<b>\$10,972,225</b>	<b>\$29,476,285</b>	<b>\$5,895,257</b>
Unincorporated	Agricultural	22	52	\$3,464,580	\$3,464,580	\$6,929,160	\$1,385,832
	Commercial	4	8	\$418,070	\$418,070	\$836,140	\$167,228
	Exempt	5	6	\$0	\$0	\$0	\$0
	Mixed Use	8	21	\$3,708,160	\$3,708,160	\$7,416,320	\$1,483,264
	Residential	103	124	\$26,594,670	\$13,297,335	\$39,892,005	\$7,978,401
	Vacant	1	1	\$2,070	\$2,070	\$4,140	\$828
	<b>Total</b>	<b>143</b>	<b>212</b>	<b>\$34,187,550</b>	<b>\$20,890,215</b>	<b>\$55,077,765</b>	<b>\$11,015,553</b>
	<b>Grand Total</b>	<b>249</b>	<b>338</b>	<b>\$52,691,610</b>	<b>\$31,862,440</b>	<b>\$84,554,050</b>	<b>\$16,910,810</b>

Table 4.40 500-Year Flood Loss Estimation

Jurisdiction	Occupancy Type	Parcel Count	Building Count	Improvement Value	Content Value	Total Value	Loss Estimate
Pagosa Springs	Commercial	6	8	\$852,560	\$852,560	\$1,705,120	\$341,024
	Mixed Use	2	3	\$888,790	\$888,790	\$1,777,580	\$355,516
	Residential	23	26	\$3,348,740	\$1,674,370	\$5,023,110	\$1,004,622
	Vacant	1	1	\$4,970	\$4,970	\$9,940	\$1,988
	<b>Total</b>	<b>32</b>	<b>38</b>	<b>\$5,095,060</b>	<b>\$3,420,690</b>	<b>\$8,515,750</b>	<b>\$1,703,150</b>
Unincorporated	Agricultural	2	2	\$180,160	\$180,160	\$360,320	\$72,064
	Mixed Use	1	2	\$744,590	\$744,590	\$1,489,180	\$297,836
	Residential	23	25	\$3,991,940	\$1,995,970	\$5,987,910	\$1,197,582
	<b>Total</b>	<b>26</b>	<b>29</b>	<b>\$4,916,690</b>	<b>\$2,920,720</b>	<b>\$7,837,410</b>	<b>\$1,567,482</b>
<b>Grand Total</b>	<b>58</b>	<b>67</b>	<b>\$10,011,750</b>	<b>\$6,341,410</b>	<b>\$16,353,160</b>	<b>\$3,270,632</b>	

Table 4.41 Combined 100-Year and 500-Year Flood Loss Estimation

Jurisdiction	Occupancy Type	Parcel Count	Building Count	Improvement Value	Content Value	Total Value	Loss Estimate
Pagosa Springs	Commercial	14	17	\$3,155,800	\$3,155,800	\$6,311,600	\$1,262,320
	Exempt	9	11	\$0	\$0	\$0	\$0
	Mixed Use	4	6	\$1,949,320	\$1,949,320	\$3,898,640	\$779,728
	Residential	103	120	\$18,412,410	\$9,206,205	\$27,618,615	\$5,523,723
	Vacant	8	10	\$81,590	\$81,590	\$163,180	\$32,636
	<b>Total</b>	<b>138</b>	<b>164</b>	<b>\$23,599,120</b>	<b>\$14,392,915</b>	<b>\$37,992,035</b>	<b>\$7,598,407</b>
Unincorporated	Agricultural	24	54	\$3,644,740	\$3,644,740	\$7,289,480	\$1,457,896
	Commercial	4	8	\$418,070	\$418,070	\$836,140	\$167,228
	Exempt	5	6	\$0	\$0	\$0	\$0
	Mixed Use	9	23	\$4,452,750	\$4,452,750	\$8,905,500	\$1,781,100
	Residential	126	149	\$30,586,610	\$15,293,305	\$45,879,915	\$9,175,983
	Vacant	1	1	\$2,070	\$2,070	\$4,140	\$828
<b>Total</b>	<b>169</b>	<b>241</b>	<b>\$39,104,240</b>	<b>\$23,810,935</b>	<b>\$62,915,175</b>	<b>\$12,583,035</b>	
<b>Grand Total</b>	<b>307</b>	<b>405</b>	<b>\$62,703,360</b>	<b>\$38,203,850</b>	<b>\$100,907,210</b>	<b>\$20,181,442</b>	

Figure 4.48. 1% and 0.2% Annual Chance Flood Zones in Archuleta County

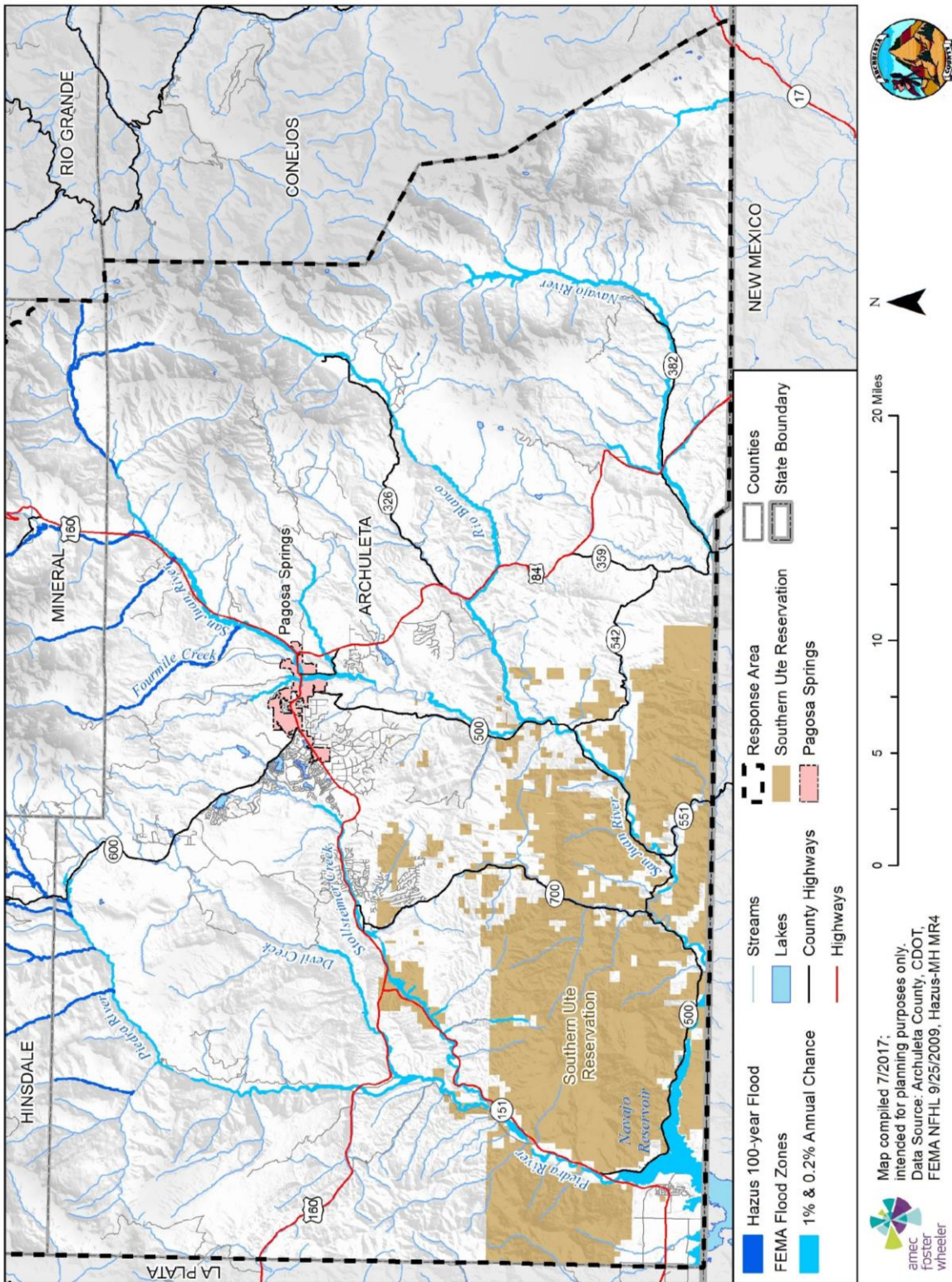


Figure 4 .49. Properties in 1% and 0.2% Annual Chance Flood Zones North of Pagosa Springs (Inset A)

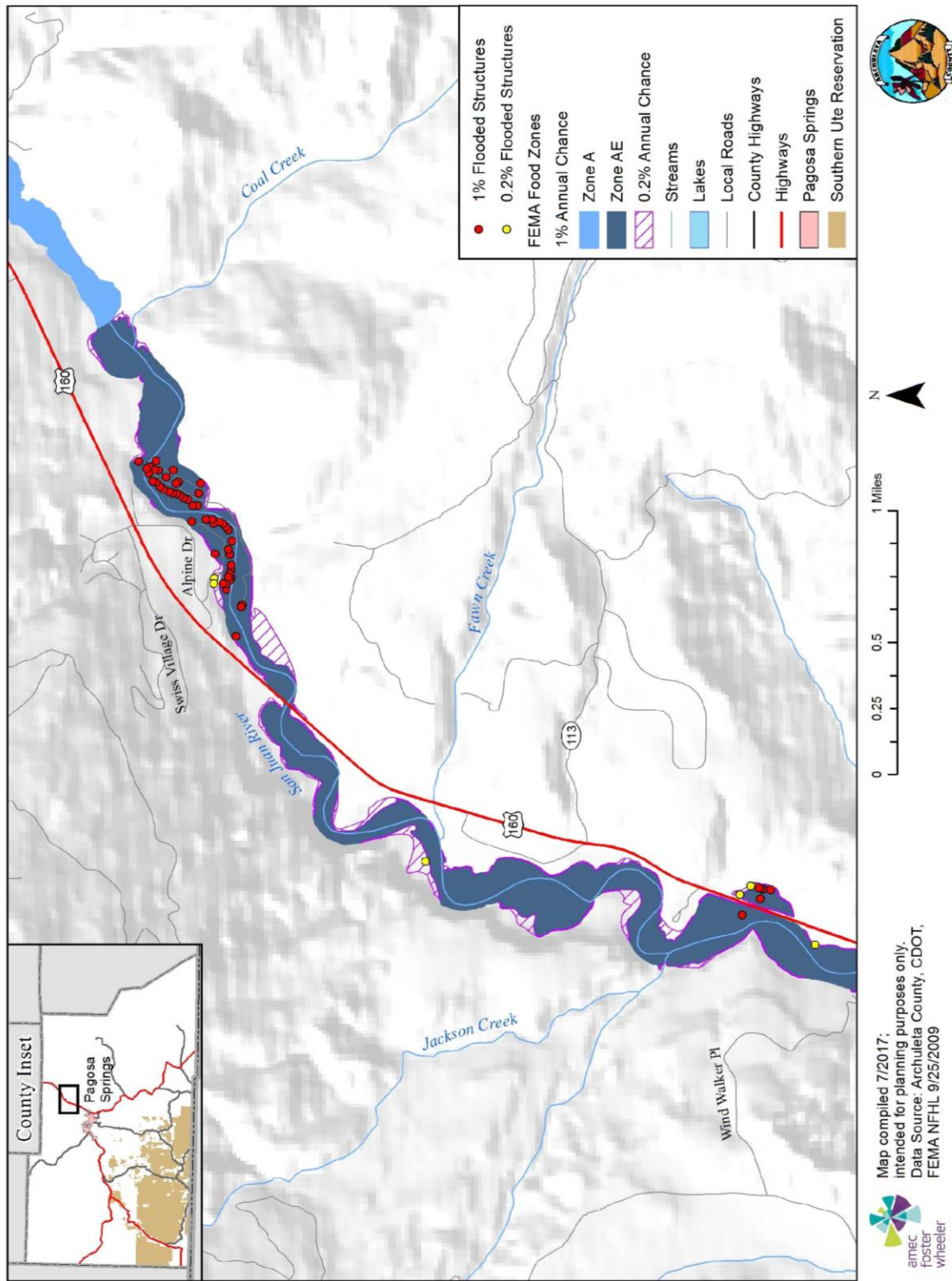
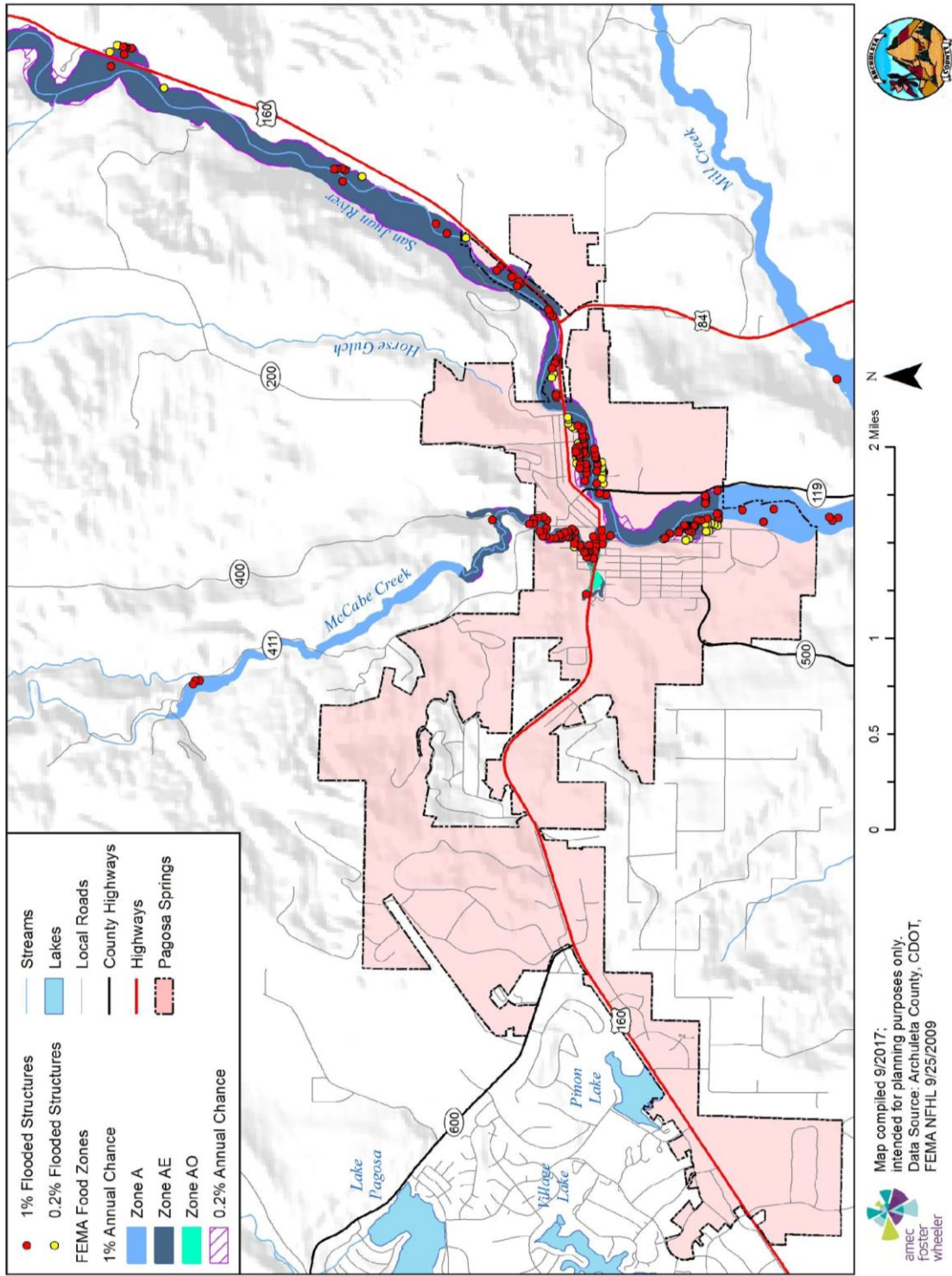


Figure 4 .50. Properties in 1% and 0.2% Annual Chance Flood Zones in Pagosa Springs (Inset B)



GIS analysis was used to generate population estimates for people living in the 1% and 0.2% annual chance flood zones. Using the 2010 Census data, the average household size in Archuleta County is 2.25, which was extrapolated in conjunction with building counts to determine that there are 412 people living in the 1% annual chance flood zone, of which 180 live in the town of Pagosa Springs, and 232 in the unincorporated County. When assessing flood hazard based on the 0.2% annual chance flood zone, there are 104 residents at risk, 52 of which live in the town of Pagosa Springs, and 52 in the unincorporated County.

The analysis of critical facilities yielded few structures at risk to flooding, as shown in Table 4.42, Figure 4.53, and Figure 4.54. Figure 4.51 and Figure 4.52 provide an aerial view of some of the critical facilities located in the floodplain. In Figure 4.51, the Archuleta County Courthouse is visible in the middle-left of the photograph. “The Springs” Resort is in the foreground. The Pagosa Wastewater Treatment facility is shown in the foreground of Figure 4.52. The town of Pagosa Springs can be seen in the background. The road and bridge infrastructure is vital to Archuleta County. There are a limited number of highways and local roads in the County. When these roads are rendered impassable by an event such as a flood, ingress or egress can be severely limited. These bridges have been impacted by floods in the past, including during April 2010. No critical facilities were identified in the floodplain in the Mineral County portion of the Response Area.

Table 4.42 and 4.43 identify the critical facilities in the 100 and 500 year floodplains. There are 5 total facilities that would be affected by a 100-year flood, the majority of which (4) are located in Pagosa Springs. There is only one facility (law enforcement) located in the 500-year floodplain in Pagosa Springs.

Table 4.42 Archuleta County Critical Facilities in the 100-Year Floodplain by Jurisdiction

Jurisdiction	CF Type	CF Count
Pagosa Springs	Electric Power	3
	Shelter	1
Unincorporated	Wastewater Facility	1
	<b>Total</b>	<b>5</b>

Source: Archuleta County, HSIP, HAZUS-MH MR4

Table 4.43 Archuleta County Critical Facilities in the 500-Year Floodplain by Jurisdiction

Jurisdiction	CF Type	CF Count
Pagosa Springs	Law Enforcement	1

Source: Archuleta County, HSIP, HAZUS-MH MR4

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Figure 4 .51 . Arch uleta a Co un ty Cou rtho us e and “The Springs ” Res ort



Source: Archuleta Sheriff's Office – Division of Emergency Management (taken May 16, 2008)



Figure 4.52. Pagosa Waste Water Treatment Facility



Source: Archuleta Sheriff's Office – Division of Emergency Management (taken May 16, 2008)

Figure 4.53. Critical Facilities and Flood Hazards

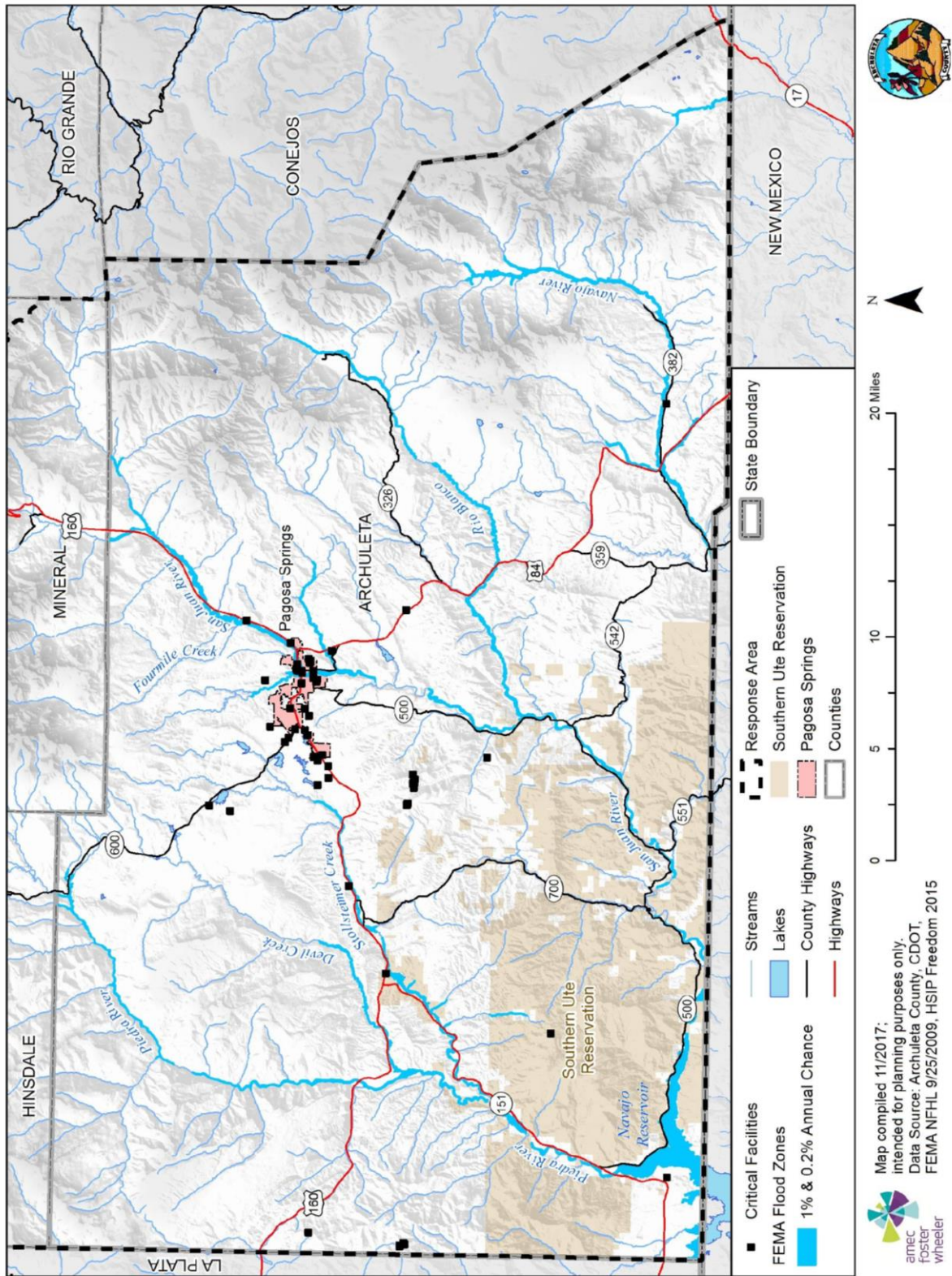
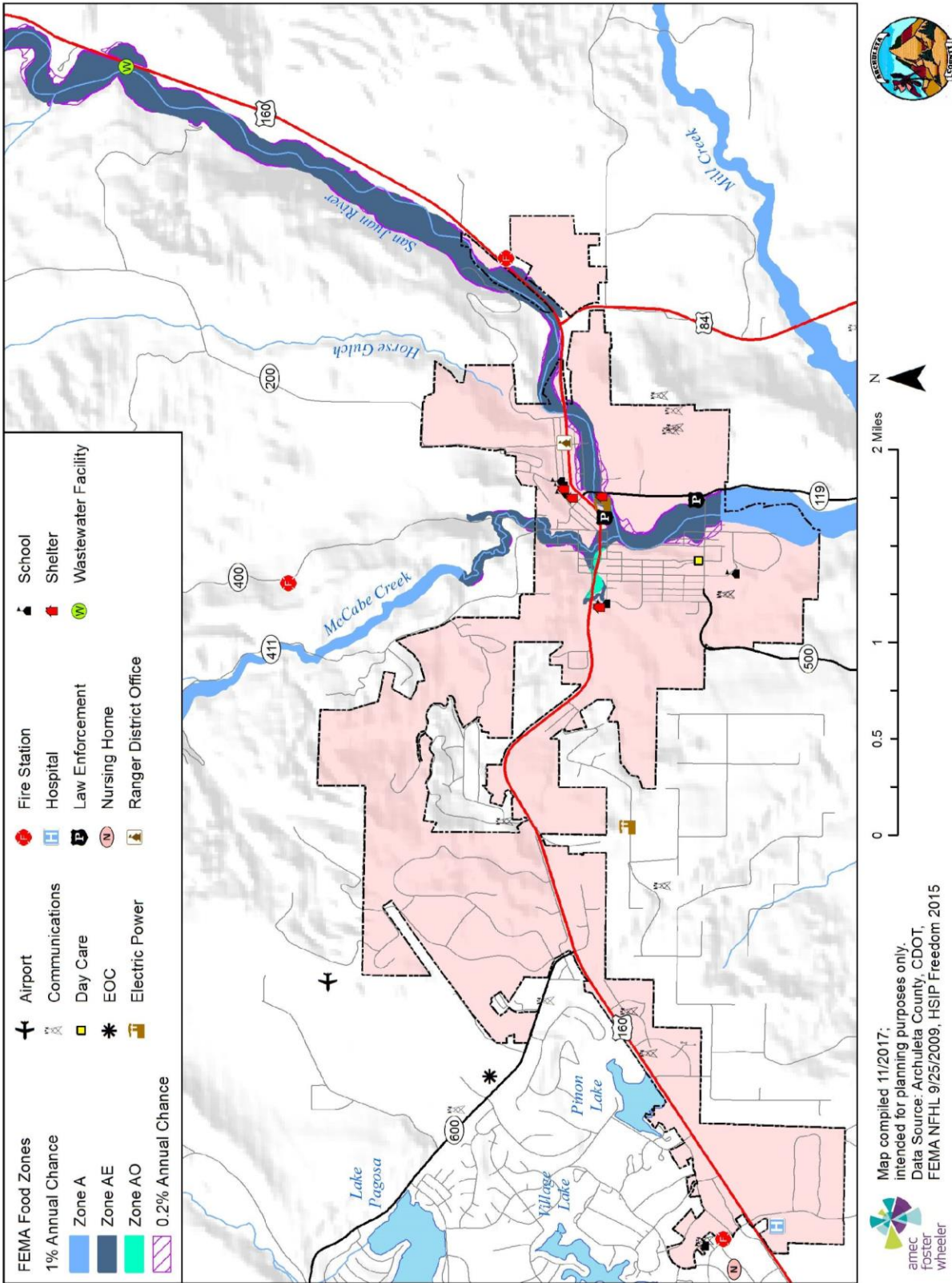


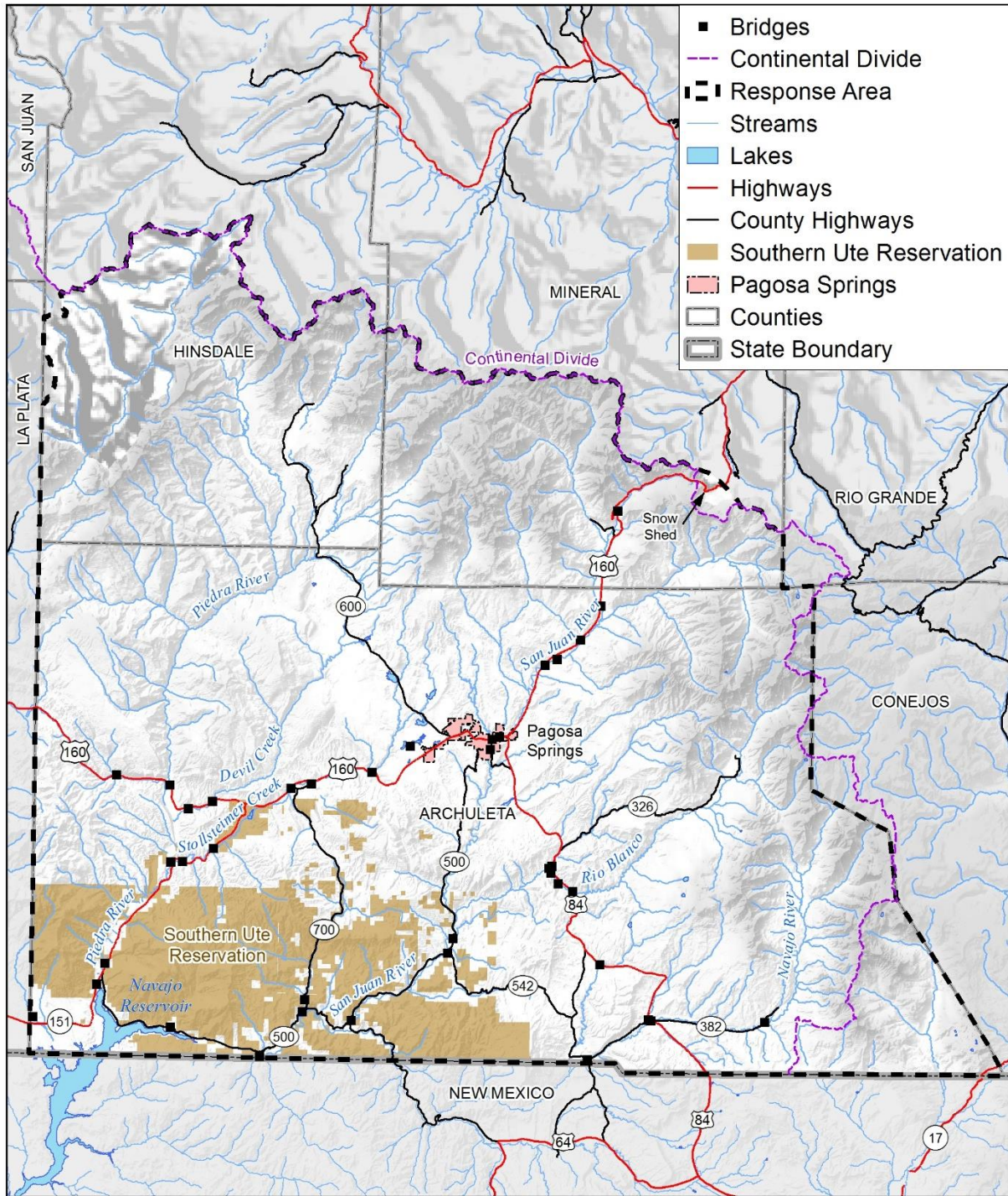
Figure 4.54. Critical Facilities and Flood Hazards Near Pagosa Springs



Bridges in the following map are from the National Inventory of Bridges database that comes with HAZUS-MH. One of the database items includes a “scour index” that is used to quantify the vulnerability of bridges to scour during a flood. Bridges with a scour index between one and three are considered “scour critical,” or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition. One bridge located in the Southern Ute Indian Reservation along Highway 160 is a “scour critical” bridge. The exact location of this bridge is displayed below in Figure 4.55, represented by the red square.

The HMPC also noted that the McCabe Creek passes through an undersized culvert where Highway 160 crosses the Creek in downtown Pagosa Springs just before where the Creek reaches the San Juan River. This culvert is likely to become clogged with debris and exacerbate flooding in the Town.

Figure 4.55. Archuleta Response Area Bridges



Map compiled 7/2017;  
intended for planning purposes only.  
Data Source: Archuleta County, CDOT,  
HSIP Freedom NBI

0 5 10 Miles



According to the State of Colorado 2010 Flood Hazard Mitigation Plan, there are four state-owned assets in the floodplain in Archuleta County.

Based on the GIS analysis, Unincorporated Archuleta County is most at risk from flooding. The estimated building loss value in unincorporated areas accounts for 70% of the County’s combined total loss from 100- and 500-year flooding. A substantial amount of Pagosa Springs is at risk as well. Serious economic ramifications could occur from a flood in the Town, since so much of the County’s commerce is centered there. A serious flash flood risk also is present in the Town, primarily on the McCabe Creek drainage.

### Flood Insurance Coverage and Claims Paid

Table 4.44 provides detailed information on National Flood Insurance Program (NFIP) policies and claims in participating jurisdictions in Archuleta County.

Table 4.44 Community Participation in the National Flood Insurance Program

Jurisdiction	Date Joined	Effective FIRM Date	Policies in Force	Insurance in Force (\$)	Number of Claims	Claims Totals (\$)
Town of Pagosa Springs	12/1/1978	9/25/2009	55	\$12,188,100	0	0
Unincorporated Archuleta County	1/3/1979	9/25/2009	84	\$23,574,500	2	\$1,863

Source: National Flood Insurance Program (<http://bsa.nfipstat.com/>), November 9, 2017

As of November 9, 2017, there were 55 policies in force in the Town of Pagosa Springs and 84 in the unincorporated County. These policies add up to \$35.3M in coverage. There were no repetitive loss properties, as defined by the NFIP, anywhere in Archuleta County at the time of the development of this plan.

In the unincorporated county, 77 of these policies were held by one-to-four family residences, 1 policy is classified as another type of residential, and 6 policies are held by nonresidential property owners. 48 policies lie in an A zone. Two losses occurred among the 82 policies, two of which were closed without payment. A total of \$1,863 in claims was paid out as a result of these losses. 66 of the 84 policies were identified as being in the flood zone after the original FIRM was produced in 1979. Theoretically, the remaining 18 policies which were identified as being in a flood zone prior to the FIRM are at higher risk.

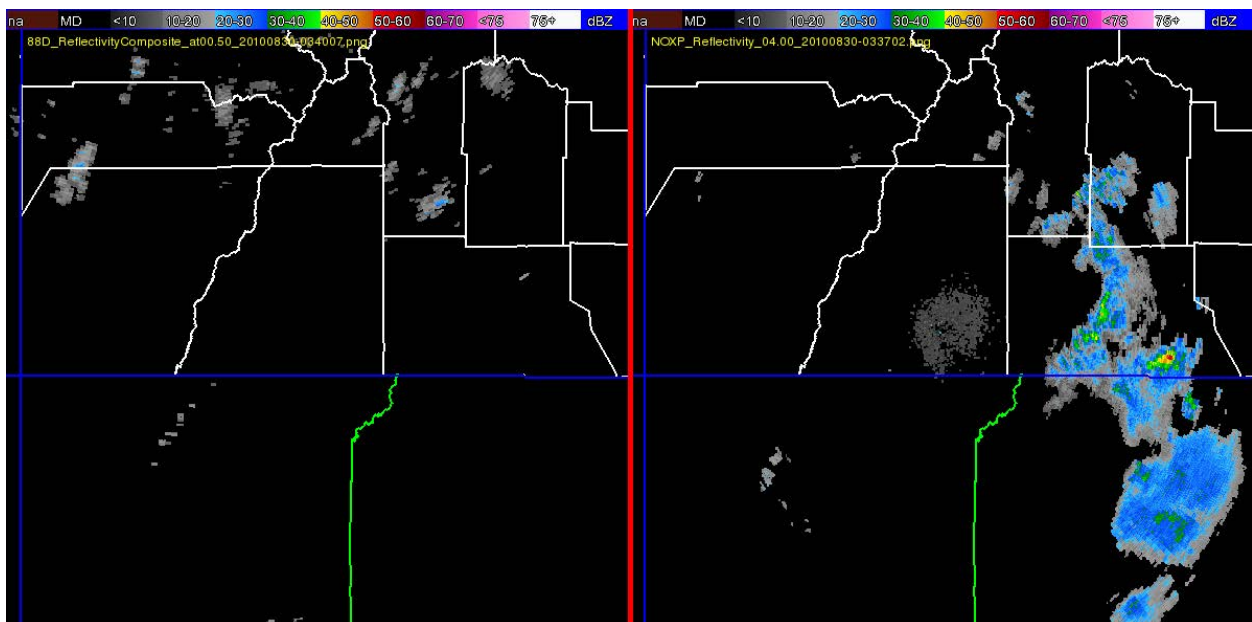
There were 53 policies in force in the town of Pagosa Springs. 50 of these policies were in an A zone with the remaining 3 in B, C, or X zones. 37 of these 53 policies were held by one-to-four family residences. 42 of the 82 policies were identified as being in the flood zone after the original FIRM was produced in 1978. Theoretically, the remaining 11 policies which were identified as being in a flood zone prior to the FIRM are at higher risk.

## Weather Radar Coverage

The ability to predict the potential severity of an impending thunderstorm, winter storm, or flooding event is made difficult by the lack of weather radar coverage in Archuleta County. This area is described as in a radar “black hole;” the elevation of the San Juan Mountains blocks radar beams, making it difficult for the National Weather Service (NWS) Doppler Radars in Grand Junction, Albuquerque, or Pueblo to accurately detect the presence and severity of storm events in southwestern Colorado and the Four Corners region as a whole. This lack of accurate information about weather events has widespread effects on the planning area. Residents in the planning area have little time to prepare for and mitigate against severe weather events. This can threaten lives, property, and the economy in the Archuleta County response area.

Between 2009 and 2010, a mobile radar was deployed twice in southwest Colorado as part of a research project. The results of this project are detailed in a 2010 Southwest Colorado Radar Project final report prepared by NOAA for the CWCB, CDEM, the Southwestern Water Conservation District, Archuleta County, and La Plata County. During the study, NWS and local officials could use the data to: monitor storms and flash flooding events; assist in Road and Bridge operations; help Search and Rescue find windows of opportunity between rain and hail to perform several rescues; and assist the National Weather Service in issuing Severe Storm and Flood Warnings. Figure 4.56 includes two panels that depict weather radar images and illustrates the gap in radar coverage from Grand Junction Doppler Radar. The left and right panels are divided by the red line down the center of the image.

Figure 4 .56. Doppler Radar KGJX in Grand Junction (left panel) and NOXP Radar at Durango/La Plata Airport (right panel)



Source: Archuleta Sheriff's Office – Division of Emergency Management (taken August 30, 2010)

## **Analyzing Development Trends**

There is high pressure from the development community to develop residential housing along the San Juan River up to the floodway boundary. Most development that has occurred has been residential and built to the local floodplain management regulations (lowest floor 1 foot above the base flood elevation). Vulnerability to floods greater than the 1% annual chance flood (base flood) has increased due to this development.

### **4.4.7 Hailstorm**

Information on vulnerability to hailstorms is limited given the relative lack of historical data on damages. According to national databases, there have been two severe hail events in Archuleta County, with significant events occurring approximately every 5 years. However, neither of the hailstorm events profiled in Table 4.24 inflicted any damage according to NCEI, so it is not possible to calculate the potential losses based on previous damages. In general, everyone in the Archuleta County response area is vulnerable to hailstorms.

### **4.4.8 High Winds and Tornadoes**

In order to calculate exposure and potential losses, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it reflects common occurrence. Based on SHELDUS records, the event of record for damaging winds in Archuleta County occurred on April 18, 2000. This event resulted in \$78,947 in damages (in 2000 dollars).

Calculating the average annual damage from damaging is another method used in assessing potential losses. According to SHELDUS and NCEI, there were 42 notable wind events and one tornado between 1960 and April 2017, causing \$208,820 in property damages and \$8,907 in crop damages. This averages out to \$3,820 in damages from damaging winds in any given year. Impacts on critical facilities and functions in the response area are possible but not anticipated to be substantial.

### **4.4.9 Landslide/Rockfall/Debris Flow**

The two active landslides in the planning area, the East Fork landslide and the Jackson Mountain landslide, pose a serious risk to public safety and have already resulted in substantial financial loss. Both landslides are prone to disrupting utility lines in the area. Landslides could impact the County, and indirectly impact the PAWD and Town of Pagosa Springs. There are no direct impacts to the Pagosa Fire Protection District. The most severe impacts would result from the damming of the East Fork of the San Juan if the East Fork landslide mass fell into the river. If this were to happen, water would build up behind the dam until it eventually breached. Studies on the issue revealed that much of Pagosa Springs would be inundated. Figure 4.24 shows where the San Juan River is constricted by boulders from the landslide, causing the River to widen upstream of the constriction.



The difference in the width of the channel above and below the point of constriction and the damage to trees on the slide area is apparent in photograph shown in this figure.

To gain some idea of the damage this dam breach could potentially cause, dam safety engineers modeled flood approximations off the 1% annual chance flood in Pagosa Springs. The results of this study are repeated below in Table 4.45. It is important to note that the data in this table are approximations; there is no way to determine for certain what dam height the landslide could potentially create.

Table 4.45 Flood Level Approximations Based on Potential Landslide Dam Height

Peak Breach Discharge (cfs)	Dam Height Associated with Peak Discharge (feet)	Storage Volume Associated with Peak Discharge (AF)	Expected Attenuation at Pagosa Springs
15,000	50	695	25%
30,000	65	1,500	10%
50,000	85	3,000	5%
100,000	125	8,500	0%
150,000	150	15,000	0%

Source: Gavin, Matt and Brown, Chris, 2008. *East Fork Landslide prompted Flood Hazard Study by Dam Safety Engineers*. Streamlines, Vol. 22 (2), p. 1-3.

Based on this data, a breach of a landslide dam of 50 feet in height could result in a flood the same size as the 1% annual chance flood. In such an event, the Town of Pagosa Springs and parts of the unincorporated County could expect the same risks and damages from the 100-year flood as discussed in the flood vulnerability section.

The Jackson Mountain Slide has ruptured the Snowball water pipeline several times in the past 10-20 years. The Snowball pipeline supplies a portion of Pagosa Springs' municipal water and is the only source of water for the Snowball Water Treatment Plant and District 2 of the Pagosa Area Water and Sanitation District. Disruption of this water supply line could also be critical for the Pagosa Springs area. The financial impact of the Jackson Mountain Slide has been substantial. According to the HMPC, roughly \$6 million has been spent on stabilizing the slide area and repairing the stretch of Highway 160 affected by the slide. This part of the Highway has been repaved repeatedly to the point that the asphalt is 27 vertical feet thick, the accumulation of one repaving after another. If this landslide is active, it will continue to drain financial resources. This slide also poses a potential threat to motorists traveling along Highway 160.

There is a potential risk to public safety to travelers due to rockfall. The areas where rockfall is a recurrent problem are identified in Section 4.3.9. CDOT installed rockfall mitigation devices on Highway 160 over Wolf Creek Pass in an effort to reduce the level of hazard. Specific loss estimates are not available for rockfall hazards in the planning area. Elsewhere, rockfalls have caused severe injury or even death. In the Archuleta County response area, this risk is higher for motorists traveling along Highway 160.

#### **4.4.10 Land Subsidence**

The greatest dangers associated with subsidence are related to property damages incurred by the hazard. There are minimal risks to injury and death from unexpected subsidence or accidental exposure to it, but the risk is possible. No injuries or deaths related to subsidence have been reported in the planning area.

Using typical damages caused by subsidence as a point of reference, the planning area could potentially experience damage to houses, critical facilities, and other structures. Given the limited number of roads in the County, subsidence along Highway 160 could affect transportation and delivery of services to the planning area, resulting in economic losses. Subsidence may also result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate natural processes of subsidence, or incur subsidence over manmade voids. The consequences of improper use of land subject to ground subsidence can be excessive economic losses, including the high costs of repair and maintenance for buildings, irrigation works, highways, utilities, and other structures. This results in direct economic losses to citizens as well as indirect economic losses through increased taxes and decreased property values.

#### **4.4.11 Lightning**

Lightning can cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. It also causes forest, brush, and structural fires. Damage from lightning occurs in four ways:

- Electrocutation, severe electrical shock, and burns of humans and animals
- Vaporization of materials in the path of the strike
- Fire caused by the high temperatures associated with lightning
- Power surges that can damage electrical and electronic equipment

When people are struck by lightning, the result is deep burns at the point of contact (usually on the head, neck, and shoulders). Approximately 70 percent of lightning survivors experience residual effects such as vision and hearing loss or neuropsychiatric issues. These effects may develop slowly and only become apparent much later. Death occurs in 20 percent of lightning strike victims.

Lightning strikes cause intense but localized damage. In contrast to other hazards, lightning does not cause widespread disruptions with the community. Structural fires, localized damage to buildings, damage to electronics and electrical appliances, and electrical power and communications outages are typical consequences of a lightning strike. Additionally, indirect fatalities may result from electrocution via contact with live power-lines that are knocked loose by a lightning strike.

The indirect social and economic impacts of lightning damage are typically associated with the loss of electrical power. Since society relies heavily on electric power, any disruption in the supply, even for a brief time, can have significant consequences.

One of the most serious risks associated with lightning is its potential to cause wildland fires. This could result in substantial losses for the Archuleta County response area. For specific details on loss and vulnerability associated with wildland fires, please see the wildland fire vulnerability discussion.

Based on the data from SHELDUS, Archuleta County's average annual loss from lightning is \$2,868. The event of record occurred on September 8, 2000, when lightning caused a house and garage to catch on fire, destroying the contents inside. The event resulted in an estimate \$50,000 in damages in 2000 dollars. Other events that caused similar amounts of damage were also fire-related.

#### **4.4.12 Pandemic Disease**

The total County population of 12,854 could potentially be exposed to a pandemic flu outbreak. According to the Colorado Department of Public Health and Environment's Internal Emergency Response Implementation Plan, susceptibility to the pandemic influenza virus strain will be universal, and the disease affect approximately 30 percent of the state's overall population. Illness rates will be highest among school-age children (about 40 percent) and decline with age. Among working adults, an average of 20 percent will become ill during a community outbreak. In a severe pandemic, it is expected that absenteeism may reach 40 percent due to illness, the need to care for ill family members, and fear of infection.

The number of hospitalizations and deaths will depend on the virulence of the virus. Risk groups cannot be predicted with certainty. During the annual influenza season, infants, the elderly, the chronically ill, and pregnant women are usually at higher risk. But, in contrast, in the 1918 pandemic, most deaths occurred among young, previously healthy adults.

If a pandemic event affected 30 percent of the Archuleta population, approximately 3,856 people in the County could become ill. It is difficult to quantify losses any further.

#### **4.4.13 Severe Winter Storms**

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. But, these storms can also impact the local economy by disrupting transportation and commercial activities. Winter storms are occasionally severe enough to overwhelm snow removal efforts, transportation, livestock management, and business and commercial activities. Travelers on highways in Archuleta County, particularly along remote stretches of road, can become stranded, requiring search and rescue assistance and shelter provisions. The County can experience high winds and drifting snow during winter storms that can occasionally isolate individuals and entire communities and lead to serious damage to livestock populations and crops.

Winter storms also contribute directly to avalanche hazards and extreme temperatures (cold). Limited phone and cell phone service in parts of the County may mean that emergency reporting may be difficult or impossible during severe winter storm events.

The County's grocery stores are largely dependent on truck shipments. These shipments can and have been interrupted for several days due to winter storms, leaving the grocery stores with very little inventory in stock. Citizens need to be prepared for food shortages during these periods. It is recommended that citizens have supplies that will last for periods of one to two weeks.

Research presented in Section 4.3.14 Severe Winter Storm did not find significant loss information for this hazard, yet structural losses are possible. Structural damage from winter storms in southwest Colorado can result from severe snow loads on rooftops. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). With older, flat-roofed structures in Pagosa Springs, the potential for damage exists, but information to quantify the amount and extent is currently not available.

#### **4.4.14 Volcano**

Based on the information provided in this profile, the potential losses resulting from the volcanic hazard are considered **negligible**.

#### **4.4.15 Wildland Fire**

The Hazard Identification section (4.3.16) laid out several issues that help frame the county's vulnerability to wildland fire:

- The typical fire season runs from May through September, peaking June through August.
- The last thirty years have shown a trend of increasing fire occurrence and acres burned.
- There is a general decline in forest health throughout southwestern Colorado, exacerbating an already worsening hazard fuels problem.
- As fire occurrence has increased and fuels have become more hazardous, population has increased, often in the areas with the most severe fuels issues.

The Archuleta County Community Wildfire Protection Plan (CWPP) of 2008 identifies all its communities and subdivisions as being in the WUI. The plan lists 288 subdivisions, of which 258 have been ranked in terms of vulnerability to wildland fire. This is illustrated below in Figure 4.57.

The Mineral County CWPP identifies two WUI communities in southern Mineral County: Wolf Creek Village and Cade Ranch. These WUI communities, depicted in Figure 4.62, fall within the borders of the Archuleta County Response Area. Wolf Creek Village is indicated by the number 13 (circled in purple), and Cade Ranch is indicated by the number 14 (circled in purple) in Figure 4.62. Both Cade Ranch and Wolf Creek Village are ranked as high wildfire hazard communities

in the Mineral County CWPP. This ranking is based on fuels, topography, access/egress routes, and water supply near the communities.

According to the Hinsdale County CWPP, one WUI community falls within the Archuleta County Response Area: the Piedra/Palisade community. Piedra/Palisade, shown in Figure 4.58 and Figure 4.59, is in the southeastern corner of Hinsdale County. The Hinsdale County CWPP ranked Piedra/Palisade as a high wildfire hazard WUI area. 155 structures were identified in the Piedra/Palisades community. Of those 155 structures, 57% are expected to be destroyed in a wildfire in the community.

Figure 4.57. Archuleta County Wildland Urban Interface Subdivisions

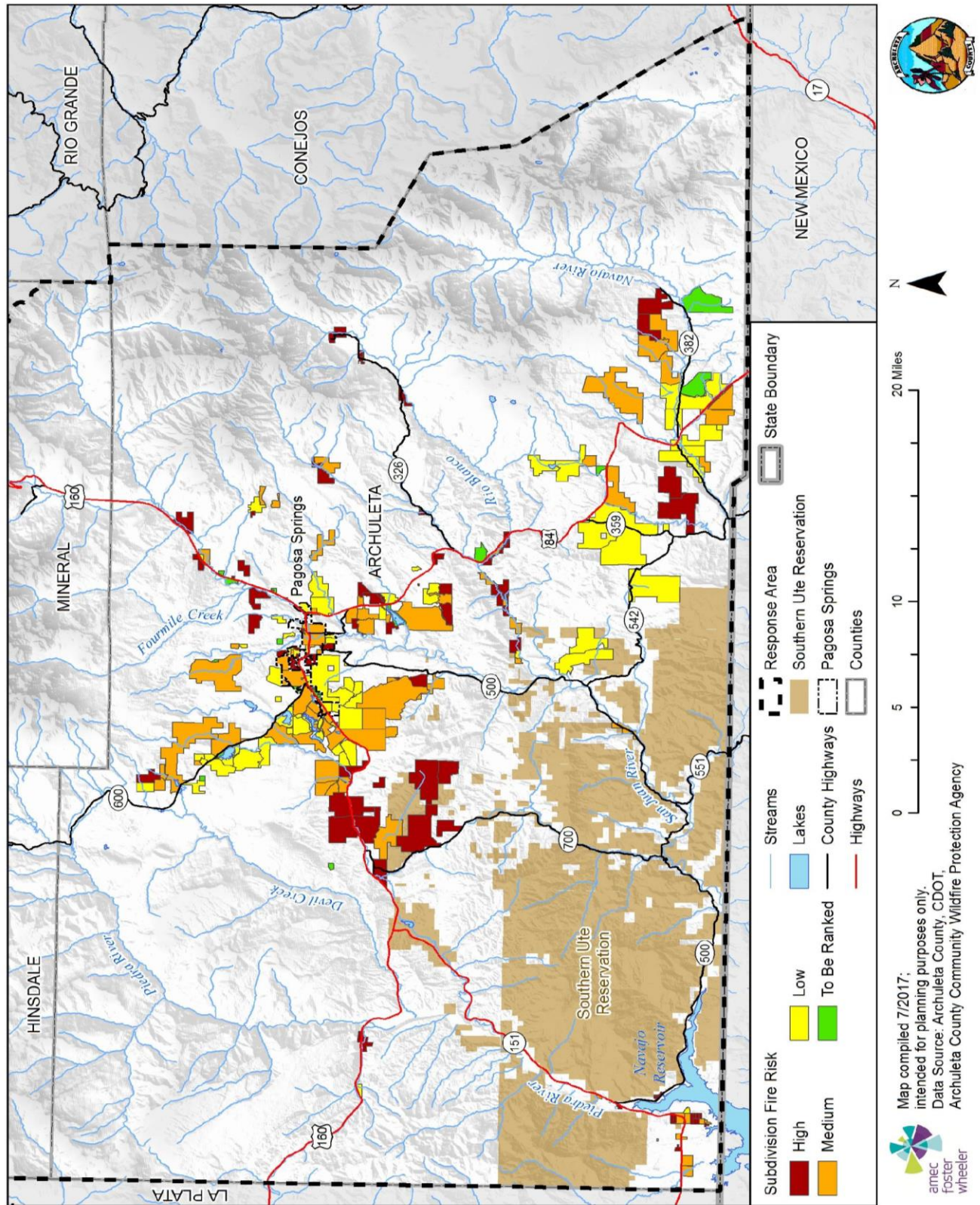
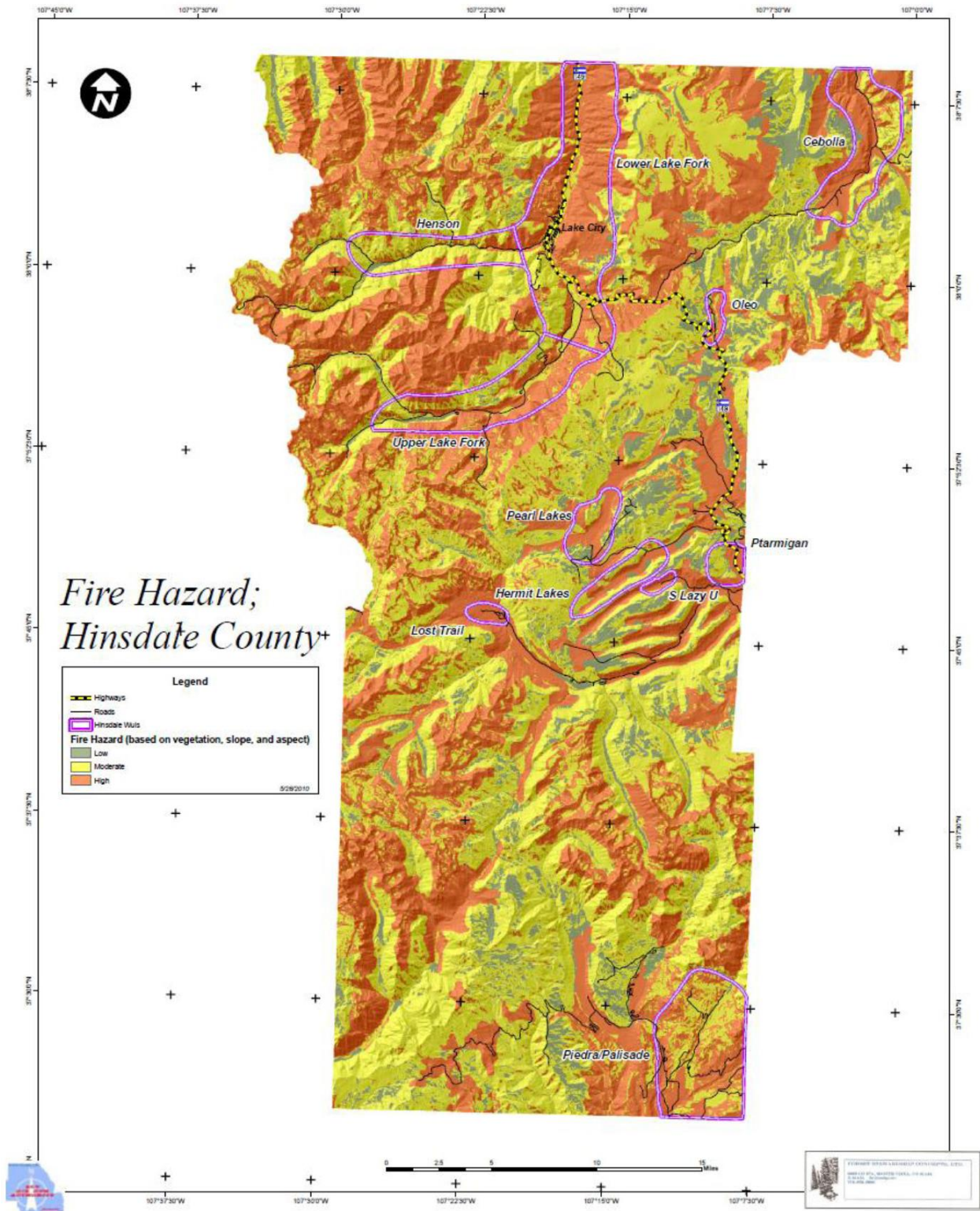
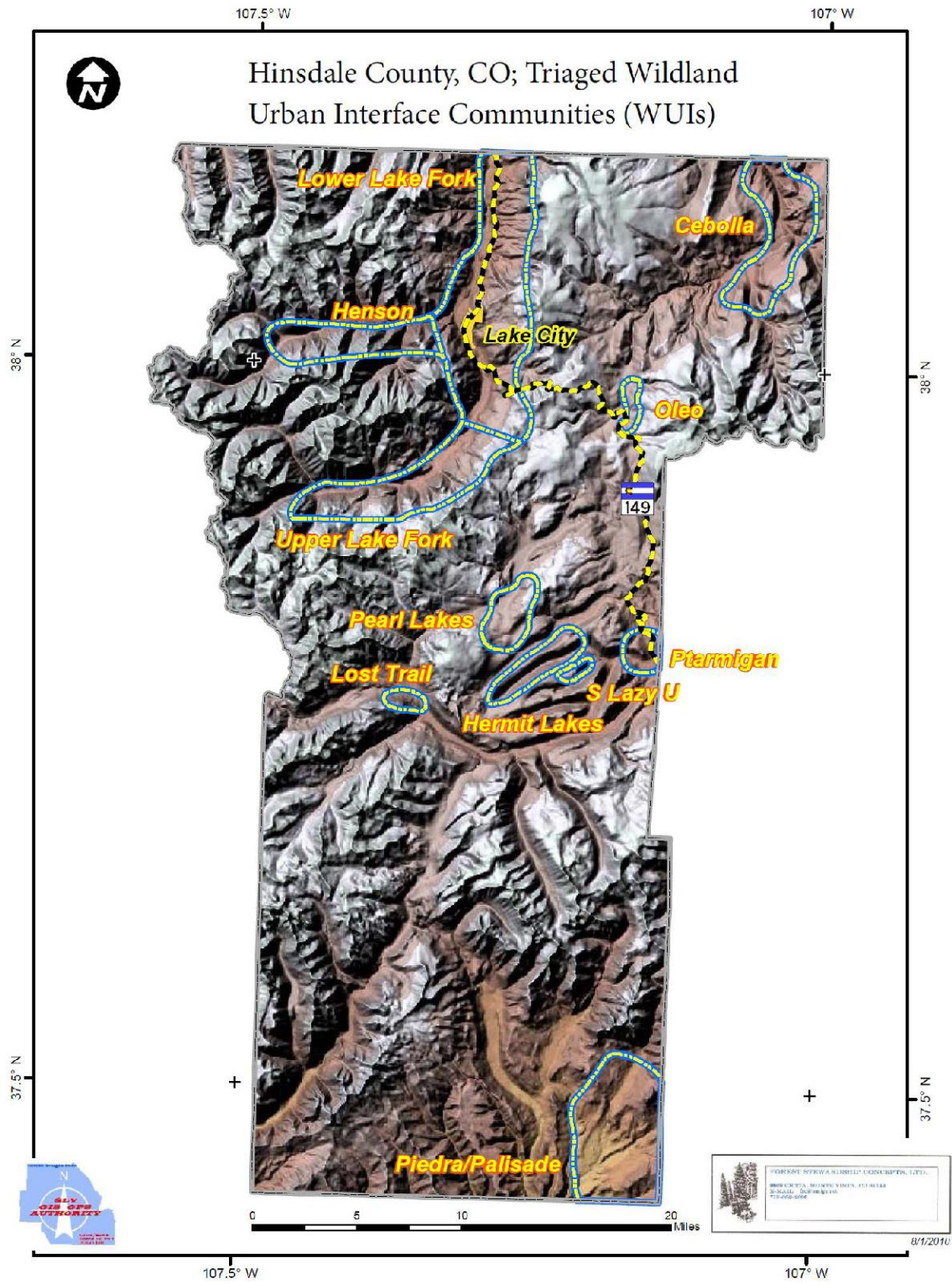


Figure 4.58. Hinsdale County Fire Hazards



Source: Hinsdale County CWPP

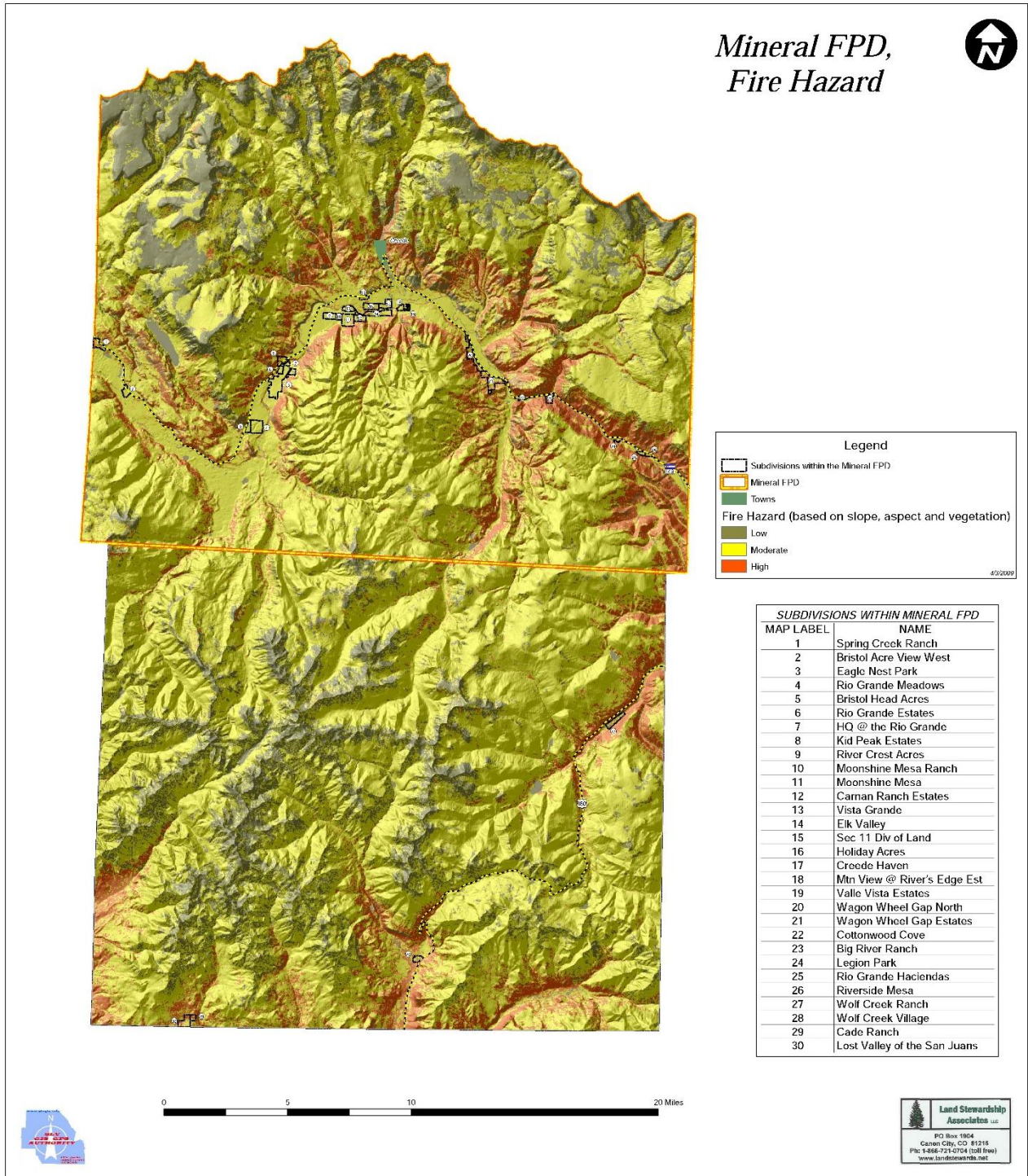
Figure 4.59. Hinsdale County Triaged Wildland Urban Interface Communities



Source: Hinsdale County Community Wildfire Protection Plan



Figure 4.60. Mineral County Fire Hazards



Source: Mineral County CWPP

Figure 4.61 . Mineral County Wildland Urban Interface Communities

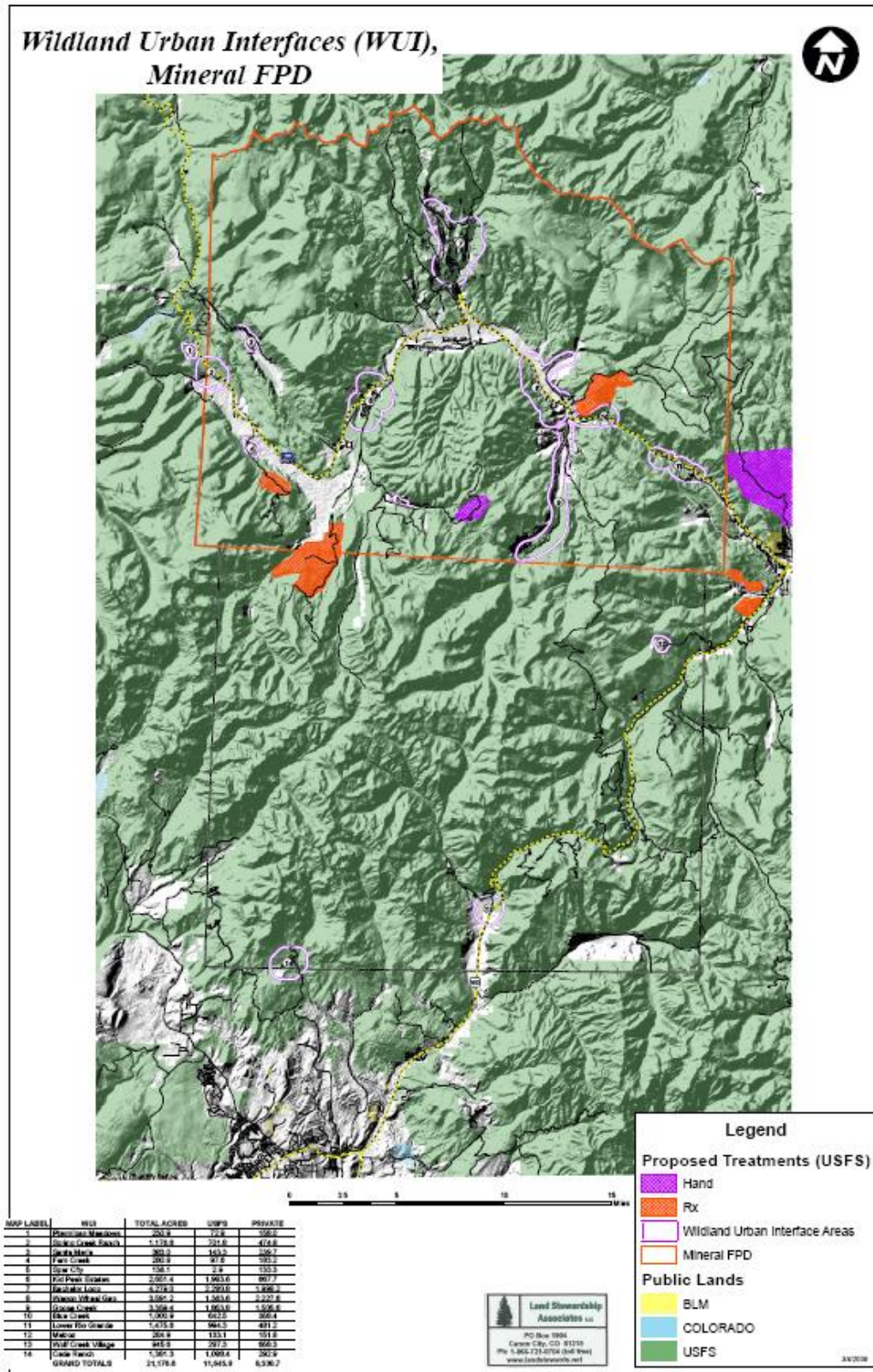
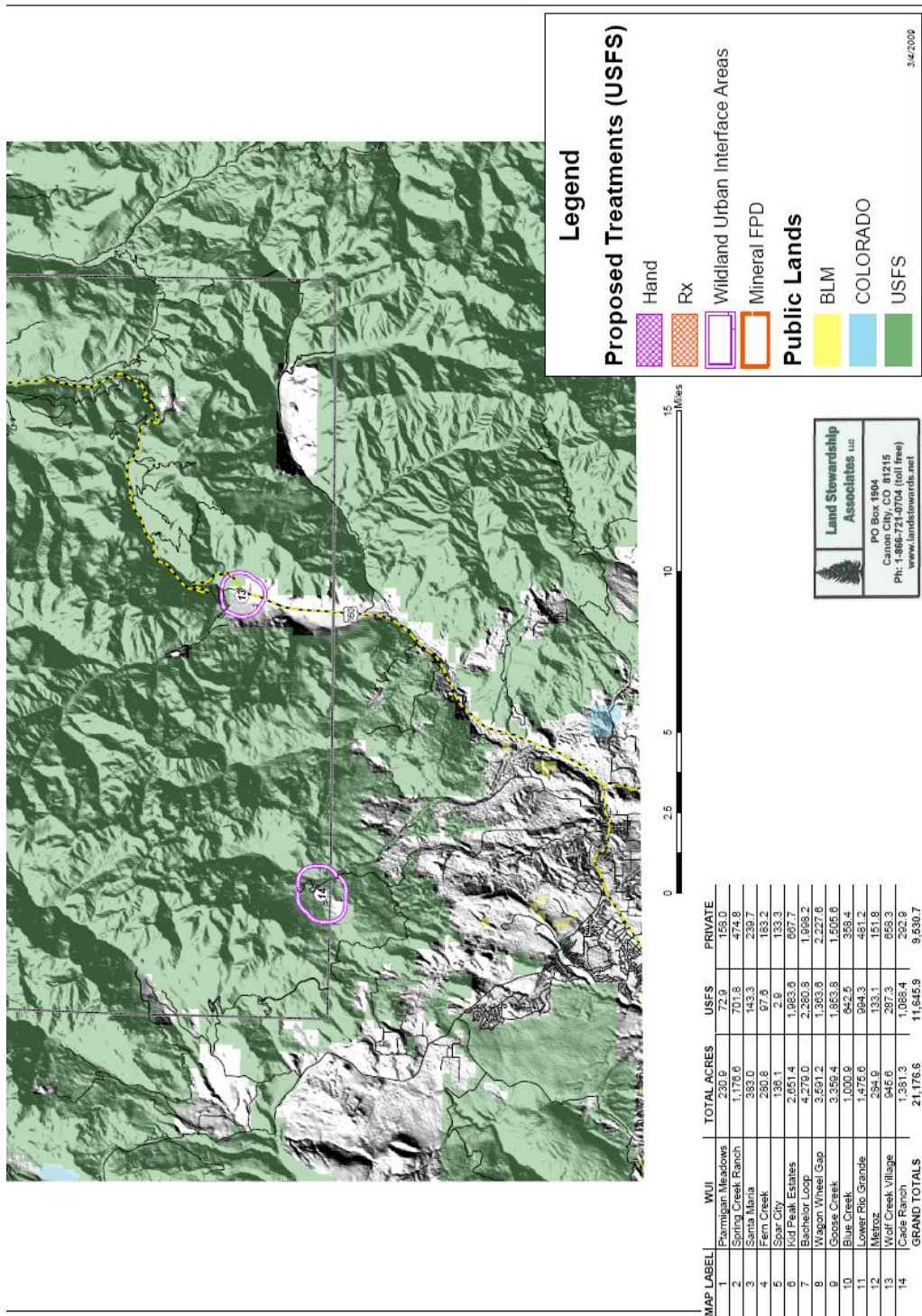


Figure 4.62 . S outhern Mineral County Wildland Urban Interface Communities in Archuleta County Response Area



These rankings of high, medium, and low vulnerability developed by the CWPP were based on a fuels layer, parcel size, and proximity to water supply. Of the rated subdivisions, 90 were rated as high, 84 were rated medium, and 84 were rated low. This rating system is subject to modification and improvement as updated and additional data become available.

During the development of this mitigation plan an effort was made to further quantify the population at risk as well as the number and value of structures at risk. GIS was used to analyze the subdivisions at risk, based on the CWPP, in relation to the number of improved (i.e. those that have a structure) parcels from 2017 assessor data. The amount of improved values and estimated structure value was quantified by high, medium, and low subdivision wildland fire risk. Contents values were also estimated (see discussion in flood vulnerability discussion). The results indicate that \$2.4 billion in property value and 7,958 structures are potentially exposed to wildland fire hazards in the unincorporated county. 18% of that value and 2,083 structures are in a subdivision designated as high risk. \$324 million in property value is associated with at-risk subdivisions in Pagosa Springs, including 1,217 structures. Nearly 8% of that value is within a high-risk subdivision, including 144 structures.

Figure 4.63 displays the high-risk subdivisions with 20 structures or more, sorted by improved parcel count. Based on the number of structures at risk the Aspen Springs Subdivisions one through four are the highest risk areas within the County.

An analysis of populations at risk was conducted by applying an average household size of 2.25 (Census) to the county of residential parcels with improvements in the subdivisions at risk. This analysis yielded an estimated 14,135 people in the unincorporated area subdivision at risk and 1,424 people in the Pagosa Springs subdivisions at risk. This includes 3,092 in the high-risk subdivisions of the unincorporated county and 189 in the high-risk subdivisions of Pagosa Springs. It should be noted that the estimate of 14,135 people in unincorporated Archuleta County at risk to wildland fire is higher than the 2016 Census estimate for the County's entire population, which was placed at 12,854 people. This gap could be due to the large number of second-home owners in the County.

An estimated 30 people are at risk in southern Hinsdale County, and 21 people are at risk in southern Mineral County, based on HAZUS block level data that uses Census 2010 estimates. According to HAZUS, there were 87 housing units in southern Hinsdale County with an estimated value of \$35,235,000, and 57 housing units in Mineral County with an estimated value of \$22,259,000.

Table 4.46 and Table 4.47 show the structures at risk to wildland fire by municipality and wildland fire risk. Based on observations in wildland-urban interface fires, structures and contents are often completely destroyed, thus the estimated total value also represents potential dollar losses. Note: a wildland fire is not likely to burn all the wildland-urban interface areas in the Archuleta County response area at once.

Future vulnerability to wildland fire will be directly related to growth and development trends. Currently, most of the County’s population is in the existing incorporated areas and the Pagosa Lakes subdivisions around Pagosa Springs, referred to as the Pagosa Hub area in the Community Plan. Growth is restricted due to the large amount of public land in the County. Roughly one-third of Archuleta County is privately owned, while the remaining two-thirds are held by federal, state, and tribal governments. According to a summary of the Archuleta County building permit statistics, the number of building permits was typically in the range of 150-300 per year from 2008-2017. Those numbers have been increasing since 2008, likely reflecting improved economic conditions. Despite the slowing growth rate, vulnerability to wildland fires may still increase when people build in the WUI.

Table 4.46 Unincorporated Archuleta County Wildland Fire Vulnerability by Level of Risk

Wildfire Risk	Occupancy Type	Improved Parcel Count	Buildings at Risk	Improvement Value	Content Value	Total Value
High	Agricultural	16	25	\$2,392,550	\$2,392,550	\$4,785,100
	Commercial	22	24	\$3,071,080	\$3,071,080	\$6,142,160
	Industrial	3	3	\$132,590	\$198,885	\$331,475
	Mixed Use	8	11	\$1,962,410	\$1,962,410	\$3,924,820
	Residential	1,374	1,924	\$275,214,650	\$137,607,325	\$412,821,975
	Vacant	92	96	\$1,539,070	\$1,539,070	\$3,078,140
	<b>Total</b>	<b>1,515</b>	<b>2,083</b>	<b>\$284,312,350</b>	<b>\$146,771,320</b>	<b>\$431,083,670</b>
Medium	Agricultural	23	29	\$6,725,210	\$6,725,210	\$13,450,420
	Commercial	67	95	\$12,718,140	\$12,718,140	\$25,436,280
	Industrial	7	9	\$728,770	\$1,093,155	\$1,821,925
	Mixed Use	11	25	\$4,433,080	\$4,433,080	\$8,866,160
	Residential	3,160	3,540	\$727,527,190	\$363,763,595	\$1,091,290,785
	Vacant	26	26	\$438,520	\$438,520	\$877,040
	<b>Total</b>	<b>3,294</b>	<b>3,724</b>	<b>\$752,570,910</b>	<b>\$389,171,700</b>	<b>\$1,141,742,610</b>
Low	Agricultural	25	60	\$7,164,970	\$7,164,970	\$14,329,940
	Commercial	20	21	\$2,669,750	\$2,669,750	\$5,339,500
	Industrial	2	2	\$259,140	\$388,710	\$647,850
	Mixed Use	4	4	\$1,319,660	\$1,319,660	\$2,639,320
	Residential	1,748	2,021	\$526,606,670	\$263,303,335	\$789,910,005
	Vacant	5	5	\$331,040	\$331,040	\$662,080
	<b>Total</b>	<b>1,804</b>	<b>2,113</b>	<b>\$538,351,230</b>	<b>\$275,177,465</b>	<b>\$813,528,695</b>
Subdivisions to Be Ranked	Agricultural	3	3	\$1,974,840	\$1,974,840	\$3,949,680
	Commercial	2	2	\$398,990	\$398,990	\$797,980
	Mixed Use	1	1	\$209,450	\$209,450	\$418,900
	Residential	22	32	\$9,993,250	\$4,996,625	\$14,989,875
	<b>Total</b>	<b>28</b>	<b>38</b>	<b>\$12,576,530</b>	<b>\$7,579,905</b>	<b>\$20,156,435</b>
<b>Grand Total</b>	<b>6,641</b>	<b>7,958</b>	<b>\$1,587,811,020</b>	<b>\$818,700,390</b>	<b>\$2,406,511,410</b>	

Table 4.47 Pagosa Springs Wildland Fire Vulnerability by Level of Risk

Wildfire Risk	Occupancy Type	Improved Parcel Count	Buildings at Risk	Improvement Value	Content Value	Total Value
High	Agricultural	1	1	\$13,530	\$13,530	\$27,060
	Commercial	35	43	\$2,865,920	\$2,865,920	\$5,731,840
	Industrial	2	2	\$236,310	\$354,465	\$590,775
	Mixed Use	2	8	\$353,330	\$353,330	\$706,660
	Residential	84	90	\$12,568,690	\$6,284,345	\$18,853,035
	<b>Total</b>	<b>124</b>	<b>144</b>	<b>\$16,037,780</b>	<b>\$9,871,590</b>	<b>\$25,909,370</b>
Medium	Agricultural	2	3	\$111,320	\$111,320	\$222,640
	Commercial	220	257	\$43,890,050	\$43,890,050	\$87,780,100
	Industrial	1	1	\$133,310	\$199,965	\$333,275
	Mixed Use	27	41	\$6,644,710	\$6,644,710	\$13,289,420
	Residential	510	618	\$94,331,590	\$47,165,795	\$141,497,385
	Vacant	33	33	\$267,026	\$267,026	\$534,052
<b>Total</b>	<b>793</b>	<b>953</b>	<b>\$145,378,006</b>	<b>\$98,278,866</b>	<b>\$243,656,872</b>	
Low	Commercial	12	21	\$1,819,230	\$1,819,230	\$3,638,460
	Mixed Use	2	5	\$426,140	\$426,140	\$852,280
	Residential	39	45	\$13,274,610	\$6,637,305	\$19,911,915
	Vacant	1	3	\$10,660	\$10,660	\$21,320
	<b>Total</b>	<b>54</b>	<b>74</b>	<b>\$15,530,640</b>	<b>\$8,893,335</b>	<b>\$24,423,975</b>
Subdivisions to Be Ranked	Commercial	24	26	\$11,401,580	\$11,401,580	\$22,803,160
	Mixed Use	3	3	\$1,760,520	\$1,760,520	\$3,521,040
	Residential	16	16	\$2,886,810	\$1,443,405	\$4,330,215
	Vacant	1	1	\$4,970	\$4,970	\$9,940
	<b>Total</b>	<b>44</b>	<b>46</b>	<b>\$16,053,880</b>	<b>\$14,610,475</b>	<b>\$30,664,355</b>
<b>Grand Total</b>	<b>1,015</b>	<b>1,217</b>	<b>\$193,000,306</b>	<b>\$131,654,266</b>	<b>\$324,654,572</b>	

Figure 4 .63. Pagosa Springs Wildland Urban Interface Subdivisions

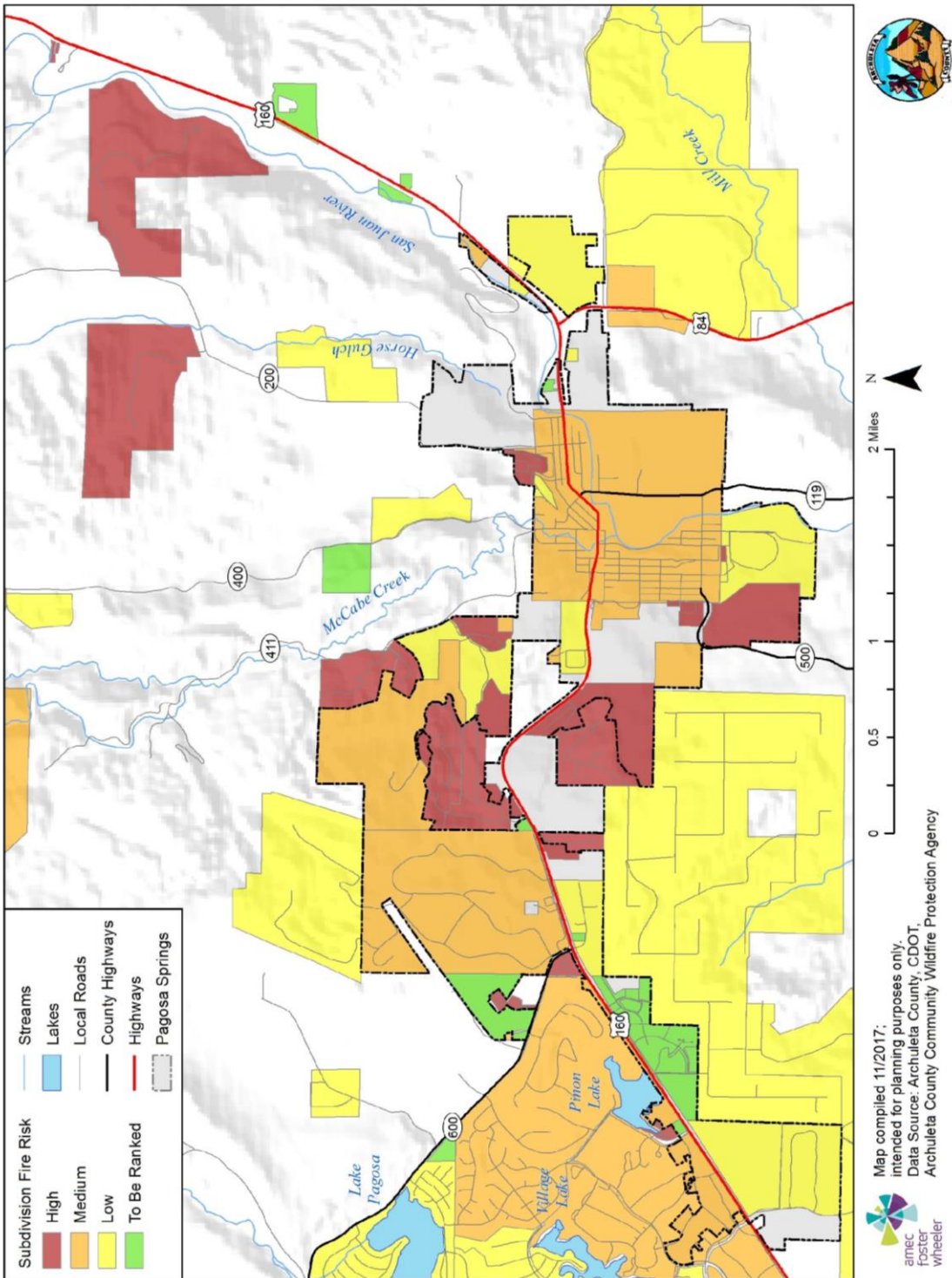


Figure 4 .64. Archuleta County Improved Parcel Counts in High Wildland Fire Risk Subdivisions

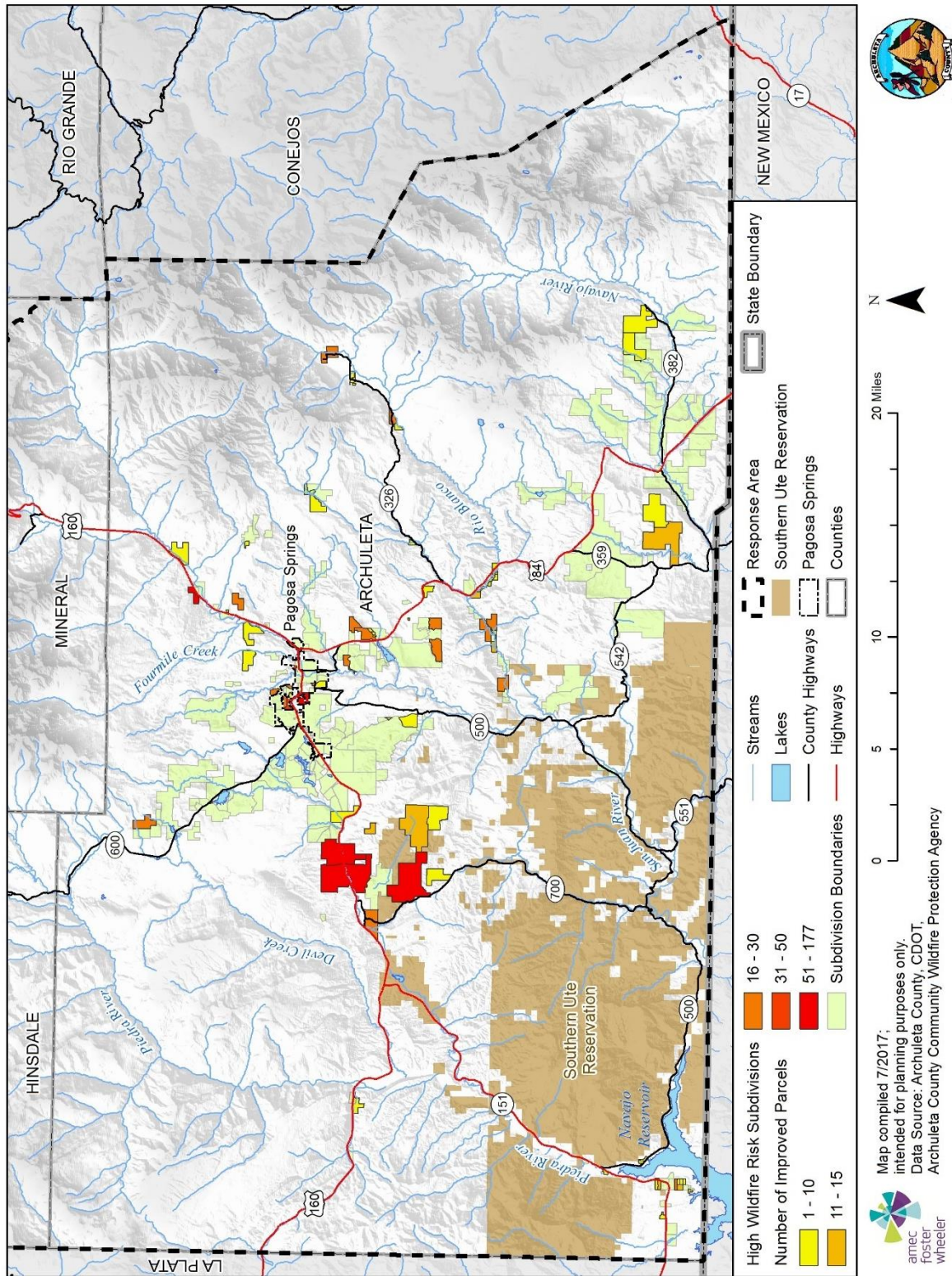
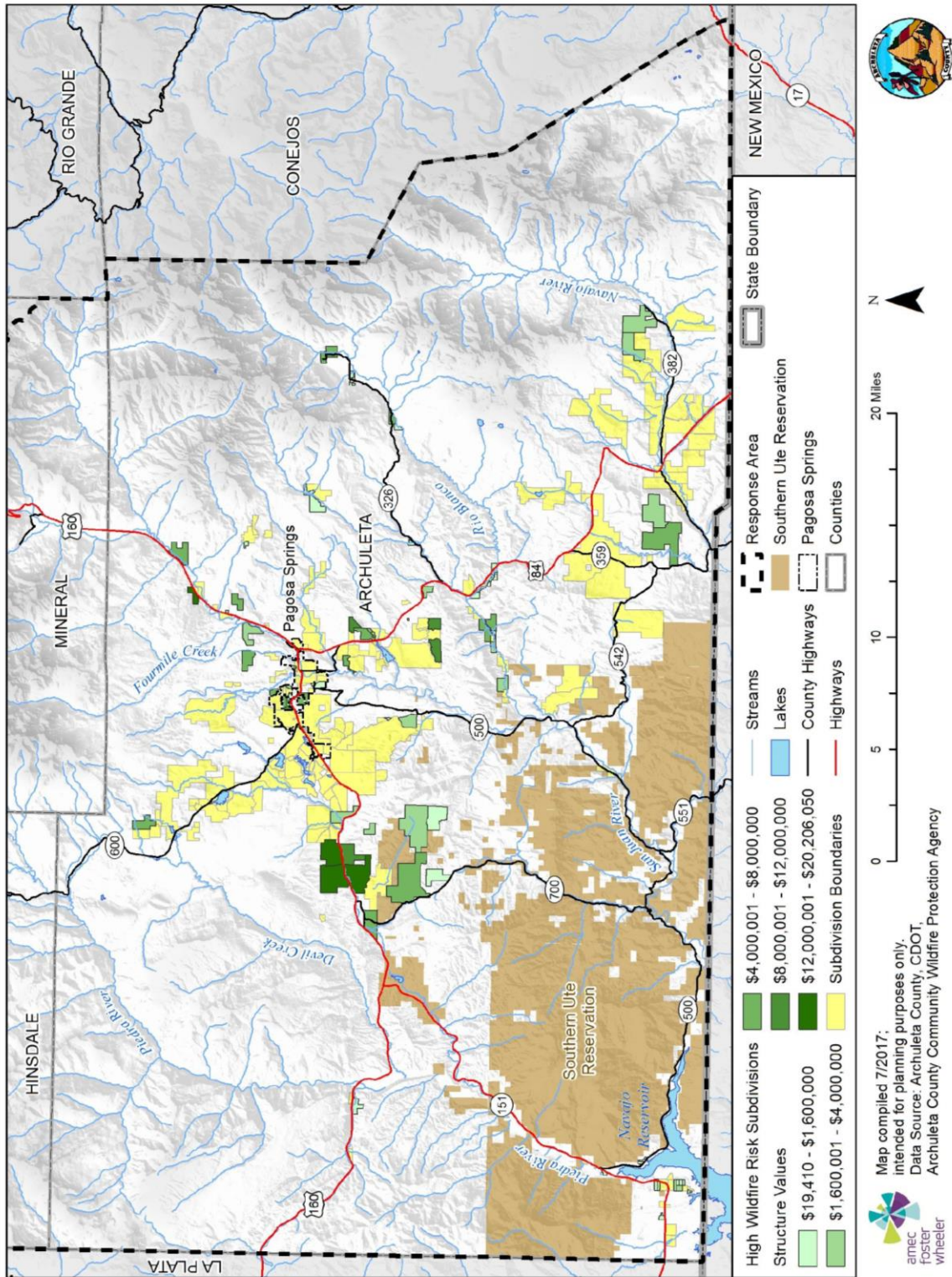




Figure 4.65. Archuleta County Structure Value in High Wildland Fire Risk Subdivisions



There are 45 critical facilities located in wildfire risk area. Table 4.48 distinguishes the different types of facilities, based on the degree of wildfire hazard and location. Most of the critical facilities (64%) are in the medium wildfire risk area, and concentrated in the Pagosa Springs area. The seven facilities in the high hazard area are all located within unincorporated areas. Types of facilities range, though communications facilities are the most numerous.

Table 4. 48 Archuleta County Wildfire Critical Facility Summary by Risk and Jurisdiction

Wildfire Risk	Jurisdiction	CF Type	CF Count
High	Unincorporated	Communications	6
		School	1
		<b>High Total</b>	<b>7</b>
Medium	Pagosa Springs	Communications	4
		Day Care	1
		Electric Power	3
		Law Enforcement	2
		Ranger District Off	1
		School	5
		Shelter	4
	<b>Total</b>	<b>20</b>	
	Unincorporated	Communications	5
		Fire Station	1
		Law Enforcement	1
		Nursing Home	2
		<b>Total</b>	<b>9</b>
	<b>Medium Total</b>	<b>29</b>	
Low	Pagosa Springs	Communications	2
		School	1
		<b>Total</b>	<b>3</b>
	Unincorporated	Communications	2
		Electric Power	1
		Fire Station	2
		Wastewater Facility	1
		<b>Total</b>	<b>6</b>
	<b>Low Total</b>	<b>9</b>	
	<b>Grand Total</b>	<b>45</b>	

Figure 4.66. Archuleta County Community Fire Risk and Critical Facilities

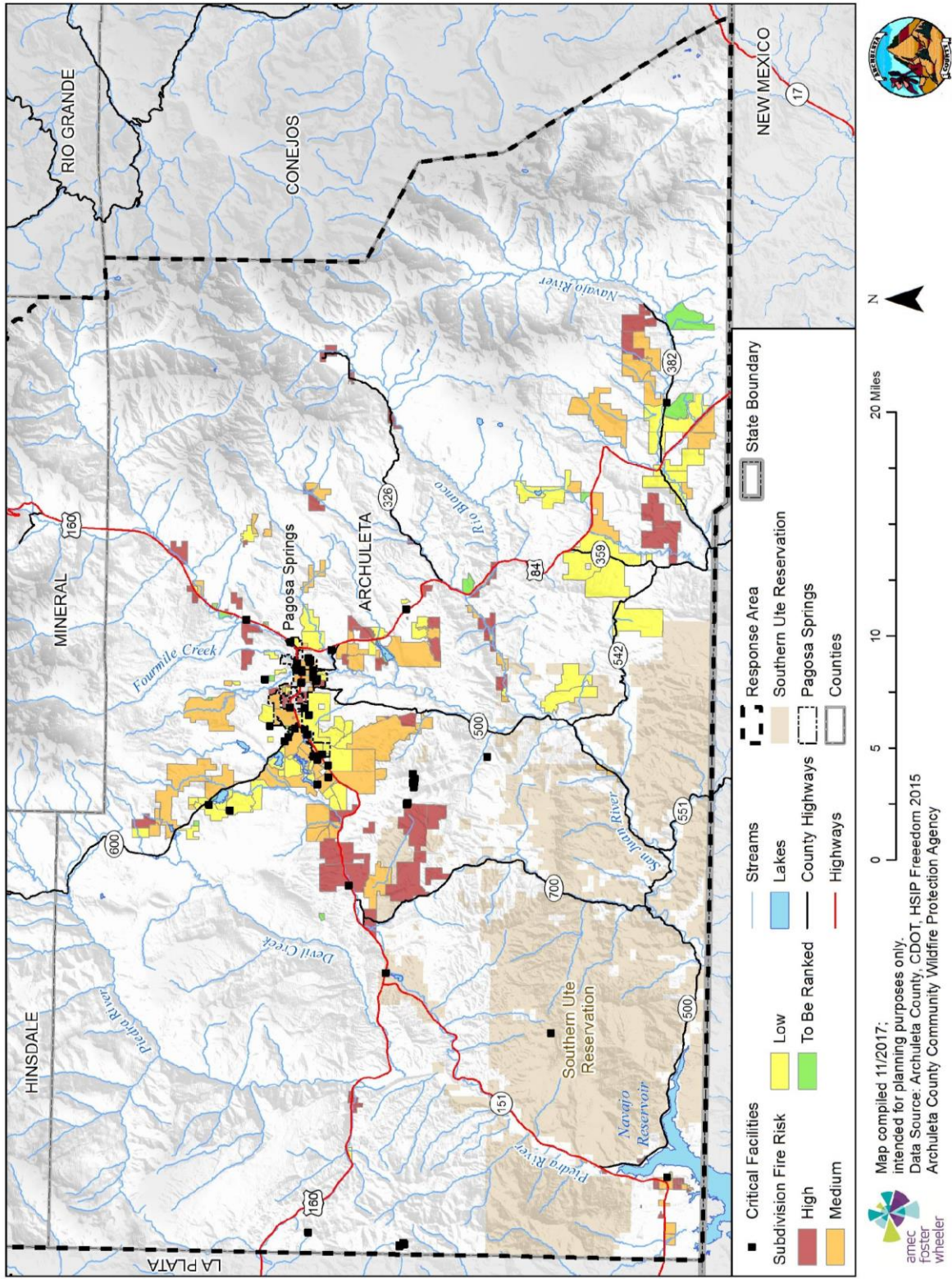
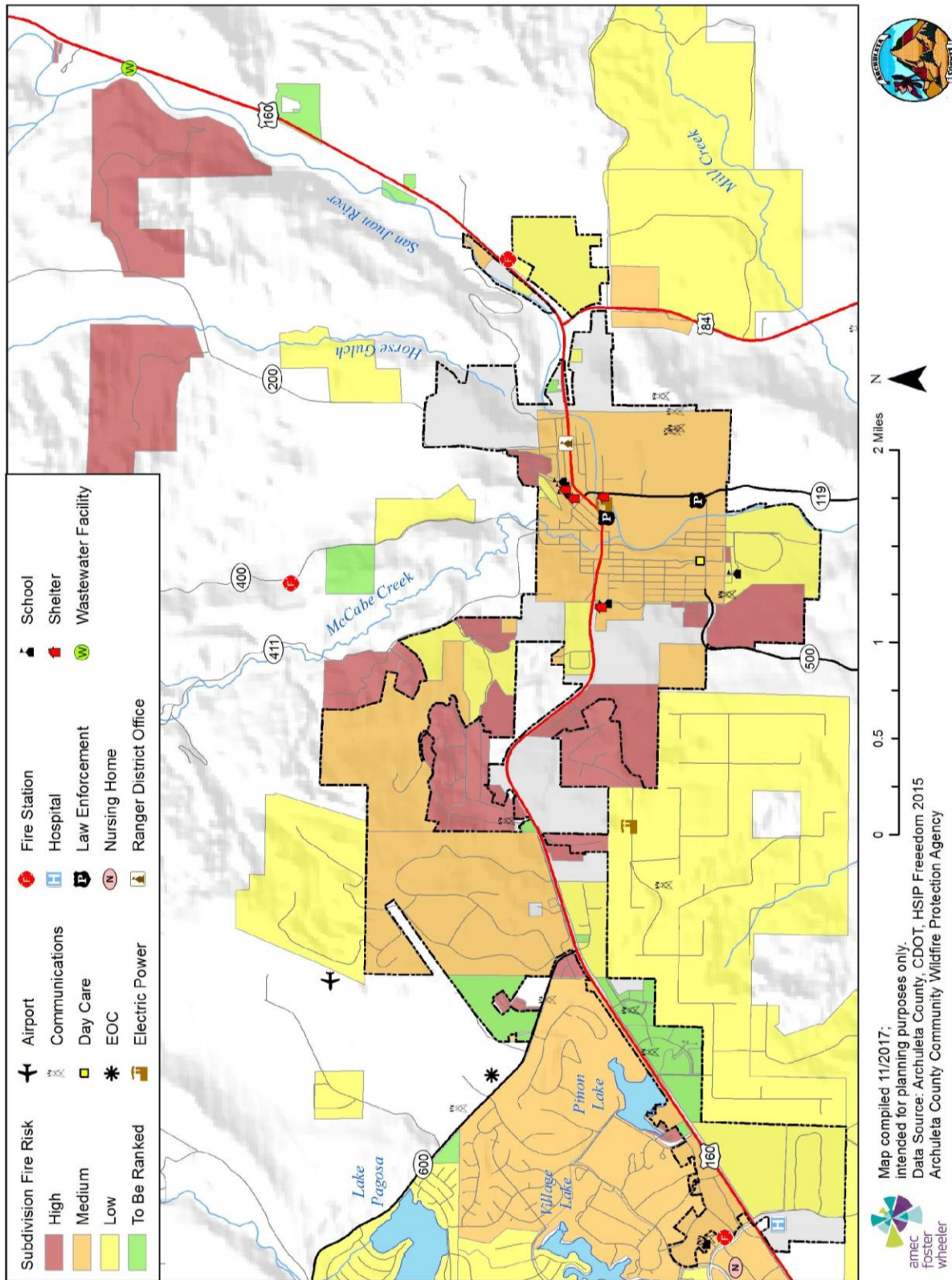


Figure 4 .67. Pagosa Springs Community Fire Risk and Critical Facilities



In addition to the Town of Pagosa Springs and the subdivisions within the county, there are additional values that are vulnerable to wildland fire:

- Watersheds, especially those associated with reservoirs (Navajo, Echo Canyon, Sullenberger, Stevens, Hatcher)
- Major travel corridors (US 160, US 84, CO 151)
- Power lines and associated facilities
- Cultural resources
- Habitat, recreational areas, natural resources (South San Juan Wilderness Area, Navajo Reservoir State Park, San Juan National Forest)

### **Urban Fire**

The populated areas of Archuleta County are not only at risk from wildland fires, but there is also a substantial history of urban conflagration in Pagosa Springs. A series of fires from 1919 to 1943 significantly impacted business district. In May of 1919 one fire burned four businesses including the telephone building. A second fire six months later swept through the offices of the United States Forest Service, the Red Cross, and several local government and court offices. Fortunately, many of the irreplaceable public records were saved.

In 1921, at least nine businesses were damaged or destroyed, prompting the town to adopt an ordinance allowing only “fire proof” masonry and steel construction in the business district. This fire was initially almost brought under control after four businesses burned, but the failure of the water supply system resulted in the additional losses.

Nine businesses and an apartment building were damaged or destroyed during the 1943 fire that consumed a downtown block within twenty minutes. There was one fatality and four serious injuries during this incident. Mutual aid was provided by the USFS, Durango, and Monte Vista. Many of the effected businesses quickly reopened in temporary locations.

This history highlights several key points. The local fire service has a strong history in the area, repeatedly preventing the loss of the entire town, a very real possibility in the early twentieth century. The limits of the municipal water distribution system have proven a key factor in past fire suppression operations. The HMPC, Pagosa Fire Protection District and the Pagosa Area Water and Sanitation District have noted the lack of adequate hydrant pressure in both the Town of Pagosa Springs and unincorporated areas of the County.

### **4.4.16 Wildlife Hazards**

The primary loss associated with wildlife hazards is public safety and to a lesser extent property damage. The entire population in the response area is at risk to this hazard. Generally, only a few people are affected by a wildlife hazard at any one time, although injuries or death are possible. It is unlikely that critical facilities and services would be impacted.

As with other wildlife hazards, public safety is the primary concern regarding hantavirus. The entire population of the response area is potentially at risk, although exposure to hantavirus is generally more likely in areas where rodents are common.

#### **4.4.17 Hazardous Materials Incident**

Hazardous materials events could potentially threaten public safety. It is important to note that schools and most of the County and Town's population are located within a one mile corridor of Highway 160 and are therefore potentially exposed to the dangers of hazardous materials incidents. Three buildings belonging to the Archuleta School District are located along Highway 160 and are identified as being vulnerable to hazardous materials issues. These vulnerable buildings include Pagosa Springs Elementary, Pagosa Springs Middle School Building #1, and Pagosa Springs Middle School Building #2. The potential impact to the environment is often related to public safety issues such as air and water quality. Impacts would be dependent on where and when the incident occurred, thus it is difficult to estimate the potential losses from an event. A hazardous materials incident in downtown Pagosa Springs could have severe consequences. It is more likely that an event would occur in the Wolf Creek Pass area where the potential for trucking accidents is higher. Hazardous materials incidents can also interrupt transportation and delivery services, potentially resulting in economic losses. Highway 160 makes an abrupt turn directly in front of the county courthouse. There is the potential for a vehicle traveling westbound to end up in the county clerk's office if the turn is missed.

#### **4.4.18 Imminent Threat/Terrorism**

It is difficult to predict the potential impacts and losses from terrorism due to the random nature of these events and lack of specific threat information. However, two high-risk points in the Response Area include the Wolf Creek Ski Area and the central portion of Pagosa Springs, where many local government buildings are located. Other potential targets might include critical infrastructure including power and gas lines.

# 5 MITIGATION STRATEGY

**Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.**

This section describes the mitigation strategy process and mitigation action plan for the Archuleta County Multi-Hazard Mitigation Plan. It explains how the County accomplished Phase 3 of FEMA’s 4-phase guidance—Develop the Mitigation Plan—and includes the following from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

## 5.1 Mitigation Strategy: Overview

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The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the HMPC led to the mitigation strategy and mitigation action plan for this HMP update. As part of the plan update process, a comprehensive review and update of the mitigation strategy portion of the plan was conducted by the HMPC. As part of this process the original goals and objectives from the 2012 Plan were reviewed and reaffirmed. While the goals were not changed, some objectives were modified to reflect current priorities. The mitigation actions from 2012 Plan were reviewed and assessed for progress and evaluated for their inclusion in this plan update. Section 5.1.1 below identifies the updated goals and objectives of this plan and Section 5.3.1 details the progress on 2012 mitigation actions and summarizes the updated mitigation action plan. Details on actions can be referenced in Appendix A.

### 5.1.1 Goals and Objectives

**Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.**

Up to this point in the planning process, the Hazard Mitigation Planning Committee (HMPC) has organized resources, assessed natural hazards and risks, and documented mitigation capabilities. A profile of the County’s vulnerability to natural hazards resulted from this effort, which is documented in the preceding chapter. The resulting goals, objectives, and mitigation actions were developed based on this profile. The HMPC developed the new updated mitigation strategy based on a series of meetings and worksheets designed to achieve a collaborative mitigation planning effort, as described further in this section. The goals for this plan were developed by the HMPC

based on the plan's risk assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPC to formulate planning goals and objectives and the mitigation strategy for Archuleta County.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals are stated without regard for implementation, that is, implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

Based upon the risk assessment review and goal setting process, the HMPC developed the following goals and associated objectives. These were revisited and validated by the HMPC during the 2017 HMP update process. The goals did not change but some modifications to the objectives occurred based on HMPC input. Objectives 1.1, 1.2, 3.1, and 4.2 below were either revised or added as part of the update process.

### **Goal 1: Increase awareness of hazards that affect the Archuleta Response Area**

- Objective 1.1 - Continue to develop and improve detection and warning systems
- Objective 1.2 – Emphasize the importance of personal responsibility for mitigating impacts to oneself, family and property

### **Goal 2: Reduce impacts of hazards on life, property, and the environment**

- Objective 2.1- Continue to reduce wildfire risk in subdivision and forest areas
- Objective 2.2- Protect existing property to the extent possible
- Objective 2.3- Ensure access to county roads for fire and utilities equipment
- Objective 2.4- Community fire mitigation and CWPP development
- Objective 2.5- Reduce impacts to new development
- Objective 2.6- Continue to reduce flood losses through compliance with National Flood Insurance Program requirements



### **Goal 3: Protect critical facilities and infrastructure from hazard impacts**

- Objective 3.1 – Continue partnerships and projects that reduce impacts to public utilities including electric, gas, water and communications.

### **Goal 4: Strengthen and develop partnerships in regards to mitigating hazard impacts**

- Objective 4.1- Promote coordination between counties, states, federal agencies, tribes, special districts, non-governmental organizations, and the private sector.
- Objective 4.2 - Reconvene on an annual basis the multiple jurisdictions and agencies on the Hazard Mitigation Planning Committee to discuss plan implementation and monitor progress.

## 5.2 Identification and Analysis of Mitigation Actions

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**Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.**

In order to identify and select mitigation measures to support the mitigation goals, each hazard identified in Section 4.1: Identifying Hazards was evaluated. The HMPC analyzed a comprehensive set of viable mitigation alternatives that would support identified goals and objectives. Each HMPC member was provided with the following list of categories of mitigation measures, which originate from the NFIP Community Rating System:

- **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
- **Property protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area.
- **Structural:** Actions that involve the construction of structures to reduce the impact of a hazard.
- **Natural resource protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- **Emergency services:** Actions that protect people and property during and immediately after a disaster or hazard event.
- **Public information/education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

The HMPC members were also provided with several lists of alternative multi-hazard mitigation actions for each of the above categories via email and at a mitigation strategy meeting in September 2017. Another reference handout document titled “Mitigation Ideas” developed by FEMA was distributed to the HMPC via an online link and a reference hardcopy brought to the HMPC mitigation strategy meeting in 2017. This reference provides four categories of mitigation actions that were discussed at the HMPC meeting in addition to the NFIP/CRS categories. These include:

- Plans and Regulations
- Structure and Infrastructure Projects

- Education and Awareness
- Natural systems protection

Other alternatives discussed at the meeting include the four ‘A’s’ of mitigation:

- Alter the physical nature of the hazard
  - Such as wildfire defensible space and fuels treatments, snow fences etc.
- Avert the hazard away from people, buildings and infrastructure
  - Can include engineered solutions, drainage and channel improvements, floodproofing, fire breaks
- Adapt to the hazard
  - Through land use planning, building codes and design standards, warning systems etc.
- Avoid the hazard
  - Natural systems protection, open space, acquisition or relocation of properties out of hazardous areas

To facilitate the brainstorming process, the HMPC referred to a matrix of typical mitigation alternatives organized by CRS category for the hazards identified in the plan, in addition to a handout that explains the categories and provided examples. These materials are included in Appendix C. HMPC members were encouraged to develop mitigation alternatives that would protect future, as well as existing, development from hazards per the DMA 2000 regulations. A facilitated discussion then took place to examine and analyze the alternatives. With an understanding of the alternatives, a brainstorming session was conducted to generate a list of preferred mitigation actions. HMPC members wrote project ideas on large sticky notes. These were posted on flip charts labeled with the goals. The result was a number of project ideas with the intent of meeting the identified goals and mitigating identified hazards.

### 5.2.1 Prioritization Process

The prioritization of mitigation actions during the 2017 update followed a similar process used during the original development of this plan. The HMPC members were provided with several sets of decision-making tools, including FEMA’s recommended criteria, STAPLE/E (which considers social, technical, administrative, political, legal, economic, and environmental constraints and benefits). The STAPLE/E factors are noted in more detail below.

- Social: Does the measure treat people fairly?
- Technical: Will it work? (Does it solve the problem? Is it feasible?)
- Administrative: Is there capacity to implement and manage the project?
- Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support the project?
- Legal: Does your organization have the authority to implement? Is it legal? Are there liability implications?

- Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?
- Environmental: Does it comply with environmental regulations or have adverse environmental impacts?

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining project priority (the ‘economic’ factor of STAPLE/E). Other criteria used to recommend what actions might be more important, more effective, or more likely to be implemented than another included:

- Does action protect lives?
- Does action address hazards or areas with the highest risk?
- Does action protect critical facilities, infrastructure or community assets?
- Does action meet multiple objectives (Multiple Objective Management)?

At the mitigation strategy update meeting the HMPC used STAPLEE considerations to determine which of the identified actions were most likely to be implemented and effective. Prioritization of previous mitigation actions identified in the 2012 HMP that are continuing in the updated plan were revisited during a HMPC meeting. New actions identified in 2017 also were prioritized using the process previously described.

### 5.3 Mitigation Action Plan

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**Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.**

This section outlines the development of the updated mitigation action plan. The action plan consists of the specific projects, or actions, designed to meet the plan’s goals. Over time the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan’s goals.

#### 5.3.1 Progress on Previous Mitigation Actions

Archuleta County and the majority of the participating jurisdictions have been very successful in implementing actions identified in the 2012 HMP Mitigation Strategy, thus, working diligently towards meeting the 2012 plan goals. Table 5.1 indicates the details for each 2012 mitigation action items indicating whether a given action item has been completed, deleted, or deferred. Some of the deferred items including projects that will continue forward in the plan and include a mix of projects with some progress and ongoing implementation and others that have been deferred due lack of funding or other priorities.

The 2012 mitigation strategy contained 33 separate mitigation actions. As of November 2017, four of these actions have been completed and 16 are considered continuing-in process, representing progress on 66% of the total actions initially identified. Many of the continuing-in process actions include actions that are implemented on a regular or annual basis that contribute to the goals of this plan that will continue to be needed moving into the future. These include public hazard awareness and outreach campaigns, Firewise activities and wildfire fuels treatment activities. Table 5.1 provides a status summary of the mitigation action projects completed from the 2012 Plan.

### 5.3.2 Updated Action Plan

The results of the project identification and prioritization exercise are summarized in Table 5.1 and detailed in Appendix A. These projects detail specific actions for reducing future hazard-related losses within Archuleta County. The projects are grouped by the hazards that the projects are intended to mitigate. Included are the affected jurisdiction(s) and notes about the department and partners necessary to implement the project. Also included are the goal(s) that the projects primarily align with, with an understanding that some projects may help to achieve more than one goal. The mitigation projects are marked with their relative level of priority: H=high, M=medium, and L=low.

Specific actions, comments, and the parties responsible for each objective are captured in Table 5.1. For each identified project, a worksheet designed to capture additional details was filled out by the HMPC member or organization taking the lead on project implementation. These details include: project intent, hazard(s) mitigated, other alternatives considered, applicable jurisdiction(s), cost, benefits (losses avoided), responsible entity, priority, and potential funding. These project details are captured in Appendix A. Many of these mitigation actions are intended to reduce impacts to existing development. Those that protect future development from hazards, as required per the DMA 2000 regulations, are indicated by a double asterisk ‘\*\*’ in the action title. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations.

During the 2017 update of the plan, the HMPC acknowledged that some actions should not be carried forward. Mitigation actions may be deferred or completely deleted due to a shift in priorities or a lack of resources. The following actions have been removed from Archuleta County’s mitigation strategy:

- Stephens Road to Airport Fiber Optic Communication Line Project
  - This project was established to install fiber lines to help avoid the loss of communication to the EOC and the county servers, as well as help maintain communication between county and town offices. Though some of the fiber optic cable lines have already been installed, the HMPC determined that it does not make sense to link Stevens Road to the Airport. The

action is therefore deleted due to an overall lack of relevance to hazard mitigation coupled with the county's limited financial capacity.

- Dry Hydrant and Water Source Development for Fire Suppression
  - During the creation of the old plan, the County recognized a need for dry hydrants to support fires suppression in the Pagosa Fire Protection District. Since this action was first introduced, the District has installed six dry hydrants. The action has been deleted because the District does not maintain the hydrants and they are not considered a viable solution.

Table 5.1 Archuleta County Mitigation Action Summary Table

Hazards Mitigated and ID #	Proposed Mitigation Action	Lead Jurisdiction/Agency	Partners	Related Goal(s)*	Priority	2017 Status Update
Multi-Hazard-1 Avalanche, Dam Failure, Drought, Earthquake, Extreme Cold, Flooding, Hail, High Winds and Tornadoes, Landslide/Rockfall/Debris Flow, Land Subsidence, Lightning, Pandemic Disease, Severe Winter Storm, Volcano, Wildland Fire, Wildlife Hazards, Hazardous Materials Incident, Imminent Threat/Terrorism	Archuleta NOAA All-Hazards Radio Transmitter	County - ACSO-EM	NOAA Archuleta, Hinsdale, Mineral, SUIT, and Pagosa Springs	1	M	<b>Continuing – not completed;</b> partly dependent on NOAA funding and priorities; priority changed from H to M.
Multi-Hazard-2 Flooding, Lightning, Severe Winter Storm, Hailstorm, High Winds, Tornadoes, and Wildland Fire	Southwest Colorado Radar and Early Detection System Improvement	County - ACSO-EM	All counties, tribes and municipalities in the four corners area, and the National Weather Service (NWS) ACSO-EM, LCOEM, and CWCB	1, 2, 4	M	<b>Continuing – not completed;</b> Animas Air Park best location; priority changed from H to M.
Multi-Hazard-3 Flooding, Dam Failure	Early Warnings to Structures and Populations in the Floodplains and Dam Inundation Zones	County - ACSO-EM	Hinsdale, Mineral, SUIT, School District and Pagosa Springs Archuleta County Combined Dispatch, and Dam owners; PAWSD and USGS	1, 2, 4	H	<b>Continuing– not completed</b> 2013 – West Fork by campground bridge monitored by PAWSD Monitors water quality – could add flow monitor to it; additional gages still needed.
Multi-Hazard-4 Avalanche, Dam Failure, Drought, Earthquake, Extreme Cold, Flooding, Hail, High Winds and Tornadoes, Landslide/Rockfall/Debris Flow, Land Subsidence, Lightning, Pandemic Disease, Severe Winter Storm, Volcano, Wildland	Improve Radio Coverage	County - ACSO-EM	Hinsdale, Mineral, SUIT, and Pagosa Springs Archuleta County Combined Dispatch USFS	1, 2, 4	H	<b>Continuing – in Progress</b> USFS has upgraded repeater components – getting portable repeater and redundancy \$30K bi-directional amplifier would cover fairground and other key areas. New tower will get better radio coverage in Chromo area.

Hazards Mitigated and ID #	Proposed Mitigation Action	Lead Jurisdiction/Agency	Partners	Related Goal(s)*	Priority	2017 Status Update
Fire, Wildlife Hazards, Hazardous Materials Incident, Imminent Threat/Terrorism						
Multi-Hazard-5 Avalanche, Dam Failure, Drought, Earthquake, Extreme Cold, Flooding, Hail, High Winds and Tornadoes, Landslide/Rockfall/Debris Flow, Land Subsidence, Lightning, Pandemic Disease, Severe Winter Storm, Volcano, Wildland Fire, Wildlife Hazards, Hazardous Materials Incident, Imminent Threat/Terrorism	Expand Cell Phone / Broadband Coverage	Century Link	Archuleta, Hinsdale, Mineral, SUIT, and Pagosa Springs	1, 2, 4	H	<b>Continuing – in Progress</b> One new private tower in Aspen Springs. Also worked with SWCOG on identifying gaps (county, Town, School District) Continuing public/private partnership
Multi-Hazard-6 Wildland Fire and Flood	Evacuation Route Identification, Marking, and Corridor Improvement	County Road and Bridge and ACSO-EM	Hinsdale, Mineral, SUIT, and Pagosa Springs – Streets Dept. Homeowners Associations	1, 2, 4	H	<b>Continuing – in Progress;</b> priority changed from M to H Some work completed -Oak Hills Ranch subdivision done -Middle Turkey Springs Road being improved for vehicles; some signage still needed
Multi-Hazard-7 Avalanche, Dam Failure, Drought, Earthquake, Extreme Cold, Flooding, Hail, High Winds and Tornadoes, Landslide/Rockfall/Debris Flow, Land Subsidence, Lightning, Pandemic Disease, Severe Winter Storm, Volcano, Wildland Fire, Wildlife Hazards, Hazardous Materials Incident, Imminent Threat/Terrorism	Public Education Program	County - ACSO-EM	Archuleta, Hinsdale, Mineral, SUIT, School District and Pagosa Springs Emergency mgmt. offices and special districts	1, 2, 4	M	<b>Continuing – in Progress</b> Activities implemented on annual basis including: Safety Fair by the FPD Sharing information at MACS meetings Search and Rescue class Avalanche safety class and awareness brochures Facebook Posts during times of high avalanche hazard Loma Linda Subdivision evacuation practice \$200/yr. budget for materials has been limiting

Hazards Mitigated and ID #	Proposed Mitigation Action	Lead Jurisdiction/Agency	Partners	Related Goal(s)*	Priority	2017 Status Update
Multi-Hazard-8 Avalanche, Dam Failure, Drought, Earthquake, Extreme Cold, Flooding, Hail, High Winds and Tornadoes, Landslide/Rockfall/Debris Flow, Land Subsidence, Lightning, Pandemic Disease, Severe Winter Storm, Volcano, Wildland Fire, Wildlife Hazards, Hazardous Materials Incident, Imminent Threat/Terrorism	Placement of a redundant fiber optic route into Archuleta County	Century Link	Archuleta, Hinsdale, Mineral, SUIT, and Pagosa Springs	2, 3	M	<b>Continuing– not completed</b>
Multi-Hazard-9 Avalanche, Dam Failure, Earthquake, Land Subsidence, and Floods	Mapping Comprehensive Hazards for Development and Hazard Aversion**	Archuleta County GIS, Planning	ACSO-EM, SUIT, Pagosa Springs	1, 2, 3, 4	M	<b>Continuing – in Progress</b> Working on land use map Updating comp plan (National Flood Hazard Layer integrated) HMP is cross referenced in Comprehensive Plan update USFS wildfire risk mapping County web map improvements
Multi-Hazard-10 Earthquake, Extreme Cold, Severe Winter Storm, High Winds, and Flooding	Assess the feasibility of adopting the current international building code standards, and if feasible, adopt the standard in Pagosa Springs and Archuleta County**	County Planning Dept. and Pagosa Springs Building Dept.	ACSO-EM	2	L	<b>Continuing– not completed</b> Deferred until 2018 edition of IBC is released at which point it will be reviewed.
Multi-Hazard-11 Severe Winter Storm, Wildland Fire, Avalanche, Lightning, High Winds, and Tornadoes	Alternative 115 KV feed line from the South	Tri-State Electric, La Plata Electric Association	Archuleta, Hinsdale, Mineral, SUIT, and Pagosa Springs	2, 3, 4	H	<b>Continuing– not completed</b> Still important aspect of power outage mitigation.



Hazards Mitigated and ID #	Proposed Mitigation Action	Lead Jurisdiction/Agency	Partners	Related Goal(s)*	Priority	2017 Status Update
Multi-Hazard-12 Severe Winter Storm, Wildland Fire, Avalanche, Lightning, High Winds, and Tornadoes	Biomass Power Facility Development	Archuleta County	Archuleta County, Pagosa Springs, USFS, and Contractor	2, 4	L	<b>Continuing– not completed.</b> This has been deferred for the next five years for technical reasons Getting power into the grid is one issue to resolve.
Multi-hazard-13 Wildland Fire, Severe Winter Storm, and Flooding	Addressing Improvements	Archuleta GIS, Archuleta Planning	Archuleta, Hinsdale, Mineral, SUIT, and Pagosa Springs Archuleta Assessor's Office, Hinsdale County and Mineral County	2, 4	M	<b>Continuing– not completed</b> Deferred but still needed
Wildland Fire-1	Reduce fuels around 115 KV line to protect from wildfire from Yellow Jacket to Pagosa Springs	Tri-State Electric	Archuleta, Hinsdale, Mineral, SUIT, and Pagosa Springs Tri-State Electric, USFS/BLM, and ACSO-EM(Fire)	2, 3, 4	H	<b>Continuing – in Progress</b> Has started July 2017 Some minor maintenance completed
Wildland Fire-2	Implement Firewise Workshops and Community meetings	Pagosa Fire Protection District	Archuleta, Hinsdale, Mineral, SUIT, and Pagosa Springs Fire Protection Districts, Sheriff's Offices, PLPOA, CSFS, and USFS/BLM	1, 2, 4	M	<b>Continuing – in Progress</b> Regular meetings and activities (monthly)
Wildland Fire-3	Community Wildland Fire Protection Plan Development	Pagosa Fire Protection District	Archuleta, Hinsdale, Mineral, SUIT, CSFS, and Pagosa Springs Fire Protection Districts and Sheriff's Offices	1, 2, 4	M	<b>Completed</b> Loma Linda CWPP– Done Echo Canyon – done but not yet adopted
Wildland Fire-4	Encourage Wildland Fire Mitigation on Private Lands and Joint Community Lands	Pagosa Fire Protection District	Archuleta, Hinsdale, Mineral, SUIT, CSFS, and Pagosa Springs Fire Protection Districts, Homeowners Associations including PLPOA, and Sheriff's Offices, Wyndham Resort, The Nature Conservancy, Chama Peak Land Alliance	2, 4	M	<b>Continuing – in Progress</b> Ties in to ongoing Firewise activities; Some burn certification training completed; TREX program (prescribed fire burning exchange)

Hazards Mitigated and ID #	Proposed Mitigation Action	Lead Jurisdiction/Agency	Partners	Related Goal(s)*	Priority	2017 Status Update
			Rio Blanco watershed group			
Wildland Fire-5	Wildland Fire Mitigation on County Open Space Lands	Archuleta County Archuleta BoCC and SO-OEM		1, 2, 4	M	<b>Continuing – in Progress</b> Some work Cloman Park
Wildland Fire-6	Wildland Fire Mitigation on Reservoir Hill	Pagosa Springs	Pagosa Springs Recreation Dept. and ACSO-EM	1, 2, 3, 4	M	<b>Completed</b> in 2015-16 Lots of brush cleared.
Wildland Fire-7	Evaluate feasibility of Upgrading Domestic Water Systems to Accommodate Fire Flow Requirements	Pagosa Fire Protection District	Archuleta, Hinsdale, Mineral, counties, SUIT, and Pagosa Springs PAWSD	2, 3, 4	M	<b>Continuing – in Progress</b> Evaluated on case by case basis Bear Creek Long term funding an issue
Wildland Fire-8	Retrofit Historic and High Potential Loss Structures with Automatic Sprinkler Systems for fire mitigation	Pagosa Fire Protection District	Archuleta, Hinsdale, Mineral, SUIT, and Pagosa Springs Building Depts.	2, 3	M	<b>Continuing– not completed</b> Downtown Pagosa Springs buildings at risk
Wildland Fire-9	Wildland Fire Dip Site Location Identification	Archuleta County – SO-OEM	Archuleta County, Hinsdale County, Mineral County, La Plata County, US Forest Service, Pagosa Fire Protection District, Southern Ute	2, 3	H	New - 2017
Wildland Fire- 10	Establish structural triage to make structures in the WUI less susceptible to fire spread.	Pagosa Fire Protection District	Archuleta County, Hinsdale County, Mineral County, La Plata County, Archuleta County Sheriff's Dept. OEM, US Forest Service, Pagosa Fire Protection District, SUIT	2, 3	H	New - 2017
Wildland Fire- 11	4,370 acres of understory prescribed burning in the Upper Rio Blanco Basin.	San Juan National Forest/ USFS in coordination with Archuleta County – SO-OEM and PAWSD	Bureau of Reclamation (Oso Water Diversion Project)	2, 3	H	New - 2017

Hazards Mitigated and ID #	Proposed Mitigation Action	Lead Jurisdiction/Agency	Partners	Related Goal(s)*	Priority	2017 Status Update
Wildland Fire – 12	Update Community Wildland Fire Protection Plan	Archuleta County Emergency Management	Pagosa Fire Protection District, Town of Pagosa Springs Los Pinos Fire Protection District, Colorado State Forest Service, SJPL, ACSO, SUI, BIA – Southern Ute Agency, Firewise Council of Southwest Colorado and Neighborhood Ambassadors, Fort Lewis College – Office of Community Services, SJMA, Wildland Fire Prevention and Education Month Planning Committee, Private contractors, The Pagosa Chamber of Commerce, AEDA, POAs, Private and commercial landowners	1,2,3,4	M	New - 2017
Wildland Fire – 13	Prescribed Burning on Private Property	Archuleta County Emergency Management,	Pagosa Fire Protection District, Town of Pagosa Springs, Los Pinos Fire Protection District, Archuleta County Sheriff's Office, San Juan Public Lands (USFS and BLM), Bureau of Indian Affairs, Colorado State Forest Service, Private landowners	1,2,4	H	New – 2017
Wildland Fire -14	Watershed Thinning Project	Pagosa Area Water and Sanitation District	Archuleta County United States Forest Service San Juan Mountain Associations (SJMA) Private Contractors Town of Pagosa Springs Private and Commercial Landowners	2	Medium	New – 2017

Hazards Mitigated and ID #	Proposed Mitigation Action	Lead Jurisdiction/Agency	Partners	Related Goal(s)*	Priority	2017 Status Update
Flood-1	McCabe Creek Flood Mitigation	Pagosa Springs Planning, Streets	CDOT, and private landowners	2, 4	M	<b>Continuing– not completed</b> Deferred but planned for CDOT to upgrade culvert at Hwy 160 crossing 2018-19. In 2013 CDOT did some improvements to the inlet structure on the northern side of the highway to alleviate erosion as well as highway and sidewalk undermining concerns.
Flood-2	West Cat Creek Bridge Replacement and East Cat Creek Entrance Closure / Bridge Abandonment	Archuleta County Public Works		2, 3	L	<b>Completed in 2012</b>
Flood-3	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program and Updated Statewide Floodplain Rules**	Archuleta County Planning Dept.		2	M	<b>Continuing – in Progress</b> Considering CFM certification Updated floodplain regulations in 2015 to conform with CWCB state flood rule
Flood-4	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program and Updated Statewide Floodplain Rules**	Pagosa Springs Building Dept.		2	M	<b>Continuing – in Progress</b>

Hazards Mitigated and ID #	Proposed Mitigation Action	Lead Jurisdiction/Agency	Partners	Related Goal(s)*	Priority	2017 Status Update
Avalanche-1	Support Ongoing Avalanche Mitigation and Control Efforts on Highway 160 near Wolf Creek Pass	CDOT and CAIC	Archuleta County, Mineral County	2, 3, 4	L	<b>Continuing – in Progress</b> CDOT & CAIC work together on regular basis to mitigate hazards
Drought-1	Water Conservation Program	Pagosa Area Water and Sanitation District - PAWSD	Private Residents	1, 2, 4	M	<b>Continuing – in Progress</b>
Drought-2	Drought Management Plan Update	Pagosa Area Water and Sanitation District- PAWSD		1, 2, 4	M	<b>Continuing – in Progress</b> Original plan completed in 2008. Deferred but planned for 2018-2019.
Landslide-1	East Fork Landslide Monitoring & Early Warning	Xcel Energy, ACSO-EM	Archuleta, USFS, and Pagosa Springs CWCB	2, 3, 4	M	<b>Continuing – in Progress</b> Xcel monitors in regard to gas line
Landslide-2	Jackson Mountain Landslide Mitigation & Early Warning	CDOT	Archuleta County and USFS	2, 3, 4	M	<b>Continuing – in Progress</b> Monitoring Some mitigation work completed at toe of slide near San Juan River
Rockfall-1	Support Ongoing Rockfall Mitigation Efforts on Highway 160 near Wolf Creek Pass and on the West Side of the County	CDOT	Archuleta and Mineral counties	2, 3, 4	M	<b>Completed</b> Rockfall mitigation wall installed on Wolf Creek Pass circa 2015.

\*Goal 1: Increase awareness of hazards; Goal 2: Reduce impacts of hazards on life, property, and the environment; Goal 3: Protect critical facilities and infrastructure from hazard impacts Goal; 4: Strengthen and develop partnerships in regard to mitigating hazard impacts.

\*\*Indicates actions that will reduce impacts to future development

## 6 PLAN ADOPTION

**Requirement §201.6(c)(3): [The local hazard mitigation plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, county commissioner, Tribal Council).**

The purpose of formally adopting this plan is to secure buy-in from Archuleta County and participating jurisdictions, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan. The governing board for each participating jurisdiction has adopted this local hazard mitigation plan by passing a resolution. A copy of the generic resolution and the executed copies are included in Appendix E: Plan Adoption.

# 7 PLAN IMPLEMENTATION AND MAINTENANCE

**Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.**

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process and Phase 4 of FEMA’s Four-phase process. This chapter provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

## 7.1 Implementation

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Implementation will be accomplished by adhering to the schedules identified for each mitigation action (see Appendix A: Mitigation Actions) and through pervasive efforts to network and highlight the multi-objective, win-win benefits of each project to the Archuleta County community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. The three main components of implementation are:

- IMPLEMENT the action plan recommendations of this plan;
- UTILIZE existing rules, regulations, policies and procedures already in existence; and
- COMMUNICATE the hazard information collected and analyzed through this planning process so that the community better understands what can happen where, and what they can do themselves to be better prepared. Also, publicize the “success stories” that are achieved through the HMPC’s ongoing efforts.

Simultaneous to these efforts, the community partners, accessed through the Archuleta County Multi-Agency Coordination (MAC) Group, will monitor funding opportunities that could be leveraged to implement some of the more costly actions. When funding does become available, the community partners will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

### 7.1.1 Role of Archuleta Multi-Agency Coordination Group in Implementation and Maintenance

With adoption of this plan, the HMPC will be assimilated back into the Archuleta MAC Group, until the next planned revision. The MAC Group will have the responsibility of plan implementation and maintenance. The MAC Group will act as an advisory body. Its primary duties will be to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. The MAC Group agrees to:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended changes to the Archuleta Board of County Commissioners, Town Council, and other partners; and
- Inform and solicit input from the public.

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the Emergency Management website and in local newspapers.

## 7.2 Maintenance/Monitoring

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Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized.

### 7.2.1 Maintenance/Monitoring Schedule

In order to track progress and update the mitigation strategies identified in the action plan, the MAC Group will revisit this plan at the following times or occurrences:

- Annually, to assess if projects have been completed;
- Following a significant hazard event;
- Following a disaster declaration;
- Any other time the MAC group sees it is prudent or necessary.

County emergency management will facilitate these reviews.



This plan will be updated, approved, and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000. Efforts to begin the update should begin no later than June 2022. The County will monitor planning grant opportunities from the Colorado Division of Homeland Security and Emergency Management (DHSEM) and FEMA for funds to assist with the update. This may include submitting a Pre- Disaster Mitigation planning grant application. This grant should be submitted in 2021, as there is a three year performance period to expend the funds, and there is no guarantee that the grant will be awarded when initially submitted. This allows time to resubmit the grant in subsequent years, if needed. Updates to this plan will follow the most current FEMA and DHSEM planning guidance. The first plan update is anticipated to be completed and reapproved by DHSEM and FEMA Region VIII by March 2023. The HMPC, based on MAC group members and those entities identified in Appendix B, will be reconvened for this process by Archuleta Emergency Management.

### 7.2.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Such changes in vulnerability may include:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

The MAC Group/HMPC will use the following process to evaluate progress, note changes in vulnerability, and consider changes in priorities as a result of plan implementation:

- A representative from the responsible entity identified in each mitigation measure will be responsible for tracking and reporting the MAC Group/HMPC when project status changes. The representative will provide input on whether the project as implemented meets the defined goals objectives and is likely to be successful in reducing vulnerabilities.
- If the project does not meet identified goals and objectives, the MAC Group/HMPC will select alternative projects for implementation.
- New projects identified will require an individual assigned to be responsible for defining the project scope, implementing the project, monitoring success of the project.
- Projects that were not ranked high priority but were identified as potential mitigation strategies will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation.
- Changes will be made to the plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, priorities, and/or funding resources.

Updates to this plan will:

- Consider changes in vulnerability due to project implementation,

- Document success stories where mitigation efforts have proven effective,
- Document areas where mitigation actions were not effective,
- Document any new hazards that may arise or were previously overlooked,
- Document hazard events and impacts that occurred within the five-year period,
- Incorporate new data or studies on hazards and risks,
- Incorporate new capabilities or changes in capabilities,
- Document continued public involvement
- Document changes to the planning process, which may include new or additional stakeholder involvement
- Incorporate growth and development-related changes to building inventories,
- Incorporate new project recommendations or changes in project prioritization,
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to DHSEM/FEMA, and
- Include re-adoption by all participating entities following DHSEM/FEMA approval.

### 7.2.3 Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other jurisdictional plans and mechanisms. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. As stated in Section 7.1 of this plan, implementation through existing plans and/or programs is recommended, where possible. This point is re-emphasized here. Based on this plan's capability assessment and progress made on mitigation actions noted in Chapter 5, the participating jurisdictions have and continue to implement policies and programs to reduce losses to life and property from natural hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing projects, where possible, through these other program mechanisms. These existing mechanisms include:

- 2007 Archuleta County Strategic Plan
- 2011 Pagosa Springs Land Use and Development Code
- 2017 Archuleta County Community Plan
- 2005 Pagosa Springs Economic Development Plan
- 2008 Archuleta County Community Wildfire Protection Plan
- 2009 Archuleta County Community Development Action Plan
- Pagosa Area Water and Sanitation District Drought Plan
- Hinsdale County Community Wildfire Protection Plan
- Mineral County Community Wildfire Protection Plan
- Archuleta County Emergency Operations Plan
- Mineral County Emergency Operations Plan
- Hinsdale County Emergency Operations Plan

- Hinsdale County Hazard Mitigation Plan
- Mineral County Hazard Mitigation Plan
- Southwest Colorado Homeland Security Strategy

MAC Group/HMPC members involved in the updates to these mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, as appropriate. An example of this is noted in Chapter 3 in regard to the HMP being cross-referenced in the update of the County Comprehensive Plan in 2017 and the Archuleta County Emergency Operations Plan. The mitigation plan can be considered as a “hub on the wheel” with spokes radiating out to other related planning mechanisms that will build from the information and recommendations contained herein.

#### 7.2.4 Continued Public Involvement

Continued public involvement is also imperative to the overall success of the plan’s implementation. The update process provides an opportunity to publicize success stories from the plan implementation and seek additional public comment. A public hearing(s) to receive public comment on plan maintenance and updating will be held during the update period. When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. The plan maintenance and update process will include continued public and stakeholder involvement and input through participation in designated committee meetings, surveys, web postings, and press releases to local media.

## **APPENDIX A: MITIGATION ACTIONS**

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# APPENDIX A. MITIGATION ACTIONS

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The following appendix provides project specifics and implementation details for mitigation actions identified. They are grouped by the type of hazard(s) they address (see Section 5.3 Mitigation Action Plan for summary).

## **Multi-Hazard Actions:**

### **1. Archuleta NOAA All-Hazards Radio Transmitter**

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<b>Hazards Addressed</b>	All
<b>Issue/Background</b>	NOAA All-hazards radio is one of the primary methods used in the US for public warnings. This technology should be our primary backup to our “reverse 9-1-1” type system. However, the Archuleta County Response Area currently does not have a NOAA transmitter capable of covering the entire Response Area. There are locations in the Response Area that lack the signal strength to set off radios using NOAA’s SAME technology. The state radio tower at the Oakbrush tower site has been identified as a useable location for the proposed upgraded NOAA transmitter.
<b>Other Alternatives</b>	Internet / Email / Reverse 9-1-1 type system
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, Pagosa Springs, Pagosa Fire Protection District, PAWSD.
<b>Responsible Office</b>	Archuleta Sheriff’s Office – Office of Emergency Management
<b>Priority</b>	High
<b>Cost Estimate</b>	\$30,000
<b>Benefits</b>	This project provides a second wireless method to warn the public of emergencies and disasters. This method is immediately available to the NWS and local emergency management. This system would also be tied directly to the National Emergency Alert System. The public will be able to purchase NOAA radios that use SAME technology for about \$30. This will help notify the public of an impending emergency so they have more time to prepare. Ultimately, this will help reduce the effects of the emergency or disaster on the public.
<b>Potential Funding</b>	National Weather Service grants, Homeland Security, County funds, Private fund raising, pre-disaster mitigation funding

**Schedule** As soon as staff time and funding allow

**2017 Status** Continuing- not completed

## **Multi-Hazard Actions:**

### **2. Southwest Colorado Radar and Early Detection System Improvement**

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<b>Hazards Addressed</b>	Flooding, Lightning, Severe Winter Storm, Hailstorm, High Winds, Tornadoes, and Wildland Fire
<b>Issue/Background</b>	The four corners area of Colorado does not have adequate radar coverage. The Archuleta Response Area is one of the worst areas. The area also has a very limited stream and rain gage network. This makes it very hard to observe storm systems as they affect the area.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, Archuleta School District, and Pagosa Springs, Pagosa Fire Protection District
<b>Responsible Office</b>	Archuleta Sheriff's Office –Office of Emergency Management, La Plata County Office of Emergency Management, and Colorado Division of Homeland Security and Emergency Management, Colorado Water Conservation Board, National Weather Service
<b>Priority</b>	High
<b>Cost Estimate</b>	\$200,000 /small radar site and NWS integration \$6,000 /unimproved rain gauge site \$30,000 / unimproved stream gauge site \$20,000 / unimproved weather station \$10,000 for data collection system (if 800 systems can be used)
<b>Benefits</b>	Project will provide advanced warning of severe weather events and more accurate water predictions. It will also improve first responder and public safety.
<b>Potential Funding</b>	Pre-disaster mitigation funding, FEMA, Homeland Security, Counties, Tribes and Colorado Water Conservation Board
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- not completed

## **Multi-Hazard Actions:**

### **3. Early Warnings to Structures and Populations in the Floodplains and Dam Inundation Zones**

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<b>Hazards Addressed</b>	Flooding, Dam failure
<b>Issue/Background</b>	Early warning for flood events is the only way to ensure that the public will know to go to safe ground. This project will use multiple forms of technology to target the population in potential danger. The goal is to make the notification process automatic, so that no human interaction is required: gauges reach a threshold and warnings are automatically issued to the affected population. Some of the relevant technologies include: Our “reverse 9-1-1” type system, cell phone, text messaging, paging, email, websites, outdoor announcement systems, indoor announcement systems, NOAA all hazards radio, and the emergency alert system. This project is also linked with the Southwest Colorado Radar and Early Detection System Improvement Project. Without detection, no warning can occur.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, Archuleta School District, Pagosa Springs, Pagosa Fire Protection District
<b>Responsible Office</b>	Archuleta Sheriff’s Office – Office of Emergency Management, Archuleta County Combined Dispatch, and Dam owners
<b>Priority</b>	High
<b>Cost Estimate</b>	Unknown, depends on scope
<b>Benefits</b>	Earliest public warning possible Will can use the system for other hazards/emergencies also Increased responder and public safety
<b>Potential Funding</b>	Pre-disaster mitigation funding, FEMA, Homeland Security, etc.
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- not completed



## **Multi-Hazard Actions:**

### **4. Improve Radio Coverage**

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<b>Hazards Addressed</b>	All Hazards
<b>Issue/Background</b>	Public safety radio communications in the southeast, southwest, and northwest portions of the Archuleta response area are limited, as well as at the base of Wolf Creek Pass. This goes for both VHF and 800 technologies
<b>Other Alternatives</b>	None identified (cell phone is not an alternative because they do not provide good situational awareness to resources during operations)
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe
<b>Responsible Office</b>	Archuleta County Combined Dispatch and Sheriff's Office – Office of Emergency Management
<b>Priority</b>	High
<b>Cost Estimate</b>	\$800,000/tower site \$40,000/800 bi-directional amplifier
<b>Benefits</b>	This project aids in the ability for emergency services and coordination entities to communicate during an emergency or disaster. The increase in coordination will make resource more efficient and which will lessen the effects to the public. It will also improve responder and public safety
<b>Potential Funding</b>	Homeland Security and budgeted agency funds for limited infrastructure development, otherwise unknown
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- not completed

## **Multi-Hazard Actions:**

### **5. Expand Cell Phone / Broadband Coverage**

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<b>Hazards Addressed</b>	All Hazards
<b>Issue/Background</b>	Cell phone and wireless broadband coverage, although improving, is still limited in much of the Archuleta County Response Area. This project would seek to improve cell phone and broadband communications.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs
<b>Responsible Office</b>	Century Link
<b>Priority</b>	High
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	It has been proven that a robust public communications system helps keep the public calm when a disaster or emergency occurs. As long as the public can communicate with each other, the panic level tends to stay low, and people are more likely to help themselves. Improved coverage will also aid in public warning. Our primary callback system uses cell phones, text messaging, and email to notify the public during emergencies. In addition, increased cell phone and broadband coverage will add in emergency service operations and coordination. It will also improve responder and public safety.
<b>Potential Funding</b>	Federal broadband grants, if they become available
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- in progress; One new private tower in Aspen Springs; also worked with Southwest Council of Governments on identifying gaps (county, Town, School District); continuing public/private partnership

**Multi-Hazard Actions:**

**6. Evacuation Route Identification, Marking, and Corridor Improvement**

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<b>Hazards Addressed</b>	Wildland Fire and Flood
<b>Issue/Background</b>	Evacuations route aid in moving the public to safe areas when an emergency or disaster occurs. At this time, there are no formally designated routes in the county. Many of the routes that would be used for evacuations are overgrown or of poor road surface quality.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs
<b>Responsible Office</b>	Town of Pagosa Springs Streets, county Road and Bridge Departments and Emergency Management Offices, Homeowners Associations including Pagosa Lakes Property Owners Association
<b>Priority</b>	High
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Public education and awareness A more coordinated movement during an emergency or disaster Improved responder and public safety
<b>Potential Funding</b>	Homeowners Associations, Metro Districts, County and Town budgets
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- in progress; Some work completed includes:  -Oak Hills Ranch subdivision done  -Middle Turkey Springs Road being improved for vehicles; some signage still needed

## **Multi-Hazard Actions:**

### **7. Public Education Program**

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<b>Hazards Addressed</b>	All hazards
<b>Issue/Background</b>	A strong public education program helps the public prepare for emergencies and disasters. Archuleta uses a series of different techniques to educate the public including: brochures, talks, interviews, websites, social media, and an annual safety expo. The challenges are acquiring the staff time and money to keep the programs going.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, Archuleta School District and Pagosa Springs
<b>Responsible Office</b>	Archuleta County Sheriff's Office – Office of Emergency Management in coordination with other emergency management offices and Pagosa Fire Protection District
<b>Priority</b>	Medium
<b>Cost Estimate</b>	\$200/yr budget for materials
<b>Benefits</b>	Public education helps the public to prepare and/or take care of themselves during an emergency or disaster
<b>Potential Funding</b>	Archuleta County, Homeland Security, State of Colorado, FEMA, Ready Colorado
<b>Schedule</b>	Ongoing
<b>2017 Status</b>	Continuing- in progress; Activities implemented on annual basis including: Safety Fair by the Fire Protection District; sharing information at MACS meetings; Search and Rescue class; avalanche safety class and awareness brochures; Facebook Posts during times of high avalanche hazard; Loma Linda Subdivision evacuation practice; \$200/yr. budget for materials has been limiting

**Multi-Hazard Actions:**

**8. Placement of a Redundant Fiber Optic Route into Archuleta County**

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<b>Hazards Addressed</b>	All
<b>Issue/Background</b>	There is currently only one single Ethernet path into Archuleta County for communications. This project would involve constructing an alternative transport route into Archuleta County. The path would follow the highway 84 corridor to the New Mexico state line.
<b>Other Alternatives</b>	Microwave Radio Link
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs
<b>Responsible Office</b>	CenturyLink Communications
<b>Priority</b>	Medium
<b>Cost Estimate</b>	\$750,000
<b>Benefits</b>	This would provide a redundant path for communications and reduce prolonged outages of communication and connectivity.
<b>Potential Funding</b>	CenturyLink Communications
<b>Schedule</b>	2017 to 2019
<b>2017 Status</b>	Continuing- not completed

**Multi-Hazard Actions:**

**9. Mapping Comprehensive Hazards for Development and Hazard Aversion**

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<b>Hazards Addressed</b>	Avalanche, Dam Failure, Earthquake, Land Subsidence, and Floods
<b>Issue/Background</b>	DFIRMs for the planning area are on-line. The Planning Department does not have other hazard maps (geo, fire, etc.) which are referred to in their land use regulations. This project lends itself to education / awareness but also reducing losses to future development through avoidance and planning. The hazard mapping developed during the Hazard Mitigation Plan can be used to guide where more detailed mapping is needed for areas such as landslide, land subsidence, and avalanche areas. Hardcopy maps of avalanche potential areas identified during the planning process should be digitized.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Pagosa Springs, and the Southern Ute Indian Tribe
<b>Responsible Office</b>	Archuleta County GIS, Planning, Archuleta Sheriff’s Office – Office of Emergency Management
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	This project will help educate & increase awareness of natural hazards to the Archuleta County Response Area and contribute to avoiding losses to future development
<b>Potential Funding</b>	Pre-disaster mitigation funding
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- in progress; Working on land use map, updating Comprehensive Plan (National Flood Hazard Layer integrated). HMP is cross referenced in Comprehensive Plan update, USFS wildfire risk mapping, county web map improvements

**Multi-Hazard Actions:**

**10. Assess the feasibility of adopting updated ICC codes when new codes are released. If feasible, adopt the codes in the Town of Pagosa Springs and Archuleta County**

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<b>Hazards Addressed</b>	Earthquake, extreme cold, severe winter storm, high winds, and flooding
<b>Issue/Background</b>	Archuleta County and the Town of Pagosa Springs currently have adopted the 2006 ICC series of codes. Both jurisdictions understand the value of current codes. Because there is a financial impact every time an update occurs, both the town and county need to assess this impact against the benefit of the current code.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County and Town of Pagosa Springs
<b>Responsible Office</b>	Archuleta County planning/building departments and Town of Pagosa Springs Planning/Building departments
<b>Priority</b>	Low
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Up to date building code use
<b>Potential Funding</b>	Pre-disaster mitigation funding, otherwise unknown
<b>Schedule</b>	2018-2019 and when opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- not completed; Deferred until 2018 edition of IBC is released at which point it will be reviewed.

## **Multi-Hazard Actions:**

### **11. Alternative 115 KV feed line from the South**

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<b>Hazards Addressed</b>	Severe Winter Storm, Wildland Fire, Avalanche, Lightning, High Winds, and Tornadoes
<b>Issue/Background</b>	This is a future work plan which could take 20 years or longer to implement and execute
<b>Other Alternatives</b>	Other alternatives are being investigated. One very limited alternative is the bio-fuels generation project. Another is the wildland fire line mitigation project.
<b>Jurisdiction(s) Involved</b>	Tri-State Electric, La Plata Electric, Archuleta, Hinsdale, and Mineral, counties, SUIT, and Pagosa Springs
<b>Responsible Office</b>	Tri-State and La Plata Electric Association
<b>Priority</b>	High
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Alternate source of electricity when power grid is affected by hazards
<b>Potential Funding</b>	Pre-disaster mitigation funding, otherwise unknown
<b>Schedule</b>	2022 to 2032 (when opportunity, staff time, and funding allow)
<b>2017 Status</b>	Continuing- not completed



## **Multi-Hazard Actions:**

### **12. Biomass power facility development**

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<b>Hazards Addressed</b>	Severe Winter Storm, Wildland Fire, Avalanche, Lightning, High Winds, and Tornadoes
<b>Issue/Background</b>	Archuleta county has a single main power source and one very limited backup line. The 5 mega-watts bio-fuel power plant uses gasification process to produce electrical energy locally. The plant uses wood chips as fuel. Trees are cut, chipped, and then hauled to the power plant to be converted into electricity.
<b>Other Alternatives</b>	Alternative 115 KV feed line project
<b>Jurisdiction(s) Involved</b>	Archuleta County, Pagosa Springs, and USFS
<b>Responsible Office</b>	Archuleta County, USFS
<b>Priority</b>	Low
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	This project will provide a limited back up power source if the main supply line is compromised. It also will provide a useful way to dispose of slash and trees, thus helping to reduce wildland fire risk by aiding in the removal of fuels in wildland urban interface.
<b>Potential Funding</b>	Green Energy Grant, USFS woody biomass grants, private funding
<b>Schedule</b>	Originally spring of 2012; within next five years
<b>2017 Status</b>	Continuing- not completed; This has been deferred for the next five years for technical reasons; getting power from the facility into the grid is one issue to resolve in order for the project to work as intended.

## **Multi-Hazard Actions:**

### **13. Addressing Improvements**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	Accuracy between agencies and jurisdictions, and communication of address changes has been an ongoing issue. Archuleta County has an ongoing addressing project involving correcting addresses, improving inconsistencies, and distributing those changes/correcting. Sustainment / expansion of this project is needed. Addresses in Southern Mineral and Southern Hinsdale are ongoing issues also.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs
<b>Responsible Office</b>	Archuleta GIS, Archuleta Planning, Archuleta Assessor's Office, Hinsdale County and Mineral County
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Accurate, consistent addressing can help minimize confusion and delay in emergency response. It contributes to saving lives and property during emergencies or disasters. It also helps to reduce the ultimate risk to responders and the public.
<b>Potential Funding</b>	County budgets
<b>Schedule</b>	Ongoing as staff time and funding allow
<b>2017 Status</b>	Continuing- not completed

## **Wildland Fire Actions:**

### **1. Wildland Fire Fuels Reduction Around 115 KV Line from Yellow Jacket to Pagosa Springs**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	This transmission line belongs to Tri-State Electric (G&T). They take care of their easement and right-of-way only. The intent of this project is to thin and reduce fuels around transmission line so that a wildland fire has minimal impact on the power supply. This would also create an effective fuel break.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Tri-State Electric, Archuleta County, Hinsdale County, Mineral County, USFS, Southern Ute Indian Tribe, Pagosa Fire Protection District, and Pagosa Springs
<b>Responsible Office</b>	Tri-State Electric, USFS/BLM, and Archuleta Sheriff's Office – Office of Emergency Management (Fire Program)
<b>Priority</b>	High
<b>Cost Estimate</b>	\$16,000/mile
<b>Benefits</b>	Reduced possibility of power outages from wildfires, reduced potential damage to power line infrastructure
<b>Potential Funding</b>	Payment in lieu of taxes for federal lands, county budget, pre-disaster mitigation funding
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- in progress; Per input from the Pagosa Lakes Property Owners Association Tri-State Electric has cleared trees and hazards from the high voltage power lines in Martinez Canyon and Dutton Draw near Pagosa Lakes and believe that these potentially hazardous areas have been mitigated.

## **Wildland Fire Actions:**

### **2. Implement Firewise Workshops and Community Meetings**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	A strong public education program on FireWise mitigation techniques helps the public better understand what they need to do to reduce the potential for property loss from wildfire. Archuleta County and partners including FireWise of Southwest Colorado uses a series of different techniques to educate the public: brochures, talks, interviews, websites, surveys, social media and an annual safety expo to name a few methods.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Pagosa Fire Protection District, Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs; FireWise of Southwest Colorado.
<b>Responsible Office</b>	Pagosa Fire Protection District, Archuleta Sheriff's Office – Office of Emergency Management (Fire Program), Colorado State Forest Service, BLM, USFS
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Reduced property losses and increased public safety
<b>Potential Funding</b>	Ready Colorado, Firewise, agency budgets, etc
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- in progress; regular meetings and activities occur monthly in partnership with FireWise of Southwest Colorado.

**Wildland Fire Actions:**

**3. Community Wildland Fire Protection Plan Development**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	Community level planning is one of the best methods to prepare residents for a wildland fire near their home or community
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs
<b>Responsible Office</b>	Pagosa Fire Protection District, Sheriff’s Offices, the Colorado State Forest Service, and Homeowner’s Associations
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Will vary depending on complexity of area
<b>Benefits</b>	This type of planning helps residence help themselves during a fire. It encourages them to participate in pre-fire mitigation activities, and educate them for what to do when a fire occurs. This also helps protect responders, the public, and property.
<b>Potential Funding</b>	Homeowners Associations, grants, pre-disaster mitigation funding, etc
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Completed; Loma Linda CWPP was completed between 2012-2016; the Echo Canyon CWPP is done but not yet adopted as of late 2017.

## **Wildland Fire Actions:**

### **4. Encourage Wildland Fire Mitigation on Private Lands and Joint Community Lands**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	Education and awareness of fire mitigation activities on private property will save houses from wildland fire. A few of the encouraged activities would include: cleaning up yard waste, thinning and liming trees and brush, improving structure access, installing none combustible landscaping within two feet of structure, etc.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Pagosa Fire Protection District, Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs
<b>Responsible Office</b>	Pagosa Fire Protection District, Homeowners Associations (including PLPOA), Colorado State Forest Service, and Archuleta Sheriff's Office – Office of Emergency Management (Fire Program)
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Varies depending on activity, some activities are free and require very little time, while others are expensive and time intensive
<b>Benefits</b>	This project will improve the survivability of homes and structures during a wildland fire. It will also improve responder and public safety.
<b>Potential Funding</b>	US Fire Administration, USFS/BLM grants, homeowners associations, and private funding, FEMA
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- in progress; Ties in to ongoing Firewise activities; some burn certification training completed; TREX program (prescribed fire burning exchange)

## **Wildland Fire Actions:**

### **5. Wildland Fire Mitigation on County Open Space Lands**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	Archuleta County has a few areas of Open Space, about 200 acres. As land stewards and good neighbors, it is Archuleta County's responsibility to take care of our open lands, just as it is our residents'. This includes keeping the areas clean and healthy. As most of the areas are ponderosa forests with interspersed grassland, this means required selective thinning, and regularly prescribed fire operations. The property the county currently owns, for the most part, is over-grown and susceptible to disease and fire. Should a fire start on county lands and spread to private lands, the county may be responsible for private losses, in particular, if the county is found negligent in their care of their land.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County
<b>Responsible Office</b>	Archuleta Board of County Commissioners and the Archuleta Sheriff's Office – Office of Emergency Management
<b>Priority</b>	Medium
<b>Cost Estimate</b>	\$400/acre thinning \$500 / acre mastication/ chipping or piling \$300/wooded or brush acre prescribed fire \$200/grass acre prescribed fire
<b>Benefits</b>	Wildland fire risk reduction Increased responder and public safety Improved wildlife habitat Healthy forests and ecosystem Increase public awareness of fire Lower liability
<b>Potential Funding</b>	County fire program budget when there are no active fires. One or two additional firefighters will be required (this will help keep fire small also).
<b>Schedule</b>	When opportunity, staff time, and funding allow

**2017 Status**

Continuing- in progress; some work completed in Cloman Park



## **Wildland Fire Actions:**

### **6. Wildland Fire Mitigation on Reservoir Hill**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	Reservoir Hill stands adjacent to downtown Pagosa Springs. The top of Reservoir Hill contains one of the response areas primary communications sites. The ecosystem is over grown and very susceptible to both disease and wildland fire. As land stewards and good neighbors, it is Pagosa Springs' responsibility to take care of our open lands, just as it is our residents'. This includes keeping the areas clean and healthy. As most of the areas are ponderosa forests with interspersed grassland, this means required thinning, and regular prescribed fire operations. Should a fire start on town lands and spread to private lands, the town may be responsible for private losses, in particular, if the town is found negligent in their care of their land.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Pagosa Springs
<b>Responsible Office</b>	Pagosa Springs Recreation Department and Archuleta County Sheriff's Office – Office of Emergency Management
<b>Priority</b>	Medium
<b>Cost Estimate</b>	\$400 / acre thinning \$500 / acre mastication/ chipping or piling \$300 / wooded or brush acre prescribed fire \$200 /grass acre prescribed fire
<b>Benefits</b>	Wildland fire risk reduction Increased responder and public safety Improved wildlife habitat and healthy forests and ecosystem Increase public awareness of fire Lower liability
<b>Potential Funding</b>	Pre-disaster mitigation funding, town budget, etc.
<b>Schedule</b>	2016
<b>2017 Status</b>	

Completed in 2015-2016 with lots of brush cleared with partnership with FireWise of Southwest Colorado and the San Juan Headwaters Forest Health Partnership.

## **Wildland Fire Actions:**

### **7. Evaluate Feasibility of Upgrading Domestic Water Systems to Accommodate Fire Flow Requirements**

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<b>Hazards Addressed</b>	Wildland and urban fires
<b>Issue/Background</b>	The Archuleta Response Area has limited firefighting resources and long travel distances. Because of these two issues, it is critical that adequate water supply is immediately available for fire suppression.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs
<b>Responsible Office</b>	Fire Protection Districts and Water Districts
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Increased structure survivability during wildland and urban fires Increased responder and public safety
<b>Potential Funding</b>	Unknown
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- in progress; Evaluated on case by case basis; Bear Creek area evaluated; long term funding is an issue

## **Wildland Fire Actions:**

### **8. Retrofit High Potential Loss Structures with Automatic Sprinkler Systems**

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<b>Hazards Addressed</b>	Wildland and urban fires
<b>Issue/Background</b>	The Archuleta Response Area has limited resources and long travel distances. Because of these two issues, buildings that support critical services should have automatic fire control systems. Adequate water supply must be available to support these systems.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	PAWSD, Archuleta County, Hinsdale County, Mineral County, Southern Ute Indian Tribe, and Pagosa Springs
<b>Responsible Office</b>	Pagosa Fire Protection District and County and Pagosa Springs Building Departments
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Increased structure survivability during wildland and urban fires Increased responder and public safety
<b>Potential Funding</b>	Unknown
<b>Schedule</b>	When opportunity, staff time, and funding allow
<b>2017 Status</b>	Continuing- not completed

## **Wildland Fire Actions:**

### **9. Wildland Fire Dip Site Location Identification**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	This project would involve locating potential bodies of water to utilize as a dip site in the event of a wildland fire. Ponds or water bodies on private lands would be identified, which would necessitate obtaining permission from property owners to utilize. A spreadsheet with names, number and the address of participating owners will be developed which will help fire personnel access water quickly during a fire.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Archuleta County Sheriff's Office – Office of Emergency Management, US Forest Service, Pagosa Fire Protection District, Southern Ute Tribe, Hinsdale County, Mineral County, La Plata County
<b>Responsible Office</b>	Archuleta County Office of Emergency Management
<b>Priority</b>	High
<b>Cost Estimate</b>	Can be accomplished with staff time
<b>Benefits</b>	There is a better chance of reducing the extent and intensity of wildland fire and mitigating property losses if there is access to water in a timely manner.
<b>Potential Funding</b>	None identified
<b>Schedule</b>	Complete in 2018
<b>2017 Status</b>	New

## **Wildland Fire Actions:**

### **10. Structural Triage for WUI**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	Fast moving WUI fires can cause significant damage as well as total destruction of buildings and homes. By knowing what to look for and how to provide defensible space, home owners can significantly reduce the threat of structural fires to existing and future buildings and infrastructure caused by wildland fires. As such, the Triage project will assess vulnerability and build an inventory of at-risk properties in the WUI to include targeted outreach to home owners with most at-risk properties
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Pagosa Fire protection district, Archuleta County, PAWSD
<b>Responsible Office</b>	Pagosa Fire Protection District
<b>Priority</b>	High
<b>Cost Estimate</b>	\$2,500
<b>Benefits</b>	Protection of personal property, tax base, watersheds, and wildlife areas
<b>Potential Funding</b>	FPD training budget, Firewise grants, Donations
<b>Schedule</b>	Summer 2018
<b>2017 Status</b>	New

## **Wildland Fire Actions:**

### **11. Rio Blanco Prescribed Fire**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	A prescribed fire would be beneficial in reducing hazardous fuels and promote vegetative resilience to a landscape near the mouth of the Upper Blanco Basin. The Upper Blanco Basin has about 186 structures (numerous primary residents) with only one egress route.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, PAWSD, US Forest Service, Bureau of Reclamation (Oso Water Diversion Project)
<b>Responsible Office</b>	San Juan National Forest/USDA Forest Service
<b>Priority</b>	High
<b>Cost Estimate</b>	None identified
<b>Benefits</b>	Hazardous fuel reduction, reduced potential for catastrophic fire and enhanced life safety and property protection benefits, ecosystem resilience, wildlife habitat improvement, water quality and watershed resilience
<b>Potential Funding</b>	Congress appropriated funds, partnerships
<b>Schedule</b>	2018-2020
<b>2017 Status</b>	New

**Wildland Fire Actions:**

**12. Update Community Wildfire Protection Plan**

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**Hazards Addressed** Wildland Fire

**Issue/Background** The risk of wildland fire occurrence in Archuleta County is very high. Historic records of fire origins indicate starts occur every year. June through August have the highest frequency of starts and most are caused by lightning. Multiple starts in 24 – 48 hour periods are common during these months. During years of low winter/spring moisture, the threat of human-caused fire starts becomes critical by June. All these factors combined cannot be ignored.

Fires will occur every year and we must be as prepared as possible. The Archuleta County Community Wildland Fire Protection Plan was originally developed in 2008 because of this increasing threat. The plan is in need of an update to reflect current conditions including widespread beetle kill and growth and development.

**Other Alternatives** None Identified

**Jurisdiction(s) Involved** Archuleta County Emergency Management, Pagosa Fire Protection District, Town of Pagosa Springs. Partner agencies include: Los Pinos Fire Protection District, Archuleta County Sheriff’s Office, San Juan Public Lands (USFS and BLM), Bureau of Indian Affairs, Colorado State Forest Service, Firewise Council of Southwest Colorado and Neighborhood Ambassadors, Fort Lewis College – Office of Community Services, SJMA, Wildland Fire Prevention and Education Month Planning Committee, Private contractors, The Pagosa Chamber of Commerce, AEDA, POAs, Private and commercial landowners

**Responsible Office** Archuleta County Emergency Management

**Priority** Medium

**Cost Estimate** \$30,000

**Benefits** Development of the update and continued implementation of the plan will result in community engagement, responsible burning practices, reduction of wildfire risk to structures and enhanced life safety.

These organizations work with each other and community partners to share resources and information. Formal Mutual Aid Agreements are in place that allow for interagency response to fire emergencies. Partnerships have developed related to fire prevention and



demonstration projects, firefighting, public education and accessing resources such as equipment, grants and training.

**Potential Funding**    Unknown

**Schedule**            2018-2019

**2017 Status**        New

## **Wildland Fire Actions:**

### **13. Prescribed Burning on Private Property**

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**Hazards Addressed** Wildland Fire

**Issue/Background** The risk of wildland fire occurrence in Archuleta County is very high. Much of the risk is on the extensive public lands in the County; fuels management projects are traditionally carried out by the public land stewards including USFS and the BLM. However, there is also risk on private property, including large parcels that could benefit from prescribed burns or other fuels treatment methods. A proposal has been submitted to the Board of County Commissioners in 2018 for the approval to proceed with research and investigation for the potential of carrying out prescribed burns on private property in coordination with willing property owners. Reduction of fuel loads on private lands would complement the parallel efforts ongoing on neighboring public lands.

**Other Alternatives** None Identified

**Jurisdiction(s) Involved** Pagosa Fire Protection District, Town of Pagosa Springs, Los Pinos Fire Protection District, Archuleta County Sheriff's Office, San Juan Public Lands (USFS and BLM), Bureau of Indian Affairs, Colorado State Forest Service, Private landowners

**Responsible Office** Archuleta County Emergency Management

**Priority** High

**Cost Estimate** Unknown

**Benefits** Responsible burning practices to reduce the potential and severity of wildfire in the wildland urban interface. Reduce potential for property loss and enhanced life safety.

**Potential Funding** Unknown

**Schedule** 2018-2019

**2017 Status** New

## **Wildland Fire Actions:**

### **14. Watershed Thinning Project**

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<b>Hazards Addressed</b>	Wildland Fire
<b>Issue/Background</b>	Wildfires and post wildfire flood and debris flow has the potential to significantly impact the water supply and water treatment capabilities for the residents of Archuleta County. This project would do fuels reduction through thinning of trees in critical portions of the watershed that affect water supply. While primarily a wildfire mitigation project, secondary benefits would include reduced potential for severe burns in the watershed, mitigating the potential for post wildfire flood and debris flows.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Town of Pagosa Springs, U.S. Forest Service, San Juan Mountains Association, Private Contractors, Private and Commercial landowners
<b>Responsible Office</b>	Pagosa Area Water and Sanitation District
<b>Priority</b>	Medium
<b>Cost Estimate</b>	\$250,000
<b>Benefits</b>	Protection of critical infrastructure including raw water diversions, water treatment plants, pipelines and irrigation ditches.
<b>Potential Funding</b>	Unknown
<b>Schedule</b>	2019-ongoing
<b>2017 Status</b>	New

## ***Flooding Actions:***

### ***1. McCabe Creek Flood Mitigation***

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**Hazards Addressed** Flooding

**Issue/Background** Flooding along McCabe Creek is exacerbated by existing under-sized (5 ft. overtopping of Highway 160 during a 100-year event) and poorly maintained culverts at several locations on the creek. Though the Town has adopted regulations for building within town boundaries in identified flood risk areas, older portions of the North Pagosa Springs residential districts along N 5th and 6th Street were built within mapped floodway of McCabe Creek prior to the mapping, with approximately 3 dozen homes in the floodway and another 2 dozen in the floodplain. Numerous dilapidated out buildings and some existing non-flood proof houses in the floodplain and floodway create a potential debris flow problem in the event of a 100-year event. Most significantly, a potential debris flow could clog the downstream culvert at Highway 160 and 6<sup>th</sup> Street. Actions involved in this project include:

- repairing/replacing inadequately sized culverts;
- coordination with CDOT on replacement of the Highway 160 culvert
- requiring removal of dilapidated outbuildings through property maintenance code enforcement, and potentially help with mitigation cost defrayal; and
- purchasing or condemning various properties for public land improvements such as river parks and walks.

**Other Alternatives** Prepare emergency preparedness plan for McCabe Creek residents  
Prepare emergency preparedness plan for potential loss of Highway 160 use at 6<sup>th</sup> Street

**Jurisdiction(s)  
Involved** Town of Pagosa Springs

**Responsible Office** Town of Pagosa Springs Floodplain Administrator (Planning Director) for floodplain management; Pagosa Springs Streets  
CDOT for culverts  
Private land owners for culverts under buildings at Highway 160 and 6<sup>th</sup> Street  
Private land owners for various buildings located along the creek

**Priority** Medium

<b>Cost Estimate</b>	Depends upon the scope of work; Cost to town is for administration of development regulations, property conveyances, Town culvert improvements. Town infrastructure cost unknown.
<b>Benefits</b>	This project could help avoid loss of property, potential loss of life, and loss of primary transportation artery for town and greater four corners. Any interruption of transportation on Highway 160 would have serious repercussions affecting the town's main economic base of tourism. This would result from difficulty negotiating already limited access routes to various tourist destinations as well as potential delay or interruption of delivery of various goods and services to the town and surrounding areas.
<b>Potential Funding</b>	Town General and Capital improvement funds  CDOT  Department of Local Affairs grants and Federal Government grants. Colorado Water Conservation Board State Grants FEMA
<b>Schedule</b>	Acquire properties within floodway: Town will have ongoing discussions with property owners, currently for donations of floodways to the Town. Timeline TBD.  Improve creek culverts at Florida Road, the Street and Juanita Street. Timeline TBD.  Maintain upstream creek channel and keep clear of debris: Timeline TBD coordination with County and Property owners.
<b>2017 Status</b>	Continuing- not completed; deferred but planned for CDOT to upgrade culvert at Hwy 160 crossing 2018-19. In 2013 CDOT did some improvements to the inlet structure on the northern side of the highway to alleviate erosion as well as highway and sidewalk undermining concerns.

***Flooding Actions:***

***2. West Cat Creek Bridge Replacement and East Cat Creek Entrance Closure / Bridge Abandonment***

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<b>Hazards Addressed</b>	Flooding
<b>Issue/Background</b>	The West Cat Creek access has a substandard bridge that needs replacement. The East Cat Creek access is an unsafe highway entrance and needs to be closed.
<b>Other Alternatives</b>	Keep the status quo
<b>Jurisdiction(s) Involved</b>	Archuleta County
<b>Responsible Office</b>	Archuleta County Public Works Department
<b>Priority</b>	Low
<b>Cost Estimate</b>	\$800,000
<b>Benefits</b>	This project would increase life safety by replacing a poorly rated structure (unsafe). It would also enhance the flood resistance of the bridge and enhance traffic safety on Highway 160.
<b>Potential Funding</b>	CDOT off-systems bridge funding – 80% Road capital improvement fund (county) – 20%
<b>Schedule</b>	On schedule for completion in 2012
<b>2017 Status</b>	Completed in 2012

## ***Flooding Actions:***

### ***3. Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program and Updated Statewide Floodplain Rules***

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**Hazards Addressed** Flooding

**Issue/Background** The County participate in the National Flood Insurance Program. This project restates the commitment of Archuleta County to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. Because of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize recently completed Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;

- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the Town of Pagosa Springs and the Colorado Water Conservation Board.
- Evaluate joining the Community Rating System to further lower the cost of flood insurance for residents

This project also involves the actions taken by the town of Pagosa Springs to comply with NFIP standards through restrictions in flood zones and floodways. Pagosa Springs is using flood maps, regulatory building code, required permitting, and floodplain management practices to more effectively mitigating flood hazards.

<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County
<b>Responsible Office</b>	Archuleta County Planning Department
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Low
<b>Benefits</b>	Reduced property loss from floods, continued availability of flood insurance for residents; Reduced vulnerability of new development to flooding
<b>Potential Funding</b>	County budget
<b>Schedule</b>	Ongoing.
<b>2017 Status</b>	Continuing- in progress; County Planner considering CFM certification  Updated floodplain regulations in 2015 to conform with CWCB state flood rule



## ***Flooding Actions:***

### ***4. Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program and Updated Statewide Floodplain Rules***

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**Hazards Addressed** Flood

**Issue/Background** The Town of Pagosa participates in the National Flood Insurance Program. This project restates the commitment of the Town to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan. Because of the adoption of updated statewide floodplain rules and regulations (effective January 14, 2011) the CWCB will require local governments to revise their ordinance to comply with the new rules by January 2014.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize recently completed Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;

- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the Town of Pagosa Springs and the Colorado Water Conservation Board.
- Evaluate joining the Community Rating System to further lower the cost of flood insurance for residents

<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Town of Pagosa Springs
<b>Responsible Office</b>	Town of Pagosa Springs Building Department
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Low
<b>Benefits</b>	Reduced property loss from floods, continued availability of flood insurance for residents; Reduced vulnerability of new development to flooding
<b>Potential Funding</b>	Covered in existing budget
<b>Schedule</b>	Ongoing with annual implementation
<b>2017 Status</b>	Continuing- in progress; Ordinance updated in 2013

## ***Other Hazards (Avalanche) Actions:***

### ***1. Support Ongoing Avalanche Mitigation and Control Efforts on Highway 160 near Wolf Creek Pass***

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<b>Hazards Addressed</b>	Avalanche
<b>Issue/Background</b>	Avalanches routinely close Highway 160 over Wolf Creek Pass in the winter. This project supports the ongoing avalanche mitigation and control operations on the pass.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Mineral County and Colorado Department of Transportation
<b>Responsible Office</b>	CDOT and the Colorado Avalanche Information Center (CAIC)
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Reduced interruption of the areas supply chain Increased safety for responders, residents, and visitors
<b>Potential Funding</b>	Pre-disaster mitigation and US highways administration funding
<b>Schedule</b>	Ongoing on annual basis in winter months
<b>2017 Status</b>	Continuing- in progress; CDOT & CAIC work together on regular basis to mitigate hazards

**Other Hazards (Drought) Actions:**

**1. Water Conservation Program**

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**Hazards Addressed** Drought

**Issue/Background** In times of extended dry weather, water supply in the Archuleta Response Area could be limited. The Pagosa Area Water and Sanitation District has made continued efforts to conserve water through efficiency improvements.

PAWSD has also implemented a Water Conservation Program that seeks to educate the public on the value and importance of water and the need to use it wisely.

During times of drought this could include water restrictions as outlined in the District’s drought mitigation and response plan.

**Other Alternatives** None identified

**Jurisdiction(s) Involved** Pagosa Area Water and Sanitation District; Pagosa Springs and Archuleta County

**Responsible Office** Pagosa Area Water and Sanitation District and individuals

**Priority** Medium

**Cost Estimate** Unknown

**Benefits** Public awareness and education  
Decreased water usage

**Potential Funding** Unknown

**Schedule** Within next 5 years when opportunity, necessity, staff time, and/or funding allow

**2017 Status** Continuing- in progress

**Other Hazards (Drought) Actions:**

**2. Pagosa Area Water and Sanitation District (PAWSD) Drought Management Plan Update**

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**Hazards Addressed** Water supply and water quality issues associated with drought.

**Issue/Background** Records show that the 1980s and 1990s were two of the wettest decades in Colorado since the 1930s. Data collected from the study of tree rings show that extended periods of extensive drought (25 years or greater) are normal in the West. The abundant water supply of the last 100 years has been an exception to the norm. The climate change variable presents a host of challenges in preparing for a significant multi-year drought event that is long overdue.

In the case of a drought, when reservoir levels begin to fall, the water quality also declines due to the hypoxic nature of water towards the bottom of a reservoir. This presents a significant challenge for a water treatment plant to deal with. In response PAWSD has upgraded 2 of its 3 water treatment plants to effectively treat water of compromised quality so as to be able to utilize more reservoir water in the case of an emergency.

PAWSD has also implemented a Water Conservation Program that seeks to educate the public on the value and importance of water and the need to use it wisely.

PAWSD’s Drought Management Plan is a dynamic document that is revisited often as new techniques, technologies, procedures and protocol develop. The most current update activity will seek to more closely align PAWSD’s plan with recommendations made by the CWCB concerning drought management.

**Other Alternatives** Increased storage capacity, construction of new reservoirs, acquisition of additional water rights, water conservation (demand reduction), and maximization of existing reservoirs through intake relocation.

**Jurisdiction(s) Involved** Pagosa Area Water and Sanitation District, Archuleta County.

**Responsible Office** Pagosa Area Water and Sanitation District

**Priority** Medium

**Cost Estimate** Will be completed by staff

<b>Benefits</b>	Longevity of water resources in the case of a drought
<b>Potential Funding</b>	State and Federal Grant programs, in-house Capital Improvement funds.
<b>Schedule</b>	On-going with completion in 2019
<b>2017 Status</b>	Continuing- in progress

## **Other Hazards (Landslide) Actions:**

### **1. East Fork Landslide Monitoring**

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<b>Hazards Addressed</b>	Landslide
<b>Issue/Background</b>	In the spring of 2008 a landslide near the junction of the east fork San Juan River and Sand Creek (T36N, R1E, Sec 4) destroyed the East Fork Road (FDR 667) and ruptured the natural gas line. An attempt has been made to stabilize the slide area with significant mitigation actions. The road has been repaired and the gas line was re-installed above ground. Although very unlikely, there is still potential for this landslide to move again and dam the East Fork River. This would create a potentially unstable landslide dam. Even more unlikely in this event, a dam break-like flood event could occur in areas along the East Fork and mainstem of the San Juan River. Because of the catastrophic implications, continued active monitoring of the area is needed for early warning.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, USFS, and Pagosa Springs
<b>Responsible Office</b>	ACSO-EM and the CWCB
<b>Priority</b>	Medium
<b>Cost Estimate</b>	\$20,000 - Permanent stream gauge and remote site monitoring
<b>Benefits</b>	Early warning to move public out of the way downstream Ability to know of land movement, which would affect the natural gas line that supplies populations from the San Luis Valley all the way to Vail
<b>Potential Funding</b>	XCEL gas (pipeline), Federal Highway Administration (road)
<b>Schedule</b>	Continued monitoring and install a permanent stream garage on the East Fork of the San Juan River as soon as possible
<b>2017 Status</b>	Continuing- in progress

**Other Hazards (Landslide) Actions:**

**2. Jackson Mountain Landslide Mitigation**

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<b>Hazards Addressed</b>	Landslide
<b>Issue/Background</b>	CDOT completed stabilization work in 2011. The work completed serves as the initial stage for a larger/comprehensive project to fully mitigate the risk in this area. It is recommended that Archuleta County continue to support any future mitigation efforts on the Jackson Mountain slide which affects Highway 160 and utility lines.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Archuleta County, Colorado Department of transportation, USFS
<b>Responsible Office</b>	Colorado Department of Transportation
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Reduced disruption to transportation, emergency responders, and utilities
<b>Potential Funding</b>	CDOT budget
<b>Schedule</b>	Ongoing for next five years
<b>2017 Status</b>	Continuing- in progress; Monitoring is ongoing and some mitigation work completed at toe of slide near San Juan River



**Other Hazards (Rockfall) Actions:**

**1. Support Ongoing Rockfall Mitigation Efforts on Highway 160 near Wolf Creek Pass and on the West Side of the County**

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<b>Hazards Addressed</b>	Rockfall
<b>Issue/Background</b>	Rockfall occurs daily on Highway 160 over Wolf Creek Pass. Most of these are minor, but even large rockfall can be considered frequent. Rockfall also occurs frequently in the area of Yellow Jacket Pass. This project indicates the County’s support of CDOT’s rockfall mitigation efforts and control operations on the pass.
<b>Other Alternatives</b>	None identified
<b>Jurisdiction(s) Involved</b>	Mineral County, Archuleta County and Colorado Department of Transportation
<b>Responsible Office</b>	CDOT
<b>Priority</b>	Medium
<b>Cost Estimate</b>	Unknown
<b>Benefits</b>	Reduced interruption of the areas supply chain Increased safety for responders, residents, and visitors
<b>Potential Funding</b>	Pre-disaster mitigation and US highways administration funding
<b>Schedule</b>	Completed
<b>2017 Status</b>	Completed - Rockfall mitigation wall installed on Wolf Creek Pass circa 2015.

**APPENDIX B: HAZARD MITIGATION PLANNING  
COMMITTEE (HMPC) REPRESENTATIVES**

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# Appendix B. HAZARD MITIGATION PLANNING COMMITTEE

**Table B.1. HMPC Contact List**

Name	Jurisdiction	Office/Agency	Phone	Email
<b>Archuleta County Participants</b>				
Mike Le Roux	Archuleta County	Archuleta County Sheriff's Office – Director of Emergency Operations	970-398-0612	<a href="mailto:mleroux@archuletacounty.org">mleroux@archuletacounty.org</a>
Christina Kraetsch	Archuleta County	Archuleta County Sheriff's Office – Deputy Director of Emergency Operations	805-403-0403	<a href="mailto:ckraetsch@archuletacounty.org">ckraetsch@archuletacounty.org</a>
Sam Montoia	Archuleta County	GIS	970-264-8333 x1312	<a href="mailto:smontoia@archuletacounty.org">smontoia@archuletacounty.org</a>
John Shepard	Archuleta County	Planning	970-903-4006	<a href="mailto:jshepard@archuletacounty.org">jshepard@archuletacounty.org</a>
Robert Perry	Archuleta County	Public Works	970-264-5660	<a href="mailto:rperry@archuletacounty.org">rperry@archuletacounty.org</a>
Peter Jankowski	Archuleta County	County Administrator	970-264-8302	<a href="mailto:pjankowski@archuletacounty.org">pjankowski@archuletacounty.org</a>
<b>Incorporated Communities</b>				
Andrea Phillips	Town of Pagosa Springs	Town Manager	970-264-4151 x236	<a href="mailto:aphillips@pagosasprings.co.gov">aphillips@pagosasprings.co.gov</a>
James Dickhoff	Town of Pagosa Springs	Building and Planning	970-264-4151 x225	<a href="mailto:jdickhoff@pagosasprings.co.gov">jdickhoff@pagosasprings.co.gov</a>
<b>Special Districts</b>				
Randy Larson	Archuleta County Response Area	Pagosa FPD	970-731-4191	<a href="mailto:rlarson@pagosafire.com">rlarson@pagosafire.com</a>
Karn Macht	Archuleta County Response Area	Pagosa FPD	970-903-9057	<a href="mailto:kmacht@pagosafire.com">kmacht@pagosafire.com</a>
Donald Brockus	Ignacio	Southern Ute	970-563-0100	<a href="mailto:dbrockus@southernute-nsn.gov">dbrockus@southernute-nsn.gov</a>
Justin Ramsey	Archuleta County Pagosa Area	PAWSD	928-606-3598-	<a href="mailto:justin@pawsd.org">justin@pawsd.org</a>
<b>State/Local /Regional/Private Stakeholders</b>				
Jerry Gray	Hinsdale County	Hinsdale County Office of Emergency Management	970-275-3010	<a href="mailto:grayj@lakecity.net">grayj@lakecity.net</a>
Terry Wetherill	Mineral County	Mineral County Office of Emergency Management	719-850-0514	<a href="mailto:mincoemc@gmail.com">mincoemc@gmail.com</a>

Name	Jurisdiction	Office/Agency	Phone	Email
Jay Godson	San Juan Public Lands	USFS/BLM	970-264-1536	<a href="mailto:jsgodson@fs.fed.us">jsgodson@fs.fed.us</a>
Jerry Wills		La Plata Electric Association		<a href="mailto:jcwills@lpea.coop">jcwills@lpea.coop</a>
Rob Goodrich		Black Hills Energy	719-469-2213	<a href="mailto:Robert.goodrich@blackhillscorp.com">Robert.goodrich@blackhillscorp.com</a>
<b>AMEC Planning Team</b>				
Jeff Brislawn		Consultant/Project Manager	303-704-5506	<a href="mailto:jeff.brislawn@amecfw.com">jeff.brislawn@amecfw.com</a>
Madeleine Pluss		Mitigation Planner	303-820-4652	<a href="mailto:madeleine.pluss@amecfw.com">madeleine.pluss@amecfw.com</a>
Mack Chambers		GIS Specialist	303-820-4663	<a href="mailto:mack.chambers@amecfw.com">mack.chambers@amecfw.com</a>

**Table B.2. MAC Contact List**

Name	Agency	Email
Bill Rockensock	Pagosa Springs PD	brockensock@pagosasprings.co.gov
Bill Trimarco	FireWise	archuletafirewise@gmail.com
Bill Werner	American Red Cross	bill.werner@redcross.org
Brien Gardner	Black Hills Energy	brien.gardner@blackhills.com
Bruce Evans	Upperpine FPD	bevans@upperpinefpd.org
Brandon Bishop	Coroner	bbishop@archuletacounty.org
Chris Gallegos	Town of Pagosa	cgallegos@pagosasprings.co.gov
Chris Torres	Airport Manager	ctorres@archuletacounty.org
Edward Bulloch	American Red Cross	hedward@bullochgallery.com
Fred Hosselkus	Mineral Sheriff's Office	mincosheriff@centurytel.net
Gabriel Cersonsky	Archuleta County	GCersonsky@archuletacounty.org
James Dickhoff	Town of Pagosa	jdickhoff@pagosasprings.co.gov
Jay Godson	USFS	jsgodson@fs.fed.us
Jason Webb	EMS	jason.webb@psmedicalcenter.org
Jerry Wills	LPEA	jcwills@lpea.coop
Judy Cole	PSMC	judith.cole@psmedicalcenter.org
Justin Cowan	Archuleta School Dist	jcowan@pagosa.k12.co.us
Donald Brockus	Southern Ute EM	dbrockus@southernute-nsn.gov
Kevin Khung	Pagosa Ranger Dist	kkhung@fs.fed.us
Larry Lynch	PLPOA	larryl@plpoa.com
Linda Reed	Archuleta School Dist	lreed@pagosa.k12.co.us
Lori Zazzaro	San Juan Basin Public Health	lzazzaro@sjbpublichealth.org
Mary Jo Coulehan	Chamber	director@pagosachamber.com
Melveta Smith	Archuleta Sheriff's Office	melvetasmith@archuletacounty.org
Michael Riggs	PSMC	michael.riggs@psmedicalcenter.org
Mike Alley	IMG	malley1950@gmail.com
Mike Le Roux	Archuleta Sheriff's Office	mleroux@archuletacounty.org
Mike Stoll	Humane Society	hsdirector@humanesociety.biz
Natalie Woodruff	Archuleta County	nwoodruff@archuletacounty.org
Peter Jankowski	Archuleta County	pjankowski@archuletacounty.org
Randy Larson	Pagosa FPD	rlarson@pagosafire.com
Rich Gustafson	BIA	richard.gustafson@bia.gov
Rich Valdez	Archuleta Sheriff's Office	rvaldez@archuletacounty.org
Rob Goodrich	Black Hills Energy	Robert.Goodrich@blackhillscorp.com
Robert Perry	Archuleta County	rperry@archuletacounty.org

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Sandy Gladfelter	Arboles	ml.sand@hotmail.com
Sean O'Donnell	Archuleta School Dist	sodonnell@pagosa.k12.co.us
Shannon Jones	Dispatch	sjones@archuletacounty.org
Tanner Hutt	Colorado State	tanner.hutt@state.co.us
Terry Wetherill	Mineral Sheriff's Office	mincoemc@gmail.com
Trevor Denney	Colorado State	trevor.denney@state.co.us
Will Spears	KWUF	will@kwuf.com

## **APPENDIX C: PLANNING PROCESS DOCUMENTATION**

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Please complete this questionnaire and return by  
March 25<sup>th</sup> 2011 to:  
Fax 970.731.4800 Attn: Mike Legoski  
Mail: Archuleta County Emergency Management  
PO Box 638  
Pagosa Springs, CO 81147  
[mlegoski@archuletacounty.org](mailto:mlegoski@archuletacounty.org) 970-731-4799

# Archuleta County Multi-Hazard Mitigation Plan

Public survey

1. The hazards addressed in the Draft Multi-Hazard Mitigation Plan are listed below. Please indicate the level of significance in Archuleta County that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

- |  |  |
|--|--|
| <input type="checkbox"/> Avalanche                       | <input type="checkbox"/> Severe Cold         |
| <input type="checkbox"/> Dam Failure                     | <input type="checkbox"/> Soil Subsidence     |
| <input type="checkbox"/> Drought                         | <input type="checkbox"/> Hazardous Materials |
| <input type="checkbox"/> Earthquake                      | <input type="checkbox"/> Severe Winter Storm |
| <input type="checkbox"/> Flood                           | <input type="checkbox"/> Tornado             |
| <input type="checkbox"/> Hailstorm                       | <input type="checkbox"/> Wildfire            |
| <input type="checkbox"/> Landslides/Rockfall/Debris Flow | <input type="checkbox"/> Wildlife hazards    |
| <input type="checkbox"/> Lightning                       | <input type="checkbox"/> Pandemic disease    |
| <input type="checkbox"/> Post-fire debris flow           | <input type="checkbox"/> Structure fire      |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider?

3. The following types of mitigation actions may be considered in Archuleta County. Please place a check  next to the types of mitigation actions that you think should have the highest priority in the Archuleta County Multi-Hazard Mitigation Plan.

- |  |  |
|--|--|
| <input type="checkbox"/> Indoor/Outdoor Warning  | <input type="checkbox"/> Planning/Zoning                 |
| <input type="checkbox"/> Wildfire Fuels Treatment projects                               | <input type="checkbox"/> Public Education/Awareness      |
| <input type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> McCabe Creek flood mitigation   |
| <input type="checkbox"/> Installation of Generators                                      | <input type="checkbox"/> San Juan River flood mitigation |
|  | <input type="checkbox"/> Floodprone Property Buyout      |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

5. Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:

**From:** Christina Kraetsch< cKraetsch@archuletacounty.org>  
**Sent:** Monday, May 08, 2017 1:46 PM  
**To:** Allen Roth; Bentley Henderson; Bill Rockensock; Bill Trimarco; Bill Werner; Brad Lattin; Brien Gardner ; Bruce Evans; carl nevitt; Chris Gallegos; Chris Tipton; Dan Keuning; 'David Montoya'; Edward Bulloch; Flora Goheen; Fred Hosselkus; Gabriel Cersonsky; Greg Schulte; James Dickhoff; Jason Webb; Jerry Wills; John Egan; Judy Cole; June Madrid; Justin Cowan; Justin Talbot; Kate Alfred; Kathy Gurule; Kent Grant; Keri Mccune; Kevin Khung; Larry Lynch; Linda Lawrie; Linda Reed; Mary Jo Coulehan; Melveta Smith; Michael Riggs ; Michael Whiting; Mike Alley; Mike Le Roux; Mike Stoll ; Natalie Woodruff; R Saint; Randi Everett; Randy Larson; Renate Widder; Rich Gustafson; Rich Valdez; Rob Goodrich ; Robert Perry; Sandy Gladfelder; Sean O'Donnell; Steve Hentschel; Susan Goebel-Canning; Tanner Hutt; Terry Wetherill; Tonya M Hamilton; Trevor Denney; Whitney Lukas; Will Spears; justin@pawsd.org  
**Cc:** Brislawn, Jeff P  
**Subject:** MAC meeting update- Thursday, May 11th at 13:30

Good afternoon everyone,

Archuleta County is beginning the process of updating its Multi-Hazard Mitigation Plan to meet the requirements of the Disaster Mitigation Act of 2000 (DMA 2000). The primary purpose of the Hazard Mitigation Plan is to reduce or eliminate long-term risk to people and property from natural and human-caused hazards and their effects on the County planning area. The plan is multi-jurisdictional in scope, including the County, Pagosa Springs, Pagosa Area Water and Sanitation District, and the Pagosa Fire Protection District, and will allow the participants to remain eligible for future federal mitigation grant funding and identify mitigation actions that will make them more disaster resilient. The emphasis of DMA 2000 is on creating an ongoing, community-wide planning process that involves the Hazard Mitigation Planning Committee, the public and other key stakeholders. The County is taking the lead on the project in coordination with a Hazard Mitigation Planning Committee (HMPC) comprised of various County departments and other stakeholders. Professional planning assistance is being provided by Amec Foster Wheeler.

As part of the planning process we are reaching out to other agencies, neighboring jurisdictions, and stakeholders to raise awareness of this effort and provide an opportunity for input. Another objective of this outreach is to coordinate with those who may bring additional information to the planning process regarding hazard issues or mitigation efforts within the County. Any information, studies, or related plans or hazard mitigation projects which might inform the plan and supplement the work of the Hazard Mitigation Planning Committee would be welcomed. Additionally we invite your participation at our committee and public meetings throughout the planning process. Let me know if you would like to be added to an email distribution so that you can stay informed of the planning process and upcoming meetings.

A kickoff meeting is set for **May 11th 13:30 – 15:00 at Archuleta County EOC as part of our standing Multi-Agency Coordination group meeting.** The purpose of the meeting is to introduce and outline the process, identify hazards, collect information, plan for stakeholder and public involvement, and answer any questions.



**Christina Kraetsch**

**Archuleta County Sheriff's Office  
Deputy Director of Emergency Ops**

**[Ckraetsch@archuletacounty.org](mailto:Ckraetsch@archuletacounty.org)**

**805-403-0403**

5-11-2017 *ml*

ARCHULETA MAC GROUP

Initial	Name	Agency	Postion / Title	Phone	Miles	Total Hours (incl. travel)	E-MAIL
	Bentley Henderson	Archuleta County					bHenderson@archuletacounty.org
	Bill Rockensock	Pagosa Springs PD	Chief Police	970-264-4151	5		brockensock@pagosasprings.co.gov
	Bill Trimarco	FireWise	ARCHULETA CHAPTER COORDINATOR	970-398-0385	22	2.5	archuletafirewise@gmail.com
	Bill Werner	American Red Cross					bill.werner@redcross.org
	Brad Lattin	Town of Pagosa					blattin@pagosasprings.co.gov
	Brien Gardner	Black Hills Energy					brien.gardner@blackhillscorp.com
	Bruce Evans	Upperpine FPD					bevans@upperpinefpd.org
	Carl Nevitt	Combined Dispatch					cnevitt@archuletacounty.org
	Chris Gallegos	Town of Pagosa					cgallegos@pagosasprings.co.gov
	Chris Tipton	USFS					ctipton@fs.fed.us
	Dan Keuning	County Coroner					dKeuning@archuletacounty.org
	David Montoya	Pagosa Springs FPD					dmontoya@pagosafire.com
	Edward Bulloch	American Red Cross	Volunteer	(505) 325-2918	2/19	6 hr	hedward@bullochgallery.com
	Flora Goheen	Archuleta County					fgoheen@archuletacounty.org
	Fred Hosselkus	Mineral Sheriffs Office					mincosheriff@centurytel.net
	Gabriel Cersonsky	Archuleta County					GCersonsky@archuletacounty.org
	Greg Schulte	Town of Pagosa					gschulte@pagosasprings.co.gov
	James Dickhoff	Town of Pagosa	PLANNING DIRECTOR	970-446-5549	8	15.25 hr	jdickhoff@pagosasprings.co.gov
<i>JW</i>	Jason Webb	EMS	EMO Unit				jason.webb@psmedicalcenter.org
	Jerry Willis	LPEA					jcwills@lpea.coop
	John Egan	Archuleta County					JEgan@archuletacounty.org
	Judy Cole	PSMC					judith.cole@psmedicalcenter.org
	June Madrid	Archuleta County					jmadrid@archuletacounty.org
	Justin Cowan	Archuleta School Dist					jcowan@pagosa.k12.co.us
	Justin Ramsey	PAWSD	District Manager	970-606-5818	3	0.5	justin@pawsd.org
	Justin Talbot	LPEA					jtalbot@lpea.coop
	Kathi Gurule	Southern Ute EM					kgurule@southern-ute.nsn.us
	Kate Alfred	Archuleta County					kalfred@archuletacounty.org
	Kent Grant	Colorado State					kgrant@lamar.colostate.edu
	Keri Mccune	SJBHD					kmccune@sjbhd.org
	Kevin Khung	Pagosa Ranger Dist					kkhung@fs.fed.us
	Larry Lynch	PLPOA					larryl@plpoa.com
	Linda Lawrie	IMG					linda@fortlawrie.com
	Linda Reed	Archuleta School Dist					lreed@pagosa.k12.co.us
	Mary Jo Coulehan	Chamber					director@pagosachamber.com
	Melveta Smith	Archuleta Sheriffs Office					melvetasmith@archuletacounty.org
<i>MR</i>	Michael Riggs	PSMC	EMS, SWRTAC MCI	970-426-2476	8	1.5	michael.riggs@psmedicalcenter.org
	Michael Whiting	Archuleta County					MWhiting@archuletacounty.org
<i>MA</i>	Mike Alley	IMG	SAT - MACE - I MGO J. White	970-749-0260	4	1.5	malley1950@gmail.com
<i>MR</i>	Mike Le Roux	Archuleta Sheriffs Office	Director of Emergency Operations	970-318-0082		1.5	mleroux@archuletacounty.org
	Mike Stoll	Humane Society					hsdirector@humanesociety.biz
<i>W</i>	Natalie Woodruff	Archuleta County	Assessor	970-264-8945	6	1.5	nwoodruff@archuletacounty.org
	R Saint	Centurytel					rksaint@centurytel.net
	Randy Larson	Pagosa FPD	FIRE CHIEF	970-558-0404	3	1.5	rlarson@pagosafire.com
	Renate Widder	American Red Cross					renate.widder2@redcross.org
	Rich Gustafson	BIA					richard.gustafson@bia.gov
<i>RV</i>	Rich Valdez	Archuleta Sheriffs Office	Sheriff	970-747-3051	3	1.5	rvaldez@archuletacounty.org

5-11-2017 *MA*

Signature	Name	Agency	Position / Title	Phone	Miles	Total Hours <small>(incl. travel)</small>	E-MAIL
	Rob Goodrich	Black Hills Energy	<i>Compliance Coordinator</i>	<i>719-469-2213</i>	<i>3</i>	<i>2.0</i>	Robert.Goodrich@blackhillscorp.com
	Robert Perry	Archuleta County	<del>Archuleta County</del>	<i>970-875-2225</i>	<i>5</i>	<i>2</i>	rperry@archuletacounty.org
	Sandy Gladfelter	Arboles					ml.sand@hotmail.com
	Sean O'Donnell	Archuleta School Dist					sodonnell@pagosa.k12.co.us
	Steve Hentschel	Pagosa Ranger Dist	<i>DISTRICT FIRE MGMT. OFFICER</i>	<i>970-799-1196</i>	<i>4</i>	<i>2</i>	shentschel@fs.fed.us
	Susan Goebel-Canning	Archuleta County					sgcanning@archuletacounty.org
	Tanner Hutt	Colorado State					tanner.hutt@state.co.us
	Terry Wetherill	Mineral Sheriffs Office					mincoemc@gmail.com
<i>TL</i>	Tonya M Hamilton	Archuleta Sheriffs Office	<i>undersheriff</i>		<i>603</i>	<i>1.5</i>	THamilton@archuletacounty.org
	Trevor Denney	Colorado State	<i>Regional Field Manager</i>	<i>970-259-1187</i>	<i>65</i>	<i>3</i>	trevor.denney@state.co.us
	Whitney Lukas	SJBHD	<i>EPR Specialist</i>	<i>970-880-2344</i>	<i>60</i>	<i>3</i>	wlukas@sjbhd.org
	Will Spears	KWUF					will@kwuf.com
	<i>GAYLE DIXON</i>	<i>RFD CROSS / EOC</i>	<i>INCUMBENT</i>	<i>806-787-8761</i>	<i>4</i>	<i>2.0</i>	<i>Gayle.Dixon@gnm.com</i>
	<i>KAREN MURPHY</i>	<i>Pagosa Fire</i>	<i>Deputy chief</i>	<i>970-922-4191</i>	<i>3</i>	<i>2.0</i>	<i>Kmurphy@pagosafire.com</i>
	<i>Brooks Brown</i>	<i>PS PD</i>	<i>Captain</i>	<i>749-3646</i>	<i>3.75</i>	<i>2</i>	<i>bbrown@pagosa-spring.co.us</i>
<i>PLAS</i>	<i>Christina Kraetsch</i>	<i>ACSO</i>	<i>E/M</i>			<i>1.5</i>	

*→ my time + miles not eligible*

**Summary of Archuleta County Hazard Mitigation Plan Update  
Kick-Off Meeting Conference Call/Webex and MACs Meeting  
Archuleta County EOC  
May 11, 2017, 1:30 - 2:30pm**

**Opening Remarks and Introductions**

Welcome remarks and a call to order of the Multi-Agency Coordination (MAC) group meeting was done by Mike Le Roux with Archuleta County Emergency Management. Jeff Brislawn, the project manager from Amec Foster Wheeler began the webinar (Skype) presentation and asked how many participated in the 2011-2012 planning process. A few in the group indicated that they had. Present at the EOC were 22 participants, documented on a sign-in sheet. A mix of people representing the County, Town of Pagosa Springs, Pagosa Area Water and Sanitation District, Pagosa Fire Protection District and other stakeholders were present including:

Archuleta County

- Assessor
- Sheriff's Office - Emergency Management
- Sheriff

Town of Pagosa Springs

- Planning Director
- Chief of Police

Pagosa Fire Protection District

- Fire Chief

Pagosa Area Water and Sanitation District

- District Manager

Other stakeholders

- Archuleta FireWise
- Pagosa Springs Medical Center
- Red Cross
- USFS – District Fire Management Officer

**Mitigation, Mitigation Planning, and Disaster Mitigation Act (DMA) Requirements**

A PowerPoint presentation was presented via Skype by Jeff Brislawn. The presentation described importance of mitigation planning and the process thereof, including the 9 step planning process that will be followed to ensure compliance with the DMA 2000. The plan is intended to identify hazards, assets at risk, and ways to reduce impacts through long-term, sustainable mitigation projects. The plan will also maintain eligibility for FEMA mitigation grant funding.

**Objectives and Schedule for Plan Development**

The local government jurisdictions within Archuleta County that participate in the plan will maintain or create eligibility for FEMA mitigation funds. The participating jurisdictions from 2012 included the County, Town of Pagosa Springs, Pagosa Area Water and Sanitation District, Pagosa Fire Protection District. Each will need to fully participate and re-adopt the 2017 plan. This meeting is

the first meeting of a committee formed to provide input to the plan update process. A definition of participation in the planning process was provided that includes:

- Attend and participate in planning meetings/workshops
- Provide available data requested of the County Emergency Management coordinator and Amec Foster Wheeler
- Provide input on local mitigation strategy (actions/projects)
- Advertise and assist with public input process
- Review and comment on plan drafts
- Coordinate formal adoption

It was discussed how each jurisdiction needs to commit to the above elements to receive full credit for participation in the plan.

### **Hazard Mitigation Planning Committee Organization and Roles**

The Hazard Mitigation Planning Committee (HMPC) will include members of appropriate county departments, e.g., Building, Planning, Public Works, Police/Fire/Public Safety, and Emergency Management and include the Town and special districts (fire and water and sanitation).

Goals of the process were discussed that included:

- Thoroughly update the plan per most current FEMA planning guidance
- Revisit and update risk assessment
- Update the mitigation strategies
- Note implementation progress of loss reduction activities

The plan will be developed over the next seven months. There will be two planning workshops. The meetings will occur in July and September. An email group will be developed for the HMPC for sharing information on upcoming meetings. Amec Foster Wheeler will be drafting the updated risk assessment in the next couple of months. A complete draft for internal review is targeted to be complete by late October of 2017, with the FEMA submittal by late December. The final approved plan is anticipated to be ready for adoption by February of 2018, depending on state and FEMA review.

### **Review of Identified Hazards**

A list of natural hazards was discussed, based on the hazards in the 2012 HMP, to start a discussion about what hazards should formally profiled and analyzed in the plan update. Jeff compared the list in the existing plan with hazard profiled in the State Hazard Mitigation Plan. The hazards discussed to be profiled in the plan update included the following:

- Avalanche
- Dam Failure
- Drought
- Earthquake
- Extreme Temperatures
- Flood
- Hailstorm
- High Winds and Tornadoes

- Landslide/Rockfall/Debris Flow
- Land Subsidence
- Lightning
- Pandemic Flu
- Severe Winter Storm
- Volcano
- Wildland Fire
- Wildlife
- Hazardous Materials
- Terrorism

Comments on hazards:

**Flood:** One comment was that since the last plan there was a flood on Horse Gulch three years ago that affected 1<sup>st</sup> St in downtown Pagosa Springs. The concern about post-wildfire flooding and debris flow was also noted.

**HazMat:** Comment: The potential magnitude rating should be changed from 'limited' to 'critical' due to the routes that parallel the San Juan River such as Hwy 160.

Structure fire was noted as an ongoing concern and an event in downtown Pagosa Springs in October of 2016 was noted. Jeff noted that urban fires were part of the wildfire hazard profile and this information will help update the profile. The group agreed the list was comprehensive and did not suggest changes but wanted to ensure that post-wildfire flooding and debris flow was addressed in the update.

### **Planning for Stakeholder and Public Involvement**

The planning team was encouraged to involve the public and stakeholders in the planning process. Possible involvement techniques discussed included:

- Develop an online and hardcopy survey
- Social media or email blasts
- Mentioning the planning efforts and 'piggybacking' at other public forums such as Comprehensive plan meetings, council or commissioner meetings
  - Pagosa Springs noted that it was updating its Comprehensive Plan and that information could be shared at a final public forum in late July.
- Firewise meetings

The group thought that a public survey and 'piggybacking' would get the best results. Jeff will send County OEM a draft survey that can be converted to a web version that can be easily distributed electronically.

### **Coordinating with Other Agencies / Related Planning Efforts / Recent Studies**

A discussion was held on how to coordinate this planning process with other agencies and departments in order to meet one of the DMA planning requirements. The MACs group present represents a broad range of agencies.

A discussion on coordination with other plans/policies and hazard information sources occurred, and the following was suggested by the HMPC. Jeff noted that the updated plan will need to reference other plans that incorporate or reference the mitigation plan

- More subdivision-level CWPPs have been completed and these should reference the HMP
- Pagosa Springs noted that it was updating its Comprehensive Plan and there could be an opportunity to reference the HMP
- The Strategic Plan for the Pagosa Fire Protection District is being updated and could reference the HMP
- The USFS is finalizing a wildfire risk assessment
- A headwaters group was working on a mapping wildfire mitigation projects for the County

### **Information Needs**

Jeff mentioned that if anyone has incident logs or damage assessments, those could be useful, and to email him links to relevant plans/studies/data/hazard events. GIS data collection was already underway in coordination with the County. Jeff also said to look out for upcoming public outreach and stakeholder engagement opportunities and to stay informed of next meetings and planning activities through participation on email list.

### **Next Steps/Next Meeting Timing**

Amec Foster Wheeler HIRA update                      May-July  
HMPC meeting to discuss HIRA and Goals      Late July  
HMPC meeting to update mitigation actions      Late Sept

Jeff will convene with County OEM to identify specific dates. An email will follow with more information on future meetings.

### **Questions and Answers/Adjourn**

The presentation and discussion on the HMP update concluded at 2:30pm.

# County's Multi-Hazard Mitigation Plan to be updated

By Marshall Dunham  
Staff Writer

On Thursday, May 11, multiple agencies in Archuleta County met to discuss updating the county's Multi-Hazard Mitigation Plan.

The meeting was held at the Archuleta County Emergency Operations Center (EOC).

"Archuleta County is beginning the process of updating its Multi-Hazard Mitigation Plan to meet the requirements of the Disaster Mitigation Act of 2000 (DMA 2000).

The primary purpose of the Hazard Mitigation Plan is to reduce or eliminate long-term risk to people and property from natural and human-caused hazards and their effects on the County planning area," reads an email disseminated prior to the meeting by Deputy Director of Emergency Operations Christina Kraetsch. "The plan is multi-jurisdictional in scope, including the County, Pagosa Springs, Pagosa Area Water and Sanitation District, and the Pagosa Fire Protection District, and will allow the participants to remain eligible for future federal mitigation grant funding and identify mitigation actions that will make them more disaster resilient."

The email goes on to explain that Archuleta County is taking the lead on this project by coordinating with a Hazard Mitigation Planning Committee (HMPC) comprising various county departments and other stakeholders.

The email also states that pro-

fessional planning assistance is being provided by Amec Foster Wheeler, and concludes by stating that the purpose of the meeting was to "introduce and outline the process, identify hazards, collect information, plan for stakeholder and public involvement, and answer any questions."

At the meeting, Jeff Brislawm of Amec Foster Wheeler made a presentation via Skype outlining the beginning steps involved with updating the Hazard Mitigation Plan.

Brislawm explained that he had worked on the original plan in 2012, and that he enjoyed working with the different agencies involved at the time.

"We're really talking about what we can do today before the next blizzard or the next wildfire happens that could reduce or mitigate the impacts," explained Brislawm. "This plan is not about what we do when that hazard occurs."

Brislawm then discussed the Disaster Mitigation Act, explaining that the act is what required every local government that wants to continue to get funding from the Federal Emergency Management Agency (FEMA) to have a plan in place.

He explained that, originally, FEMA had a four-step plan for updating a hazard mitigation plan, but that it now has nine steps.

These steps are to:

- Determine the planning area and resources.
- Build the planning team.

- Create an outreach strategy.
- Review community capabilities.
- Conduct a risk assessment.
- Develop a mitigation strategy.
- Keep the plan current.
- Review and adopt the plan.
- Create a safe and resilient community.

Brislawm talked about hazard mitigation, and how certain types of mitigation allow the county to be eligible for FEMA funding.

For wildfires, Brislawm explained that eligibility for FEMA funding can result from reducing hazardous fuels.

For example, removing and thinning vegetation, or vertically clearing tree branches are mitigation techniques that could possibly be funded by FEMA.

For flooding, Brislawm explained that mitigation techniques include things like creating detention ponds and installing bridges and culverts.

Brislawm explained that these mitigation techniques are also techniques that could be funded by FEMA.

Brislawm discussed keeping the plan current, and explained that, once it has been updated, it will be reviewed and adopted at a local level, approved by FEMA and then re-adopted locally.

Brislawm then discussed the duties of the HMPC, as well as what roles Amec Foster Wheeler would play in the hazard mitigation plan update process.

The HMPC will:

- Require representatives from all participating jurisdictions.
- Participate in the planning process.
- Assist with developing or updating the plan's content.
- Tailor the plan to meet specific needs and issues.

Brislawm explained that Amec Foster Wheeler would facilitate the planning process, manage the project and conduct risk assessments as the plan is updated and developed.

Brislawm's presentation then showed a timeline that explained that from now until July, the main goal is to collect data and identify hazards.

In late July, the HMPC will meet for the second time.

The rest of the summer season will primarily be used to develop mitigation goals and objectives and draft a plan, with the HMPC meeting a third time in September.

The draft will be reviewed by the HMPC in October and November, and then will be reviewed by the public and the Department of Homeland Security and Emergency Management in November and December.

At the end of December, the final plan will be reviewed by FEMA.

Brislawm's presentation then turned to identifying the hazards that are prevalent in the county and area.

Hazards that were rated as having "high" significance in the area include droughts, flooding, landslides, lightning, severe winter

storms, wildland fires and hazardous material incidents.

Hazards that were rated as having a "medium" significance include avalanches, dam failures, high winds/tornadoes and the pandemic flu.

The presentation then turned to other plans that the Hazard Mitigation Plan should be linked to, or is already linked to.

These plans include the:

- 2007 Archuleta County Strategic Plan.
- 2011 Pagosa Springs Land Use and Development Code.
- Archuleta County Community Plan.
- 2005 Pagosa Springs Economic Development Plan.
- 2008 Archuleta County Community Wildfire Protection Plan.
- 2009 Archuleta County Community Development Action Plan.
- Archuleta County Emergency Operations Plan.

Brislawm's presentation concluded with the next steps for the planning process, with those steps including sending links of relevant plans, studies, hazards and events, coordinating with internal departments on the planning effort, thinking about upcoming opportunities to get the public and stakeholders involved and stay informed of upcoming meetings and planning opportunities via an email list.

The next HMPC meeting will be held in July, with specifics yet to be decided.

[marshall@pagosasun.com](mailto:marshall@pagosasun.com)



## Survey: Input on hazards and hazard planning solicited

By Mike Le Roux  
Special to The SUN

Archuleta County is updating its Multi-Hazard Mitigation Plan and is soliciting public input through a short survey.

The purpose of this survey is to collect information from the public and stakeholders to better understand hazard vulnerabilities within the county as well as solicit input on needs to best mitigate, or reduce, the impacts of natural and human-caused

hazards.

Please complete this survey via [www.surveymonkey.com/r/ArchuletaHMP](http://www.surveymonkey.com/r/ArchuletaHMP) by July 15.

The Multi-Hazard Mitigation Plan is multi-jurisdictional in scope, including the county, town, Pagosa Area Water and San-

itation District and the Pagosa Fire Protection District. The plan will allow the participants to remain eligible for future federal mitigation grant funding and identify mitigation actions that will make them more resilient in disasters.

From: Mike Le Roux <mleroux@archuletacounty.org>  
Sent: Friday, June 09, 2017 4:49 PM  
To: Brislawn, Jeff P  
Subject: FW: Pagosa Lakes Weekly Update

Jeff,

Just confirming that the survey was emailed out to the PLPOA email list this afternoon. Hits about 2,000 owners.

We did Facebook it, Sent to the MAC Group via email and requested that it be passed on through their channels. I will also forward you the SUN Flashes which is our newspaper's online blast.

Mike

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From: Pagosa Lakes Property Owners Association [mailto:Messenger@AssociationVoice.com]  
Sent: Friday, June 09, 2017 4:45 PM  
To: Mike Le Roux <mleroux@archuletacounty.org>  
Subject: Pagosa Lakes Weekly Update



[Full View](#)

# The second floor at the Recreation Center is now OPEN!



The second floor at the

Recreation Center is now OPEN! Come by and enjoy the space and the view. We will have our new functional trainer in a few weeks but for now you can stretch, work with bands, balls and bosu, and spin! We would love to see you.

# Candidate FORUM - JUNE 22, 2017

## 6pm

Click the image for a detail view.

### Pagosa Lakes POA

BOD incumbents & Candidates



Bill M. Invernizzi (Incumbent), Director, PLPOA BOD, Director Manager of Pagosa Springs Golf Course, CEO/President of Western Project Engineers & Consultants, 4000 S. Durango, CO 81429, USA. A member of the Board of Directors since 2011. He has been a successful businessman throughout his professional career and serves as trustee for community. He has a wife and two children. He is a member of the Board of Directors of Pagosa Springs, CO, a professional, business leader, and a great community member.



Steve Jones (Incumbent), Director, PLPOA BOD, Director Manager - Home Landscaping, Delgado to state assembly 2012, World Tennis, Inc., League Coach. Steve is a professional and a great community member. He has been a successful businessman throughout his professional career and serves as trustee for community. He has a wife and two children. He is a member of the Board of Directors of Pagosa Springs, CO, a professional, business leader, and a great community member.



Marilyn Invernizzi (Incumbent), PLPOA BOD, Senior Board Chair member, Gary Winters, member, Incumbent Board member. Marilyn has 40 years of professional and professional experience in the planning, management and implementation of public, regulatory, business, and other. She is a successful businessman throughout her professional career and serves as trustee for community. She has a husband and two children. She is a member of the Board of Directors of Pagosa Springs, CO, a professional, business leader, and a great community member.



Steve Jones (Incumbent), Director, PLPOA BOD, Director Manager - Home Landscaping, Delgado to state assembly 2012, World Tennis, Inc., League Coach. Steve is a professional and a great community member. He has been a successful businessman throughout his professional career and serves as trustee for community. He has a wife and two children. He is a member of the Board of Directors of Pagosa Springs, CO, a professional, business leader, and a great community member.



Dan Van Linn (Incumbent), President, PLPOA BOD, Director Manager and the town of Pagosa Springs building systems committee, and the Incumbent county building advisory committee. Dan has been an active member of the PLPOA BOD since 2011 and served on the Board of Directors of Pagosa Springs, CO. He is a professional and a great community member. He has a wife and two children. He is a member of the Board of Directors of Pagosa Springs, CO, a professional, business leader, and a great community member.



Steve Jones (Incumbent), Director, PLPOA BOD, Director Manager - Home Landscaping, Delgado to state assembly 2012, World Tennis, Inc., League Coach. Steve is a professional and a great community member. He has been a successful businessman throughout his professional career and serves as trustee for community. He has a wife and two children. He is a member of the Board of Directors of Pagosa Springs, CO, a professional, business leader, and a great community member.



David Smith (Candidate), Board Member, PLPOA BOD, Director Manager and the town of Pagosa Springs. David has been an active member of the PLPOA BOD since 2011 and served on the Board of Directors of Pagosa Springs, CO. He is a professional and a great community member. He has a wife and two children. He is a member of the Board of Directors of Pagosa Springs, CO, a professional, business leader, and a great community member.



Steve Jones (Incumbent), Director, PLPOA BOD, Director Manager - Home Landscaping, Delgado to state assembly 2012, World Tennis, Inc., League Coach. Steve is a professional and a great community member. He has been a successful businessman throughout his professional career and serves as trustee for community. He has a wife and two children. He is a member of the Board of Directors of Pagosa Springs, CO, a professional, business leader, and a great community member.

**JOIN US**  
Thursday  
June 22, 2017  
6:00 - 7:30 PM

**PAGOSA LAKES PROPERTY OWNERS ASSOCIATION BOD**  
**CANDIDATE FORUM**  
Pagosa Lakes Clubhouse - 230 Port Avenue, Pagosa Springs, Colorado 81417

# 5 Days of Fun

Click the image for details.

**5 DAYS OF FUN!**  
FOR AGES 5-12!

**WOOHOO!**

BIBLE LESSONS  
MEMORY VERSES  
SONGS

WHAT HAPPENS AT A 5-DAY CLUB?

FUN ACTIVITIES  
PRIZES  
GREAT GAMES

**NOTE TO PARENTS:**  
Your child is invited to attend a fun club for boys and girls ages 5 to 12! 5-Day Club® meets for 90 minutes every day for five days. Clubs are sponsored by Child Evangelism Fellowship®, a Bible-centered ministry serving in every region of the world. All teachers and helpers have been trained and screened to ensure your child's protection. Parents are welcome to attend.

**FREE!**

When: June 19-23  
Time: 2:30-4:00 pm  
Where: Playground/park on Prospect Blvd.  
Contact: Frank & Connie 303-901-5290

CEF  
Child Evangelism Fellowship

To see an actual 5-Day Club® visit [5dayclub.com](http://5dayclub.com)

## Input on hazards and hazard planning solicited

Archuleta County is updating its Multi-Hazard Mitigation Plan and is soliciting public input with a short survey. The purpose of this survey is to collect information from the public and stakeholders to better understand hazard vulnerabilities within the County as well as solicit input on needs to best mitigate, or reduce, the impacts of natural and human-caused hazards. Please complete this survey via the link below by July 15, 2017.

<https://www.surveymonkey.com/r/ArchuletaHMP>

[More](#) ▶

## Kids Fishing Derby Coming Soon

We have scheduled the Annual Kids Fishing Derby for Saturday, June 17th at Lake Forest. The Derby will begin at around 9:00 a.m. and run until noon. The location will be the Lake

Forest boat ramp and ...

[More](#) ▶

## Unoccupied Lot Maintenance

Unoccupied lots within the Pagosa Lakes Community are required to be maintained in such a manner as to prevent their becoming unsightly. Unsightly refers to dead trees and accumulative brush and debris ...

[More](#) ▶

## FREE Informational Course by local Chiropractor, Matt Monroe

Join Matt, of Monroe Chiropractic, for an hour starting at 5:20pm, Tuesday nights, in the Pagosa Lakes Clubhouse. The first class is Tuesday May 30th, the four week course will teach you how to address trigger points to release head, neck, and back pain at home.

Please bring a mat, towel, or blanket. It is ideal to attend the course with a partner, but not mandatory.

## Summer Kids Activities

For information and to register for some great summer programs visit our lifestyle website by [Clicking HERE.](#)

## Red Cross looking to revamp in Archuleta County

Interested in more information? Click on the links below.

[Southwest Colorado Brochure](#)

[Archuleta County Brochure](#)

# Springtime Lawn Care

In extremely cold winters with sub-zero temperatures and record snowfalls, parts of your lawn, especially in low-lying areas, can be dead on arrival in spring. Snow can insulate your lawn from extremely ...

[More](#) ▶

# Springtime Mowing

With the abundant moisture we received this winter and spring, grasses are growing quickly. As part of our regular neighborhood inspections, we will be making note of yards that are not being maintained ...

[More](#) ▶

# Permit Needed to Change the Surface Material of your Driveway

Every year we have Asphalt Contractors drive through neighborhoods and go door to door asking homeowners if they would like their driveways asphalted. Some will tell you that you do not need a permit. ...

[More](#) ▶

# Classifieds



# Screening Propane Tanks

Our Declaration of Restrictions states that: "Every tank for the storage of fuel installed outside any building in the Subdivision shall be either buried below the surface of the ground or screened to ...

[More](#) ▶

# Protecting our Homes & Neighborhoods from Wildfires

The Pagosa Lakes sponsored a presentation by Bill Trimarco from Archuleta Firewise last Saturday on creating defensible space around your homes to help protect them from wildfires. We had 5 presenters ...

[More](#) ▶

# Rain Barrel Water Collection

PLPOA BOARD APPROVES RESOLUTION TO REGULATE RAIN BARRELS Recently, the state of Colorado passed a bill lifting restrictions for the collection of rainwater. Residents of Colorado are now lawfully allowed ...

[More](#) ▶

# LIVING WITH BEARS

Spring is here and bears are becoming active. Surrounded by National Forest, we must learn to live with the wildlife who share this area as their home. Make sure you don't contribute to resident bears ...

[More](#) ▶

# 19th hole Concert series



Click the image for a full view.

**19<sup>th</sup> Hole Concerts at The Pagosa Springs Golf Club**  
Thursday Evenings, June 15 through July 20, 2017  
5:30 to 7:30 pm

Six Archuleta County nonprofits have been selected to benefit from the 19<sup>th</sup> Hole Concerts at The Pagosa Springs Golf Club. The 19<sup>th</sup> Hole Concerts pairs a nonprofit with a local music talent on Thursday evenings, 5:30 to 7:30 pm, June 15 through July 20, to offer a fun evening of entertainment. Food from the grill and signature cocktails will be available for purchase; no outside food or beverage is allowed. Concert goers should bring a camp chair or blanket. We ask that dogs be left at home. The 2017 19<sup>th</sup> Hole Concert Schedule is available below.

The cover charge is a \$10 donation which supports the six nonprofits selected for the 2017 concert series. At the end of the series, all proceeds are pooled and will be distributed equally to the six featured organizations.

In 2016, the 19<sup>th</sup> Hole Concerts' inaugural year, \$750 was awarded to each of that year's six organizations. This year, the Archuleta Committee of the Community Foundation anticipates seeing attendance increase and aims to raise \$1,000 for each nonprofit. The nonprofits will collaborate to promote and generate attendance at each concert through a variety of marketing tasks.

Please join us for a wonderful evening that will help benefit the nonprofit community of Archuleta County.

**2017 19<sup>th</sup> Hole Concert Schedule:**

	<b>Nonprofit</b>	<b>Band</b>
June 15	Rise Above Violence	Brooks-I Band
June 22	Justice Ministries	The San Juan Mountain Boys
June 29	Pagosa Nordic Club	Jack Ellis
July 6	Audubon Rockies	Songs of the Fall
July 13	Loaves and Fishes of Archuleta County	Rob Heminger
July 20	Veterans for Veterans	Eric from Philly

Hosted by the Community Foundation of Southwest Colorado  
Event sponsors: Tito's Handmade Vodka, Galles Properties, First Southwest Bank

Loaves and Fishes of Archuleta County, Colorado • P. O. Box 1001 • Pagosa Springs, Colorado 81427  
(970) 521-7400 Fax: (970) 521-7401

[More](#) »

## SKUNKS AND FOXES

It's summertime and skunks and foxes are active. Surrounded by National Forest, we must learn to live with the wildlife who share this area as their home. Many people do not understand the habits of these ...

[More](#) »

## SPLISH SPLASH the fish are in the lakes!!!

Good news, the fish are HERE! We have an assortment of 12-16 rainbow trout, around 6000 pounds, spread between the four lakes. These are primarily fish out of the Monte Vista hatchery and have always ...

[More](#) »

## Would You Like to be on our Service



# Provider List?

The Pagosa Lakes provides owners and residents with a Service Provider List upon request. If you are a contractor, landscaper, handyman, dog walker, will do snow removal, painting, yard work, or provide some other service and would like more work, this is a great tool to get more jobs. If you are interested in being included on this list, please contact our office at (970)731-5635 ext 214. Hurry to be included in our updated list which we will be completing in May...just in time for spring and summer projects.

# How to Dispose of...

In addition to all of our Earthday celebrations and services we will be providing over the weekend of April 22 and 23, we wanted to share with you more information for proper disposal of all types of items. This information is always available on our website under “Living in PLPOA...MORE Helpful BULLETINS, FLYERS & BROCHURES”. To see this information now... [CLICK HERE](#)

# Community Calendars

[PLPOA Clubhouse Classes](#)

[PLPOA Community Events](#)

[Pagosa Lakes Rec Center Classes](#)

[Chamber of Commerce Community Calendar](#)

[Pagosa Mountain Sports Events Calendar](#)

[Ruby Sisson Library Calendar](#)

[Town of Pagosa Springs Community Center](#)

[Pagosa Sun Event Calendar](#)

[pagosa.com Events Calendar](#)

[KWUF Events and Live Broadcast Calendar](#)

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This message has been sent to [mieroux@archuletacounty.org](mailto:mieroux@archuletacounty.org)

As a subscriber of General Correspondence at Pagosa Lakes Property Owners Association, we'll periodically send you an email to help keep you informed. If you wish to discontinue receiving these types of emails, you may opt out by clicking [Safe Unsubscribe](#).

To view our privacy policy, click [Privacy Policy](#).

This message has been sent as a service of [AssociationVoice](#), provider of smart Websites for Associations and Management, 400 S. Colorado Blvd. Ste 790, Denver, CO 80246. AssociationVoice © 2017. All rights reserved.

From: Mike Le Roux <mleroux@archuletacounty.org>  
Sent: Friday, June 09, 2017 4:49 PM  
To: Brislawn, Jeff P  
Subject: FW: SUN flashes - Fire update

Jeff,

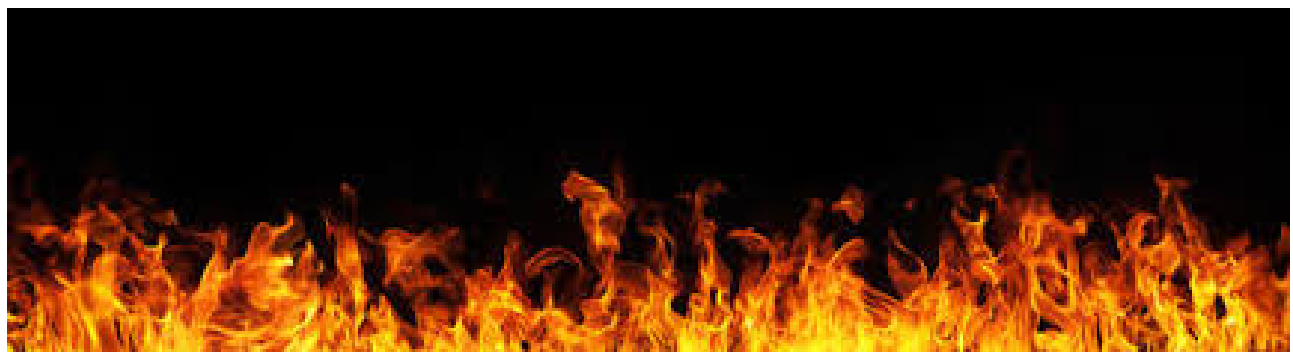
Sun Flashes – Survey link included

Mike

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From: The Pagosa Springs SUN [mailto:editor=pagosasun.com@mail47.us4.mcsv.net] On Behalf Of The Pagosa Springs SUN  
Sent: Thursday, June 08, 2017 9:26 PM  
To: Mike Le Roux <mleroux@archuletacounty.org>  
Subject: SUN flashes - Fire update

[View this email in your browser](#)



## San Juan Hot Shots monitor Chris Mountain Fire

A 20-member crew of San Juan Hot Shots out of Durango are monitoring a 5.7-acre fire on Chris Mountain tonight, according to Archuleta County Sheriff's Office Director of Emergency Operations Mike Le Roux.

The fire is located on federal land. Archuleta County fire crews provided mutual aid to

Pagosa Ranger District along with the San Juan Hot Shots. A helicopter also assisted by dropping water on the fire.

There is fire line around perimeter, but the fire still active, Le Roux said. This evening's cooling temperatures are expected to aid with conditions.



The weekend of June 9-11 is anticipated to be one of the busier weekends of the year, including the 12th annual Pagosa Folk 'N Bluegrass festival, the 32nd annual Denver Post Ride the Rockies bicycle tour and the ninth annual Car Show in Pagosa.

[Subscribe and read more here.](#)

## Input on hazards and hazard planning solicited

By Archuleta County Sheriff's Office Director of Emergency Operations Mike Le Roux

Archuleta County is updating its Multi-Hazard Mitigation Plan and is soliciting public input with a short survey. The purpose of this survey is to collect information from the public and stakeholders to better understand hazard vulnerabilities within the county as well as solicit input on needs to best mitigate, or reduce, the impacts of natural and human-caused hazards.

Please complete this survey via the link below by July 15, 2017.

<https://www.surveymonkey.com/r/ArchuletaHMP>

# Community Calendar June

Friday, June 9

Pickleball. 8 a.m.-noon, Community Center. Loaner paddles are available if you don't have one.

Pagosa Stitching Group. 9:30-11:30 a.m., second floor of the Pruitt building, Pagosa Springs Medical Center. Bring your stitching project and enjoy coffee and camaraderie. All stitchers are welcome.

Tai Chi. 11 a.m.-noon, Community Center. This is a slow, gentle exercise that improves balance, strength, flexibility and lung capacity while reducing stress and increasing an overall sense of well-being.

Zumba. Noon-1 p.m., Community Center. Open to all abilities and ages.

Mexican Train. 1 p.m., Senior Center.

Movie. 2-3:30 p.m., Sisson Library. A chieftain's daughter missions to save her people, leading to an action-packed adventure, encountering monsters and impossible odds. For all ages. Call 264-2209 for more information.

Pagosa Folk 'N Bluegrass. 4:30 p.m.-midnight, Reservoir Hill. We



## Bike planters: Scavenger hunt begins Friday

As a part of this summer's beautification efforts, the Tourism Board is launching a scavenger hunt in conjunction with the 30 new bike planters adopted by businesses and nonprofits throughout the community. The scavenger hunt kicks off Friday at noon. Brochures can be found at locations where you see a bike planter. Participants will need to locate the bikes to solve a puzzle. Scavenger hunt participants will bring their completed puzzles to the Visitor Center to spin a prize wheel.

have another terrific musical lineup in store for this year. Main Stage: 4:30 p.m., The Heartstring Hunters. 5:45 p.m., Luke Bulla Trio. 7 p.m., The Last Revel. 8:30 p.m., The Lil' Smokies. Kids Tent: 3 p.m., instrument petting zoo. 4 p.m., Andy the Juggler. Late-night stage: 10 p.m., Molly Tuttle. 11 p.m., The Last Revel. For tickets and information, go to [www.folkwest.com](http://www.folkwest.com) or call (877) 472-4672.

The Car Show in Pagosa: Party in the Park. 5 p.m., Town Park. The Retro Cats will keep the crowd entertained as the cars gather to give the public their first glimpse into the car artistry that will be on display over the weekend. There will be food and a beer and wine garden available.

Personal Growth and Empowerment Life Coaching Class. 5-6 p.m., Community Center. Geared toward providing individuals with tools to find the inner power to make changes within — healing and understanding the core reason for our actions, thoughts and desires. This class is open to everyone.

Chimney Rock Full Moon Program. 8 p.m., Chimney Rock National Monument. Steven Lekson, Ph.D., will be our special guest speaker for the program. At this special program, visitors will hear Native American flute music by Charles Martinez and experience the moon rising from the ridge where the Puebloan Great House is located. This program is not recommended for children under



## Fourth of July Parade applications available

By John Duvall

Special to The SUN

It's not too early to complete an application to participate in this year's Fourth of July parade. Organizations, families and individuals are welcome and are urged to apply now.

Having a family reunion? Why not walk, march or ride in this year's parade? And, what could be more American than you and your Harley buddies firing up those Hogs and kicking up the pulse rate of the 5,000 parade onlookers as you roar down the parade route? What about you Corvette guys? You're not going to sit this one out, are you? Boy Scouts, Girl Scouts, animal lovers and champion skiers — everyone's welcome to make this a great parade. Got a classic car you're proud of? Let's see it in the parade. How about your neighborhood ATV or canoe groups? Show us your spirit and your smiles.

There is no fee to participate. Just get an application, fill it out and drop it off. Once

the age of 8. There is a \$15 fee for attending or \$20 to attend the Full Moon Program with an early tour. Guests who plan to attend the early tour should check in at the Visitor Cabin by 6 p.m. Guests who attend the Full Program only, please check in at the Visitor Cabin by 6:45 p.m. For more information and tickets, go to [www.chimneyrockco.org](http://www.chimneyrockco.org).

Saturday, June 10

Hunter Education Internet Conclusion Class. 8 a.m.-2 p.m., Community Center. This Internet Conclusion Class will be open to all.

Students taking the conclusion class must complete an approved online course and bring proof of completion on June 10. For more information, contact Don Volger at 264-2197.

The Car Show in Pagosa: Show and Shine. 9 a.m., Town Park. The whole park area will be filled with stunning cars, motorcycles and display, retail and food booths. Come out and enjoy looking at all the collectable cars, taste some delicious food and a beverage. Car Show participants and spectators can vote for their favorite car.

Baby Storytime. 9:05-9:25 a.m., Sisson Library. Twenty minutes of stories, songs and fingerplays for you and your little one. Learn easy tips on how to include literacy skills in everyday family life. Call 264-2209 for more information.

Toddler Storytime. 9:30-10 a.m., Sisson Library. A half hour of stories, songs and fingerplays for

your application has been filled out and turned in, you'll be contacted with all the information you need to be an important part of Pagosa's Fourth of July parade.

[Download an application here](#)



## Pagosa roads and trails damage update

By Ann Bond

While all of the seasonally closed National Forest roads on the Pagosa Ranger District are now open to motorized travel, some roads sustained considerable damage during the winter, and access may be limited.

Price Lakes Road (#731) is impassable at 4.7 miles due to a major failure, which will require reconstruction. It is uncertain at this time when the reconstruction will occur; until it is completed, motorized access to the Navajo Peak Trailhead will not be possible.

The Mosca Road (#631) also experienced failures in some sections, but is currently

you and your little one. Learn easy tips on how to include literacy skills in everyday family life. Call 264-2209 for more information.

Meditation and Recorded Dharma Talk. 10 a.m., Unitarian Universal Fellowship, Suite 15-B, 70 Greenbriar Drive. All are welcome.

Pagosa Piecemakers Quilt Guild. 10 a.m., CrossRoad Christian Fellowship, 1044 Park Ave. We welcome our seasonal members back and are planning a busy summer of programs and fun meetings. Whether you're new or a returning alumnae, come greet the season with fellowship, friendship and refreshments. Enjoy show and tell with beautiful quilts and idea sharing among creative people.

Zumba. 10-11 a.m., Community Center. Open to all abilities and ages.

Yoga: Laugh and Let Go. 10-11:30 a.m., Community Center. This class explores the ancient technique of chi self-massage followed by a lighter yoga asana practice. Call 264-4152 for more information.

Navajo State Park Activities: Beginning Archery Class. 10 a.m.-noon, Navajo State Park. Beginning archery class for kids ages 6 and up. Meet at the amphitheater. These programs are free with the purchase of a \$7 daily pass per vehicle. All materials and gear will be provided. Call 883-2208 for more information.

passable to high-clearance passenger vehicles. The damage to other Pagosa District roads is less extensive, but users may encounter rougher than normal conditions, impassable river crossings, and narrowing of sections until maintenance and repairs can be performed.

Additionally, due to a landslide, the Horse Creek ATV trail (#690) is impassable approximately four miles from its terminus at the West Monument Road (#630). Crews hope to have the landslide cleared in the next several weeks.

Please contact the Pagosa Ranger District office at (970) 264-2268 for the latest road and trail condition updates.



Archuleta County Sheriff's Office: Public Walk-Through Event. 11 a.m.-3 p.m., 449 San Juan St. Guided tour of the county courts, offices and the jail facilities will start every half hour. Parking and start of the tours will be behind the county facilities. For anyone interested in the future of Archuleta County's court and jail facilities.

LEGO Club. 11 a.m.-noon, Sisson Library. All you need to bring is your imagination, we have the LEGOs. For ages 5-12. Call 264-2209 for more information.

Pagosa Folk 'N Bluegrass. 11:30 a.m.-12 p.m., Reservoir Hill. We have another terrific musical lineup in store for this year. Main Stage: 11:30 a.m., Phoebe Hunt and The Gatherers. 1 p.m., Western Centuries. 2:30 p.m., Molly Tuttle. 4 p.m., The Stash! Band. 5:30 p.m., The Lil' Smokies. 7 p.m., The O'Connor Band featuring Mark O'Connor. Workshop Tent: Noon, guitar workshop with Molly Tuttle, Stash Wyslouch and Joe Smart. 1 p.m., Canadian trad music with Ten Strings and a Goat Skin. 2 p.m., fiddle workshop with Mark O'Connor, Maggie O'Connor, Phoebe Hunt and Luke Bulla. 3 p.m., mandolin workshop with Dominick Leslie and Forrest O'Connor. Kids Tent: 10 a.m., T-shirt giveaway to first 150 kids 12 and under. Fabric markers and paint provided to create a one-of-a-kind festival momento. 10 a.m.-3 p.m., Upcycled Arts and Crafts and Face Painting. Noon, juggling

workshop (all ages). 2 p.m., Andy the Juggler. Late-night Stage: 9 p.m., Ten Strings and a Goat Skin. 10 p.m., The Stash! Band. For tickets and information, go to [www.folkwest.com](http://www.folkwest.com) or call (877) 472-4672.

### Sunday, June 11

Navajo State Park Activities: Learn About Butterflies. 9:30 a.m., Navajo State Park. Learn about a butterfly's life cycle while making fun crafts. All ages are welcome to attend. Meet at the pavilion next to the Visitor Center. These programs are free with the purchase of a \$7 daily pass per vehicle. All materials and gear will be provided. Call 883-2208 for more information.

Pagosa Folk 'N Bluegrass. 11 a.m.-8 p.m., Reservoir Hill. We have another terrific musical lineup in store for this year. Main Stage: 11 a.m., Moors and McCumber. 12:15 p.m., The Barefoot Movement. 1:30 p.m., Luke Bulla Trio. 3 p.m., Ten Strings and a Goat Skin. 4:30 p.m., The Dustbowl Revival. 6 p.m., Loudon Wainwright III. Workshop Tent: Noon, guitar setup workshop with Eric Richard Stone. 1 p.m., songwriting workshop with Moors and McCumber. 2 p.m., bluegrass arranging with The Barefoot Movement. Kids Tent: 10 a.m.-3 p.m., Upcycled Arts and Crafts and Face Painting. 11 a.m.-2 p.m., Ruby Balloon (balloon artist). 2 p.m., Andy the Juggler. For tickets and information, go to [www.folkwest.com](http://www.folkwest.com) or call (877) 472-4672.

Denver Post Ride the Rockies Bicycle Tour: Party in the Park. 2 p.m., Yamaguchi Park. Food vendors, retail vendors, a beer and wine garden and, of course, lots of live music. The musical lineup begins with the Retro Cats, then Songs of the Fall will perform.

Sunday Night Unplugged. 5 p.m., St. Patrick's Episcopal Church, 225 S. Pagosa Blvd. A trio of artists that includes Heidi Tanner, Jean Broderick and Jean Smith will serenade those in attendance. As always, the evening will be a time of quiet meditation punctuated by soothing music, thoughtful readings, prayers and silence.

Bingo. 5:45 p.m., Parish Hall. Doors open at 5 p.m., early-bird bingo at 5:45 p.m., bingo from 6-8 p.m. Concessions and cash prizes. No outside food or drink.

[Read more ...](#)



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From: Mike Le Roux <mleroux@archuletacounty.org>  
Sent: Monday, July 24, 2017 11:42 AM  
To: Kathi Gurule; Rich Valdez; James Dickoff; Black Hills Energy; Tonya M Hamilton; Bentley Henderson; Justin Ramsey; Randy Larson; 'Denney - CDPS, Trevor'; Steve Hentschel; Jerry Wills; Brislawn, Jeff P; Jerry Gray; Terry Wetherill; Gavelda - CDPS, Patricia; John Shepard; Thompson - CDPS, Mark; Susan Goebel-Canning; Samuel Montoia; Christina Kraetsch; Greg Schulte (gschulte@pagosasprings.co.gov); Karn Macht  
Subject: Archuleta County Hazard Mitigation Planning Committee Meeting agenda and reminder  
Attachments: Archuleta County Risk and Goals Meeting Agenda.docx; Mitigation Goals WorksheetArchuleta2017.doc; Summary of Archuleta HMP 2017 Kickoff Meeting.docx

Good morning all,

This is a reminder for the meeting on Thursday 27<sup>th</sup> July at 13:00 at the EOC. I have attached a meeting agenda, kick-off meeting summary, and goals update worksheet. We will discuss the hazards and vulnerability assessment in more detail, and revisit the goals from the 2012 plan (see attached handout).

Your participation and input is critical to the development and update of the new plan. We hope to see as many of you there as possible, and look forward to the discussion.

Regards

Mike Le Roux  
Archuleta County Sheriff's Office  
Director of Emergency Operations  
Email: [mleroux@archuletacounty.org](mailto:mleroux@archuletacounty.org)  
Ph: 970-731-4799  
Cell: 970-398-0612

# ARCHULETA COUNTY MULTI-HAZARD MITIGATION PLAN

## 2017 UPDATE

### Updating the Mitigation Strategy

#### Goals, Objectives, and Actions

Goals, objectives, and mitigation actions should be based on the information revealed in the Risk Assessment. Definitions and actions are provided below:

**Goals** are general guidelines that explain what you want to achieve. Goals are defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. They are usually broad policy-type statements, long term, and represent global visions, such as:

- Reduce exposure to hazard related losses
- Minimize the risk from natural disasters to existing facilities and proposed development.
- Reduce the impact of natural hazards to the citizens of the county.
- Provide protection for natural resources from hazard impacts
- Maintain and enhance existing mitigation measures.
- Increase public awareness of vulnerability to hazards and support and demand for hazard mitigation

**Objectives** define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and measurable, such as:

- Maintain the flood mitigation programs to provide 100-year flood protection
- Protect critical facilities to the 500 year flood
- Educate citizens about wildfire defensible space actions.
- Prepare plans and identify resources to facilitate reestablishing operations after a disaster.

**Mitigation Actions** are specific actions that help you achieve your goals and objectives. Some examples include:

- Elevate three historic structures located in the downtown district
- Sponsor a community fair to promote wildfire defensible space
- Retrofit the police department to withstand flood damage

The goals and objectives from the Archuleta County Hazard Mitigation Plan 2012 are shown on the next page. The 2017 plan update presents an opportunity to review the goals and modify if desired. Use this handout to verify that they are still appropriate or suggest modifications to the planning committee and Amec Foster Wheeler (Jeff.brislawn@amecfw.com).

# **Archuleta County Hazard Mitigation Plan 2012 Goals**

**Goal 1: Increase awareness of hazards that affect the Archuleta Response Area**

**Goal 2: Reduce impacts of hazards on life, property, and the environment**

Objective 2.1- Continue to reduce wildfire risk in subdivision and forest areas

Objective 2.2- Protect existing property to the extent possible

Objective 2.3- Continue to develop and improve detection and warning systems

Objective 2.4- Ensure access to county roads for fire and utilities equipment

Objective 2.5- Community fire mitigation and CWPP development

Objective 2.6- Reduce impacts to new development

Objective 2.7- Continue to reduce flood losses through compliance with National Flood Insurance Program requirements

**Goal 3: Protect critical facilities and infrastructure from hazard impacts**

**Goal 4: Strengthen and develop partnerships in regards to mitigating hazard impacts**

Objective 4.1- Promote coordination between counties, states, federal agencies, tribes, special districts, non-governmental organizations, and the private sector.

## Other Related Plan Goals

It is also important to integrate the mitigation strategy with other existing goals to ensure consistency, efficiency, and effectiveness, which is also useful in identifying funding opportunities.

### **State of Colorado Multi-Hazard Mitigation Plan, 2013 Goals and Objectives**

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1. Reduce the loss of life and personal injuries from natural hazard events.
  - Strengthen risk communication tools and procedures
  - Strengthen continuity of operations at the state, regional, tribal, and local levels of government to ensure the delivery of essential services
  - Strengthen cross-sector connections
  - Identify specific areas at risk to natural hazards and zones of vulnerability
  - Continue to develop and expand public awareness and information programs
  - Develop projects focused on preventing loss of life and injuries from natural hazards
2. Reduce damage to local government assets.
  - Assist local government officials with non-construction activities
  - Assist local government officials with construction activities
  - Improve local government monitoring and decision-making tools
3. Reduce damage to state government assets.
  - Continue to identify and prioritize state critical, essential, and necessary assets
  - Develop projects to protect state critical, essential, and necessary assets in natural hazard risk areas
  - Improve state government monitoring and decision-making tools
4. Reduce state and local costs of disaster response and recovery.
  - Strengthen connections between hazard mitigation activities and preparedness, response, and recovery activities
  - Improve coordination of state government resources with local and tribal government and private nonprofit resources
5. Minimize damages to personal property.
  - Distribute information on and promote involvement in existing programs
  - Continue to partner with local and tribal governments to develop projects and initiatives to protect personal property
6. Minimize economic losses.
  - Reduce service interruptions and revenue losses to the state
  - Reduce down time and revenue losses for local and tribal governments and private nonprofit organizations



## Archuleta County Community Plan (2011)

<b>Environment and Natural Resources</b>
<b>Policy 1:</b> Design and locate new development to avoid or minimize damage and disruption to wildlife habitat and avoid or minimize damage to other environmentally sensitive areas.
<b>Policy 2:</b> Water districts should provide incentives for water conservation, for residential and commercial uses.
<b>Policy 3:</b> Protect adjudicated water rights pursuant to Colorado State law, including the use of riparian areas for livestock.
<b>Policy 4:</b> New development is encouraged to use landscaping practices that conserve water and enhance the appearance of the built environment.
<b>Land Use and Growth Management</b>
<b>Policy 11:</b> The County should take an active role, while continuing to cooperate with organizations that pursue acquisition or donation of conservation easements/development rights.
<b>Community Services, Activities, and Facilities</b>
<b>Policy 4:</b> Maintain the necessary level of public facilities and services (including police/sheriff patrols, fire protection, emergency medical services, health care services, schools, and recreation facilities) to adequately serve the population.
<b>Policy 8:</b> Archuleta County and the Town of Pagosa Springs are committed to fostering cooperation between local, state, federal, and tribal government entities, including but not limited to Hinsdale, La Plata, and Mineral Counties, the State of Colorado and New Mexico, the U.S. Forest Service, and the Southern Ute Indian tribe.
<b>Transportation</b>
<b>Policy 2:</b> A long-range plan for road maintenance and snow removal is required for each new development.

## Archuleta County Community Wildfire Protection Plan, 2008

<b>Goal: Reduce risk of destructive wildland fire in the wildland-urban interface (WUI).</b>
<b>Strategy 1:</b> Utilize community base map to display identified threat areas
<b>Strategy 2:</b> Continue adding layers to base map to assist in emergency management and development planning.
<b>Strategy 3:</b> Build capacity of Firewise Council of Southwest Colorado's Neighborhood Ambassador Program.
<b>Strategy 4:</b> Initiate fire mitigation projects based on community base map and <i>San Juan Public Lands Fire Year Action Plan</i> .
<b>Strategy 5:</b> Support and advertise private contractors who carry out Firewise mitigation projects for homeowners.
<b>Strategy 6:</b> Encourage business development that utilizes biomass byproducts of mitigation activities.
<b>Strategy 7:</b> Assist Property Owners Associations in developing wildland fire protection plans in at-risk subdivisions.
<b>Goal: Increase the number of fuel reduction projects on San Juan Public Lands in the WUI and other priority areas</b>
<b>Strategy 1:</b> Collaborate with San Juan Public Lands in identifying wildland fire mitigation projects
<b>Strategy 2:</b> Continue to build, create, and strengthen partnerships with federal, state and local governments and
<b>Strategy 3:</b> Encourage continued development of private small diameter wood products processing businesses
<b>Goal: Work with ranches and rural landowners to promote health watersheds, forest and range ecosystems along with wildland fire mitigation</b>
<b>Strategy 1:</b> Support efforts by private landowners and federal land managers to implement stewardship projects that are beneficial to both parties and the ecosystem as a whole.
<b>Strategy 2:</b> Landowners, fire professionals, county officials, natural resource specialists and representatives from the Colorado State Forest Service and San Juan Public Lands should continue to work together to promote the health of rural lands within the County.
<b>Strategy 3:</b> Support the professional use of prescribed fire and wildland fire use as an effective and appropriate resource management tool.
<b>Goal: Reduce Ignitability of Structures</b>
<b>Strategy 1:</b> Promote the use of Firewise construction techniques and defensible space strategies to reduce the wildland fire risk to existing and planned structures within the WUI.
<b>Strategy 2:</b> Support and advertise the existence of private contractors who can carry out Firewise prevention projects on homeowners' properties.

<b>Strategy 3:</b> Continue to work collaboratively across jurisdictions to support and develop the Archuleta County land use code, fire code and building codes. Address issues such as emergency fire equipment, water sources, less flammable building materials, access and egress, and distances from structures to burnable vegetation constantly in
<b>Goal: Increase Public Involvement in Wildland Fire Awareness</b>
<b>Strategy 1:</b> Increase the collaboration with partners to provide timely information on wildland fire awareness and community responsibility.
<b>Strategy 2:</b> Continue ongoing demonstration projects and add new ones in different areas to give property owners a visual picture of treatments.

### **Pagosa Springs Comprehensive Plan, 2006**

<b>Natural Environment</b>
<b>Goal N-3: Pagosa Springs will avoid potential hazards caused by development occurring in natural hazard areas</b>
<b>Policy N-3(a):</b> Hazard areas avoided
<b>Action N-3.1:</b> Work with Archuleta County and Federal Emergency management Agency (FEMA) to develop or update floodplain maps as necessary and convert data to digital formats.
<b>Action N-3.2:</b> Strengthen current floodplain standards to limit future development within floodplains for health and safety purposes.
<b>Action N-3.3:</b> Identify steep slopes and other potential hazard areas. Develop standards to limit development on slopes greater than 30% or other unstable areas. Require mitigation for developments in potentially hazardous areas to protect adjacent properties and future occupants of the development.
<b>Regional Coordination</b>
<b>Goal R-4: Pagosa Springs will coordinate with public safety agencies to plan for hazard mitigation and promote public safety.</b>
<b>Action R-4.1:</b> Coordinate with public safety and hazard mitigation agencies for information sharing, planning, education, and training.
<b>Action R-4.2:</b> Develop a coordinated hazard mitigation plan
<b>Action R-4.3:</b> Support events that promote “getting to know” your public safety employees for residents and businesses.

### **Archuleta County Community Development Action Plan, 2012**

<b>Project: Maintain Sustainability of Ponderosa Pine and Pinon Forest</b>
<b>Actions and Outcomes:</b> Existing Fire Risk Mapping incorporated into Community Forest maintenance and wildfire protection programs. Fire risk is reduced and timber products industry is strengthened. Improve forest health. Control Pine Beetle infestation and other pathological threats. Reduce risk to life and property and protect watershed/community water supplies. Defensible space education resulting in defensible space created around residences. Wild land fire mitigation

**ARCHULETA COUNTY MULTI-JURISDICTIONAL  
MULTI-HAZARD MITIGATION PLAN  
2017 UPDATE**

***RISK ASSESSMENT and GOALS Meeting***

**Thursday, July 27, 1:00pm – 3:30pm**

**Archuleta County EOC  
777 CR 600  
Pagosa Springs, CO**

- ❖ **Introductions**
- ❖ **Review of the Planning Process**
- ❖ **Review of Identified Hazards**
- ❖ **Vulnerability Assessment Overview by Hazard**
- ❖ **Capabilities Assessment Update**
- ❖ **Updating Goals for the Mitigation Plan**
- ❖ **Mitigation Action Strategy update needs**
- ❖ **Update on Public Involvement Activities/public meeting planning**
- ❖ **Next Steps**
- ❖ **Questions and Answers/Adjourn**

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**Summary of the Archuleta County  
Multi-Jurisdictional Hazard Mitigation Plan Update  
Risk Assessment and Goals Meeting**

**July 27, 2017**

**1:00 PM – 3:30 PM**

**Archuleta County Emergency Operations Center, 777 CR 600  
Pagosa Springs, CO**

**Introductions and Opening Remarks**

Jeff Brislawm of Amec Foster Wheeler, the consulting firm hired to facilitate the plan development process, began the meeting with welcoming remarks. Fifteen persons were present and documented on a sign in sheet.

**Review of Mitigation, Disaster Mitigation Act (DMA) Requirements, and the Planning Process**

Following introductions a PowerPoint presentation was presented by Jeff Brislawm. Jeff reviewed the planning process being followed and discussed the project status.

**Risk Assessment Presentation and Discussion**

Jeff outlined the general risk assessment requirements before beginning a detailed discussion of each hazard. He presented highlights on each hazard included in the updated risk assessment chapter of the plan. Refer to the Archuleta County HMP Risk Assessment PowerPoint presentation for specific details on each hazard and a handout summarizing hazard significance and problem statements.

Additional insight and details were learned during the risk assessment conversation among participants. Highlights of the discussion are noted by hazard in the table below.

<b>Hazard or Topic</b>	<b>Meeting Discussion</b>
Dam Failure	<ul style="list-style-type: none"><li>• Lake Capote- redid Emergency Action Plan</li><li>• No recent incidents</li></ul>
Avalanche	<ul style="list-style-type: none"><li>• New snowmobiles make it easier to access hazardous areas in the backcountry and their bigger size and weight increase the likelihood of triggering an avalanche.</li><li>• There are 24 avalanche runout zones on the Archuleta side of Wolf Creek Pass</li><li>• During the winter of 2016-2017 three closures of the pass occurred: two for about 8 hours and one for 24 hours</li></ul>

<b>Hazard or Topic</b>	<b>Meeting Discussion</b>
Drought	<ul style="list-style-type: none"> <li>• In 2013 PAWS was close to issuing water restrictions.</li> <li>• River recreation impacts.</li> <li>• Winter recreation impacts</li> <li>• Navajo Reservoir boat ramp access impacted.</li> <li>• Water for firefighting needed to be trucked in during 2013 as other sources were not available</li> </ul>
Extreme Cold	<ul style="list-style-type: none"> <li>• Some intoxication/exposure deaths were noted but otherwise minimal impacts</li> </ul>
Flood	<ul style="list-style-type: none"> <li>• Flash flood warnings occurred in early July 2017</li> <li>• East Fork and Rio Blanco campsites at risk</li> <li>• Bureau of Reclamation Diversion Dam on upper Rio Blanco <ul style="list-style-type: none"> <li>○ Log jam built up on it last year which caused a rush of water downstream when removed.</li> <li>○ Diversion for water supply for Albuquerque</li> </ul> </li> <li>• Culvert in Arboles-Cox Circle has been problematic</li> <li>• Private road bridge/culvert access/egress can be an issue</li> <li>• Rumbaugh/Horse Gulch- debris stuck in culvert caused flooding; needs maintenance.</li> <li>• County adopted the Colorado Water Conservation Board's floodplain regulations for critical facilities in floodplain</li> <li>• Sheriff office might be moved out of 0.2% chance floodplain if new public safety center is approved</li> <li>• Cat Creek flood – CR 700 in 2010 and bridge undermined in 2016 flood</li> <li>• McCabe culvert under highway at Pagosa Springs is still undersized; CDOT looking for \$10 M funding needed for upgrades.</li> <li>• Development pressures in the San Juan floodplain continue; lots of non-conforming structures exist before NFIP participation</li> <li>• Lots of properties are 2<sup>nd</sup> homes thus less likely to have a mortgage and thus no requirement for flood insurance.</li> <li>• The Rio Blanco has two non-conforming RV parks and a mix of temporary and permanent occupancies</li> </ul>
Hail	<ul style="list-style-type: none"> <li>• Typically storms are short lived</li> </ul>
Landslide, Debris Flow, Rockfall	<ul style="list-style-type: none"> <li>• Mitigation has helped on Jackson Mountain where Hwy 160 crosses it. <ul style="list-style-type: none"> <li>○ A problem spot has recently occurred in new location</li> <li>○ water and gas line corridor are affected</li> <li>○ landslide dam potential on San Juan River</li> </ul> </li> <li>• The East Fork landslide has not seen recent movement and is being monitored by Xcel Energy due to the gas line that feeds the San Luis Valley</li> <li>• Other problem areas noted: <ul style="list-style-type: none"> <li>○ Park ditch sliding 2 years ago</li> <li>○ Highway 168, MM 146 and 147</li> <li>○ Wolf Creek, MM 158-165 Yellow Jacket Pass</li> <li>○ CR 151- MM 114, 117</li> <li>○ CR335 Lower Blanco culverts plugged with mud, rock, and shale</li> <li>○ CR 500 has been affected with rockfall and landslides</li> <li>○ Landslide behind high school did some damage in Spring of 2017.</li> </ul> </li> </ul>
Lightning	<ul style="list-style-type: none"> <li>• NCDC data does not capture all events</li> <li>• An HMPC member noted that he could pull data from NFIRS</li> </ul>

Hazard or Topic	Meeting Discussion
	<ul style="list-style-type: none"> <li>• 3 homes hit in recent years</li> <li>• The group recommended changing the 'Hazard Extent' rating from 'Limited' to 'Extensive' due to the fact that it can occur anywhere in the planning area.</li> </ul>
Pandemic Disease	<ul style="list-style-type: none"> <li>• No recent outbreaks but several exercises have been held in preparation for an incident.</li> </ul>
Winter Storm	<ul style="list-style-type: none"> <li>• La Plata Electric has done upgrades on lines and poles</li> <li>• Spring snows (heavy, wet) have the worst impacts to utilities, structures and trees</li> <li>• Slushy/heavy snow loads lead to collapse of accessory structures</li> <li>• Road access sometimes a struggle to keep clear</li> </ul>
Wildfire	<ul style="list-style-type: none"> <li>• Siltation on San Juan River from West Fork Fire</li> <li>• Impact on drinking water supply, PAWS infrastructure, and watershed health.</li> <li>• CWPP is in need of an update</li> <li>• Countywide 2006 land use regulations address wildfire</li> <li>• Fire department operations review development proposals for wildfire concerns</li> <li>• Fires could affect the Tri-state power line</li> <li>• Beetle kill has become more widespread due to the spruce fir engraver, particularly around Wolf Creek Pass</li> </ul>
Wildlife	<ul style="list-style-type: none"> <li>• Jeff presented some wildlife/vehicle collision statistics; a CSP representative noted that 2 out of 3 crashes unreported so statistics likely low</li> <li>• Bear conflicts/break ins</li> <li>• No bear proof containers are required currently</li> <li>• Areas of concern include mile markers 111-131, 118-131-night speed reduction</li> <li>• Hwy 151 and Hwy160 just west of Piedra River</li> <li>• Bottom of Yellow Jacket Pass</li> </ul>
Wind	<ul style="list-style-type: none"> <li>• No major issues but some blowdowns in the forest have occurred</li> <li>• Blowdowns on Rio Blanco Ranch subdivision happened around 2013</li> <li>• Wood Pass blowdown in beetle killed trees 2004-2005</li> <li>• Risk to blowdowns higher due to extensive beetle kill.</li> </ul>
Hazardous Materials	<ul style="list-style-type: none"> <li>• Arboles- cluster of gas wells on tribal property noted as an issue</li> <li>• CDOT explosive depot east of town for avalanche mitigation, highway MM 153, next to natural gas pump station</li> <li>• Propane dealer in floodplain east of Pagosa Springs</li> </ul>
Terrorism	<ul style="list-style-type: none"> <li>• This should include active shooter/imminent threat</li> <li>• 1 or 2 lockdowns a year on average in the schools</li> <li>• Potential threat of arson sparking devastating wildfires</li> <li>• Cyber threats are increasing</li> </ul>
Capabilities	<ul style="list-style-type: none"> <li>• Fire Protection District Strategic plan is updated.</li> <li>• Town has Capital Improvement Plan</li> <li>• County has 5 year road plan.</li> <li>• 2009 Pagosa Springs Comprehensive plan will be updated</li> <li>• County Comprehensive I plan (2001) is being updated and will acknowledge HMP</li> <li>• Not sure the SWCO Homeland Security strategy noted in presentation exists – the SW All-Hazard Council should know.</li> <li>• Mineral HMP is complete and almost fully approved</li> <li>• Hinsdale HMP not yet updated</li> <li>• Some subdivision CWPPs have been completed (e.g. Loma Linda, Echo Canyon) but it has been a challenge getting them finalized/signed off by signatory authorities</li> </ul>

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## **Plan Goals Update**

The HMPC reviewed the goals and objectives from the previous plan to see if they were still relevant or needed updating. In general the group thought they were still valid. The group noted that most of the objectives were listed under goal 2 and some of them could fit under other goals or new objectives could be developed under the other goals. Recognizing the value of today's meeting, an objective to meet annually was suggested as a way to formalize implementation of the plan. Jeff will revise per the suggestions and the group will revisit the goals for finalization at the beginning of the next meeting.

## **Mitigation Action Strategy update needs**

Jeff and Mike noted that the mitigation action strategy will be revisited moving forward and will be the focus of the next HMPC meeting. Jeff recommended that the existing mitigation actions be reviewed by the HMPC as a status report will need to be completed for each action. Jeff will send out a worksheet to help facilitate the status reporting prior to the next meeting. There will be an opportunity to develop new mitigation actions for the plan as well. These will be identified at the next meeting.

## **Update on Public Involvement Activities/public meeting.**

Jeff noted that the on-line public survey had 100 responses thus far, which was a good response. He will share the details of the responses prior to the next meeting. A public meeting will occur in September during the week of the 11th with details forthcoming.

## **Plan Timeline/Next steps**

The next and final HMPC planning meeting will be during the week of September 11. The purpose of this meeting is to develop mitigation actions for the plan. Once a date has been identified, a calendar update will be sent out to save the date. The meeting materials will also be shared electronically, including the presentation and handouts.

The meeting adjourned at 3:30.

PRE-DISASTER HAZARD MITIGATION PLAN SIGN-IN SHEET

27th July 2017

Signature	Name	Agency	Postion / Title	Phone	Miles	Total Hours (incl. travel)	E-MAIL
	Bentley Henderson	Archuleta County					bHenderson@archuletacounty.org
	Bill Rockensock	Pagosa Springs PD	Chief of Police	970-264-4151			brockensock@pagosasprings.co.gov
	Bill Trimarco	FireWise	Archuleta Chapter Coordinator	970-398-0305			archuletafirewise@gmail.com
	Bill Werner	American Red Cross					bill.werner@redcross.org
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	Brien Gardner	Black Hills Energy					brien.gardner@blackhillscorp.com
<i>Brooks Brown</i>	Brooks Brown	Pagosa Springs PD	Lieutenant	970-749-3646	8	2.5	bbrown@pagosasprings.co.gov
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	Jerry Wills	LPEA					jcwills@lpea.coop
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	June Madrid	Archuleta County					jmadrid@archuletacounty.org
	Justin Cowan	Archuleta School Dist					jcowan@pagosa.k12.co.us
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	Justin Talbot	LPEA					jtalbot@lpea.coop
<i>Karn Macht</i>	Karn Macht	Pagosa FPD	Deputy Chief	970-903-9057	7	2.5	kmacht@pagosafire.com
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	Linda Lawrie	IMG					linda@fortlawrie.com
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	Mary Jo Coulehan	Chamber					director@pagosachamber.com
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<i>Mike Le Roux</i>	Mike Le Roux	Archuleta Sheriffs Office		970-398-0612		2.5	mleroux@archuletacounty.org
	Mike Stoll	Humane Society					hsdirector@humanesociety.biz
	Natalie Woodruff	Archuleta County	Assessor	970-264-8315			nwoodruff@archuletacounty.org
	R Saint	Centurytel					rksaint@centurytel.net
	Randy Larson	Pagosa FPD	Fire Chief	970-553-0404			rlarson@pagosafire.com
	Renate Widder	American Red Cross					renate.widder2@redcross.org
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<i>Rich Valdez</i>	Rich Valdez	Archuleta Sheriffs Office	Sheriff	970-749-3051	6	2.5	rvaldez@archuletacounty.org





From: Mike Le Roux <mleroux@archuletacounty.org>  
Sent: Monday, September 11, 2017 3:15 PM  
To: Brislaw, Jeff P  
Subject: RE: Hazard Mitigation Planning Committee meeting # 2

Yes it is being changed. Re-advertising in The Sun, FB, Radio and word of mouth.

-----Original Appointment-----

From: Brislaw, Jeff P [mailto:Jeff.Brislaw@amecfw.com]  
Sent: Monday, September 11, 2017 3:02 PM  
To: Mike Le Roux  
Subject: Accepted: Hazard Mitigation Planning Committee meeting # 2  
When: Thursday, September 14, 2017 1:00 PM-4:00 PM (UTC-07:00) Mountain Time (US & Canada).  
Where: 398 Lewis Street (BoCC Building)

Did the public meeting location get changed as well?

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## Mitigation Action Selection and Prioritization Criteria

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Does the proposed action protect lives?

Does the proposed action address hazards or areas with the highest risk?

Does the proposed action protect critical facilities, infrastructure, or community assets?

Does the proposed action meet multiple objectives (multi-objective management)?

### **STAPLE/E**

Developed by FEMA, this method of applying evaluation criteria enables the planning team to consider in a systematic way the social, technical, administrative, political, legal, economic, and environmental opportunities and constraints of implementing a particular mitigation action. For each action, the HMPC should ask, and consider the answers to, the following questions:

#### **Social**

Does the measure treat people fairly (different groups, different generations)?

#### **Technical**

Will it work? (Does it solve the problem? Is it feasible?)

#### **Aministrative**

Is there capacity to implement and manage project?

#### **Political**

Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?

#### **Legal**

Does your organization have the authority to implement? Is it legal? Are there liability implications?

#### **Economic**

Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?

#### **Environmental**

Does it comply with environmental regulations or have adverse environmental impacts?

**Example Mitigation Actions by FEMA categories with Hazards Identified in the Archuleta Hazard Mitigation Plan Update 2017**

Alternative Mitigation Actions	Dam Failure	Floods	Hazardous Materials	Avalanches; Landslides/ Debris Flows/ Rockfalls; subsidence	Weather Extremes (drought, hail, lightning, wind and tornado, temps)	Earth quakes	Wildfires	Severe Winter Storm
<b>PLANS and REGULATIONS</b>								
Building codes and enforcement		■	■	■	■	■	■	■
Comprehensive Watershed Tax		■						
Density controls	■	■	■	■			■	
Design review standards		■	■	■		■	■	
Easements		■	■	■			■	
Environmental review standards		■	■	■		■	■	
Floodplain development regulations	■	■	■					
Hazard mapping	■	■	■	■			■	
Floodplain zoning	■	■	■					
Forest fire fuel reduction							■	
Housing/landlord codes			■		■			
Slide-prone area/grading/hillside development regulations				■			■	
Manufactured home guidelines/regulations		■			■	■		
Minimize hazardous materials waste generation			■					
Multi-Jurisdiction Cooperation within watershed	■	■						
Open space preservation	■	■		■			■	
Performance standards	■	■		■	■	■	■	■
Periodically contain/remove wastes for disposal			■					
Pesticide/herbicide management regulations			■					
Special use permits	■	■	■	■			■	
Stormwater management regulations		■	■					
Subdivision and development regulations	■	■	■	■		■	■	
Surge protectors and lightning protection					■			

Alternative Mitigation Actions	Dam Failure	Floods	Hazardous Materials	Avalanches; Landslides/ Debris Flows/ Rockfalls; subsidence	Weather Extremes (drought, hail, lightning, wind and tornado, temps)	Earth quakes	Wildfires	Severe Winter Storm
Tree Management					■		■	■
Transfer of development rights		■		■			■	
Utility location			■	■	■			■
<b>STRUCTURE AND INFRASTRUCTRE PROJECTS</b>								
Acquisition of hazard prone structures	■	■		■			■	
Facility inspections/reporting	■	■	■			■		
Construction of barriers around structures	■	■	■					
Elevation of structures	■	■						
Relocation out of hazard areas	■	■	■	■			■	
Structural retrofits (e.g., reinforcement, floodproofing, bracing, etc.)		■	■	■	■	■	■	■
Channel maintenance		■		■				
Dams/reservoirs (including maintenance)	■	■						
Isolate hazardous materials waste storage sties			■					
Levees and floodwalls (including maintenance)		■						
Safe room/shelter					■	■		■
Secondary containment system			■					
Site reclamation/restoration/revegetation		■		■				
Snow fences								■
Water supply augmentation					■			
Debris Control		■		■				
Defensible Space							■	
Stream stabilization		■		■				
<b>EDUCATION AND AWARENESS</b>								
Flood Insurance	■	■						
Hazard information centers	■	■	■	■	■	■	■	■

Alternative Mitigation Actions	Dam Failure	Floods	Hazardous Materials	Avalanches; Landslides/ Debris Flows/ Rockfalls; subsidence	Weather Extremes (drought, hail, lightning, wind and tornado, temps)	Earth quakes	Wildfires	Severe Winter Storm
Public education and outreach programs	■	■	■	■	■	■	■	■
Real estate disclosure	■	■	■	■	■	■	■	■
Crop Insurance					■	■		
Lightning detectors in public areas					■			
<b>NATURAL SYSTEMS PROTECTION</b>								
Best Management Practices (BMPs)		■	■	■	■		■	
Forest and vegetation management	■	■		■	■		■	■
Hydrological Monitoring	■	■	■	■	■			
Sediment and erosion control regulations	■	■	■	■				
Stream corridor restoration		■		■				
Stream dumping regulations		■	■					
Urban forestry and landscape management		■		■	■		■	■
Wetlands development regulations		■	■	■			■	
<b>EMERGENCY SERVICES</b>								
Critical facilities protection	■	■	■	■	■	■	■	■
Emergency response services	■	■	■	■	■	■	■	■
Facility employee safety training programs	■	■	■	■	■	■	■	■
Hazard threat recognition	■	■	■	■	■	■	■	■
Hazard warning systems (community sirens, NOAA weather radio)	■	■	■	■	■	■	■	■
Health and safety maintenance	■	■	■	■	■	■	■	■
Post-disaster mitigation	■	■	■	■	■	■	■	■
Evacuation planning	■	■	■	■			■	

# **ARCHULETA COUNTY HAZARD MITIGATION PLAN**

## **2017 UPDATE**

### ***MITIGATION STRATEGY MEETING***

**Thursday, September 14, 1:00 – 4:00 pm**

**398 Lewis Street (BoCC Building)  
Pagosa Springs, CO**

- ❖ Introductions**
- ❖ Review of the Planning Process**
- ❖ Finalizing Updated Goals**
- ❖ Review of possible mitigation activities and alternatives**
- ❖ Discuss criteria for mitigation action selection and prioritization**
- ❖ Review of progress on existing actions in the plan**
- ❖ Brainstorming Session: Development of new mitigation actions (group process)**
- ❖ Prioritize mitigation actions (group process)**
- ❖ Discuss plan implementation and maintenance**
- ❖ Discuss next steps**
- ❖ Questions and Answers/Adjourn**

## **Public Notice Ad**

**Public Meeting on the Archuleta County Multi-Hazard Mitigation Plan Update  
Emergency Operations Center, 777 CR 600 (Piedra Rd)  
Thursday, September 14<sup>th</sup>, 2017 at 5:00-6:30 pm.**

**A meeting to discuss the Archuleta County Multi-Hazard Mitigation Plan update will be held at the Emergency Operations Center on Thursday, September 14<sup>th</sup>, 2017 at 5:00.** Citizens, elected officials, and emergency responder personnel are encouraged to attend. The purpose of the meeting will be to discuss the update of the County's hazard mitigation plan, with an emphasis on hazards such as floods, wildfires, avalanches, and landslides and their potential impacts. The plan details the County's risk to multiple hazards and identifies strategies intended to reduce future losses from these hazards. The plan is being updated under the guidance of a multi-jurisdictional Hazard Mitigation Planning Committee (HMPC) with assistance from a consultant and a FEMA grant. Attendees will learn more about the hazards and strategies to mitigate them at this meeting. Public input is also being sought on these same topics at this meeting. For more information contact Mike Le Roux at Archuleta County Emergency Management 970-731-4799.



# Summary of the Archuleta County Mitigation Strategy Meeting

## 2017 Hazard Mitigation Plan Update

September 14, 2017

1:00 – 4:30 PM

398 Lewis Street (Board of County Commissioners Building), Pagosa Springs, CO

### Introduction and Opening Remarks

Jeff Brislawn, project manager with Amec Foster Wheeler, initiated the meeting with a discussion of the agenda for the afternoon. Jeff asked everyone around the room to introduce themselves; 10 persons from various County departments and the Pagosa Area Water and Sanitation District were in attendance and documented on a sign in sheet. Stakeholders included the Colorado State Patrol, CO Division of Homeland Security and Emergency Management, and the US Forest Service. Handout materials were provided.

Jeff presented the PowerPoint slide deck that outlined the meeting agenda and topics.

### Review of the Planning Process

Jeff reviewed the planning process that has taken place so far. The process is currently in Phase III – Develop a Mitigation Plan and this meeting is the last formally facilitated meeting of the Hazard Mitigation Planning Committee (HMPC). Jeff also reviewed the findings of the process up to the point of the meeting, including the draft hazard identification and risk assessment. Jeff presented a slide that summarized the hazard significance ratings. Some discussion around avalanches and related road closures occurred. Earlier warning and coordination could reduce the traffic waiting for the pass to re-open, though the CSP noted that many of those travelers are waiting for quick ski-area access on powder days. Wind related blowdown hazards were also noted as increasing due to beetle-killed trees. A fatality and injury were noted as occurring in the past year. The potential for long term power outages was also noted as a vulnerability. The Jeff also noted the results of the online-public survey that was summarized for additional public input into the process. A public meeting was scheduled for the evening following today's HMPC meeting. The county planner noted that the Hazard Mitigation Plan was going to be referenced in the update of the County Comprehensive Plan update.

### Plan Goals

Jeff reviewed the broad mitigation goals with some suggested modifications to the objectives that were suggested at the previous meeting. The group felt that they looked reasonable but might need revisiting after the mitigation actions are updated. The revised goals and objectives that will be included in the updated plan for review by the HMPC, during which there will be opportunity for final review and comment.

### Review of Possible Mitigation Activities and Alternatives

Jeff presented information on typical mitigation activities and alternatives and referred to handouts with further details and guidance. Jeff reviewed ideas for possible mitigation activities and alternatives based on the risk assessment. Jeff outlined potential project criteria and action

requirements, including the requirements of the Disaster Mitigation Act of 2000. Each hazard and each participating jurisdiction must have at least one true mitigation action (not preparedness) pertaining to them. The group was provided a handout with a matrix of typical mitigation alternatives organized by FEMA categories for the hazards identified in the plan. Another reference document titled “Mitigation Ideas” developed by FEMA was suggested at the meeting, which can be found online at: <https://www.fema.gov/media-library/assets/documents/30627>

This reference discusses the common alternatives and best practices for mitigation by hazard.

### **Action Prioritization**

The group was provided with a decision-making tools to consider when prioritizing the actions. This including FEMA’s recommended criteria, STAPLE/E (which considers social, technical, administrative, political, legal, economic, and environmental constraints and benefits). Other criteria used to recommend what actions might be more important, more effective, or more likely to be implemented than another included:

- Does action protect lives?
- Does action address hazards or areas with the highest risk?
- Does action protect critical facilities, infrastructure or community assets?
- Does action meet multiple objectives (Multiple Objective Management)?

Actions continuing from the 2012 plan will need to review for relative priority (high, medium, low). Any new actions developed will also need a relative prioritization based on these criteria. Typical mitigation activities were ranked by the public in the public survey. The results showed that activities related to forest health/watershed protection, wildfire fuels treatment, defensible space, evacuation route and public education/awareness received the most support from the public.

### **Review of progress on 2012 Plan actions and identification of new actions**

Jeff provided a handout with the mitigation action table from the 2012 plan. Each of the 33 actions from the 2012 plan was discussed with the group. The group provided input on whether the action had been completed and if not reasons why. Some actions were determined to still be relevant and should continue in the updated plan. Others were recommended to be deleted. Jeff took notes on the revisions to the action table. Action priorities were revisited and modified in some cases. Completed and deleted actions will be moved to separate tables in the updated plan. The continuing, deferred and new actions will be grouped together in an updated action strategy table.

During the discussion some new actions to include in the plan were noted. Possible new action ideas included the following:

- Providing backup power or generator transfer switches to critical facilities such as the High School to enhance use as shelter

- Providing options for backup power for local gas stations so that fuel can be available during extended power outages.
- Mitigate the potential for post wildfire debris flow incidents

Jeff included some other potential ideas for mitigation projects in the PowerPoint presentation for the HMPC to consider, such as achieving Storm Ready designation from the National Weather Service.

### **Next Steps**

Jeff provided a new action worksheet for participants to flush out the details of proposed actions. These are due September 30th from the constituents. These will be compiled by Jeff into the mitigation action table and shared with the committee for further refinement and prioritization when the draft plan is made available for review, which is targeted for late October. The goal is to finalize the plan for submittal to FEMA by late December.

The meeting adjourned at 4:30 PM.

PRE-DISASTER HAZARD MITIGATION PLAN SIGN-IN SHEET

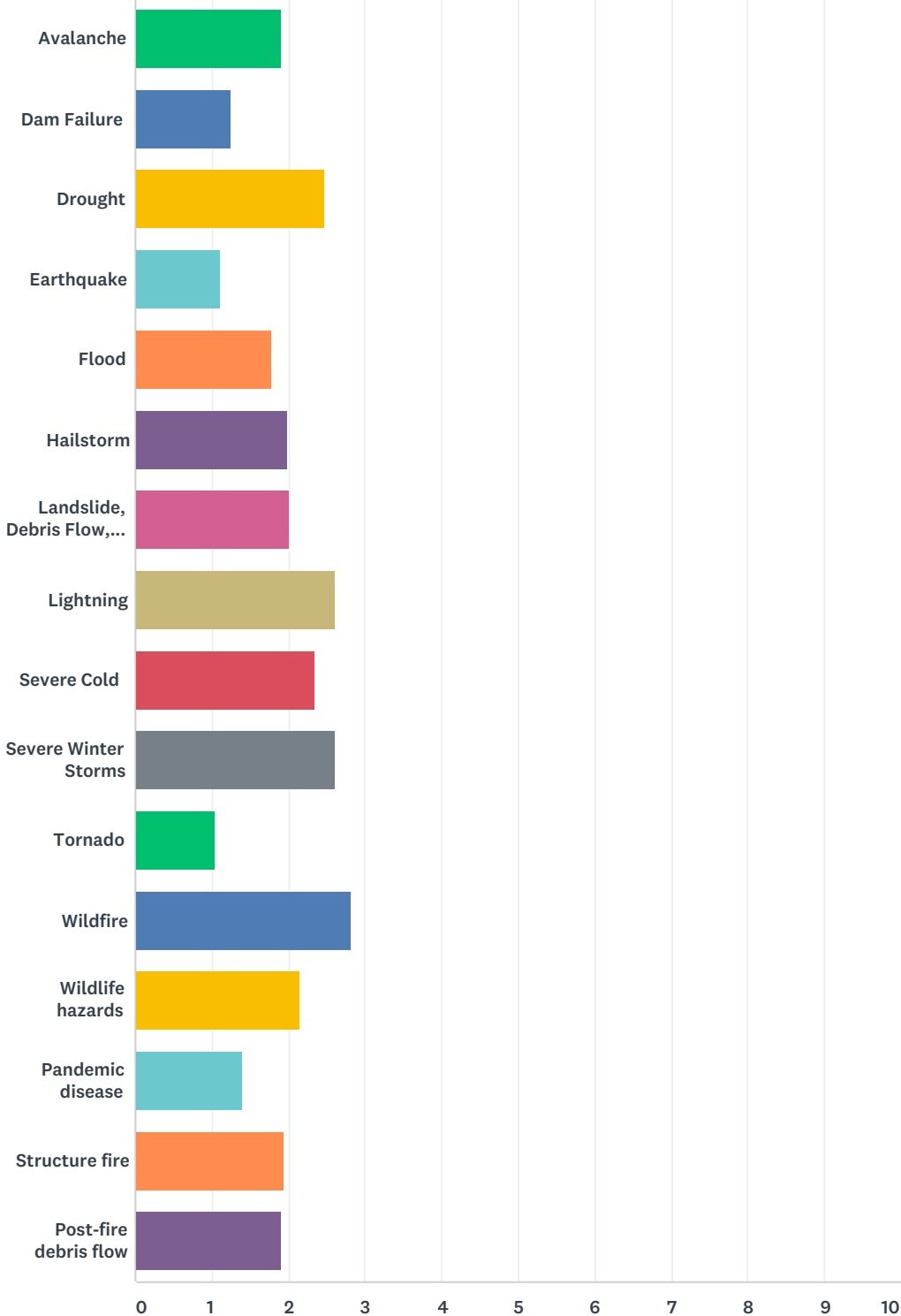
14th September 2017

Signature	Name	Agency	Postion / Title	Phone	Miles	Total Hours (incl. travel)	E-MAIL
<i>clmo</i>	Bentley Henderson	Archuleta County	Archuleta County Administrator				bHenderson@archuletacounty.org
	Christina Kraetsch	Archuleta Sheriffs Office	Deputy Director Of Emergncy Ops	805-403-0403		3.5	ckraetsch@archuletacounty.org
	Andrea Phillips	Town of Pagosa	Town Manager	970-264-4151			aphillips@pagosasprings.co.gov
	James Dickhoff	Town of Pagosa	Planning Director	970-946-5549			jdickhoff@pagosasprings.co.gov
	Jerry Wills	LPEA					jcwills@lpea.coop
	Justin Ramsey	PAWSD	District Manager	928-606-3598			justin@pawsd.org
	Karn Macht	Pagosa FPD	Deputy Chief	970-903-9057			kmacht@pagosafire.com
	Kathi Gurule	Southern Ute EM	Southern Ute Emergency Manager				kgurule@southern-ute.nsn.us
	Randy Larson	Pagosa FPD	Fire Chief	970-553-0404			rlarson@pagosafire.com
	Rich Valdez	Archuleta Sheriffs Office	Sheriff	970-749-3051			rvaldez@archuletacounty.org
	Rob Goodrich	Black Hills Energy	Compliance Coordinator	719-469-2213			Robert.Goodrich@blackhillscorp.com
	Robert Perry	Archuleta County	County Engineer	970-275-2556			rperry@archuletacounty.org
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	Susan Goebel-Canning	Archuleta County	Public Works Director	970-264-5660			sgcanning@archuletacounty.org
	Terry Wetherill	Mineral Sheriffs Office	Mineral County Emergency Manager	719-658-2600			mincoemc@gmail.com
	Tonya M Hamilton	Archuleta Sheriffs Office	Undersheriff	970-264-8444			THamilton@archuletacounty.org
	Brian Vining	Colorado State Patrol	Trooper	970-731-0039			brian.vining@state.co.us
<i>Art Holloman</i>	<i>Art Holloman</i>	<i>PAWSD</i>	<i>Mitigation Plan Sprint Supt.</i>	<i>720-630-8770</i>		3.5	<i>mark.thompson@state.co.us</i>
				<i>971-7691</i>		3.5	<i>art at PAWSD.ORG</i>
<i>Mike Le Roux</i>	<i>MIKE LE ROUX</i>	<i>ARCHULETA COUNTY</i>	<i>EMERGENCY MANAGER</i>	<i>970-518-0612</i>		3.5	<i>MLEROUX@ARCHULETACOUNTY.CO.GOV</i>
	<i>Jeff Brislawn</i>	<i>AMAC Foster Home</i>	<i>Project Mgr</i>	<i>303-704-5506</i>		3.5	<i>Jeff.Brislawn@amacfh.com</i>
	<i>BEN STUENDEL</i>	<i>CSP</i>	<i>SGT</i>	<i>970-946-7263</i>		3.5	<i>BENJAMIN.STUENDEL@STATE.CO.US</i>
<i>Sam Montoya</i>	<i>SAM Montoya</i>	<i>Archuleta County</i>	<i>GIS</i>	<i>264-8312</i>		3.5	<i>SMontoya@Archuletacounty.org</i>
<i>John Shepard</i>	<i>John Shepard</i>	<i>Arch. &amp; Development</i>	<i>Planning Mgr</i>	<i>264-8383</i>		3.5	<i>jshepard@archuletacounty.org</i>



Q1 The hazards addressed in the Multi-Hazard Mitigation Plan update are listed below. Please indicate the level of significance in Archuleta County that you perceive for each hazard.

Answered: 101 Skipped: 0



## Archuleta County Hazard Mitigation Plan Update Public Input Survey

	LOW	MODERATE	HIGH	TOTAL	WEIGHTED AVERAGE
Avalanche	30.30% 30	48.48% 48	21.21% 21	99	1.91
Dam Failure	75.00% 75	24.00% 24	1.00% 1	100	1.26
Drought	8.08% 8	36.36% 36	55.56% 55	99	2.47
Earthquake	90.91% 90	8.08% 8	1.01% 1	99	1.10
Flood	37.37% 37	48.48% 48	14.14% 14	99	1.77
Hailstorm	23.23% 23	55.56% 55	21.21% 21	99	1.98
Landslide, Debris Flow, Rockfall	26.26% 26	47.47% 47	26.26% 26	99	2.00
Lightning	3.96% 4	29.70% 30	66.34% 67	101	2.62
Severe Cold	9.00% 9	48.00% 48	43.00% 43	100	2.34
Severe Winter Storms	2.00% 2	35.00% 35	63.00% 63	100	2.61
Tornado	95.92% 94	4.08% 4	0.00% 0	98	1.04
Wildfire	1.00% 1	15.00% 15	84.00% 84	100	2.83
Wildlife hazards	17.17% 17	50.51% 50	32.32% 32	99	2.15
Pandemic disease	64.95% 63	28.87% 28	6.19% 6	97	1.41
Structure fire	24.24% 24	56.57% 56	19.19% 19	99	1.95
Post-fire debris flow	30.30% 30	49.49% 49	20.20% 20	99	1.90

## Q2 Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies:

Answered: 44 Skipped: 57

#	RESPONSES	DATE
1	no	7/13/2017 9:13 AM
2	Snow removal	7/7/2017 7:36 PM
3	Town of Pagosa Springs	6/28/2017 1:54 PM
4	As the climate changes and Pagosa Springs grows, drought conditions are expected. We need long term planning for water availability.	6/27/2017 12:29 PM
5	prescribed burns in windy season;county wide	6/26/2017 11:18 AM
6	no	6/25/2017 11:32 AM
7	Wildfires	6/25/2017 9:22 AM
8	Wild fires	6/24/2017 11:40 PM
9	None at this time.	6/24/2017 6:19 PM
10	Archuleta County: some forest trails near homes are being re-routed away from homes with branches and dangerous debris. Clearly, those responsible do not consider the well being of those folks using the trails. Piling debris, especall dead fall having branches protruding create dangers such as impaling and broken bones, and WILDFIRES.	6/24/2017 1:15 PM
11	Additional cell phone towers	6/24/2017 7:32 AM
12	No	6/23/2017 7:33 PM
13	no	6/23/2017 5:59 PM
14	Wildfire, defensible space on private lands - County and Town jurisdiction	6/23/2017 5:43 PM
15	No.	6/19/2017 8:55 PM
16	no	6/19/2017 12:55 PM
17	Wildfire preparedness can always use more efforts and funding	6/17/2017 7:27 AM
18	Support and encourage FireWise of SW Colorado.	6/16/2017 5:12 PM
19	Encourage residents to seek assistance & guidance from FireWise to help reduce fire hazards on private property	6/16/2017 5:11 PM
20	Plpoa forcing permit fees for dead trees and tree removal from hazard areas on property. Another is traffic hazards from weather on dirt roads. Roads should be chip and sealed to stop potholes and washboards.	6/16/2017 4:37 PM
21	Mitigation of climate change - we all need to do our part	6/11/2017 11:42 AM
22	None	6/11/2017 7:45 AM
23	No	6/10/2017 10:13 AM
24	no	6/10/2017 8:28 AM
25	water pollution due to pet feces(dogs)	6/10/2017 8:07 AM
26	No	6/10/2017 7:57 AM
27	Nope	6/9/2017 9:53 PM
28	Ants are seriously taking over, hills are everywhere, Larry Lynch and green belts need mowing	6/9/2017 5:54 PM

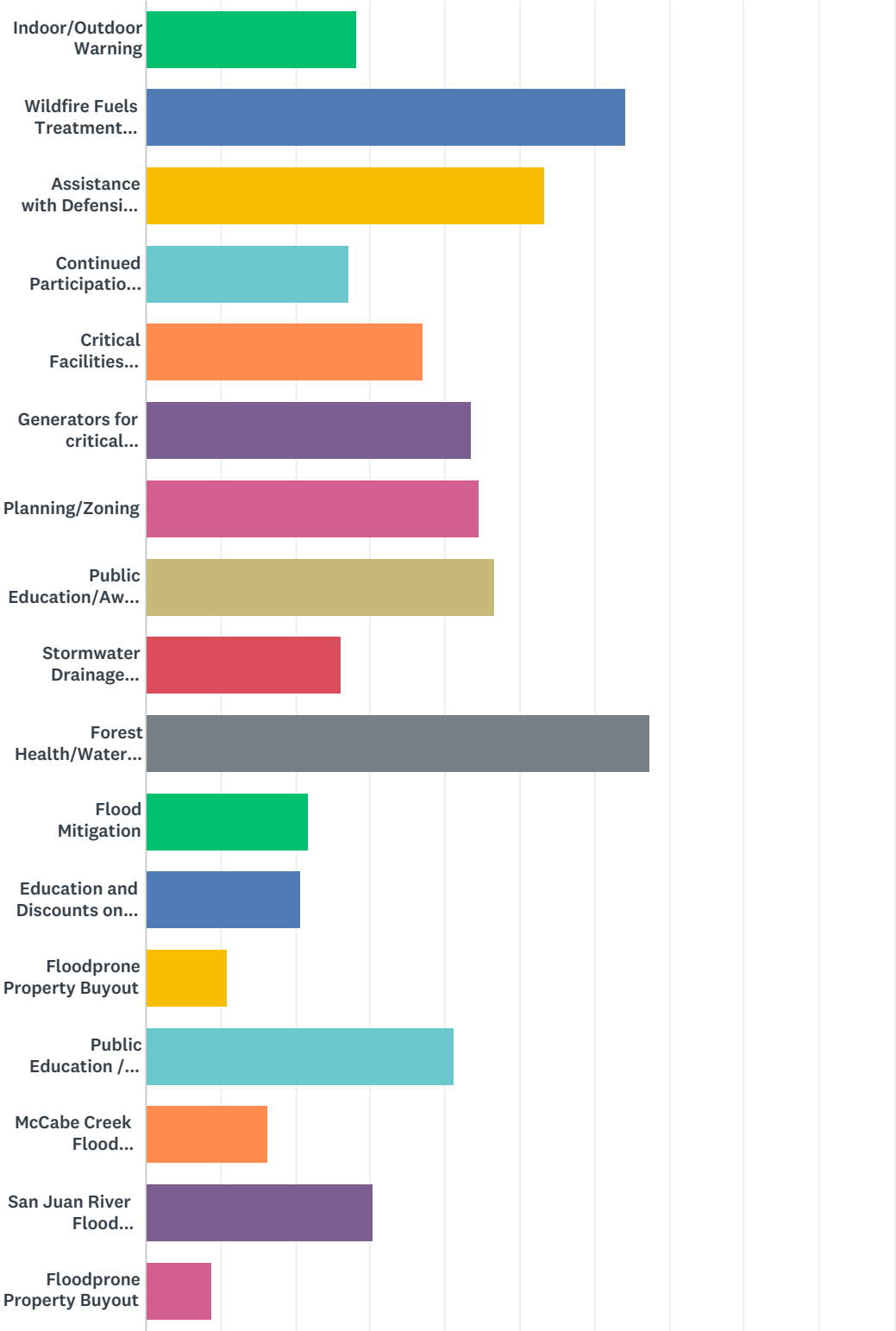


## Archuleta County Hazard Mitigation Plan Update Public Input Survey

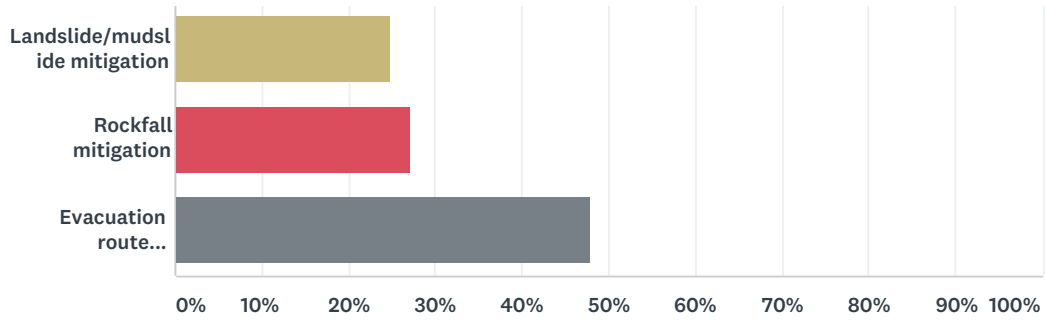
29	No	6/9/2017 5:26 PM
30	Not at this time.	6/9/2017 5:19 PM
31	na	6/9/2017 9:25 AM
32	Horse evacuation planning, CR 359-Chromo area	6/9/2017 3:30 AM
33	No	6/9/2017 1:40 AM
34	Archuleta County Wildfire Self Assessment (OEM, PFPD, USFS, SUTE	6/6/2017 1:48 PM
35	No	6/5/2017 9:20 AM
36	Power Outage you only have one feeder into the area	6/2/2017 10:18 AM
37	no	6/2/2017 9:07 AM
38	No	6/1/2017 9:27 PM
39	No	6/1/2017 7:56 PM
40	no	6/1/2017 2:55 PM
41	none	6/1/2017 1:26 PM
42	small creek flooding in downtown area, water supply for commercial structure fires	6/1/2017 1:13 PM
43	No	6/1/2017 12:45 PM
44	power failure	6/1/2017 12:31 PM

Q3 The following types of mitigation actions may be considered in Archuleta County. Please indicate the types of mitigation actions that you think should have the highest priority in the Archuleta County Multi-Hazard Mitigation Plan.

Answered: 92 Skipped: 9



## Archuleta County Hazard Mitigation Plan Update Public Input Survey



ANSWER CHOICES	RESPONSES	
Indoor/Outdoor Warning	28.26%	26
Wildfire Fuels Treatment projects	64.13%	59
Assistance with Defensible Space	53.26%	49
Continued Participation in the National Flood Insurance Program	27.17%	25
Critical Facilities Protection	36.96%	34
Generators for critical facilities	43.48%	40
Planning/Zoning	44.57%	41
Public Education/Awareness	46.74%	43
Stormwater Drainage Improvements	26.09%	24
Forest Health/Watershed Protection	67.39%	62
Flood Mitigation	21.74%	20
Education and Discounts on Flood Insurance	20.65%	19
Floodprone Property Buyout	10.87%	10
Public Education / Awareness of hazards	41.30%	38
McCabe Creek Flood Mitigation	16.30%	15
San Juan River Flood Mitigation	30.43%	28
Floodprone Property Buyout	8.70%	8
Landslide/mudslide mitigation	25.00%	23
Rockfall mitigation	27.17%	25
Evacuation route development	47.83%	44
Total Respondents: 92		

## Q4 Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters:

Answered: 24 Skipped: 77

#	RESPONSES	DATE
1	better communication. maybe text messages	7/13/2017 9:18 AM
2	Notifying property owners who need fire mitigation work done on their property.	7/8/2017 10:14 AM
3	The way snow is currently plowed in residential areas makes it very difficult for 1st responders to access people and properties.	7/7/2017 7:40 PM
4	Airborn dust levels exceed EPA requirements for infant and elderly health. Lower speed limits on dirt/gravel roads.	6/27/2017 12:33 PM
5	Communication to public warning of disasters	6/26/2017 11:20 AM
6	Terrorism	6/24/2017 11:42 PM
7	Be prepared to control even one tree lightning strikes. Home owners should mitigate to prevent fires from reaching structures.	6/24/2017 6:23 PM
8	Plans to bring people together to mitigate the hatred and self-centeredness we experience in this country currently.	6/24/2017 1:18 PM
9	Wildfire mitigation	6/24/2017 7:36 AM
10	Fire/smoke	6/23/2017 6:54 PM
11	Participate in efforts to prevent/mitigate global warming, which is a major threat in this fire-prone area.	6/17/2017 12:46 PM
12	Do fire mitigation along the roads throughout COunty. There are many dead and dying trees and the trees are too close together.	6/17/2017 7:31 AM
13	Encourage FireWise defensible space for homes and properties.	6/16/2017 5:17 PM
14	Reduce fuels around homes. Seek FireWise help.	6/16/2017 5:13 PM
15	Pave roads so they are pitched properly to shed water off road and not a washboard mud pit.	6/16/2017 4:41 PM
16	climate change mitigation - will impact storms floods, extreme weather	6/11/2017 11:44 AM
17	Previously checked	6/10/2017 10:16 AM
18	Importance of PERSONAL RESPONSIBILITY for ones' ownself, family and property!	6/9/2017 9:56 PM
19	na	6/9/2017 9:26 AM
20	terrorism or mass shootings	6/5/2017 9:25 AM
21	Snow removal for extreme winter storms to provide access for emergency services/utilities/etc.	6/1/2017 7:58 PM
22	Updating the reverse 911	6/1/2017 6:14 PM
23	none	6/1/2017 1:27 PM
24	flood plain buyout since there are several properties that can not have new improvements over a certain square footage added. Some of these properties are not allowed to remove old mobile homes and bring in new ones causing a devaluation of their property.	6/1/2017 1:17 PM

**Q5 Optional: Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:**

Answered: 22 Skipped: 79

#	RESPONSES	DATE
1	sharimerie@gmail.com	6/24/2017 7:16 PM
2	rhortoncompany@gmail.com	6/24/2017 7:03 PM
3	Kenny King Kkingpagosa@msn.com	6/24/2017 5:22 PM
4	Darrell Steed - steeddog@gmail.com	6/24/2017 7:37 AM
5	Steven Fisher. sfisherva@gmail.com	6/23/2017 7:35 PM
6	Theresa Lussi teesplalce@frontier.net	6/19/2017 9:00 PM
7	Karen Katsos, karen@plpoa.com	6/17/2017 7:31 AM
8	Paul Schweizer- paschweizer@live.com	6/16/2017 5:18 PM
9	Daniel Haag spidermantat@yahoo.com	6/16/2017 4:41 PM
10	Mr & Mrs Michael Kostin craneneckdreamin@hotmail.com	6/10/2017 10:19 AM
11	pminm@yahoo.com	6/10/2017 8:30 AM
12	Ian Weerstra theschmian1@hotmail.com	6/9/2017 8:43 PM
13	salukishelly@yahoo.com	6/9/2017 5:55 PM
14	Steven Fisher sfisherva@gmail.com	6/9/2017 5:22 PM
15	sylvia_goossens@yahoo.com	6/9/2017 3:35 AM
16	susan goebel-canning sgcanning@archuletacounty.org	6/6/2017 2:26 PM
17	Bill Trimarco, archuletafirewise@gmail.com	6/6/2017 1:50 PM
18	Jason Danvir jasondanvir@me.com	6/2/2017 7:42 AM
19	Connie Cook - Conniec2771@gmail.com	6/1/2017 7:59 PM
20	West Davies west@jimsmithrealty.com	6/1/2017 2:56 PM
21	Carl Nevitt cnevitt@archuletacounty.org	6/1/2017 1:28 PM
22	jason.webb@psmedicalcenter.org	6/1/2017 12:32 PM

# Summary of Public Meeting Archuleta County Hazard Mitigation Plan 2017 Update

September 14, 2017

5:00-6:30pm

398 Lewis Street (Board of County Commissioners Building), Pagosa Springs, CO

Two members of the public were present for the meeting and were documented on a sign in sheet. A reporter with the Pagosa Sun was also present. Mike Le Roux, Archuleta County Emergency Manager, introduced Jeff Brislawn, project manager with Amec Foster Wheeler. Jeff initiated the meeting with a discussion of the background of the plan, its intent, and the planning process being followed. He also explained the make-up of the County and Hazard Mitigation Planning Committee.

Jeff presented the PowerPoint slide deck that outlined the meeting agenda and topics. Jeff presented a slideshow that summarized the hazard risk assessment. When asked, the members of the public noted hazard concerns with wildfires, winter storms, flooding, pandemic disease, evacuation routes and power outages. Specific incidents noted included:

- March 2013 heavy snow caused power outages
- March 2015 avalanche caused a fatality
- High wind incidents affecting beetle-killed trees caused a fatality and an injury (horseback rider) in two separate incidents in recent years.

The meeting adjourned at 6:15.

## **APPENDIX D: REFERENCES**

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# APPENDIX D. REFERENCES

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Colorado Avalanche Information Center. [avalanche.state.co.us](http://avalanche.state.co.us)

Colorado Climate Center. <http://climate.colostate.edu/climateofcolorado.php>

Colorado Department of Local Affairs. [www.dola.colorado.gov](http://www.dola.colorado.gov)

Colorado Division of Water Resources Dam Safety Branch.  
[water.state.co.us/damsafety/dams.asp](http://water.state.co.us/damsafety/dams.asp)

Colorado Geological Survey. [geosurvey.state.co.us](http://geosurvey.state.co.us)

Colorado State Natural Hazard Mitigation Plan (2008).  
[www.dola.state.co.us/dem/mitigation/plan\\_2007/2008\\_plan.htm](http://www.dola.state.co.us/dem/mitigation/plan_2007/2008_plan.htm)

Colorado State Natural Hazard Mitigation Plan (2011).  
<http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251595686517>

Colorado State Natural Hazard Mitigation Plan (2013).

Colorado Water Conservation Board. [cwcb.state.co.us](http://cwcb.state.co.us)

Colorado Water Conservation Board Drought Mitigation and Response Plan and Drought Vulnerability Study

Enhanced Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center, [www.spc.noaa.gov/faq/tornado/ef-scale.html](http://www.spc.noaa.gov/faq/tornado/ef-scale.html)

Federal Emergency Management Agency. [www.fema.gov](http://www.fema.gov)

FEMA Understanding Your Risks: Identifying Hazards and Estimating Losses (2001).  
<http://www.fema.gov/library/viewRecord.do?id=1880>

Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center,  
[www.spc.noaa.gov/faq/tornado/f-scale.html](http://www.spc.noaa.gov/faq/tornado/f-scale.html)

Modified Mercalli Intensity and peak ground acceleration (PGA) (Wald, et al 1999).

National Climatic Data Center. [www.ncdc.noaa.gov](http://www.ncdc.noaa.gov)

National Flood Insurance Program. [www.fema.gov/business/nfip](http://www.fema.gov/business/nfip)

National Institute of Building Science Multi-Hazard Mitigation Council

National Lightning Safety Institute. [www.lightningsafety.com](http://www.lightningsafety.com)



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National Oceanic and Atmospheric Agency. [www.noaa.gov](http://www.noaa.gov)

National Register of Historic Places. [www.nps.gov/history/nr](http://www.nps.gov/history/nr)

National Response Center. [www.nrc.uscg.mil](http://www.nrc.uscg.mil)

National Weather Service. [www.nws.noaa.gov](http://www.nws.noaa.gov)

Pagosa.com

Pagosa Area Water and Sanitation District. <http://www.pawsd.org>

Pagosa Springs SUN Newspaper. [www.pagosahun.com](http://www.pagosahun.com)

Public Entity Risk Institute (PERI) Presidential Disaster Declaration Site.  
[www.peripresdecusa.org/mainframe.htm](http://www.peripresdecusa.org/mainframe.htm)

Sangres.com, “A Reference and Travel Guide for the Rocky Mountain States”  
<http://www.sangres.com/colorado/archuleta/index.htm>

Small Business Administration. [www.sba.gov](http://www.sba.gov)

Spatial Hazard Events and Losses Database for the United States.  
<http://webra.cas.sc.edu/hvri/products/sheldus.aspx>

United States Army Corps of Engineers. [www.usace.army.mil](http://www.usace.army.mil)

United States Census Bureau. [www.census.gov](http://www.census.gov)

United States Department of Agriculture. [www.usda.gov](http://www.usda.gov)

United States Fish and Wildlife Service. [www.fws.gov](http://www.fws.gov)

United States Forest Service. [www.usfs.gov](http://www.usfs.gov)

United States Geological Survey. [www.usgs.gov](http://www.usgs.gov)

Western Regional Climate Center. <http://www.wrcc.dri.edu/>

## **APPENDIX E: PLAN ADOPTION**

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**FEMA**

R8-MT

September 7, 2018

Steve Wadley, Chairman  
Archuleta County Board of County Commissioners  
398 Lewis Street  
P.O. Box 1507  
Pagosa Springs, Colorado 81147

Dear Mr. Wadley:

We are pleased to announce the approval of the Archuleta County Multi-Hazard Mitigation Plan Update as meeting the requirements of the Stafford Act and Title 44 Code of Federal Regulations §201.6 for a local hazard mitigation plan. The plan approval extends to Archuleta County; the Town of Pagosa Springs; and the Pagosa Area Water and Sanitation District.

The jurisdictions are hereby eligible for FEMA Hazard Mitigation Assistance grant programs. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular programs under which the application is submitted. Approved mitigation plans may be eligible for points under the National Flood Insurance Program Community Rating System.

The plan is approved through September 6, 2023. A local jurisdiction must revise its plan and resubmit it for approval within five years to continue to be eligible for mitigation project grant funding. We have provided recommendations for the next plan update on the enclosed Plan Review Tool.

We wish to thank the jurisdictions for participating in the process and commend your continued commitment to mitigation planning. Please contact Steve Boand, State Hazard Mitigation Officer, Colorado Department of Emergency Services, at [steven.boand@state.co.us](mailto:steven.boand@state.co.us) or (303) 915-6063 with any questions on the plan approval or mitigation grant programs.

Sincerely,

A handwritten signature in black ink that reads "Jeanine D. Petterson". The signature is fluid and cursive, with the first name "Jeanine" being the most prominent.

Jeanine D. Petterson  
Mitigation Division Director

Enclosure

cc: Steve Boand, State Hazard Mitigation Officer, Colorado Department of Homeland Security and Emergency Management

## LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA’s evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan’s strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to
- Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

<b>Jurisdiction:</b> Archuleta County, CO	<b>Title of Plan:</b> Archuleta County Multi-Hazard Mitigation Plan Update	<b>Date of Plan:</b> 3/20/2018
<b>Local Point of Contact:</b> Mike Le Roux	<b>Address:</b> 777 County Road 600 PO Box 638 Pagosa Springs, CO 81147	<b>E-Mail:</b> mleroux@archuletacounty.org
<b>Title:</b> Director of Emergency Operations		
<b>Agency:</b> Archuleta County Sheriff’s Office		
<b>Phone Number:</b> (970) 731-4799		

<b>State Reviewer:</b> Patricia L. Gavelda	<b>Title:</b> DHSEM Local Hazard Mitigation Planning Program Manager;	<b>Date:</b> 3/26/2018; 7/3/2018
Mark W. Thompson	Mitigation Planning Specialist	

<b>FEMA Reviewer:</b> Bryan Mentlik, IR	<b>Title:</b> Mitigation Champion, Michael Baker	<b>Date:</b> 7/23/2018
Madi Pluss, QA/QC	Community Planner	7/31/2018
<b>Date Received in FEMA Region VIII</b>	7/3/2018	
<b>Plan Not Approved</b>		
<b>Plan Approvable Pending Adoption</b>	7/31/2018	
<b>Plan Approved</b>	9/7/2018	

**SECTION 1:  
MULTI-JURISDICTION SUMMARY SHEET**

<b>MULTI-JURISDICTION SUMMARY SHEET</b>									
#	Jurisdiction Name	Type	Jurisdiction Contact	Email	Requirements Met (Y/N)				
					A. Planning Process	B. HIRA	C. Mitigation Strategy	D. Update Reqts	E. Adoption Resolution
1	Archuleta County	County	Mike Le Roux	mleroux@archuletacounty.org	Y	Y	Y	Y	Y
2	Town of Pagosa Springs	City	Andrea Phillips	aphillips@pagosasprings.co.gov	Y	Y	Y	Y	Y
3	Pagosa Fire Protection District (FPD)	Local government entity	Randy Larson	rlarson@pagosafire.com	Y	Y	Y	Y	Y
4	Pagosa Area Water and Sanitation District (PAWSD)	Local government entity	Justin Ramsey	justin@pawsd.org	Y	Y	Y	Y	Y

**SECTION 2:  
REGULATION CHECKLIST**

<b>REGULATION CHECKLIST</b>		<b>Location in Plan (section and/or page number)</b>	<b>Met</b>	<b>Not Met</b>
<b>Regulation (44 CFR 201.6 Local Mitigation Plans)</b>				
<b>ELEMENT A. PLANNING PROCESS</b>				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	CH. 3, section 3.1 – 3.3.1; See Table 3.1, p. 3.3 (Task 1 references); Planning Step 1, page 3.4; Appendix B	X		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	CH.3, Table 3.1, p. 3.3 (Task 3); Section 3.3.1, Planning Step 3, pp. 3.7-3.8	X		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Chapter 3, Table 3.1 (Task 2); Section 3.3.1 Planning Step 2, pp. 3.5-3.7	X		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 3.3.1, Planning Step 3, “Other Community Planning Efforts”, pp. 3.8-3.9	X		
A5. Is there discussion of how the community (ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Ch. 7, section 7.2.4, p. 7.5	X		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	<b>Method:</b> Ch.7, section 7.2.2, pp. 7.3-7.4; <b>Schedule:</b> Ch. 7, section 7.2.1, pp. 7.2-7.3	X		
<b><u>ELEMENT A: REQUIRED REVISIONS</u></b>				
<b>ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT</b>				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	CH.4, Section 4.1, pg 4.1-4.6 p. 4.18 – 4.129	X		

<b>REGULATION CHECKLIST</b>		<b>Location in Plan (section and/or page number)</b>	<b>Met</b>	<b>Not Met</b>
<b>Regulation (44 CFR 201.6 Local Mitigation Plans)</b>				
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Ch. 4, pp. 4.21 – 4.129	X		
B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Chapter 4, Section 4.2, Pages 4.8 - 4.132 Section 4.2, p. 4.6; Section 4.4, p. 4.129-4.171; Section 4.1.1, Table 4.1, p. 4.3	X		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Chapter 4, p. 4.147	X		
<b><u>ELEMENT B: REQUIRED REVISIONS</u></b>				
<b><u>ELEMENT C. MITIGATION STRATEGY</u></b>				
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	CH.2, Section 2.6, pp. 2.6 – 2.20	X		
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	CH.2, Table 2.4, p. 2.7; Table 2.8, p. 2.12; PP. 2.10 and 2.14 CH. 5, Table 5.1, p. 5.11	X		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	CH.5, section 5.1.1 pp. 5.1 – 5.3	X		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 5, Table 5.1, pp. 5.7-5.12; Appendix A	X		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	CH. 5, Section 5.2.1; Section 5.3; Appendix A; CH. 7, Section 7.1 and 7.1.1	X		

<b>REGULATION CHECKLIST</b>		<b>Location in Plan (section and/or page number)</b>	<b>Met</b>	<b>Not Met</b>
<b>Regulation (44 CFR 201.6 Local Mitigation Plans)</b>				
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Ch. 7, Section 7.2.3 CH.2, Section 2.6, pp. 2.6 – 2.16	X		
<b><u>ELEMENT C: REQUIRED REVISIONS</u></b>				
<b>ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)</b>				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Ch. 4, Section 4.2.1, p. 4.7 Section 4.2.3, p. 4.18	X		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Ch.5, Section 5.3.1, p. 5.5-5.7	X		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Ch. 5, Sections 5.2, 5.2.1, 5.3.1, 5.3.2, pp. 5.3-5.12	X		
<b><u>ELEMENT D: REQUIRED REVISIONS</u></b>				
<b>ELEMENT E. PLAN ADOPTION</b>				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	NA	NA		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Chapter 6 Appendix E	X		
<b><u>ELEMENT E: REQUIRED REVISIONS</u></b>				
<b>ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)</b>				
F1.				



<b>REGULATION CHECKLIST</b>		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
F2.				
<b><u>ELEMENT F: REQUIRED REVISIONS</u></b>				

**SECTION 3:  
PLAN ASSESSMENT**

**A. Plan Strengths and Opportunities for Improvement**

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

**Element A: Planning Process**

**State:**

Strengths: (1) Great discussion of the process overall and how each jurisdiction participated in the HIRA development and Mitigation Strategy. (2) The community also had a very strong stakeholder group. (3) Very good effort and description of how the planning team invited neighboring jurisdictions to the process and kept them updated throughout. (4) The communities have done a very good job of integrating their HMP with other planning efforts and policies to take a holistic view towards hazard mitigation.

**FEMA:**

Strength: Great use of social media to engage the public and use of online resources to distribute the hazard survey.

Opportunity: Consider increasing outreach to residents in the unincorporated areas of Archuleta County. While significant work was done to meet with people within Pagosa Springs, approximately 75% of the county’s population reside outside of the town. Perhaps several smaller public meetings scattered around the county could provide a fuller understanding of resident awareness of hazard risk.

**Element B: Hazard Identification and Risk Assessment**

**State:**

Strength: The Planning Team did a great job in creating a focused and concise vulnerability assessment that will help the community prioritize mitigation efforts. Also, the HIRA included an excellent discussion of the impacts of Climate Change and Public Health on the community.

**FEMA:**

Opportunity: Considering aggregating historic events into one table. The Flood profile, for example, lists significant events in one table and then SHELDUS events in another. While most events appear in both, some do not. The hazard profile may be better served having one comprehensive list of past events.

Opportunity: Attaching an appendix to the report which catalogues all events, whether they resulted in fatalities, injuries, or property/crop losses could be useful in framing a more accurate risk to the County and its citizens.

Opportunity: Since a large percentage of the county's building stock is residential with many properties being second homes, consider including this demographic makeup in the county's profile and risk assessment. Second homes create unique risks including seasonal occupancy and no mortgages/no mandatory flood insurance.

Opportunity: Consider adding the Richter or Moment Magnitude Scale into the Earthquake profile. While the intensity scale is useful, the profile also mentions these other rankings which may be confusing to a reader without a reference table.

### **Element C: Mitigation Strategy**

#### **FEMA:**

Strength: Excellent discussion of mitigation efforts since the previous plan. Splitting new actions by jurisdiction presents each community's strategy in a clear and succinct manner.

Opportunity: All new ideas included on the mitigation actions table are wildfire related. Often mitigation plan risk assessments reflect the most recent hazard events as they are freshest in participants minds. While important, don't lose sight of other vulnerabilities such as flooding.

Opportunity: NFIP and flood mitigation actions are ranked low in the resident survey. This may be due to recent droughts and minimal flooding events. Please do not lose sight that flooding can happen anytime, anywhere and that flood mitigation should remain a priority at all times.

Opportunity: A number of the actions provided in the mitigation strategy are response related activities, or continuing activities. Activities that include terms like continue, encourage, evaluate, etc. may be more indicative of a capability, and likely do not represent a mitigation action.

### **Element D: Plan Review, Evaluation, and Implementation (Plan Updates Only)**

Strength: The Hazard Mitigation Planning Council (HMPC) will be folded into the Archuleta County Multi-Agency Coordination (MAC) group. This preexisting entity should have the resources available to ensure an annual mitigation plan update cycle as well as awareness of mitigation funding opportunities.

### **B. Resources for Implementing Your Approved Plan**

**FEMA Fire Prevention and Safety Grants.** The Fire Prevention and Safety Grants (FP&S) are part of the Assistance to Firefighters Grants, and are administered by the FEMA. FP&S Grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death. Eligibility includes fire departments, national, regional, state, and local organizations, Native American tribal organizations, and/or community organizations recognized for their experience and expertise in fire prevention and safety programs and activities. Private non-profit and public organizations are also eligible. Interested applicants are advised to check the website periodically for announcements of

grant availability. More information: <https://www.fema.gov/welcome-assistance-firefighters-grant-program>

**Community Planning Assistance for Wildfire.** Established in 2015 by Headwaters Economics and Wildfire Planning International, Community Planning Assistance for Wildfire (CPAW) works with communities to reduce wildfire risks through improved land use planning. CPAW is a grant-funded program providing communities with professional assistance from foresters, planners, economists and wildfire risk modelers to integrate wildfire mitigation into the development planning process. All services and recommendations are site-specific and come at no cost to the community. More information: <http://planningforwildfire.org/what-we-do/>

**Urban and Community Forestry (UCF) Program.** A cooperative program of the U.S. Forest Service that focuses on the stewardship of urban natural resources. With 80 percent of the nation's population in urban areas, there are strong environmental, social, and economic cases to be made for the conservation of green spaces to guide growth and revitalize city centers and older suburbs. UCF responds to the needs of urban areas by maintaining, restoring, and improving urban forest ecosystems on more than 70 million acres. Through these efforts the program encourages and promotes the creation of healthier, more livable urban environments across the nation. These grant programs are focused on issues and landscapes of national importance and prioritized through state and regional assessments. Information: <http://www.fs.fed.us/managing-land/urban-forests/ucf>

**Western Wildland Urban Interface Grants.** The National Fire Plan (NFP) is a long-term strategy for reducing the effects of catastrophic wildfires throughout the nation. The Division of Forestry's NFP Program is implemented within the Division's Fire and Aviation Program through the existing USDA Forest Service, State & Private Forestry, State Fire Assistance Program.

Congress has provided increased funding assistance to states through the U.S. Forest Service State and Private Forestry programs since 2001. The focus of much of this additional funding was mitigating risk in WUI areas. In the West, the State Fire Assistance funding is available and awarded through a competitive process with emphasis on hazard fuel reduction, information and education, and community and homeowner action. This portion of the National Fire Plan was developed to assist interface communities manage the unique hazards they find around them. Long-term solutions to interface challenges require informing and educating people who live in these areas about what they and their local organizations can do to mitigate these hazards.

The 10-Year Comprehensive Strategy focuses on assisting people and communities in the WUI to moderate the threat of catastrophic fire through the four broad goals of improving prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance. The Western States Wildland Urban Interface Grant may be used to apply for financial assistance towards hazardous fuels and educational projects within the four goals of: improved prevention, reduction of hazardous fuels, restoration of fire-adapted ecosystems and promotion of community assistance. Information: <https://www.westernforesters.org/sites/default/files/2017-WUI-Applications-Instructions-and-Criteria-CLEAN-COPY-002b.pdf>

**U.S. Fish & Wildlife Service, Rural Fire Assistance Grants.** Each year, the U.S. Fish & Wildlife Service (FWS) provides Rural Fire Assistance (RFA) grants to neighboring community fire departments to enhance local wildfire protection, purchase equipment, and train volunteer firefighters. Service fire staff also assist directly with community projects. These efforts reduce the risk to human life and better permit FWS firefighters to interact and work with community fire organizations when fighting wildfires. The Department of the Interior (DOI) receives an appropriated budget each year for an RFA grant program. The maximum award per grant is \$20,000. The [DOI assistance program](http://www.fws.gov/fire/living_with_fire/rural_fire_assistance.shtml) targets rural and volunteer fire departments that routinely help fight fire on or near DOI lands. More information: [http://www.fws.gov/fire/living\\_with\\_fire/rural\\_fire\\_assistance.shtml](http://www.fws.gov/fire/living_with_fire/rural_fire_assistance.shtml)

**U.S. Bureau of Land Management, Community Assistance Program.** BLM provides funds to communities through assistance agreements to complete mitigation projects, education and planning within the WUI. More information: [http://www.blm.gov/nifc/st/en/prog/fire/community\\_assistance.html](http://www.blm.gov/nifc/st/en/prog/fire/community_assistance.html)

**Fire Management Assistance Program.** This program is authorized under Section 420 of the Stafford Act. It allows for the mitigation, management, and control of fires burning on publicly or privately owned forest or grasslands that threaten destruction that would constitute a major disaster. More information: <http://www.fema.gov/fire-management-assistance-grant-program>

**NOAA Office of Education Grants.** The Office of Education supports formal, informal and non-formal education projects and programs through competitively awarded grants and cooperative agreements to a variety of educational institutions and organizations in the United States. More information: <http://www.noaa.gov/office-education/grants>

**NRCS Environmental Quality Incentives Program (EQIP).** The Environmental Quality Incentives Program, administered through the NRCS, is a cost-share program that provides financial and technical assistance to agricultural producers to plan and implement conservation practices that improve soil, water, plant, animal, air and related natural resources on agricultural land and non-industrial private forestland. Owners of land in agricultural or forest production or persons who are engaged in livestock, agricultural or forest production on eligible land and that have a natural resource concern on that land may apply to participate in EQIP. Eligible land includes cropland, rangeland, pastureland, non-industrial private forestland and other farm or ranch lands. EQIP is another funding mechanism for landowner fuel reduction projects. More information: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/>

**U.S. Department of Agriculture, Community Facilities Loans and Grants.** Provides grants (and loans) to cities, counties, states and other public entities to improve community facilities for essential services to rural residents. Projects can include fire and rescue services; funds have been provided to purchase fire-fighting equipment for rural areas. No match is required. More information: [http://www.usda.gov/wps/portal/usda/usdahome?navid=GRANTS\\_LOANS](http://www.usda.gov/wps/portal/usda/usdahome?navid=GRANTS_LOANS)

**Community Development Block Grants (CDBG).** The U.S. Department of Commerce administers the CDBG program which are intended to provide low and moderate-income households with viable communities, including decent housing, as suitable living environment, and expanded economic

opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during the times of “urgent need” (e.g. post disaster) as defined by the CDBG National Objectives, CDBG funding may be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. CDBG funds can be used to match FEMA grants. More Information:

<http://www.hud.gov/offices/cpd/communitydevelopment/programs/>

**FEMA: Building Science.** The Building Science branch develops and produces multi-hazard mitigation publications, guidance materials, tools, technical bulletins, and recovery advisories that incorporate the most up-to-date building codes, floodproofing requirements, seismic design standards, and wind design requirements for new construction and the repair of existing buildings. To learn more, visit:

<https://www.fema.gov/building-science>

**EPA: Smart Growth in Small Towns and Rural Communities.** EPA has consolidated resources just for small towns and rural communities to help them achieve their goals for growth and development while maintaining their distinctive rural character. To learn more, visit:

<https://www.epa.gov/smartgrowth/smart-growth-small-towns-and-rural-communities>

**EPA: Hazard Mitigation for Natural Disasters: A Starter Guide for Water and Wastewater Utilities.**

The EPA released guidance on how to mitigate natural disasters specifically for water and wastewater utilities. For more information,

visit: <https://www.epa.gov/waterutilityresponse/hazard-mitigation-natural-disasters>

**STAR Community Rating System.** Consider measuring your mitigation success by participating in the STAR Community Rating System. Local leaders can use the STAR Community Rating System to assess how sustainable they are, set goals for moving ahead and measure progress along the way.

To get started, go to <http://www.starcommunities.org/get-started>

**Beyond the Basics: Best Practices in Local Mitigation Planning.** The product of a 5-year research study where the Coastal Hazards Center and the Center for Sustainable Community Design analyzed local mitigation plans to assess their content and quality. The website features numerous examples and best practices that were drawn from the analyzed plans. Visit: <http://mitigationguide.org/>

**Flood Economics.** The Economist Intelligence Unit analyzed case studies and state-level mitigation data in order to gain a better understanding of the economic imperatives for investment in flood mitigation. To learn more, visit: <http://floodeconomics.com/>

**Headwaters Economics.** Headwaters Economics is an independent, nonprofit research group that works to improve community development and land management decisions in the West. To learn more, visit: <https://headwaterseconomics.org/>

**RESOLUTION NO. 2018 – 35**

**A RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF ARCHULETA COUNTY, COLORADO, ADOPTING THE MULTI-HAZARD MITIGATION PLAN**

**WHEREAS**, pursuant to C.R.S. §§ 30-11-101(1)(d), 30-11-103, and 30-11-107(1)(a), the Board of County Commissioners of Archuleta County, Colorado, has the legislative authority to manage the business and concerns of the County to ensure the welfare and interest of the County and its inhabitants; and

**WHEREAS**, the County recognizes the threat natural emergencies pose to the citizens of the County and that undertaking emergency mitigations and response actions will reduce the potential for harm to citizens and property in the County; and

**WHEREAS**, the Archuleta County Emergency Management Office has prepared the Multi-Hazard Mitigation Plan to develop strategies to mitigate the emergency; and

**WHEREAS**, adoption by the Board of County Commissioners of Archuleta County, demonstrates the County's commitment to fulfill the mitigation goals and objectives outlined in the Multi-Hazard Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan; and

**NOW, THEREFORE**, be it resolved that the Board of County Commissioners hereby adopts the Multi-Hazard Mitigation Plan, incorporated into this Resolution by this reference which plan replaces the 2012 Multi-Hazard Mitigation Plan.

**APPROVED AND ADOPTED** this 21<sup>st</sup> day August, 2018 in Pagosa Springs, Archuleta County, Colorado.

ATTEST:

BOARD OF COUNTY COMMISSIONERS  
ARCHULETA COUNTY, COLORADO

*June Madrid, by  
Mary Helminski, by*  
June Madrid, County Clerk *Deputy Clerk*

*Ronnie Maez*  
Ronnie Maez, Vice Chairman



**TOWN OF PAGOSA SPRINGS**

**RESOLUTION 2018-23**

**A RESOLUTION OF THE TOWN OF PAGOSA SPRINGS,  
COLORADO ADOPTING THE ARCHULETA COUNTY MULTI-  
HAZARD MITIGATION PLAN**

WHEREAS, the Town of Pagosa Springs is a home rule municipality duly organized and existing under Article XX of the Colorado Constitution and the Town's home rule charter; and

WHEREAS, the Town of Pagosa Springs with the assistance from Archuleta County Emergency Management Office and its consultant Amec Foster Wheeler and community stakeholders, has gathered information and prepared the Archuleta County Multi-Hazard Mitigation Plan; and,

WHEREAS, the Archuleta County Multi-Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Town of Pagosa Springs is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and,

WHEREAS, the Town of Pagosa Springs has reviewed the Plan and affirms that the Plan will be updated no less than every five years.

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COUNCIL FOR THE TOWN OF PAGOSA SPRINGS, COLORADO, THAT:

1. The Town Council hereby adopts the Archuleta County Multi-Hazard Mitigation Plan as the Town of Pagosa Springs' Multi-Hazard Mitigation Plan and resolves to execute the actions in the Plan.

ADOPTED THIS 4<sup>th</sup> DAY OF September, 2018, BY THE TOWN COUNCIL OF THE TOWN OF PAGOSA SPRINGS, BY A VOTE OF 6 IN FAVOR, 0 AGAINST.

ATTEST:

By: \_\_\_\_\_

April Hessman, Town Clerk



TOWN OF PAGOSA SPRINGS  
TOWN COUNCIL

By: \_\_\_\_\_

Don Volger, Mayor

PAGOSA AREA WATER AND SANITATION DISTRICT

RESOLUTION NO. 2018-04

Resolution to Adopt Multi-Hazard Mitigation Plan

WHEREAS, Archuleta County, with the assistance of amec foster wheeler, has gathered information and prepared the Archuleta County Multi-Hazard Mitigation Plan; and,

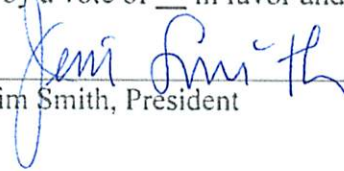
WHEREAS, the Archuleta County Multi-Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and

WHEREAS, Archuleta County is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

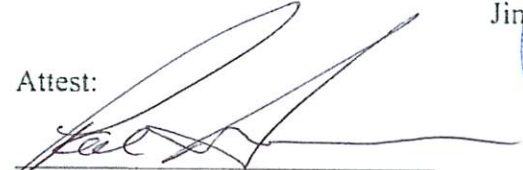
WHEREAS, Archuleta County has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

**NOW, THEREFORE, BE IT RESOLVED** that the Board of Directors of the Pagosa Area Water and Sanitation District shall adopt the Archuleta County Multi-Hazard Mitigation Plan as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan:

Adopted this 16<sup>th</sup> day of August, 2018, by a vote of \_\_ in favor and \_\_ opposed.

  
\_\_\_\_\_  
Jim Smith, President

Attest:

  
\_\_\_\_\_  
Paul Hansen, Treasurer



**Exhibit 1: Adoption Resolution**

**PAGOSA FIRE PROTECTION DISTRICT  
BOARD OF DIRECTORS**

**RESOLUTION**

WHEREAS, Pagosa Fire Protection District, with the assistance from Archuleta County Office of Emergency Management, has gathered information and prepared the Archuleta County Multi-Hazard Mitigation Plan and,

WHEREAS, the Archuleta County Multi-Hazard Mitigation Plan has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,


WHEREAS, Pagosa Fire Protection District is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, Pagosa Fire Protection District Board of Directors has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by Pagosa Fire Protection District Board of Directors that Pagosa Fire Protection District adopts the Archuleta County Multi-Hazard Mitigation Plan as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 9<sup>th</sup> day of October, 2018 at the meeting of the Pagosa Fire Protection District Board of Directors.

*John Thompson*  
Chairman



\_\_\_\_\_  
Pagosa Fire Protection District Board of Directors

## **APPENDIX F: GLOSSARY**

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# APPENDIX F. GLOSSARY

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**AVC:** Animal-Vehicle Collision

**BIA:** Bureau of Indian Affairs

**BLM:** Bureau of Land Management

**CDC:** Centers for Disease Control

**CO DHSEM:** Colorado Division of Homeland Security and Emergency Management

**CDOT:** Colorado Department of Transportation

**CDOW:** Colorado Division of Wildlife

**CGS:** Colorado Geological Survey

**CRHRS:** Colorado Rockfall Hazard Rating System

**CRS:** Community Rating Systemyeah

**CSFS:** Colorado State Forest Service

**CWCB:** Colorado Water Conservation Board

**CWPP:** Community Wildfire Protection Plan

**DFIRM:** Digital Flood Insurance Rate Map

**DMA:** Disaster Mitigation Act

**DWR:** Division of Water Resources

**EAP:** Emergency Action Plan

**EOC:** Emergency Operations Center

**FBFM:** Fire Behavior Fuel Models

**FBI:** Federal Bureau of Investigation

**FEMA:** Federal Emergency Management Agency

**FPD:** Fire Protection District

**FTP:** File Transfer Protocol

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**GIS:** Geographic Information Systems

**HAZUS:** Hazards US

**HAZUS-MH:** Hazards US – Multi-Hazard

**HMGP:** Hazard Mitigation Grant Program

**HMP:** Hazard Mitigation Plan

**HMPC:** Hazard Mitigation Planning Committee

**HPS:** Hantavirus Pulmonary Syndrome

**LEPC:** Local Emergency Planning Committee

**MAC:** Multi-Agency Coordination

**MMI:** Modified Mercalli Intensity (scale)

**NCDC:** National Climatic Data Center

**NEPA:** National Environmental Policy Act

**NFIP:** National Flood Insurance Program

**NOAA:** National Oceanic and Atmospheric Administration

**NWS:** National Weather Service

**PAWSD:** Pagosa Area Water and Sanitation District

**PDM:** Pre-Disaster Mitigation

**PDO:** Property Damage Only

**SBA:** Small Business Administration

**SHELDUS:** Spatial Hazard Events and Losses Database for the United States

**TRI:** Toxics Release Inventory

**USDA:** United States Department of Agriculture

**USFS:** United States Forest Service

**USGS:** United States Geologic Survey

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**WHO:** World Health Organization

**WRCC:** Western Regional Climate Center

**WUI:** Wildland-Urban Interface