City of Santa Fe

Mitigation Plan

December 2020

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EXECUTIVE SUMMARY

The purpose of mitigation is to reduce or eliminate long-term risk to people and property from hazards. The City of Santa Fe developed this Mitigation Plan (MP) to make the City and its residents less vulnerable to future hazard events. This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 so that the City of Santa Fe would be eligible for the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation and Hazard Mitigation Grant programs.

The City followed a planning process aligned with FEMA guidance, which began with the formation of a hazard mitigation planning team (HMPT) comprised of key City representatives, and other regional stakeholders. The HMPT conducted a risk assessment that identified and profiled hazards that pose a risk to the City, assessed the City's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The City is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Wildfires, floods and severe weather are among the hazards that can have a significant impact on the City.

Based on the risk assessment, the HMPT identified goals for reducing the City's vulnerability to hazards. The goals of this mitigation plan are:

Plan Goals:

Goal 1: Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure including the watershed due to hazards.

Goal 2: Reduce possibility of injury and death from hazards.

Goal 3: Promote disaster-resistant development.

Goal 4: Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.

Goal 5: Increase awareness and understanding of risks and opportunities for mitigation among citizens and elected officials.

This plan was originally developed in 2014 and underwent a comprehensive update in 2020.

1.0 INTRODUCTION

1.1 Purpose

The City of Santa Fe prepared this Mitigation Plan (MP) in 2020 to better protect the people and property of the City 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 ensure the City of Santa Fe's eligibility for certain federal disaster assistance; specifically, the FEMA Hazard Mitigation Assistance grants including the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA). Mitigation planning can also earn credits for the National Flood Insurance Program's Community Rating System (CRS) which provides for lower flood insurance premiums in CRS communities.

1.2 Background & Scope

Each year in the United States, natural 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 incurred by insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable and much of the damage caused by these events can be reduced 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 $1 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). An update to this report in 2017 (Natural Hazard Mitigation Saves: 2017 Interim Report) indicates that mitigation grants funded through select federal government agencies, on average, can save the nation $6 in future disaster costs for every $1 spent on hazard mitigation.

Mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. This plan documents the City of Santa Fe's mitigation planning process and identifies relevant hazards and vulnerabilities and strategies the City will use to decrease vulnerability and increase resiliency and sustainability in the community.

This plan was prepared 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 (DMA) or DMA 2000.) 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 the City 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). This planning effort also follows FEMA's Local Mitigation Planning Handbook (March 2013). Because the City of Santa Fe's Planning Area is subject to many kinds of hazards, access to FEMA's Hazard Mitigation Assistance 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 communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. This plan is a single-jurisdictional plan that includes the incorporated areas of the City of Santa Fe.

The planning area has been affected by hazards in the past and is thus committed to reducing future impacts from hazard events and establishing eligibility for mitigation-related federal funding.

1.3 Plan Organization

The City of Santa Fe's Local Hazard Mitigation Plan is organized as follows:

- Chapter 1: Introduction
- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Hazard Identification and Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption
- Chapter 7: Plan Implementation and Maintenance

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- Annex A Human Caused Hazards

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- Appendix A: Hazard Mitigation Planning Team
- Appendix B: Planning Process Documentation
- Appendix C: Adoption

2.0 COMMUNITY PROFILE

The City of Santa Fe is located in central Santa Fe County and is the oldest state capital and the second oldest city in the United States. History of the area dates back to c.1050-1150 AD with historic remnants of Pueblo Indian settlements being found in the modern City of Santa Fe. Spanish settlers made efforts to colonize the area in 1573 establishing the region as a province of New Spain. New Mexico's second Spanish Governor, Don Pedro de Peralta, founded the provincial capital of La Villa Real de la Santa Fe de San Francisco de Asisi (which later became shortened to Santa Fe) in 1610. In modern history, the City of Santa Fe is a charter city with a mayor-council system.

The City of Santa Fe is known for its Pueblo-style architecture and being a center for arts and culture. In 2005, Santa Fe was the first U.S. city to be chosen by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a Creative City, one of only nine cities in the world to have the designation.

2.1 Geography and Climate

The City of Santa Fe city limits comprise of 53 square miles and is bounded by the Sangre de Cristo Mountains to the east, Interstate 25 to the south and the Municipal Airport and State Highway 599 to the west. At 7,000 feet above sea level, the City is the highest state capital in the United States.

Santa Fe's climate is considered high desert; with low humidity, warm summer days and cool summer nights. The City averages 300 sunny days in a year and has four distinct seasons. The City experiences a 2-month rainy season, known as the "monsoon" season. The monsoon season brings predictable afternoon rainstorms throughout the months of July and August. The average maximum temperature in Santa Fe is 65°F with July being the warmest month on average. The average low temperature is 37°F and December is the coldest month.

2.2 Land Use

The City covers approximately 33,610 acres, of which nearly 78% is developed with the remaining 22% vacant. The dominant land use in the City is residential single-family, which accounts for nearly 40% of the total land area. The City's Land Use and Urban Design Plan (2017) notes that while there is a large amount of vacant land in City, the 2,233 acres owned by the City comprised of the Northwest Quadrant would require substantial public investment to develop the land. The City's land use distribution as of 2017 is shown in Table 2-1.

Population density per square mile of land area was 1,560 persons per square mile in the 2010 Census. As shown in Figure 2-1 the greatest density is in the western and central portions of the City.

Table 2-1 City of Santa Fe Land Use Distribution (as of 2017)

Land Use	Acres	% of Total Area
Residential - Single Family	12,793	38%
Vacant - Privately Owned	5,303	16%
Public ROW	4,502	14%
Vacant - Publicly Owned	2,233	6%
Commercial (Retail & Office)	1,955	6%
Airport	1,643	5%
Industrial/Warehousing	1,331	4%
Parks/Open Space	1,407	4%
Residential - Multi-Family	1,384	4%
Institutional	1,059	3%
Total	**33,610**	**100%**

Source: City of Santa Fe Land Use and Urban Design Plan, 2017

Figure 2-1 City of Santa Fe Planning Area

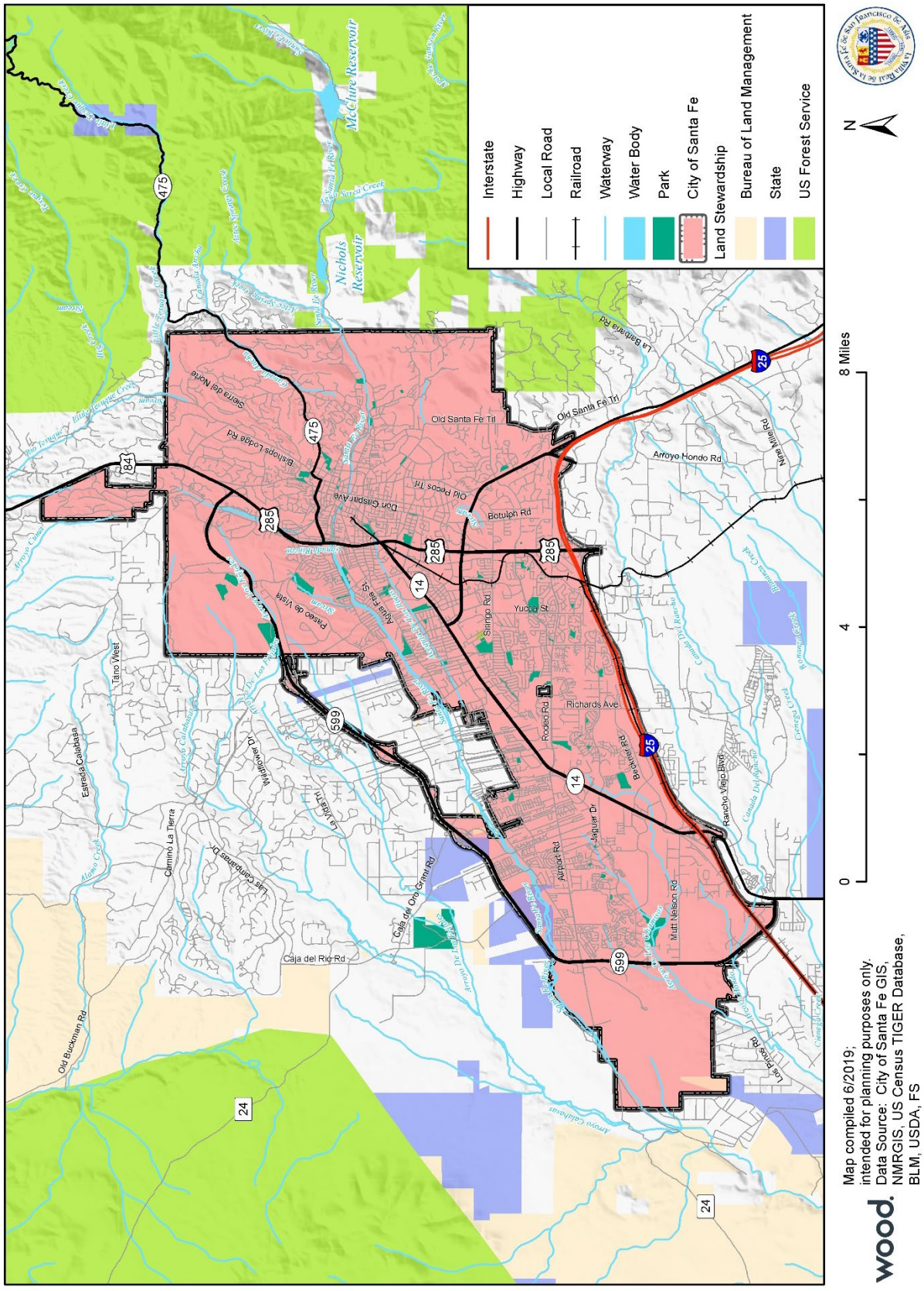
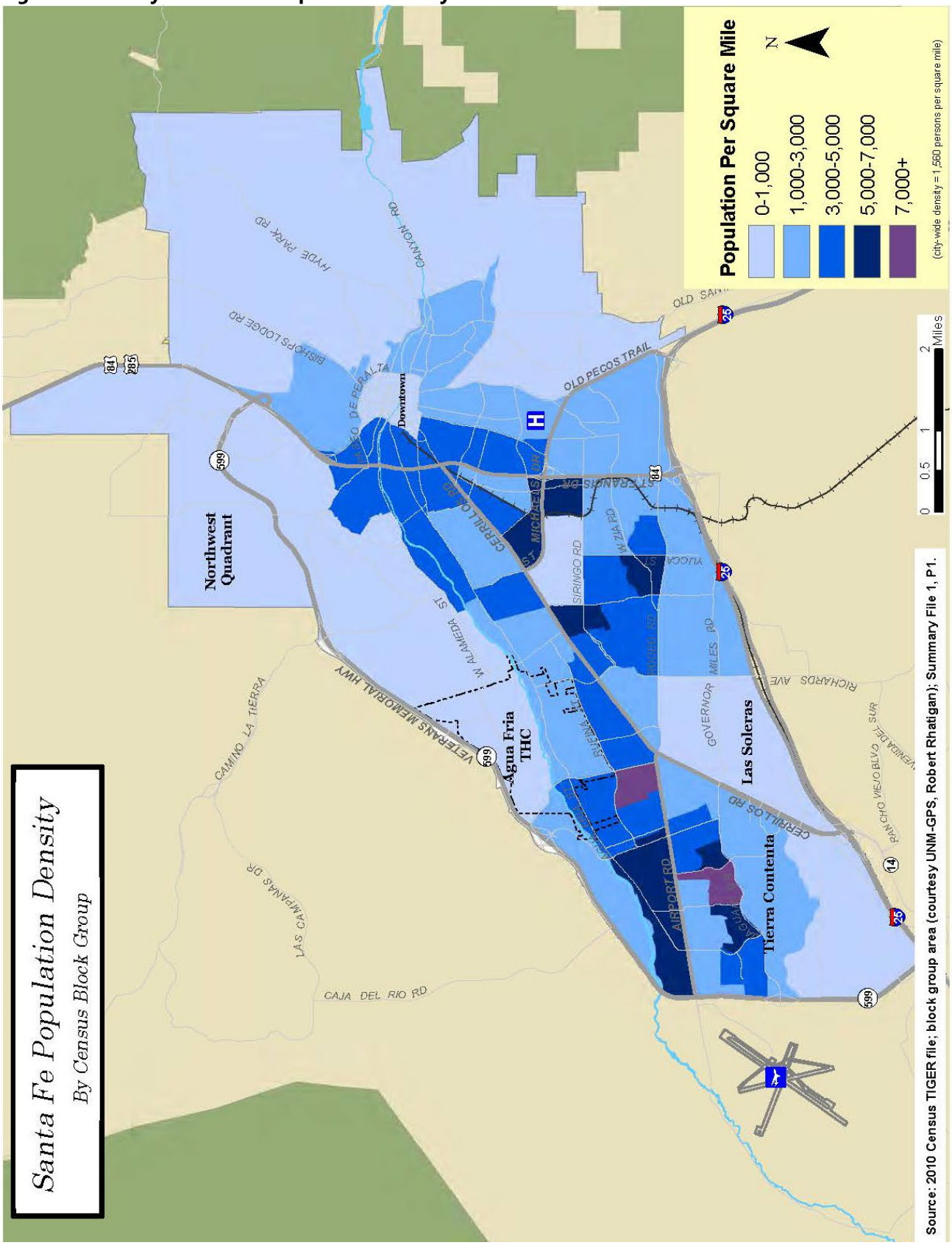


Figure 2-2 City of Santa Fe Population Density



2.3 History

The City of Santa Fe has been a center for commerce for over 400 years. The history of the City can be divided into five periods.

Preconquest and Founding (1050 – 1607) — The area that is today Santa Fe was originally occupied by Pueblo Indians. Archaeologists have found evidence of remains that date back between 1050 and 1150.

Established as a provincial capital of New Spain in 1610 the city's central downtown plaza and surrounding streets were laid out as evidence of Spain's King Phillip II decree.

Settlement Revolt and Reconquest (1607 – 1692) — Early 17th century, Spanish officials and Franciscan missionaries sought to convert Pueblo Indians in the region. By 1680 Pueblo Indians revolted against the Spanish burning many of the buildings in Santa Fe, killing several and pushing others back into Mexico. Santa Fe was occupied by Pueblo Indians until 1692 when the Spanish reconquered the region.

Established Spanish Empire (1692 – 1821) — Santa Fe continued to grow and prosper as a city. Spanish policy at this time was a closed empire restricting trade to the Americans, British, and French.

The Mexican Period (1821 – 1846) — In 1821 New Spain (Mexico) became independent from Spain and shortly after the 1,000-mile-long Santa Fe Trail was established.

Territorial Period (1846 – 1912) — August 1846 in the midst of the Mexican American War, the Americans captured Santa Fe. In 1848 the Treaty of Guadalupe Hidalgo was signed ceding New Mexico and California to the United States. By 1880 the Santa Fe Railroad was established helping to lead New Mexico and Santa Fe into an economic revolution. In 1912 New Mexico gained statehood making the City of Santa Fe the oldest state capital in the United States.

2.4 Demographics

Comprehensive data on the demographics of the City of Santa Fe was obtained from the U.S. Census Bureau's American Community Survey (ACS) five-year estimates (2013-2017).

2.4.1 Population

According to the American Community Survey estimates, the City of Santa Fe population in 2017 was 82,980, an 18 percent increase from 67,947 in 2010. The City's population is aging while also becoming more diverse. Between 2010 and 2017 individuals who identify as Hispanic or Latino increased by 6 percent, while the population that identifies as White decreased by nearly the same amount of 6.2 percent. Individuals 65 years and older experienced the greatest increase from 2010, a trend that is projected to continue. Refer to subsection 2.4.2 Age for additional information.

Table 2-2 City of Santa Fe's Demographic and Social Characteristics, 2017

Characteristic	
Total Population	82,980
Gender/Age	
Median Age	43
Male, percentage	48%
Female, percentage	52%
Under 5 Years, percentage	4.8%
Under 18 Years, percentage	20%

Characteristic	
65 Years and Over, percentage	20%
Race/Ethnicity	Percentage
White	40%
Hispanic or Latino (Any Race)	55%
Asian	1.3%
Some Other Race	0.2%
Black or African American	0.8%
American Indian/Alaska Native	1.5%
Native Hawaiian and Other Pacific Islander	0.1%
Education	Percentage
High School Graduate or higher	88.2%
Bachelor's Degree or Higher	41.9%

Source: U.S. Census Bureau American Community Survey, 2013-2017, www.census.gov/

2.4.2 Age

The City of Santa Fe's population is older compared to the U.S. and other cities in New Mexico. The City is estimating that this trend will continue; with the senior population estimated to double by the end 2020 averaging 1,000 residents turning 65 each year following. As noted in Table 2-2, the median age in the City is 43 years old as of 2017. As noted above, the greatest increase in population growth has been in the 65 years and older demographic, a trend that is projected to continue through 2030.

The eastern portion of the City is projected to have a 50 percent or more increase in senior population (refer to Figure 4-2). The neighborhoods in this area have steeper terrain and are adjacent to the Santa Fe National Forest. This area is also considered the Wildland Urban Interface being designated as having a high to extreme risk to wildfire based on the City's 2006 Wildland Urban Interface/Wildland Fire Hazard and Risk Analysis. Refer to Section 4.3.6 Wildfire/Wildland Urban Interface for more information on the City's risk and vulnerability to wildfire events.

The U.S. Department of Health and Human Services ePOWER Mapping tool (https://empowermap.hhs.gov/) provides information on Medicare beneficiaries who rely on electricity-dependent medical equipment such as ventilators to live independently in their homes. According to the tool there are 26,832 Medicare Beneficiaries located within the four zip codes that cover the City of Santa Fe: 87501, 87505, 87506, and 87507. Of these individuals, 2,432 are considered electricity dependent and are highly vulnerable to power outages. Zip code 87505 located in the southeast portion of the City including the downtown area, has the most electricity dependent beneficiaries with 808 individuals who require electricity-dependent medical equipment in order to live independently in their own homes.

2.4.3 Housing

Housing tenure for City of Santa Fe was also obtained through ACS and shows the majority of residents live in a home they own. The overall number of housing units in the City as of 2017, has increased to 41,484 units, a 10 percent increase from the 37,200 units in 2010 due to the completion of a phase of the City's annexation plan in 2016. Owner occupied units also saw a 10 percent increase while renter occupied units increased by 6 percent since 2010. Table 2-3 breaks down the differences in housing tenure.

City's annexation plan in 2016. Owner occupied units also saw a 10 percent increase while renter occupied units increased by 6 percent since 2010. Table 2-3 breaks down the differences in housing tenure.

Table 2-3 City of Santa Fe Housing Tenure 2017

Characteristic	Estimates	Percentage
Total Housing Units	41,485	100%
Occupied Housing Units	35,524	86%
Owner Occupied	22,187	62%
Renter Occupied	13,337	38%

Source: U.S. Census Bureau American Community Survey, 2013-2017, www.census.gov/

2.4.4 Income and Poverty

Individual households are commonly expected to use private resources and funds to prepare for, respond to, and recover from disasters. This means that households living in poverty are automatically disadvantaged when confronting natural and human-caused hazards. Households living in poverty may also occupy poorly built or inadequately maintained housing. These housing types may be more susceptible to damage in flood or severe weather events than other types of housing. Further, residents living below the poverty level are less likely to have insurance to compensate for the losses incurred from natural and human-caused disasters.

Table 2-4 City of Santa Fe Comparative Economic Characteristics 2010 vs. 2017

	City of Santa Fe	
Characteristic	2010	2017
Families below Poverty Level	9.9%	10.6%
All People below Poverty Level (under 18 years)	22.2%	22.8%
All People below Poverty Level (18 years and over)	13.0%	13.2%
Median Family Income	$62,347	$64,728
Median (Nonfamily) Household Income	$34,695	$40,610
Per Capita Income	$34,428	$34,371
Population in Labor Force	37,504	42,764
Population Employed*	35,216	40,339
Unemployment	2,288	2,388

Source: U.S. Census Bureau American Community Survey, 2013-2017 *Exclude active duty and armed forces

2.4.5 Economy and Employment

U.S. Census estimates show economic characteristics for the City. These are shown in Table 2-5, Educational services, arts and entertainment and professional services make up the largest sectors of the local economy.

Table 2-5 City of Santa Fe Employment by Industry, 2017

Industry	# Employed	% Employed
Educational services and Health care and social assistance	8,783	22%
Arts, entertainment, and recreation, and accommodation, and food services	6,146	15%
Professional, scientific, and management, and administrative and waste management services	5,530	14%
Retail Trade	5,256	13%
Public Administration	3,854	10%
Other services	2,472	6%
Construction	2,419	6%
Finance, Insurance, Real Estate and rental and leasing	2,374	6%
Transportation and warehousing, and utilities	1,033	3%
Manufacturing	1,030	3%
Information	676	2%
Wholesale Trade	481	1%
Agriculture, Forestry, Fishing, Mining	285	1%
Total	**40,339**	**100%**

Source: U.S. Census Bureau American Community Survey, 2013-2017 www.census.gov/
*Civilian population 16 or older

The following table shows the top 10 major employers in the City of Santa Fe.

Table 2-6 City of Santa Fe Major Employers, 2017

Company	# Employed
State Personnel Office	23,152
Los Alamos National Laboratory	11,300
Santa Fe Public Schools	2,151
CHRISTUS St. Vincent Regional Medical Center	2,150
City of Santa Fe	1,469
Santa Fe County	844
Santa Fe Community College	800
Santa Fe Opera	791
Peters Corporation	518
Santa Fe Ski Company	400

Source: Santa Fe Chamber of Commerce (2017)

3.0 PLANNING PROCESS

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 the City of Santa Fe

The City of Santa Fe originally developed this Mitigation Plan (MP) in 2008. The first update to the plan was completed in 2014, which was subsequently approved by FEMA and adopted by the City in October. The plan underwent a comprehensive update in Spring of 2019 to December 2020 to comply with the five-year update cycle required by the Disaster Mitigation Act of 2000 (DMA 2000). The planning process and update of this plan was originally initiated in the spring of 2019 under the coordination of the City of Santa Fe Office 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. Wood Environment and Infrastructure Solutions (Wood) of Denver, Colorado contracted with the City to provide professional planning services during the development of the original plan. Wood's role was to:

- Assist in establishing a Hazard Mitigation Planning Team (HMPT) as defined by regulations in DMA 2000,
- Meet the DMA 2000 requirements as established by federal regulations and following the Federal Emergency Management Agency's (FEMA) planning guidance,
- Facilitate the entire planning process under the guidance of a professional planner,
- Identify the data requirements that HMPT participants could provide and conduct the research and documentation necessary to augment that data,
- Assist in facilitating the public input process,
- Produce the draft and final plan documents, and
- Coordinate the New Mexico Department of Homeland Security and Emergency Management (DHSEM) and FEMA Region VI plan reviews.
- The development of the plan followed a structured planning process that involved various local government departments and other public and private stakeholders. The planning process is described further in this chapter and documented in Appendix B.

3.1.1 What's New in the Plan Update

DMA 2000 Requirement §201.6(d)(3):	*A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.*

The updated Mitigation Plan (MP) complies with Federal Emergency Management Agency (FEMA) guidance for Local Hazard Mitigation Plans. The update followed the requirements noted in the Disaster Mitigation Act (DMA) of 2000 and FEMA's 2013 Local Hazard Mitigation Planning Handbook.

This MP update involved a comprehensive review and update of each chapter of the 2014 plan and includes an assessment of the progress in evaluating, monitoring, and implementing the mitigation strategy outlined in the initial plan. As part of this plan update, all chapters of the plan were reviewed and updated to reflect new data on hazards and risk, risk analysis processes, capabilities, participating stakeholders, and mitigation strategies. Only the information and data still valid from the 2014 plan was carried forward as applicable into this MP update. One change to the hazard identification and risk assessment (HIRA) was to move the human caused hazards into an annex (Annex A). New to the 2020 plan update was the addition of climate change considerations within each hazard profile, particularly in areas where the frequency and intensity of hazards might change in the future. The hazards addressed in the plan also changed, as described in more detail in Chapter 4 Risk Assessment.

3.1.2 2014 Plan Section Review and Analysis

During the 2020 update process, the HMPT updated each chapter of the previously approved plan to include new information and improve the organization and formatting of the plan's contents. The HMPT and Wood analyzed each chapter using FEMA's local plan update guidance to ensure that the plan met the latest requirements. Upon review the HMPT and Wood determined that nearly every chapter 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 changed to align the plan with modern hazard mitigation planning practices. The Risk Assessment in Chapter 4 was substantially revised to incorporate recent events and expand on information, including a GIS-based risk assessment. The Mitigation Strategy in Chapter 5 has been updated to reflect current priorities and mitigation actions moving forward from the 2014 plan. The following table details the review and revision process for the 2020 update process.

Table 3-1 2020 Plan Update Summary of Changes by Section

2014 Plan Section	2020 Plan Section	Update Review and Analysis
Preamble materials	Executive Summary	• Updated Executive Summary • Plan Adoption resolutions moved to Section 6
1.0 Introduction and Community Profile	1 Introduction	• Updated language to describe purpose and requirements of the City of Santa Fe Local Mitigation Plan update process. • Updated summary of changes • Described and document the planning process for the 2020 update, including coordination among agencies and integration with other planning efforts.
2.0 Hazard Identification and Risk Assessment	2 Community Profile	• Moved from the Introduction into a separate chapter • Updated Census data, and current economy description, including the results of any recent annexations.
3.0 Vulnerability Assessment	3 Planning Process	• Updated summary of changes. • Described 2020 public participation process.
4.0 Goals, Objectives and Mitigation Actions	4 Hazard Identification and Risk Assessment and Vulnerability Assessment	• Revisited 2014 hazards list for possible modifications. • Reviewed hazards from current New Mexico State Hazard Mitigation Plan and Santa Fe County HMP for consistency. • Split human-caused hazards into separate profiles. • Updated list of disaster declarations to include 2014-2020 data. • Updated hazards data to include 2014-2020 data. • Updated past occurrences for each hazard to include 2014-2020 data. • Incorporated new hazard studies since 2014 and/or CWPPs/wildfire risk mapping. • Considered consequences of climate change on hazard frequency and severity • Updated critical facilities data from the 2014 plan • Provided replacement cost details to critical facilities, as data permits. • Updated growth and development trends to include Census data, state, county, and local data sources. • Updated historic and cultural resources using New Mexico State Historic Preservation Division and other local/state/national sources. • Used 2019 Assessor's data, update current property values. • Estimated flood losses using the latest flood hazard mapping and building counts and values. • Updated NFIP data and Repetitive Loss structure data from the previous plan. • Incorporated new hazard loss estimates since 2014, as applicable. • Changes in growth and development were examined; especially changes in the context of hazard-prone areas and how the changes may affect loss estimates and vulnerability. • Conducted a Hazus-MH Level I earthquake vulnerability analysis. • Updated information regarding specific vulnerabilities to hazards, including maps and tables of specific assets at risk, specific critical facilities at risk, and specific populations at risk • Updated maps in plan where appropriate.

2014 Plan Section	2020 Plan Section	Update Review and Analysis
		• Reviewed City mitigation capabilities and update to reflect current capabilities. • Develop and distribute Data Collection Guide for a more robust capability assessment. • Indicate projects that have been implemented that may reduce previously identified vulnerabilities
5.0 Mitigation Plan and Implementation Strategy	5 Mitigation Plan	• Moved section on goals, objectives to be together in the Mitigation Strategy Chapter • Updated goals based on the results of the updated risk assessment, completed mitigation actions, and implementation obstacles and opportunities over the last five years. • Reviewed goals and objectives to determine if they are still representative of the City's mitigation strategy. If necessary, form new goals and objectives or revise existing ones. • Reviewed mitigation actions from the 2014 plan and develop a status report for each; identify if action has been completed, deleted, or deferred. • Identified and detail new mitigation actions not captured in the previous plan. • Identified projects that have been submitted for funding and those that will be likely candidates for this funding
	6 Adoption	• Moved from Preamble • Includes 2020 plan adoption resolution: City of Santa Fe, New Mexico Mitigation Plan Adoption Resolution
	7 Implementation and Maintenance	• Reviewed and update procedures for monitoring, evaluating, and updating the plan. • Revised to reflect current methods. • Revised to note opportunities for integration in future planning efforts • Updated the system for monitoring progress of mitigation activities by identifying additional criteria for plan monitoring and maintenance.
	Annex	• Annex A – Human Caused Hazards
Appendices Appendix A – Agendas, Meeting Minutes and Invite Letter Appendix B – Public Meetings and Advertisements Appendix C – Hazard Assessment Forms Appendix D – City of Santa Fe Floodplain Maps Appendix E – STAPLE+E Forms Appendix F – References	Appendices	• Appendix A –Hazard Mitigation Planning Team • Appendix B – Planning Process Documentation • Appendix C – Local Adoption

3.2 Local Government Participation

This mitigation plan is a single-jurisdictional plan that covers the City of Santa Fe. The DMA planning regulations and guidance stress that local governments 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 Team (HMPT);
- Detail areas within the planning area where the risk differs from that facing the entire area;
- Identify potential mitigation actions to be eligible for funding; and
- Formally adopt the plan.

For the City of Santa Fe HMPT, "participation" was defined at the outset of the plan as the following:

- Providing facilities for meetings;
- Attending and participating in the HMPT meetings;
- Completing and returning the Wood Data Collection Workbooks;
- Collecting and providing other requested data (as available);
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;
- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the governing board.

In the interest of completing a robust process that would ultimately result in FEMA approval the City met all of these participation requirements. In most cases one or more representatives for each agency attended the HMPT meetings described in Table 3-3 and also brought together department staff to help collect data, identify mitigation actions and implementation strategies, and review and provide data on plan drafts. Appendix B provides additional information and documentation of the planning process.

The City's Emergency Management Director within the Office of Emergency Management (OEM) took the lead on the plan's initial development in 2008, the update process in 2014, as well as in 2020.

3.3 The 10-Step Planning Process

The process for developing the City of Santa Fe Mitigation Plan followed the DMA 2000 planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

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

Into this process, Wood 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 requirements of the Hazard Mitigation Assistance grants (HMA), including Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation program (PDM), Flood Mitigation Assistance (FMA), Community Rating System, and the flood control projects authorized by the U.S. Army Corps of Engineers (USACE). FEMA's March 2013 Local Mitigation Planning Handbook recommends a nine-step process within the four-phase process. Table 3-2 summarizes the four-phase DMA 2000 process, the detailed CRS planning steps and workplan 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 3-2 Mitigation Planning Processes Used to Develop the City of Santa Fe Local Hazard Mitigation Plan

FEMA's 4-Phase DMA Process	Modified 10-Step CRS Process	FEMA Local Mitigation Planning Handbook Tasks
1) Organize Resources		
201.6(c)(1)	1) Organize the Planning Effort	1: Determine the planning area and resources
201.6(b)(1)	2) Involve the Public	2: Build the planning team - 44 CFR 201.6 (C)(1)
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies	3: Create an outreach strategy - 44 CFR 201.6(b)(1)
		4: Review community capabilities - 44 CFR 201.6 (b)(2)&(3)
2) Assess Risks		
201.6(c)(2)(i)	4) Identify the Hazards	5: Conduct a risk assessment - 44 CFR 201.6 (C)(2)(i) 44 CFR 201.6(C)(2)(ii)&(iii)
201.6(c)(2)(ii)	5) Assess the Risks	
3) Develop the Mitigation Plan		
201.6(c)(3)(i)	6) Set Goals	6: Develop a mitigation strategy - 44 CFR 201.6(c)(3)(i); 44 CFR 201(c)(3)(ii) and 44 CFR 201.6(c)(3)(iii)
201.6(c)(3)(ii)	7) Review Possible Activities	
201.6(c)(3)(iii)	8) Draft an Action Plan	
4) Implement the Plan and Monitor Progress		
201.6(c)(5)	9) Adopt the Plan	7: Review and adopt the plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan	8: Keep the plan current
		9: Create a safe and resilient community - 44 CFR 201.6(c)(4)

Phase 1: Organize Resources

Planning Step 1: Organize the Planning Effort

With the City of Santa Fe's commitment to develop the plan, Wood worked with OEM to establish the framework and organization for the process. Organizational efforts were initiated with the City to inform and educate the plan participants of the purpose and need for the citywide mitigation plan. The planning consultant held an initial call to discuss the organizational aspects of this planning process with the City Emergency Management Specialist, who took the lead on this project. Invitations to the kickoff meeting were extended to key City departments and key state partners. Representatives from the City's Emergency Management Coordinating Group (EMCG) were used as a starting point for the invite list, with additional invitations extended as appropriate throughout the planning process. The HMPT was re-established as a result of this effort.

The HMPT was established as a result of this effort, as well as through interest generated through outreach conduced for this project. The HMPT, comprising of key city government and stakeholder

representatives, developed the plan with leadership from City OEM and facilitation by Wood. Representatives from the following City departments participated on the HMPT and the development of the plan:

- Emergency Management
- Land Use
- Parks and Recreation – Recreation Division
- Parks and Recreation – Parks Division
- Community Services
- Human Resources
- Constituent Services
- Tourism
- Public Utilities – Environmental Services Division
- City Attorney's Office
- Finance
- Economic Development
- Water
- Fire
- Police
- Public Works
- ITT

Per the DMA 2000 requirements the Land Use Department has the authority to regulate development and was an active participant in the plan update process. A complete list of participating HMPT representatives for the City is included in Appendix A.

The planning process officially began with a kick-off meeting held on May 7, 2019. The meeting covered the scope of work and an introduction to the DMA planning requirements. Participants were provided with a Data Collection Guide, which included worksheets to facilitate the collection of information necessary to support development of the plan. Using FEMA guidance, Wood designed these worksheets to capture information on past hazard events, identify hazards of concern to the City, quantify values at risk to identified hazards, inventory existing capabilities, and record possible mitigation actions. Copies of Wood's Data Collection Guide for this project are included in Appendix B. The City completed and returned the worksheets to supply Wood information for incorporation into the plan document.

During the planning process, the HMPT communicated through face-to-face meetings, email, and telephone conversations. Draft documents were shared by email.

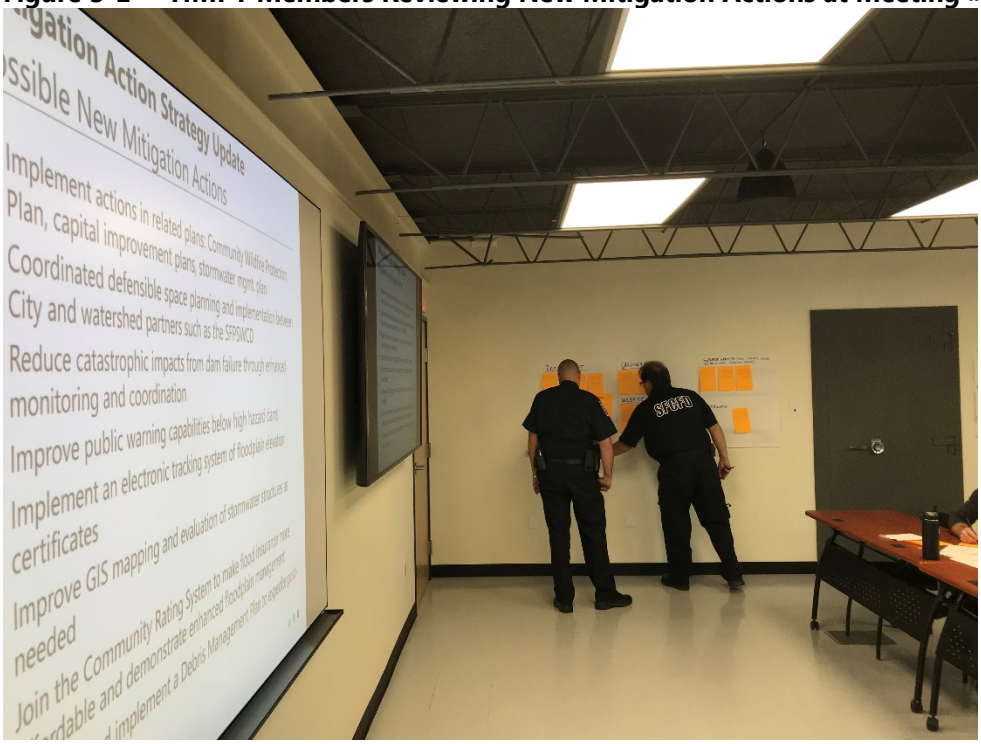
The HMPT held three primary planning meetings during the planning period (May 2019 – September 2019). The purposes of these meetings are described in Table 3-3 and agendas for each of the meetings are included in Appendix B.

Table 3-3 HMPT Meetings

HMPT Meeting	Meeting Topic	Meeting Date
1	Kickoff Meeting: Introduction to DMA Planning and overview of Update Process, Hazard Identification Review from 2014 plan	May 7, 2019
2	Risk Assessment Summary/Goals Development	July 30, 2019
3	Mitigation Strategy Development	September 17, 2019

The following photos were taken at the third meeting, Mitigation Strategy Development, and show members of the HMPT participating in an activity to develop new mitigation actions and beginning to prioritize actions.

Figure 3-1 HMPT Members Reviewing New Mitigation Actions at Meeting #3



Source: Jeff Brislawn

Figure 3-2 HMPT Members Reviewing and Prioritizing New Mitigation Actions at Meeting #3

Source: Jeff Brislawn

Planning Step 2: Involve the Public

Early discussions with City OEM established the initial plan for public and stakeholder involvement. At the planning team kick-off meeting, the HMPT discussed additional strategies for public involvement and agreed to an approach using established public information mechanisms and resources within the community. Public involvement activities for this plan included: posting on City's social media sites such as the OEM Facebook page, press releases; posting noticed on the City's website; collection of results from a public survey; one public workshop and the collection of public and stakeholder comments on the draft plan. Comments from the public survey were reviewed by the HMPT and discussed during the development and prioritization of mitigation projects.

A public workshop was held on September 16, 2019. The meeting notice was also posted on the homepage of the City's website under news and announcements. The City Emergency Management staff and the planning consultant were present, but no members of the public attended. Press releases and the meeting sign in sheet are documented in Appendix B.

Online Public Survey

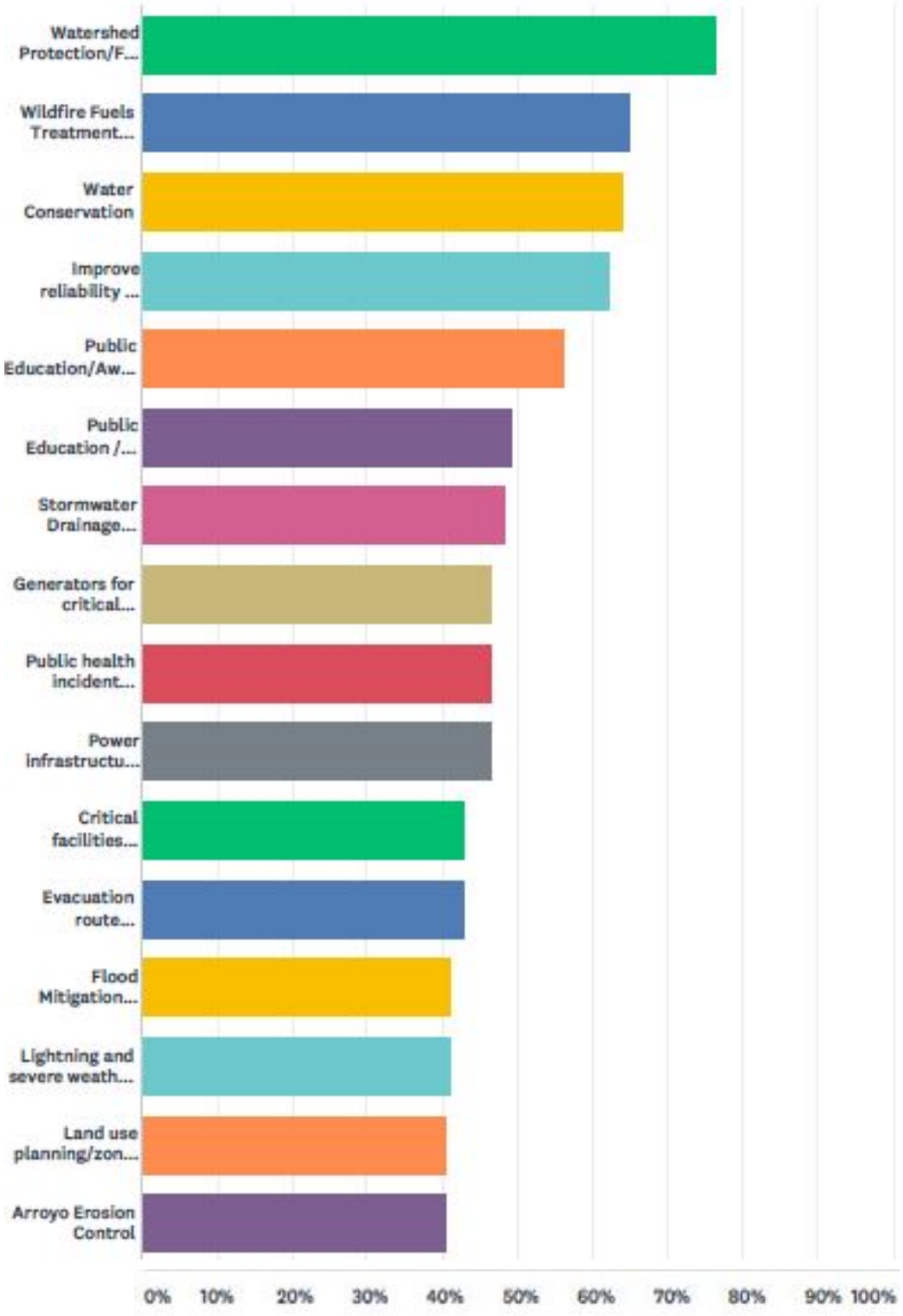
During the plan update's drafting stage, an online public survey was developed as a tool to gather public input. The survey was for the public to provide feedback to the City of Santa Fe HMPT on reducing hazard impacts. The survey provided an opportunity for public input during the planning process, prior to finalization of the plan update. The survey gathered public feedback on concerns about hazards and input on strategies to reduce their impacts. The survey was released on September 4th and closed on October 17th. The HMPT provided links to the public survey by distributing it using social media, email, and posting the link on websites.

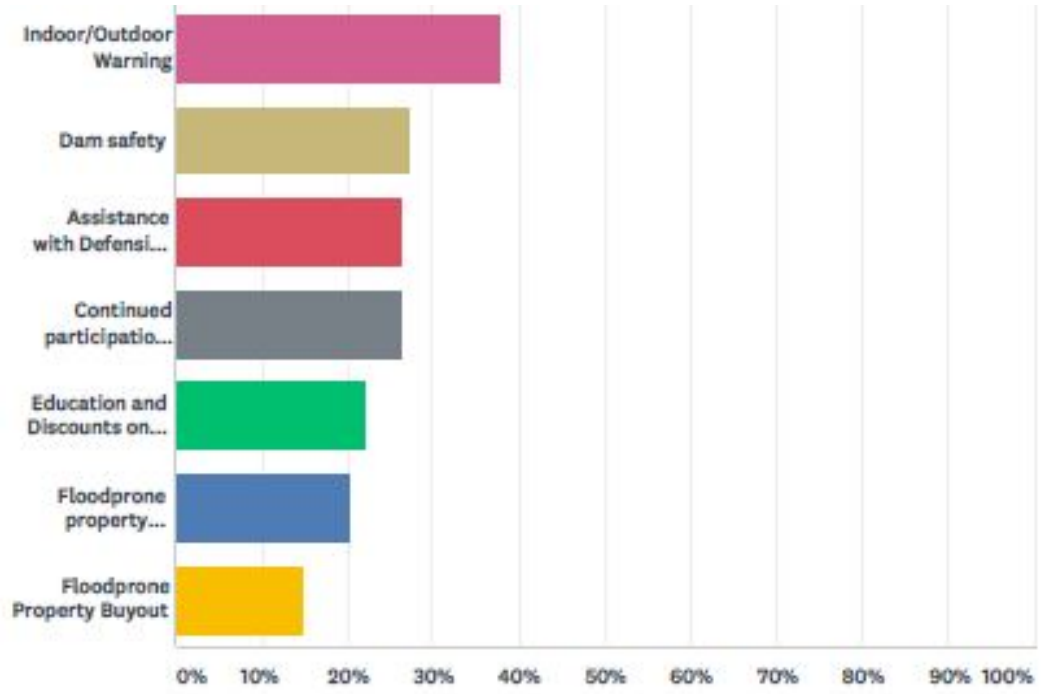
One hundred and eighteen (118) people filled out the survey online. Results showed that the public perceives the most significant hazards to be drought, wildfire, and severe weather (includes: hail, lighting, wind, winter storms, thunderstorms, extreme temperatures). In terms of human caused hazards, the public perceives cyber attacks, active shooters, and hazardous materials release to be the most significant.

Figure 3-3 shows the responses to question 4 of the survey, which solicited the public's opinion on the mitigation actions that should have the highest priority in the updated mitigation plan. Watershed

protection and forest health initiatives, wildfire fuels treatment projects, water conservation, improving the reliability of communications systems, and public education and awareness of hazards were cited as the most popular mitigation actions. This information was shared with the HMPT during the update of the mitigation strategy as a source of potential mitigation ideas. A summary of all the survey data and documentation of the public feedback can be found in Appendix B.

Figure 3-3 Public Survey Responses to Question 4





Stakeholder and public comments and recommendations were considered by the HMPT during the drafting of the final plan, including the sections that address mitigation goals and strategies.

Public Review Process

Prior to finalization of the plan a draft was made available on the City website for a public comment period that spanned March 25 to April 11, 2020. The availability of the public review draft was announced through a press release and on Facebook. An online comment form was posted with the plan to collect feedback. Highlights of the hazard vulnerability assessment including interactive hazard maps, along with a summary of the plan's proposed mitigation actions and link to the plan was posted on the project StoryMap website. The site also allowed the public to report concerns about hazards through a map interface using the ArcGIS Survey123 application.

Eight responses were received in total on the comment form posted with the plan. Seven were from "members of the public" and one from "private industry". Some of the more extensive comments were around concerns for continuity of operations for the city during human caused emergencies, wildfires and snowstorms. Other comments were related to stopping prescribed burns and pile burns during emergencies and limiting firearms and fireworks in vegetated areas. The public review took place during the COVID-19 pandemic and there was a suggestion to create a pandemic annex to the plan to further identify mitigation strategies related to the hazard. Another comment was regarding wanting more information on early warning systems and procedures. A separate email was sent to Santa Fe Office of Emergency Management with comments suggesting highlighting the Santa Fe Fire Department's Ready, Set Go! Brochure, complements on the City's Emergency Management Alert System and Amber Alert System, and suggestions for dam emergency drills and concerns about chlorine gas. Santa Fe Office of Emergency Management considered the input and felt that the early warning systems and procedures was already captured in mitigation actions T-1 and HC-5 in Section 5 of the Mitigation Plan. The recommendations for a pandemic annex will be considered for future updates to the plan.

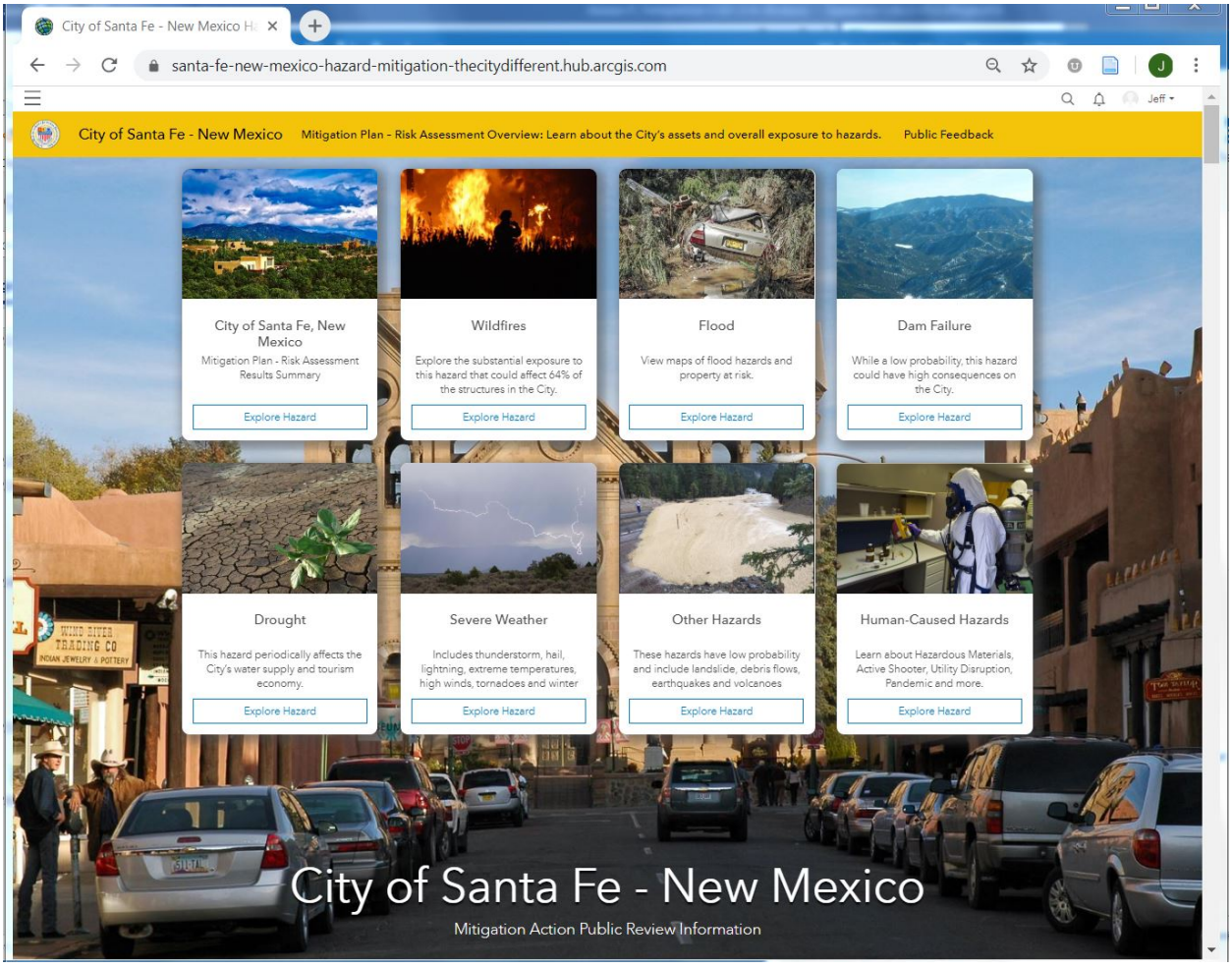
Five comments through the ArcGIS online Survey 123 application. Most of the comments were regarding the maps, including suggestions to add a legend for the wildfire map and have greater details and public

access to the dam failure mapping data. The dam failure inundation, due to the sensitive nature and homeland security concerns, was intentionally more general. None of the comments resulted in changes to the plan, only minor modifications to the StoryMap website. All comments received can be referenced in Appendix B, along with documentation regarding the public review period.

StoryMap

As part of the public outreach strategy for the City of Santa Fe Mitigation Plan Update, a story map was created and placed on the city's website. The StoryMap was created using ArcGIS to summarize the results of the updated risk assessment and used the same hazard and vulnerability maps within the Mitigation Plan. The StoryMap also contains a summary of the hazard mitigation action strategy for quick reference by the public and HMPT.

Figure 3-4 City of Santa Fe Mitigation Plan Story Map



Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPT determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting other local, state and federal agencies and organizations to participate in the process. The following groups were invited to participate or provide input into the planning process based on their involvement in hazard mitigation planning,

mitigation projects, climate resilience and sustainability, knowledge of hazards and/or their interest as a neighboring jurisdiction. Many of these agencies that participated in the HMPT planning meetings. Others reviewed drafts or provided data.

State Agencies

- New Mexico Department of Homeland Security and Emergency Management*
- New Mexico Office of the State Engineer – Dam Safety
- New Mexico Bureau of Minerals and Geology

Local Agencies

- Santa Fe County Emergency Management (neighboring jurisdiction)*
- Los Alamos County Emergency Management (neighboring County)*
- Sandoval County Emergency Management (neighboring County)
- San Miguel County Emergency Management (neighboring County)*

Nonprofit/Other

- Forest Stewards Guild
- Pojoaque Valley Irrigation District/Santa Fe Pojoaque Soil Conservation District (neighboring jurisdiction)*
- Urban Sustainability Directors Network**

*Participated in HMPT meetings. **Provided review comments on draft plan

Coordination with key agencies, organizations, and advisory groups throughout the planning process allowed the HMPT to review common problems, development policies, and mitigation strategies as well as identifying any conflicts or inconsistencies with regional mitigation policies, plans, programs and regulations. Key agencies, organizations and advisory groups often provided a resource of information on potential hazards in the City that informed the Risk and Capability Assessments.

Phone calls and emails were used during plan development to directly coordinate with key individuals representing other agencies or regional programs. The City Emergency Manager also worked as the liaison to this plan and other planning efforts to ensure successful coordination and input with other ongoing plans.

As part of the public review and comment period for the draft plan, key agencies, organizations and advisory groups were again specifically solicited to provide any final input to the draft plan document. This input was solicited both through membership on the HMPT and by direct emails to key groups and associations to review and comment on the plan. Edits and comments from key agencies and stakeholders were integrated into Chapter 4 Risk Assessment.

Other Community Planning Efforts and Hazard Mitigation Activities

The coordination and synchronization with other community planning mechanisms and efforts are vital to the success of this plan. As part of this planning process a thorough evaluation of mitigation practices already in place was conducted. A review of appropriate planning procedures involved identifying and reviewing existing plans, policies, regulations, codes, tools, and other actions that are designed to reduce a community's risk and vulnerability from natural hazards. The City of Santa Fe uses a variety of mechanisms to guide growth and development. Integrating existing planning efforts, mitigation policies, and action strategies into this plan establishes a credible, comprehensive document that weaves the common threads of a community's values together. The development and update of this plan involved a comprehensive review of existing plans, studies, reports, and initiatives from the City of Santa Fe that relate to hazards or mitigation. A high-level summary of the key plans, studies and reports is summarized

in the table below. Information on how they informed the update is noted and incorporated where applicable.

Table 3-4 Incorporated Planning Mechanisms

Plan, Study, Report Name	How Plan informed 2020 Mitigation Plan
City of Santa Fe Hazard Mitigation Plan (2014)	Informed past disaster history and starting point for hazard profiles and vulnerability assessment updates
Santa Fe County Hazard Mitigation Plan (2018)	Informed past disaster history; General background on Planning Area
State of New Mexico Hazard Mitigation Plan (2018)	Informed past disaster history and climate change considerations
National Centers for Environmental Information – Storm Events Database	Informed severe weather hazard profile, including past events and vulnerability assessment
Santa Fe County Assessor parcel data	Informed vulnerability assessments and asset summary
New Mexico Historic Preservation Division	Information on the Division's website informed the asset summary section
City of Santa Fe General Plan (1999)	Informed Community Profile chapter and Capability Assessment; provided information on growth management and land use policies and historic resources
City of Santa Fe Land Use and Design Plan (2018)	Informed Capability Assessment
National Drought Impact Reporter	Informed drought vulnerability assessment
City of Santa Fe Long Range Water Supply Plan (2008)	Informed drought hazard profile
City of Santa Fe Water Conservation and Drought Management Plan (2015)	Informed drought hazard profile
Santa Fe County Flood Insurance Study (FIS) (2012)	Informed flood hazard profile
Western Regional Climate Center	Informed the Severe Weather profile
Confronting Climate Change in New Mexico (2016) - Union of Concerned Scientists	Informed the climate considerations sections of the hazard profiles
City of Santa Fe Wildland Urban Interface Wildland Fire Hazard and Risk Analysis (2006) – Anchor Point	Informed the wildfire hazard profile and vulnerability assessment
2019 Wildfire Risk Report – Core Logic	Informed the wildfire hazard profile and vulnerability assessment
Fourth National Climate Change Assessment (2018)	Informed the climate change considerations for each of the hazard profiles
City of Santa Fe Code of Ordinances	Informed the Capability Assessment and the development of new mitigation actions
City of Santa Fe Comprehensive Emergency Management Plan	Informed the Capability Assessment and Hazard Identification
Right to Know Network data – EPA National Response Center	Informed the hazardous materials accidents hazard profile and vulnerability assessment
City of Santa Fe 2017 Annual Water Report	Informed the drought hazard profile
Santa Fe Basin Study: Adaptations to Projected Changes in Water Supply and Demand (2015)	Informed the drought hazard profile and Capability Assessment
City of Santa Fe Stormwater Management Strategic Plan (2018)	Informed the flood hazard profile
Sustainable Santa Fe 25-Year Plan	Informed the climate change considerations section of the drought hazard profile and Capability Assessment
Santa Fe River and Arroyo de Los Chamisos Modeling Report #100-IWM-737272 (2018) – Tetra Tech	Informed the flood profile and vulnerability assessment

Other technical data, reports, studies, and 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. Information from the following agencies and groups were reviewed in the development and update of this plan. Specific references used in the development of this plan are sourced throughout the document as appropriate.

- New Mexico State Forestry Service
- New Mexico Institute of Mining and Technology
- U.S. Geological Survey
- National Weather Service

Phase 2: Assess Risks

Planning Steps 4: Identify the Hazards

Wood led the HMPT in an effort to review the list of hazards identified in the 2014 plan and document all the hazards that have impacted, or could impact the planning area, including documenting recent drought, flood, wildfire and winter storm events. Data collection worksheets were used in this effort to aid in determining hazards and vulnerabilities and where risk varies across the planning area. The profile of each of these hazards was then updated in 2020 with information from the HMPT and additional sources. Web resources, existing reports and plans, and existing GIS layers were used to compile information about past hazard events and determine the location, previous occurrences, probability of future occurrences, and magnitude/severity of each hazard. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities where data permitted. The potential for climate change to affect the frequency and intensity of the hazards was summarized based on latest available science, where applicable. A more detailed description of the hazard identification and risk assessment process and the results are included in Chapter 4 Risk Assessment.

Planning Steps 5: Assess the Risks

After updating the profiles of the hazards that could affect the City, the HMPT collected information to describe the likely impacts of future hazard events. This step included two parts: a vulnerability assessment and a capability assessment.

Vulnerability Assessment—The vulnerability assessment analyzed assets at risk to natural hazards—including overall exposure and those located in identified hazard areas. These assets included total number and value of structures; critical facilities and infrastructure; natural, historic, and cultural assets; and economic assets. The HMPT also analyzed development trends in hazard areas. The latest DFIRM (2012) was used to refine the estimated flood losses during the update, where available.

Capability Assessment— The HMPT also 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 HMPT can assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. This information for the City is included in Chapter 4. This addressed FEMA planning task 4: Review community capabilities - 44 CFR 201.6 (b)(2) & (3).

Results of the risk assessment were presented, and comments discussed at the second meeting of the HMPT in July 2019.

A more detailed description of the risk assessment process and the results are included in Chapter 4 Risk Assessment.

Phase 3: Develop the Mitigation Plan

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

Wood facilitated brainstorming and discussion sessions with the HMPT that included a description of the purpose and process of developing planning goals, as well as discussion of a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. Additional details of the process to develop goals and actions is included in Chapter 5 Mitigation Strategy. Additional documentation on the process the HMPT used to develop the goals and strategy is in Appendix B.

Planning Step 8: Draft an Action Plan

Based on input from the HMPT regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, Wood produced a complete first draft of the plan. This complete draft was distributed electronically to the HMPT for review and comment. Other agencies were invited to comment on this draft as well. Comments were integrated into a public review draft, which was advertised and distributed to collect public input. Wood integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the NMDHSEM and FEMA Region VI to review and approve prior to final adoption by the Santa Fe City Council.

Phase 4: Implement the Plan and Monitor Progress

Planning Step 9: Adopt the Plan

In order to secure buy-in and officially implement the plan, the plan was adopted by the City of Santa Fe using the sample resolution contained in Appendix C.

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

The true worth of any mitigation plan is in the effectiveness of its implementation. In the previous steps of the planning process the HMPT's efforts have been directed at researching data, gathering information for the plan, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead entity and possible funding sources, to help initiate implementation. An overall implementation strategy is described in Chapter 7 Plan Implementation and Maintenance.

Finally, there are numerous organizations within the City of Santa Fe Planning Area whose goals and interests' interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is key to the ongoing success of this plan and mitigation in the City of Santa Fe and is addressed further in Chapter 7. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Chapter 7.

4.0 RISK ASSESSMENT

DMA 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 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 the City'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 builds upon the methodology described in the 2013 FEMA Local Mitigation Planning Handbook which recommends a four-step process for conducting a risk assessment:

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

In essence, the risk assessment evaluates potential loss from hazards by assessing the vulnerability of the city's population, built environment, critical facilities, and other assets. Data collected through this process has been incorporated into the following sections of this chapter:

Section 4.1: Hazard Identification - Identifies the natural hazards that threaten the Planning Area (City of Santa Fe) and describes why some hazards have been omitted from further consideration.

Section 4.2: Asset Summary - Describes the methodology for determining vulnerability of the Planning Area to the identified hazards.

Section 4.3: Hazard Analysis and Risk Assessment - Discusses the threat to the Planning Area and describes previous occurrences of hazard events and the likelihood of future occurrences (2013 FEMA Local Mitigation Planning Handbook Risk Assessment Step 1). It also includes an assessment of the Planning Areas' exposure to natural hazards; considering assets at risk, critical facilities, and future development trends (2013 FEMA Local Mitigation Planning Handbook Risk Assessment Steps 2, 3 and 4).

Section 4.4: Capability Assessment - inventories existing mitigation activities and policies, regulations, and plans that pertain to mitigation and can affect net vulnerability (2013 FEMA Local Mitigation Planning Handbook Planning Task 4).

4.1 Hazard Identification and Prioritization

DMA 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 first step in developing a risk assessment is identifying the hazards. The City of Santa Fe HMPT conducted a hazard identification process to determine the hazards that threaten the Planning Area. This section details the methodology and results of this effort.

4.1.1 Methodology and Results

Using the City's 2014 Hazard Mitigation Plan, recent hazards data, other related plans and information and input gained through planning and public meetings, the HMPT agreed upon a list of hazards that could affect the City of Santa Fe. Hazards data from the New Mexico Department of Homeland Security and Emergency Management (DHSEM), FEMA, the National Oceanic and Atmospheric Administration (NOAA), a preliminary Santa Fe Threat and Hazard Identification and Risk Assessment (THIRA) and the Santa Fe County's 2018 Hazard Mitigation Plan, as well as many other sources were examined to assess the significance of these hazards to the Planning Area. The hazards assessment builds upon a hazard identification and ranking exercise undertaken by the City's Emergency Management Coordinating Group (EMCG) in 2018. The natural hazards evaluated as part of this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future. Human caused hazards have also been identified and assessed and are contained in a separate annex (Annex A).

In alphabetical order, the following hazards were identified and investigated for the City of Santa Fe Mitigation Plan development; those hazards that are new to the plan in 2020 are identified with an asterisk(*):

Natural Hazards

- Dam Failure*
- Drought
- Flood
- Severe Weather (Thunderstorms, Hail, Lightning, Extreme Temperatures, High Wind, Winter Storms)
- Tornado*
- Wildfire/Wildland Urban Interface

Human Caused Hazards

- Active Shooter*
- CBRNE (Chemical, Biological, Radiation, Nuclear Events)
- Cyber Attack*
- Hazardous Materials Release
- Pipeline Explosion*
- Pandemic Influenza*
- Transportation Accident*
- Utility Disruption*

Other Hazards Considered

Based on discussions at the early planning meetings, the HMPT eliminated the natural hazards below from further considerations in this risk assessment due to a low probability of future occurrences based on a

lack of past events in the City of Santa Fe or based on minimal potential impacts at the time of the plan update to the City.

- Earthquake
- Expansive Soils
- Land Subsidence
- Landslide/Debris Flow
- Volcanoes
- Space Weather

Debris flow hazards have not historically been an issue but are acknowledged to be a potential future hazard should a wildfire burn within the City's watershed. Space weather was profiled in the 2014 Hazard Mitigation Plan but is now considered within the Utility Disruption hazard profile.

Overall Hazard Significance Summary

Members of the HMPT used a hazards worksheet to identify and rate the significance of a variety of possible hazards based on their experience and knowledge of the Planning Area. Overall hazard significance was based on a combination of Geographic Area coverage, Probability of Future Occurrence, and Potential Magnitude/Severity (e.g. Extent) as defined below. Table 4-1 summarizes the results of the risk assessment. The most significant hazards based on the input from the HMPT as well as the results of the updated vulnerability assessment are flood and wildfire. This also generally aligns with public input on hazards collected during the public survey, as described in Section 3.

Table 4-1 The City of Santa Fe Hazard Identification Worksheet

Hazard	Geographic Area	Probability of Future Occurrence	Magnitude/ Severity (Extent)	Overall Significance
Dam Failure	Significant	Occasional	Catastrophic	Medium
Drought	Extensive	Likely	Limited	Medium
Flood	Significant	Likely	Critical	High
Severe Weather: Thunderstorm, Hail, Lightning	Extensive	Highly Likely	Limited	Medium
Severe Weather: High Wind	Extensive	Highly Likely	Limited	Medium
Severe Weather: Extreme Temperatures (cold and heat)	Extensive	Highly Likely	Limited	Medium
Severe Weather: Winter Storms	Extensive	Highly Likely	Limited	Medium
Tornado	Limited	Occasional	Limited	Low
Wildfire/Wildland Urban Interface	Significant	Likely	Catastrophic	High
Active Shooter	Limited	Possible	Limited	Low
CBRNE	Limited	Unlikely	Critical	Low
Cyber Attack	Limited	Likely	Negligible	Low
Hazardous Materials Release	Significant	Likely	Limited	Medium
Pandemic	Extensive	Occasional	Critical	Medium
Pipeline Explosion	Limited	Occasional	Limited	Low
Transportation Accident	Limited	Highly Likely	Negligible	Low
Utility Disruption	Limited	Likely	Negligible	Low

Geographic Area
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
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.

Magnitude/Severity (Extent)
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

4.1.2 Disaster Declaration History

One method to identify hazards based upon past occurrence is to look at what events triggered federal disaster declarations within the Planning Area. Disaster declarations are granted when the severity and magnitude of the event's impact surpass 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 government's capacity is exceeded, a federal disaster declaration may be issued allowing for the provision of federal disaster assistance.

Santa Fe County has experienced five federal disaster declarations, two emergency declarations and one fire suppression authorization since 1973. The City of Santa Fe alone has experienced two federal disaster declarations, one federal emergency disaster declaration and two state emergency declarations. Three of the disaster declarations were associated with severe storms and flooding events and one was associated with a wildfire event. Of the state emergency declarations for the City, one was related to drought and one was for extreme wildfire hazard. Refer to Section 4.3.2 Drought, for discussion related to disaster designations from the US Secretary of Agriculture due to drought for Santa Fe County.

A summary of federal declarations is shown in Table 4-2.

Table 4-2 City of Santa Fe Federal Disaster Declaration History, 1973-2014

Event/ Hazard	Year	Disaster #	Declaration Type	Location
Severe Storms, Snow Melt, Flooding	1973	380	Major	Santa Fe County
Drought	1977	3034	Emergency	Santa Fe County
Flooding	1979	571	Major	Santa Fe County
Flooding	1979	589	Major	Santa Fe County
Drought	1997	3034	State Emergency	City of Santa Fe
Extreme Fire Hazard	1998	3128	State Emergency	City of Santa Fe
Severe Fire Threats	2000	3154	Emergency	City of Santa Fe
Severe Forest Fire	2000	1329	Major	City of Santa Fe
Wildfire - Borrego Fire	2002	2408	Fire Suppression Authorization	Santa Fe County
Severe Storms, Flooding, and Mudslides	2013	4152	Major	City of Santa Fe
Severe Storms and Flooding	2014	4197	Major	Santa Fe County
Severe Storms and Flooding	2014	4199	Major	Santa Fe County

Source: FEMA, 2014 City of Santa Fe MP, 2018 Santa Fe County HMP

4.2 Asset Summary

4.2.1 Assets Exposure

As a starting point for analyzing the Planning Area's vulnerability to identified hazards, the HMPT 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.

4.2.2 Total Assets at Risk

Parcel boundary data was provided by the City of Santa Fe with parcel attributes from the County Assessor's Office and current to March 2019. This data presents an inventory of the total exposure of developed properties within the county. It is important to note that depending on the nature and type of hazard event or disaster, it is generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a total loss, but may see a reduction in value. Thus, the parcel analysis excludes land value.

Building Exposure

Building counts and valuations in this plan are based on data from the City of Santa Fe GIS Department. An address point layer representing structure point locations throughout the City of Santa Fe was provided in GIS. This layer was used in conjunction with the parcel layer to obtain a structure count for each parcel, and to identify those parcels that have improvements on them. Table 4-3 shows a summary of the total property inventory from the Assessor's Office for the County.

Note that this table includes a total of all parcels and 'improved' parcels. For the purposes of this plan improved includes parcels that have an improvement value greater than zero or includes at least one structure point represented in the GIS structure layer. In some cases, exempt properties such as government-owned parcels have no structure value. Thus, the building value is likely understated as a whole, which is a noted limitation. Building value is based on 2020 full market value. Agriculture value was included because of the analysis of agricultural diseases in this plan.

Table 4-3 City of Santa Fe Total Parcel Exposure

Address Point Type (based on Parcel Type)	Address Point Total	Improved Value (based on Parcel Data)	Content Value	Total Value
Commercial	5,707	$16,817,974,576	$16,817,974,576	$33,635,949,152
Common Area	282	$0	--	$0
Open Spaces/Parks	60	$78,530	--	$78,530
US Government	2	$0	--	$0
Exempt	82	$41,080,767	--	$41,080,767
Lot with Mobile Home	666	$3,221,415	$1,610,708	$4,832,123
Multi-Unit Residential	7,097	$41,349,549,539	$20,674,774,770	$62,024,324,309
Single Family Residential	27,216	$6,475,351,242	$3,237,675,621	$9,713,026,863
Residential: Condo	5,782	$1,488,636,412	$744,318,206	$2,232,954,618
Vacant	2,152	$127,017,312	--	$127,017,312
Undetermined	10	$0	--	$0
TOTAL	**49,056**	**$66,302,909,793**	**$41,476,353,880**	**$107,779,263,673**

Source: City of Santa Fe, Santa Fe County Assessor., Wood Plc analysis

Critical Facility Inventory

For the purposes of this plan, a critical facility is defined using FEMA's Community Lifelines construct. FEMA defines lifelines as providing indispensable "service that enable the continuous operations of critical business and government function, and is critical to human health and safety, or economic security". There are seven total lifelines and lifeline components that provide the scope of and parameters for what is included in each lifeline. Examples of each are provided in Table 4-4 and shown in Figure 4-1.

Table 4-4 Critical Facilities Types and Examples Applicable to the City of Santa Fe

Lifeline	Components
Safety and Security	Law Enforcement/Security
	Fire Services
	Community Safety
Food, Water, Sheltering	Water
	Shelter
Health and Medical	Medical Care
	Public Health
Energy	Power (Grid)
Communications	Infrastructure
Transportation	Mass Transit
	Aviation
Hazardous Materials	Facilities
Other	Community Services
	Daycare
	Schools

Source: FEMA

Figure 4-1 FEMA's Community Lifelines

Source: FEMA

A summary of the specific critical lifelines in the Planning Area (the City) can be found in Table 4-5.

Table 4-5 City of Santa Fe Critical Facilities Summary Table

Lifeline	Total
Safety and Security	46
Food/Water/Shelter	39
Health and Medical	30
Energy	4
Communications	110
Transportation	6
Hazardous Materials	9
Other	63
Total	**307**

Source: Wood Plc analysis of City of Santa Fe GIS data

Cultural, Historical, and Natural Resources

Assessing the City of Santa Fe's vulnerability 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.
- In the event of a disaster, an accurate inventory of natural, historical and cultural resources allows for more prudent care in the disaster's immediate aftermath when the potential for additional impacts is 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, for example, riparian habitats help absorb and attenuate floodwaters and thus support overall mitigation objectives.

Cultural and Historical Resources

The City of Santa Fe has a large stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the HMPT collected information from a number of sources. The New Mexico Historic Preservation Division (NMHPD) was the primary source of information. The Office of Historic Preservation (OHP) is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of New Mexico's irreplaceable archaeological and historical resources. NMHPD administers the National Register of Historic Places and the State Register of Cultural Properties. Each program has different eligibility criteria and procedural requirements.

- **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. Properties listed on this database in the City of Santa Fe are included in Table 4-6.
- **New Mexico State Register of Cultural Properties** are sites, buildings, features, or events that are of local (city or county) significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value. Properties listed on this database in the City of Santa Fe are included in Table 4-7.

Table 4-6 City of Santa Fe Historical Resources, National Register

Resource Name	Date Listed
Acequia System of El Rancho de las Golondrinas	2/1/1980
Alarid, Ricardo, House	8/30/1984
Allison Dormitory	11/29/1984
Archbishop Lamy's Chapel	8/19/1988
Arroyo Hondo Pueblo	9/13/2007
Barrio de Analco Historic District	11/24/1968
Baumann, Jane and Gustave, House and Studio	10/10/2012
Bergere, Alfred M., House	10/1/1975

Resource Name	Date Listed
Camino del Monte Sol Historic District	7/11/1988
Camino Real--Canon de las Bocas Section	4/8/2011
Camino Real--La Bajada Mesa Section	4/8/2011
Connor Hall	9/22/1988
Crespin, Gregorio, House	5/29/1975
Davey, Randall, House	7/9/1970
Delgado Street Bridge	8/3/2015
Digneo-Valdes House	11/21/1978
Dodge--Bailey House	5/8/2007
Don Gaspar Bridge	10/16/2002
Don Gaspar Historic District	7/21/1983
El Puente de Los Hidalgos	7/25/2001
El Rancho de las Golondrinas Section--El Camino Real de Tierra Adento	9/25/2013
El Zaguan	8/1/2008
Fairview Cemetery	1/20/2005
Federal Building	8/15/1974
Fort Marcy Officer's Residence	6/20/1975
Fort Marcy Ruins	4/14/1975
Hayt--Wientge House	5/6/1977
Hospital	9/22/1988
Jackson, J.B., House	6/4/1999
Jones, Everret, House	1/15/2004
Kelly, Daniel T., House	10/19/2005
Laboratory of Anthropology	7/12/1983
Las Acequias	7/25/2008
Meem, John Gaw and Faith Bemis, House	4/3/2017
National Park Service Southwest Regional Office	10/6/1970
New Mexico Supreme Court Building	1/18/2002
Otowi Historic District	12/4/1975
Palace of the Governors	10/15/1966
Pond--Kelly House	10/19/2018
Pueblo of Nambe	1/21/1974
Pueblo of Tesuque	7/16/1973
Reredos of Our Lady of Light	9/4/1970
San Lazaro	10/15/1966
Santa Fe Historic District	7/23/1973
Santa Fe National Cemetery	9/6/2016
Santa Fe Plaza	10/15/1966
Santa Fe River Park Channel	12/10/2008
School Building Number 2	9/22/1988
Scottish Rite Cathedral	3/13/1987
Second Ward School	3/30/1978
Seton Village	10/15/1966
Shonnard, Eugenie, House	9/5/1975
Spiegelberg House	5/25/1973
St. John's College--Santa Fe, New Mexico	8/3/2015
Superintendent's Residence	9/22/1988
Tully, Pinckney R., House	11/5/1974
U.S. Courthouse	5/25/1973

Resource Name	Date Listed
Vierra, Carlos, House	8/3/1979
Vigil, Donaciano, House	6/28/1972
Wheelwright Museum of the American Indian	12/18/1990

Source: National Parks Service http://www.nps.gov/nr

Table 4-7 City of Santa Fe Historical Resources, State Register

Resource Name	Date Listed
Ortiz, Nicholas and Antonio Jose, Houses	12/20/1968
Delgado, Felipe, House	5/23/1969
Gallegos, Padre, House	5/23/1969
Hinojos, Francisca, House	5/23/1969
Lobato, Roque, House	5/23/1969
Our Lady of Guadalupe Church	5/23/1969
Rodriguez, Juan, House	5/23/1969
Borrego, House	7/18/1969
Boyle, House	7/18/1969
La Conquistadora	7/18/1969
Rosario Chapel and Cemetery	7/18/1969
Sena Plaza	7/18/1969

Source: New Mexico Historic Preservation Division

It should be noted that these lists change periodically, and they may not include those currently in the nomination process and not yet listed. Additionally, 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 the purpose of this regulation.

Santa Fe Historic and Archaeological Districts

The City of Santa Fe has six historic districts and three archaeological districts. In 1957 the Santa Fe Downtown and Eastside Historic Districts were established, and the Historic Districts Review Board was formed. Four additional historic districts were established in 1983: Westside-Guadalupe Historic District, Don Gaspar Area Historic District, Historic Review Historic District and Historic Transition Historic District.

The City of Santa Fe's Archaeological Districts were established in 1987, they include the following, Historic Downtown Archaeological Review District, River and Trail Archaeological Review District, and Suburban Archeological Review District. The five-member Archaeological Review Committee is responsible for reviewing reports by archaeologists working to provide clearance permits for construction in the three Archaeological Districts.

Natural Resources

Natural resources are important to include in benefit/cost analyses for future projects and may be used to leverage additional funding for mitigation 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 reducing the force of and storing floodwaters. Adjacent to the City is the Santa Fe National Forest. This is a significant

natural resource as it provides the primary source of drinking water for the City. It also provides wildlife habitat and abundant recreational opportunities.

Natural and Beneficial Functions

Floodplains can have natural and beneficial functions. Wetlands function as natural sponges that trap and slowly release surface water, rain, snowmelt, groundwater and flood waters. Trees, root mats, and other wetland vegetation also slow the speed of floodwaters and distribute them more slowly over the floodplain. This combined water storage and braking action lowers flood heights and reduces erosion. Wetlands within and downstream of urban areas are particularly valuable, counteracting the greatly increased rate and volume of surface water runoff from pavement and buildings. The holding capacity of wetlands helps control floods and prevents water logging of crops. Preserving and restoring wetlands, together with other water retention, can often provide the level of flood control otherwise provided by expensive dredge operations and levees.

Special Status 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. The US Fish and Wildlife Service maintains a list of threatened and endangered species in New Mexico at the county level. State and federal laws protect the habitat of these species through the environmental review process. Several additional species are of special concern or candidates to make the protected list.

Table 4-8 summarizes Santa Fe County's special status animal species in the Fish and Wildlife Service database. A search for the County's special status plant species in the Fish and Wildlife Service database yielded no results.

Table 4-8 Threatened and Endangered Animals in Santa Fe County

Name	Scientific Name	Status
Yellow-billed Cuckoo	*Coccyzus americanus*	Threatened
Mexican spotted owl	*Strix occidentalis lucida*	Threatened
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered
North American wolverine	*Gulo gulo luscus*	*Proposed Threatened*

Source: US Fish and Wildlife Service

Population Growth and Development Trends

As part of the planning process, the HMPT looked at changes in growth and development, both past and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability.

The American Community Survey five-year estimates show that as of 2017 the City of Santa Fe total population to be 82,980 individuals an 18 percent increase from the total population accounted for in the 2010 census. Table **4-9** below summarizes the population change for the City of Santa Fe between 2010 and 2017 based on the U.S. Census Bureau data. The City experienced the greatest growth in total population between in 2015 due to the City annexation and has experienced steady growth since.

Table 4-9 Population Change in the City of Santa Fe, 2010-2017

Year	Total Population	Change

2010	67,588	
2011	67,909	0.5%
2012	68,298	0.6%
2013	68,800	0.7%
2014	69,245	0.6%
2015	83,008	19.9%
2016	82,927	-0.1%
2017	82,980	0.1%

Source: U.S. Census Bureau, ACS 2010-2017 estimates

The following table shows the age of the population estimated in 2017.

Table 4-10 Age of Population in the City of Santa Fe, 2017 ACS estimates

Age	Total (estimate)
Under 18 years	16,322
16 years and over	68,649
18 years and over	66,658
21 years and over	63,720
62 years and over	20,319
65 years and over	16,686

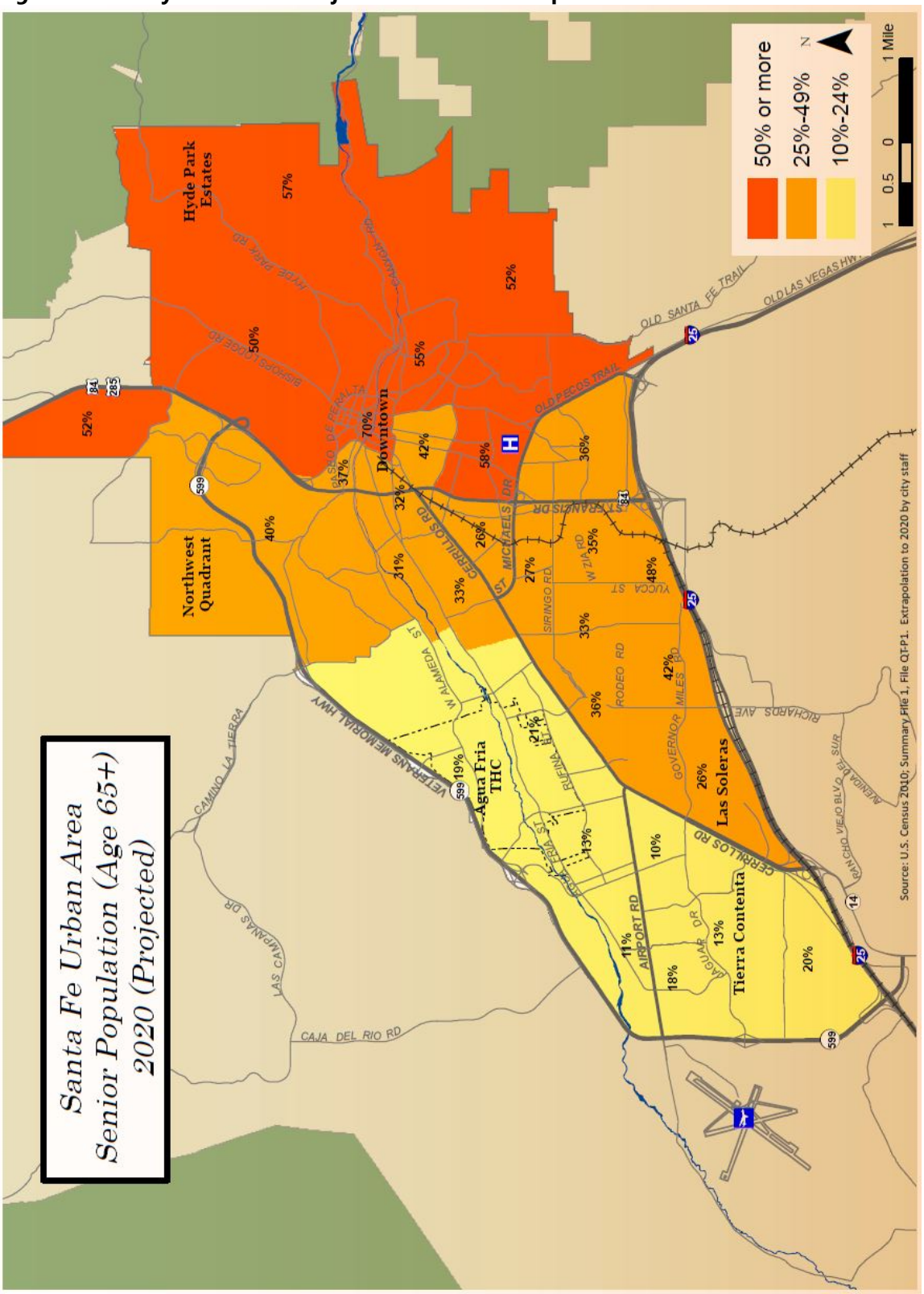
Source: U.S. Census Bureau, ACS 2010-2017 estimates

As of 2017, the median age in the City of Santa Fe was estimated to be 43 years old. The City has been experiencing a "silver tsunami" in recent years with its greatest population growth in the senior population (age 65+). Santa Fe is estimating the senior population could double by 2020 to be over 20,000 senior residents averaging 1,000 residents turning 65 each year. Figure 4-2, created by the City of Santa Fe in 2013, depicts the projected 2020 senior population within the City of Santa Fe.

City's Annexation Plan

The City of Santa Fe and Santa Fe County reached an Annexation Settlement Agreement in 2008. The agreement allows the City to annex areas generally bounded by Interstate 25 and State Highway 599. The City has a plan for three phases of annexation, the first became effective on November 24, 2009. The second phase was effective January 1, 2014 and added over 4,000 acres and an estimated population of 13,251 people. The third annexation phase became effective in 2018 and added 640 individuals to the City's population and 1,072 acres.

Figure 4-2 City of Santa Fe Projected 2020 Senior Population



Source: City of Santa Fe, City of Santa Fe Land Use & Urban Design Plan Draft, 2019

4.3 Hazard Analysis and Risk Assessment

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.

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 hazards identified in Section 4.1, are profiled and assessed individually in this section. In general, information provided by planning team members is integrated into this section with information from other data sources. This section also includes the identified vulnerability to each of the priority hazards, describing the impact that each hazard would have on the city. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to hazards and estimates potential losses. Each hazard is assessed in the following areas:

- **Hazard/Problem Description:** A description of the hazard and associated issues; where known, this includes general information on the hazard extent, seasonal patterns, speed of onset/duration, and magnitude and/or any secondary effects.
- **Location:** The geographic areas within the Planning Area that could be affected by the hazard. The entire planning area could be uniformly affected by some hazards.
- **Extent (Magnitude/Severity):** The strength or magnitude of the hazard. Different hazards may have different measures of extent.
- **Previous Occurrences:** A record of historical incidents, including impacts where known. Available hazard data and historical incident worksheets were used to capture information from the HMPT on previous occurrences.
- **Probability of Future Occurrence:** The frequency of past events is used in this section to gauge the likelihood of future occurrences. Where possible, frequency was calculated based on existing data. This was determined by dividing the number of events observed by the number of years on record and multiplying by 100. This gives the percent chance of the event happening in any given year. e.g., three droughts over a 30-year period equates to a 10 percent chance of a drought in any given year). 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.

- **Climate Change Considerations:** This describes the potential for climate change to affect the frequency and intensity of the hazard in the future
- **Vulnerability Assessment:** The vulnerability of the Planning Area to a specific hazard is assessed through the study of potential impacts to specific sectors:
  - People
  - Economy
  - Built Environment
  - Critical Facilities and Infrastructure
  - Historic, Cultural, and Natural Resources
  - Future Development
  - Risk Summary - Each vulnerability assessment includes a risk summary of the key issues/problems based on threat, vulnerability and consequence to the Planning Area and jurisdictions from the specific hazard.

Data used to support this assessment included the following:

- City GIS data (hazards, base layers, and facilities);
- Statewide GIS datasets to support mitigation planning;
- 2018 Santa Fe County Hazard Mitigation Plan
- 2014 City of Santa Fe Mitigation Plan
- 2018 State of New Mexico Hazard Mitigation Plan
- Written descriptions of inventory and risks provided by the City;
- Online data sources (cited where applicable)
- Data and information from existing plans and studies; and
- Input from planning team members and staff from the City and local, state, and federal agencies.

4.3.1 Dam Failure

Hazard Description

Dams are man-made structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they are usually engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped and fail. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can also result from any one or a combination of the following causes:

- Earthquake
- Inadequate spillway capacity resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage, or piping or rodent activity
- Improper design
- Improper maintenance
- Negligent operation
- Failure of upstream dams on the same waterway

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources

available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Electric generating facilities and transmission lines could also be damaged and affect life support systems in communities outside the immediate hazard area. Associated water supply, water quality and health concerns could also be an issue. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

In general, there are three types of dams: concrete arch or hydraulic fill, earth and rockfill, and concrete gravity. Each type of dam has different failure characteristics. A concrete arch or hydraulic fill dam can fail almost instantaneously; the flood wave builds up rapidly to a peak then gradually declines. An earth-rockfill dam fails gradually due to erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. And, a concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

Dams and reservoirs have been built throughout New Mexico to supply water for agriculture and domestic use, to allow for flood control, as a source of hydroelectric power, and to serve as recreational facilities. The storage capacities of these reservoirs range from a few thousand-acre feet to five million acre-feet. The Office of the State Engineer - Dam Safety Bureau regulates the design, construction, reconstruction, modification, removal, inspection, operation, maintenance, and continued safety of dams over 10 feet high, or dams that store more than 10 acre-feet of water. Dams 10 feet or less in height or dams that store 10 acre-feet or less are generally not regulated and are considered non-jurisdictional dams; however, if a non-jurisdictional dam threatens life and property due to an unsafe condition, the state engineer can issue a safety order to the owner requiring action to remove the threat.

Location

According to data provided by the National Inventory of Dams, which was last updated as of 2018, there are 2 high hazard dams upstream the City of Santa Fe. Both of these dams have an Emergency Action Plan (EAP) according to the database. Dam locations can be seen in Figure 4-3 below. Table 4-11 gives details of the dams of concern, which are closest to the City and could drain or inundate portions of it given a failure event.

Figure 4-3 Dams of Concern Upstream of the City of Santa Fe

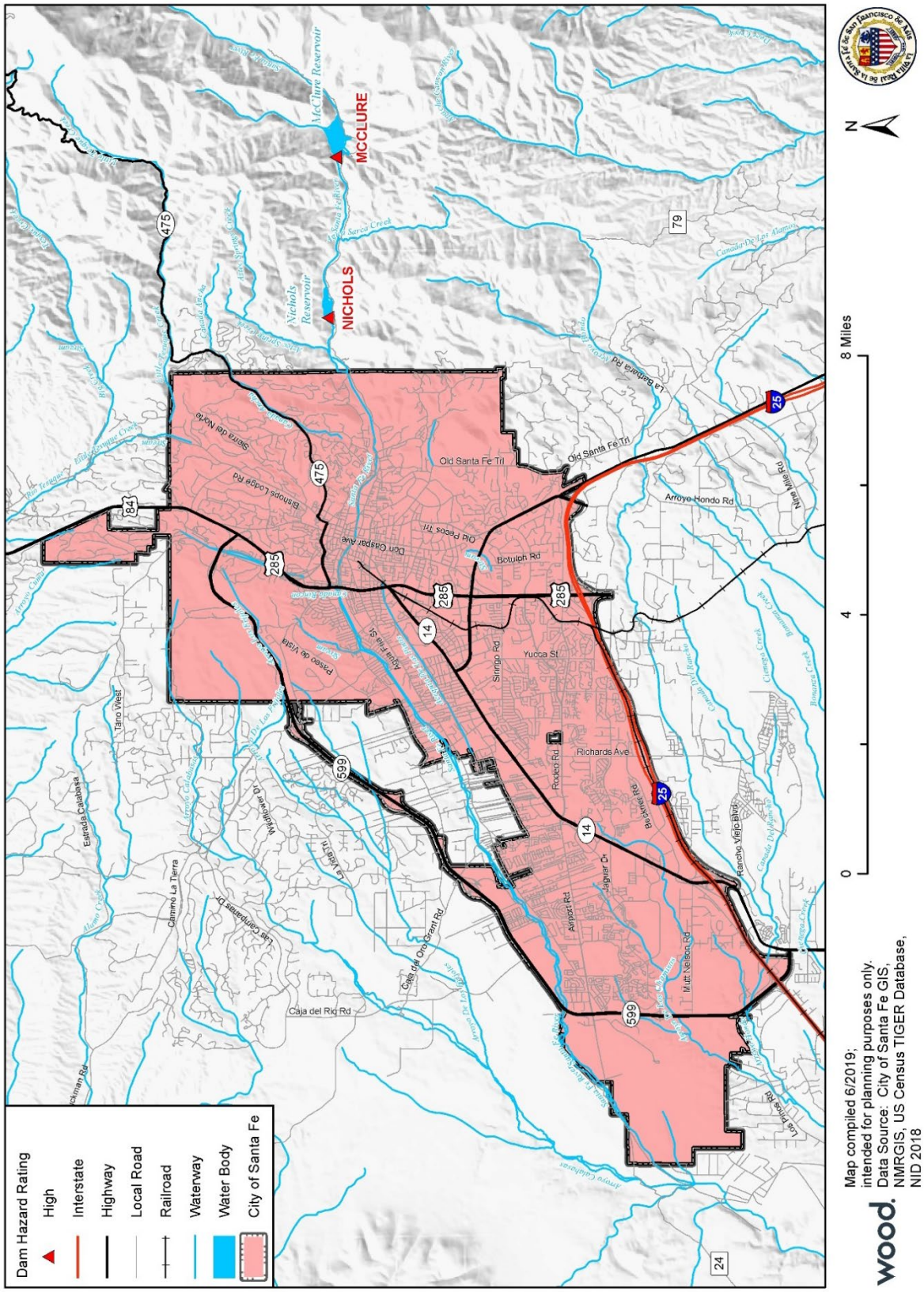


Table 4-11 Dams of Concern Upstream the City of Santa Fe

Hazard Rating	Dam Name	River	Downstream City	Dam Type	Dam Height (ft)	Dam Storage Capacity* (Acre-Feet)	EAP
High	Nichols	Santa Fe River	Santa Fe	Earth	91	1,234	Yes
High	McClure	Santa Fe River	Santa Fe	Earth	128	4,278	Yes

Source: National Inventory of Dams, 2018; These values represent volumes at the dam crest, not volumes at the spillway where impacts may occur downstream due to flooding prior to the full Dam Storage Capacity. For example, at McClure Reservoir the flow to overtop the Dam Storage Capacity is 17,000+ cubic feet per second which would cause downstream flood impacts from spillway flows without the failure of the dam.

Extent (Magnitude/Severity)

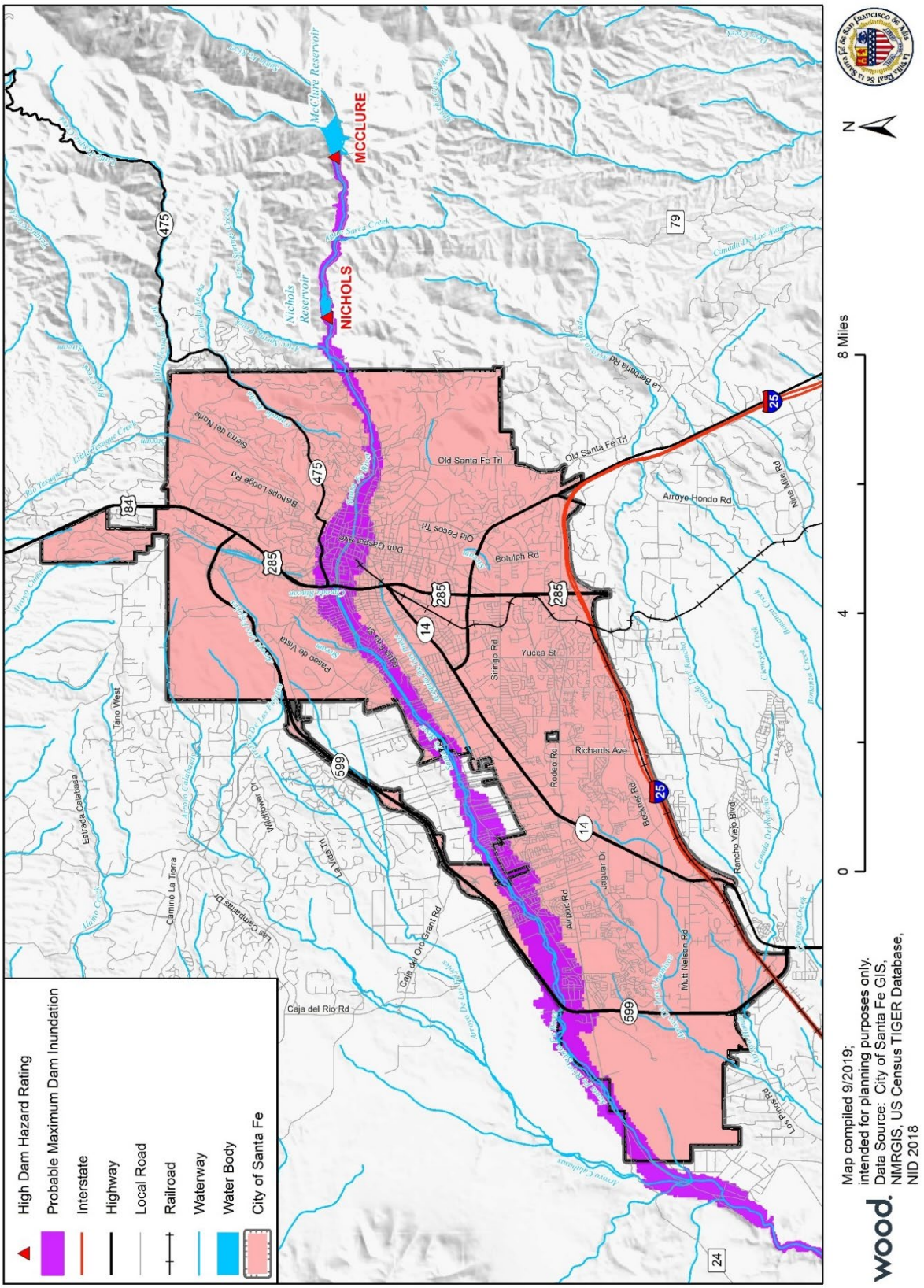
Standard practice among federal and state dam safety offices is to classify a dam according to the potential impact a dam failure (breach) or mis-operation (unscheduled release) would have on downstream areas. The hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental and lifeline facilities. Dams are classified in three categories that identify the potential hazard to life and property:

- *High hazard* indicates that a failure would most probably result in the loss of life;
- *Significant hazard* indicates that a failure could result in appreciable property damage;
- *Low hazard* indicates that failure would result in only minimal property damage and loss of life is unlikely.

Both McClure and Nichols dams are rated high hazard dams. McClure Dam has the greatest storage (able to contain almost 4,300 acre-feet), so failure of this dam could cause the most damage as it would likely overtop and cause a cascading failure of the Nichols Dam. The Nichols Dam has a lower capacity of 1,200 acre-feet. As noted in the footnote to Table 4-11 downstream flooding would occur prior to failure due to spillway flows.

Since the City has these High hazard dams directly upstream of the downtown area and only 5-7 miles away from downtown there is potential for significant loss of life and property damage The Dam Emergency Action Plans (EAPs) for these High hazard dams contain information on inundation areas for dam breaks, and areas that would need evacuation and warning. Dam inundation mapping was available for the McClure and Nichols dams, to show probable maximum flooding from these two structures. There is considerable flooding risk to the downtown are due to the location of the Nichols and McClure dams in the watershed above the City of Santa Fe. The extent of the probable maximum inundation from a dam failure is displayed in Figure 4-4 below; the map represents failure of McClure Dam from a Probable Maximum Flood event, effectively the worst case scenario. The EAPs for McClure and Nichols contain additional details on the maximum flood discharge, maximum water surface elevation, flood stage, and time to maximum flood stage. These details are provided for spillway flows, "Sunny Day" failures without additional precipitation, and Probable Maximum Flood (PMF) breach at three locations throughout the City. Depth of inundation from the McClure Dam would vary from depths of 9-21 feet closest to the Santa Fe River at the intersection of US 84 and US 285 (Saint Francis Dr and Alameda St) depending on spillway flooding vs the PMF breach. Maximum discharge ranges from 20,700 cfs (spillway) to 176,000 cfs (PMF). Time to the maximum stage ranges from 47 to 49 minutes.

Figure 4-4 Probable Maximum Dam Inundation Extents through the City of Santa Fe



Previous Occurrences

According to the database of the National Performance of Dams Program, there have been no past incidents of dam failure or any dam incidents related to the dams discussed herein. According to the HMPT the Nichols dam spillway ran for a couple of months in spring 2019 due to heavy snowmelt in the watershed, but no flooding issues were noted.

Probability of Future Occurrences

Occasional—No known dam failure events have occurred in the City to record. The State Hazard Mitigation plan made efforts to determine a probability of occurrence for dam failure. Santa Fe County falls in Preparedness Area 3, which the State determined had a 6% chance of a dam failure occurring in a given year. Using the definitions list in Table 4-1, the probability for future events are occasional or between 1 and 10% chance that the City of Santa Fe is to experience dam failure events in any given year.

Climate Change Considerations

The potential for climate change to affect the likelihood of dam failure is not fully understood at this point in time. With a potential for more extreme precipitation events a result of climate change, this could result in large inflows to reservoirs. However, this could be offset by generally lower reservoir levels if storage water resources become more limited or stretched in the future due to climate change, drought and/or population growth.

Vulnerability Assessment

People

Persons located underneath or downstream of a dam are at risk of a dam failure, though the level of risk can be tempered by topography, amount of water in the reservoir, and time of day of the breach. The populations most at-risk are directly downstream of the dams and reservoirs which could cause inundation, followed by people located in the downtown area. For the Nichols and McClure Dams, those populations near or on Upper Canyon Road along the Santa Fe River, on the eastern entrance/exit of the City by Atalaya Mountain, would be hit first and worse were a failure to occur from either of these two structures. The downtown area is also at considerable risk of inundation if failure was to occur from either structure. In addition to the risk to human life, the HMPT noted that a failure of either Nichols or McClure dams would jeopardize the City's water supply.

Economy

Depending on the circumstances and location of the breach, dam failure can have significant impacts on the economy. Waters can flood and ruin buildings, and wash out culverts, roads, bridges and other transportation systems and essential infrastructure providing to the economy directly or indirectly. Due to the potential for inundation in the downtown area, a dam failure could have long term economic impacts on local businesses and affect the tourism industry.

Built Environment

Probable maximum dam inundation-based flooding through the City were available as combined extents for the Nichols and McClure Dams, as shown in Figure 4-4. A GIS overlay analysis was performed using this layer which took the parcel and address point layers and intersected them with the dam inundation extents. The result was a count of total address points found in these inundation zones. Table 4-12 below summarizes the total address points, by parcel type, found in these inundation zones. A substantial number of commercial and residential structures are exposed. Depth of inundation would vary from

minor flooding to flooding depths of 8-25 feet closest to the Santa Fe River at the intersection of US 84 (Saint Francis Dr and Alameda St.

Table 4-12 Total Address Point Count of Properties Within Dam Inundation Extents in the City

Parcel Type	Address Point Count
Commercial	1,735
Exempt	12
Lot with Mobile Home	23
Multi-Unit Residential	836
Residential: Condo	678
Single Family Residential	3,589
Vacant	9
TOTAL	**6,882**

Source: City of Santa Fe GIS and Public Utilities Depts., National Inventory of Dams 2018, Wood Plc analysis

Critical Facilities and Infrastructure

A total dam failure could cause catastrophic impacts to areas downstream along the Santa Fe River which includes critical infrastructure and lifelines. The greatest risk would be to roads and bridges that could be vulnerable to washouts that further complicate emergency response and recovery. A failure of the Nichols or McClure dams would immediately impact Upper Canyon Road.

A GIS overlay analysis was performed which took the critical facility/lifeline layers and intersected them with the dam inundation extents, to obtain a count of total facilities found in these inundation zones. Table 4-13 below summarizes the 68 critical facilities, by FEMA lifeline and component categories, found in these inundation zones.

Table 4-13 Critical Facilities Within Dam Inundation Extents in the City of Santa Fe

Critical Facility based on FEMA Lifeline	Critical Facility Component Category	Critical Facility Total
Communications	Infrastructure	26
Food, Water, Shelter	Shelter	1
	Water	5
Hazardous Materials	Facilities	1
Health and Medical	Medical Care	5
Other	Community Services	1
	Daycare	4
	Schools	5
Safety and Security	Fire Services	2
	Government Services	12
	Law Enforcement/Security	2
Transportation	Mass Transit	4
TOTAL		**68**

Source: City of Santa Fe GIS and Public Utilities Depts., HIFLD, National Inventory of Dams 2018, Wood Plc analysis

Historical, Cultural, and Natural Resources

Dam failure effects on the environment would be similar to those caused by flooding from other causes. Water could erode topsoil, cover the environment with debris, and affect parks and other open spaces within the City. Dam failure has the potential to inundate some of the significant historic and cultural resources within the City's downtown area.

Future Development

Much of the area downstream of the 2 high hazards dams are already developed. As of 2019 there is some sporadic residential development and re-development occurring between the dams and the City Center along the Santa Fe River. In the case of a dam failure, inundation would likely follow some existing FEMA mapped floodplains, which contains development restrictions for the 1% annual chance floods, but it could exceed those floodplains.

Risk Summary

- There are 2 high hazard dams upstream that could affect the City of Santa Fe: the Nichols Dam and the McClure Dam.
- A total of 6,882 parcels are found in the path of the probable maximum dam inundation flooding extents for both dams of concern. Most of these are single family residential parcels followed by commercial, multi-unit residential, residential condos, lots with mobile homes, exempt parcels, and vacant parcels.
- A total of 68 critical facilities are found in the path of the probable maximum dam inundation flooding extents for both dams of concern.
- In addition to risk to life and property, failure of Nichols or McClure dams would also jeopardize the City's water supply.
- According to the National Performance of Dams Program, the City of Santa Fe has never suffered a failure of one of these dams and the probability is low.
- *Related Hazards*: Severe weather, flood

Location	Probability of Future Occurrence	Extent (Magnitude/Severity)	Overall Significance
Limited	Occasional	Catastrophic	Medium

4.3.2 Drought

Hazard Description

Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue for agricultural, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so too will the demand for water.

Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

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 be defined regionally based on its effects:

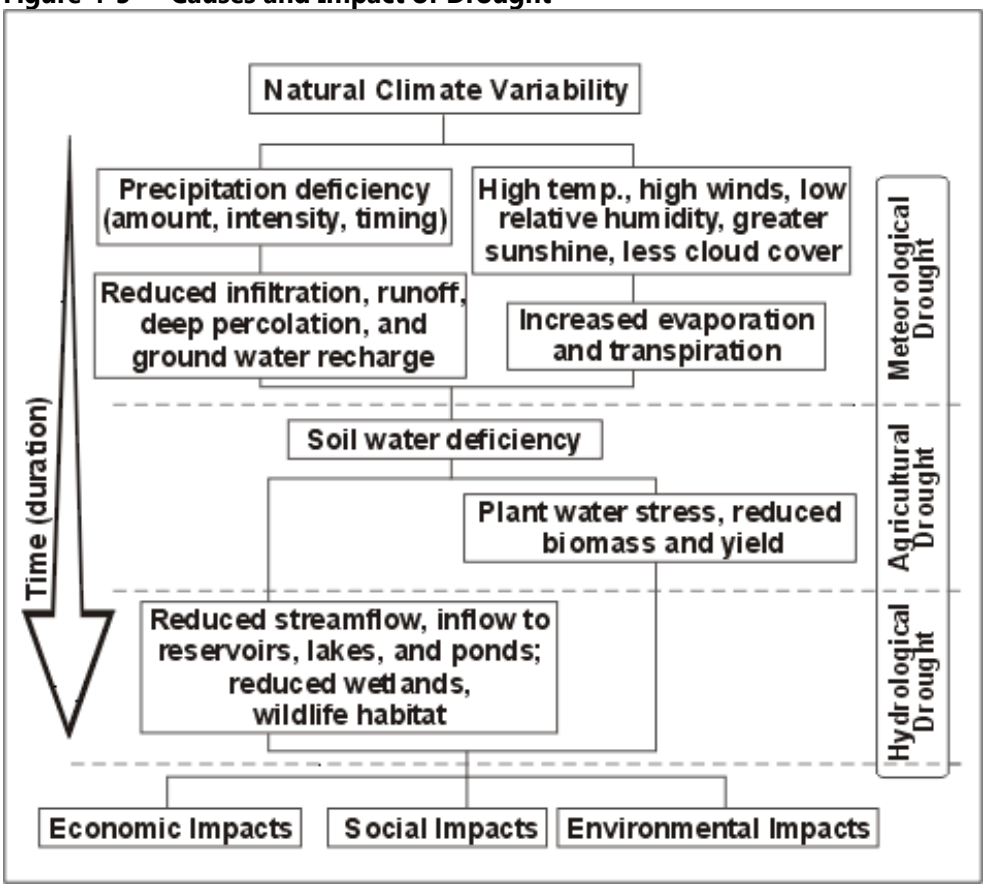
Meteorological Drought - The first stage of drought is known as a meteorological drought. The conditions at this stage include any precipitation shortfall of 75% of normal for three months or longer. This criterion can be misleading if all the precipitation falls in a very short time period resulting in floods.

Agricultural Drought - The second stage is known as agricultural drought. Soil moisture is deficient to the point where plants are stressed and biomass (yield) is reduced.

Hydrological Drought - 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.

Figure 4-5 Causes and Impact of Drought



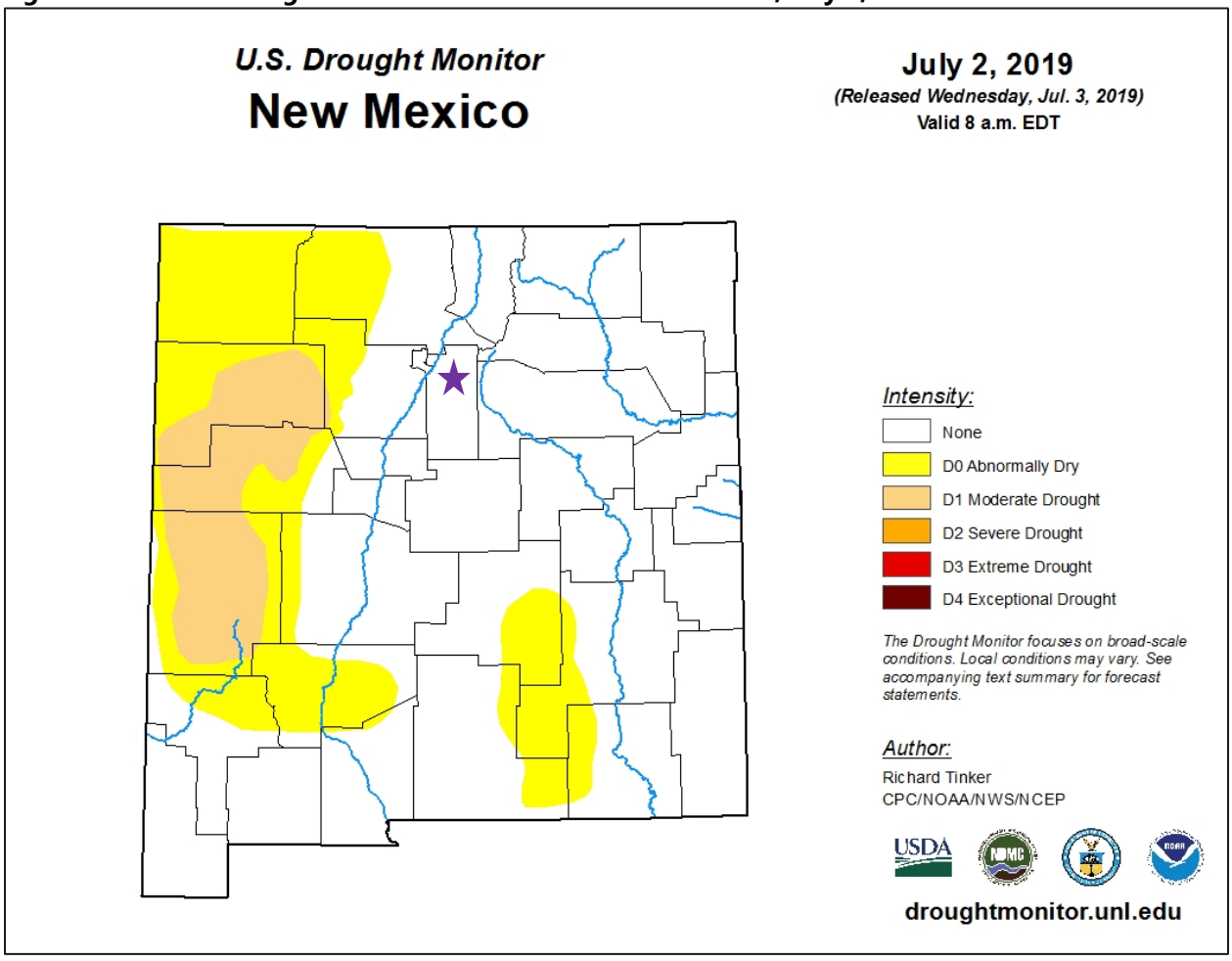
Source: National Drought Mitigation Center

Location

Drought is a regional hazard, impacting vast areas of land at a time. Drought can impact the entire Planning Area at once.

Figure 4-6 shows drought areas identified by the U.S. Drought Monitor as of July 2019. Drought classifications are further defined in the Extent section of this chapter. Santa Fe is noted by a red circle.

Figure 4-6 U.S. Drought Monitor Conditions for New Mexico, July 2, 2019



Extent (Magnitude/Severity)

Drought extent can be defined in terms of intensity, using the U.S. Drought Monitor scale. The Drought Monitor Scale measures drought episodes with input from the Palmer Drought Severity Index, the Standardized Precipitation Index, the Keetch-Byram Drought Index, soil moisture indicators, and other inputs as well as information on how drought is affecting people. Figure 4-7 details the classifications used by the U.S. Drought Monitor. A category of D2 (severe) or higher on the U.S. Drought Monitor Scale can typically result in crop or pasture losses, water shortages, and the need to institute water restrictions.

Figure 4-7 US Drought Monitor Classifications

Category	Description	Possible Impacts	Ranges				
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

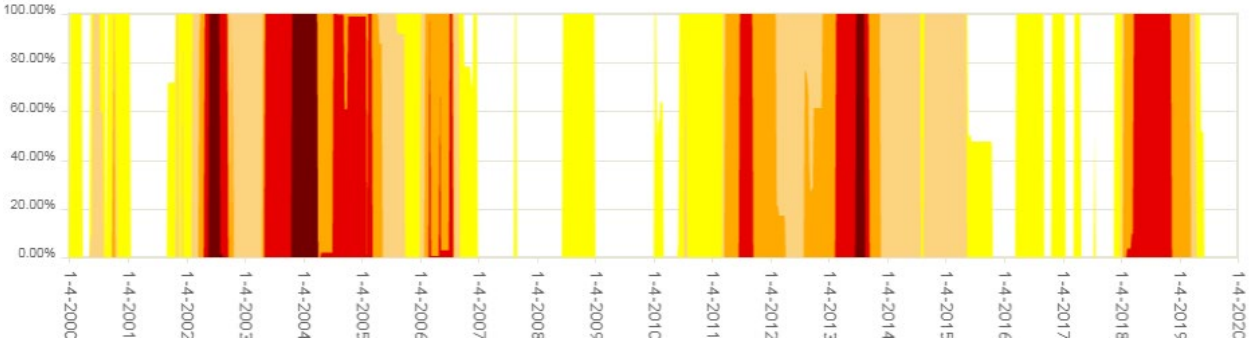
Source: US Drought Monitor

The City of Santa Fe is vulnerable to any category of drought.

Previous Occurrences

Figure 4-8 shows drought conditions since January 2000 in the City of Santa Fe, with drought severity corresponding to the drought classifications in Table 4-5.

Figure 4-8 Drought Conditions in Santa Fe, NM – 2000-2019



Source: US Drought Monitor

The NCEI reports periods of severe drought or worse on a monthly basis. From 1999 through 2018, there were 30 months of drought impacts reported. The longest period of drought lasted nine consecutive months from May 2007 to January 2008. Often the drought conditions coincide with significant wildfires in the area, including the 2003 Molina Complex Fire and 2011 Las Conchas fire.

The following table summarizes the drought declarations for Santa Fe County issued by the U.S Department of Agriculture (USDA) Secretary of Agriculture between 2012 and March 2019. Of the declarations all were Fast Track Secretarial disaster designations. According to the Secretary of Agriculture, a Fast Track designation is for a severe drought and provides an automatic designation when during the growing season any portion of the county meets the severe drought intensity value for eight consecutive weeks. Santa Fe County has received 16 disaster designations from the Secretary of Agriculture since

2012. The 2014 crop year experienced the most disaster declarations with 6 declarations in that year for drought. Many of the disaster declarations were associated with other hazards such as high wind events, wildfire, excessive heat and insects.

Table 4-14 Secretary of Agriculture Drought Disaster Designation for Santa Fe County, 2012-2019

Crop Year	Designation Number	Disaster Description	Associated Hazards	Approval Date	Begin Date	End Date
2012	S3282	Drought-FAST TRACK	Wind, Fire, Heat, Insects	7/12/2012	1/1/2012	Continuing
	S3331	Drought-FAST TRACK	Wind, Fire, Heat, Insects	8/8/2012	6/12/2012	8/6/2012
2013	S3461	Drought-FAST TRACK	Wind, Fire, Heat, Insects	1/9/2013	10/1/2012	Continuing
	S3474	Drought-FAST TRACK	Wind, Fire, Heat, Insects	1/23/2013	11/15/2012	Continuing
	S3494	Drought-FAST TRACK	Wind, Fire, Heat, Insects	2/27/2013	1/1/2013	Continuing
2014	S3630	Drought-FAST TRACK	Wind, Fire, Heat, Insects	1/15/2013	10/1/2013	11/25/2013
	S3645	Drought-FAST TRACK	Wind, Fire, Heat, Insects	2/5/2014	1/28/2014	N/A
	S3653	Drought-FAST TRACK	Wind, Fire, Heat, Insects	3/5/2014	1/1/2014	N/A
	S3630	Drought-FAST TRACK	Wind, Fire, Heat, Insects	1/15/2014	10/1/2013	11/25/2013
	S3645	Drought-FAST TRACK	Wind, Fire, Heat, Insects	2/5/2014	1/28/2014	N/A
	S3653	Drought-FAST TRACK	Wind, Fire, Heat, Insects	3/5/2014	1/1/2014	N/A
2015	S3802	Drought-FAST TRACK	Wind, Fire, Heat, Insects	3/4/2015	1/1/2015	N/A
2018	S4300	Drought-FAST TRACK	--	3/30/2018	1/30/2018	N/A
	S4310	Drought-FAST TRACK	--	4/26/2018	4/10/2018	N/A
	S4316	Drought-FAST TRACK	--	5/3/2018	3/1/2018	N/A
2019	S4469	Drought-FAST TRACK	--	3/22/2019	11/1/2018	N/A

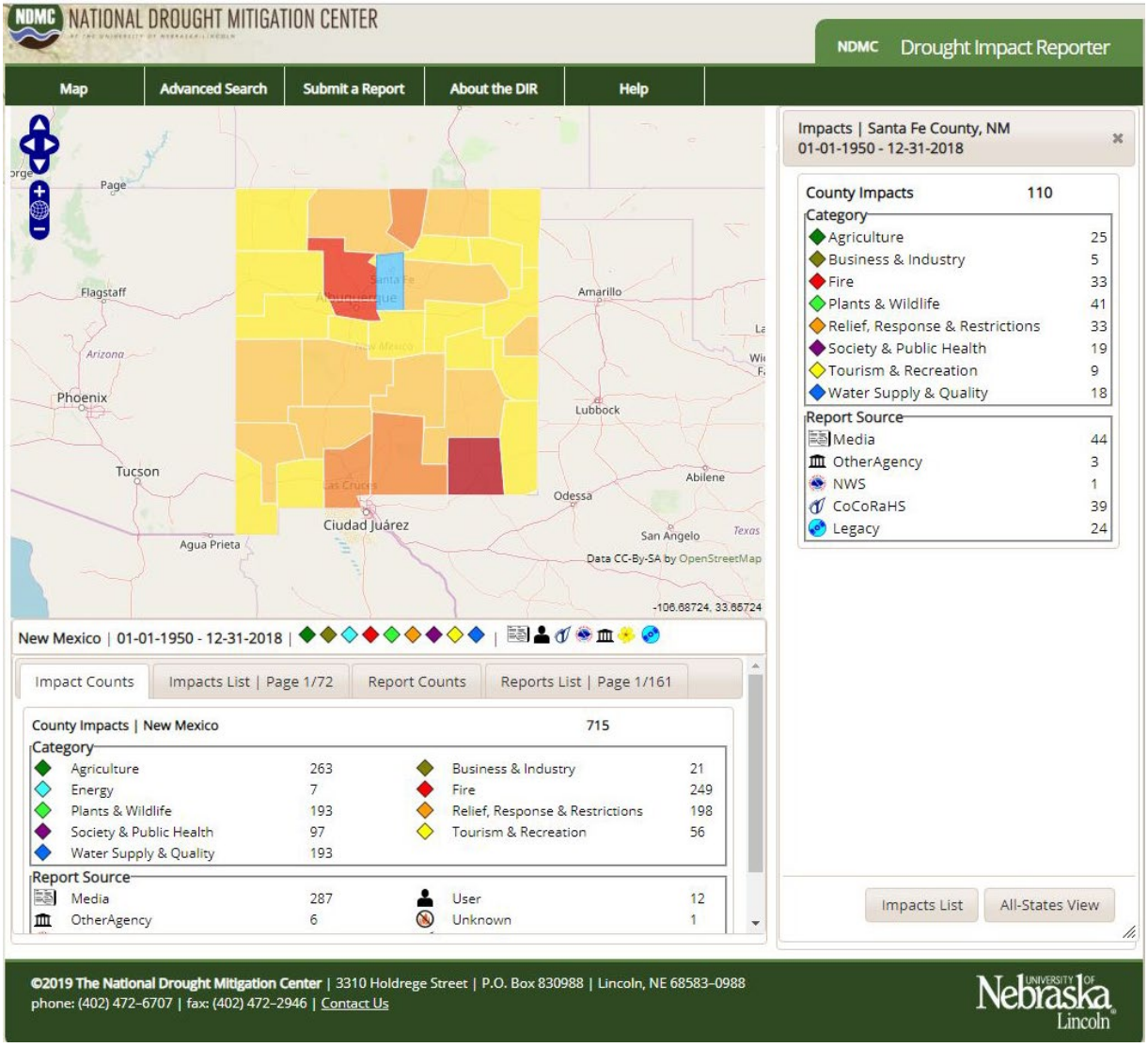
Source: USDA

The National Drought Mitigation Center (NDMC), located at the University of Nebraska in Lincoln, provides a clearinghouse for information on the effects of drought, based on reports from media, observers, impact records, and other sources.

The National Drought Impact Reporter from the NDMC, summarizes drought impacts at the County Level. Figure 4-9 graphically displays the amount of drought-related reported impacts to Santa Fe County 1950-2018. While it is difficult to extract the impacts specifically affecting the City of Santa Fe, a total of 110 reports were made within Santa Fe County between January 1, 1950 and December 31, 2018. It is assumed that these drought-related impacts for areas across Santa Fe County are likely to have also affected the City of Santa Fe at some point or to some extent. Based on the summary of negative effects to the County since 1950, the category of plants and wildlife has had the most reports, followed by fire and relief, response, and restrictions, and agriculture. Agriculture and plants and wildlife have also suffered the effects of drought, but to a lesser extent.

According to the HMPT, the City relies on three sources for their water supply: Nichols and McClure reservoirs, wells and versions from the San Juan/Chama water allocation; despite the diversity in water supply past drought have stretched available resources. During the 2002 drought the City had to turn off irrigation to City parks. The HMPT added the City has some reclaimed and recycled water capabilities.

Figure 4-9 Drought Impact Reporter Summarizing Impacts at the County Level in Santa Fe County, 1950-2018



Source: NDMC

Probability of Future Occurrences

According to over 100 years of precipitation data from the National Climate Data Center, the State of New Mexico experiences negative Palmer Hydrological Drought Index years an average of 5 years per decade and, in some decades (like 1950 through 1960 and 2000 to 2010), negative years outnumber positive years. Based on the above information the probability rating of drought in the City of Santa Fe is 'likely' in any given year.

Climate Change Considerations

The Intergovernmental Panel on Climate has projected dramatic changes in regional climate characteristics between present-day and if global temperatures rise between 1.5 degrees Celsius and 2 degrees Celsius. Climate change will have the greatest impacts on the City's water resources through the reduction of water quality and available water supply. Drought events specifically are projected to increase in frequency and have longer durations due to shifts in seasonal precipitation patterns leading to decreases in snowpack and water content, earlier peak of snow-fed streamflow and increases in proportion of rain to snow, exacerbating hydrological drought. A majority of the Santa Fe River's discharge, the main water supply source for the City, is from snow melt runoff; making monitoring snowpack a critical component to assessing and forecasting river water supply on an annual and seasonal basis.

According to the Sustainable Santa Fe 25-year Plan (2018), climate change modeling predicts that by the year 2055 up to 25% of reductions in the San Juan River, from which Santa Fe diverts water into the Rio Grande, and overall reductions and increased variability in the Santa Fe River will take place. The City and County have taken steps to address this through a series of policies and programs related to water conservation and increased energy efficiency which save water. Some of these policies are included in the 2015 Santa Fe Basin study, a WaterSMART grant funded project, which identified water supply gaps and developed adaptation strategies to ensure a sustainable water supply for the City even in times of drought.

Vulnerability Assessment

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in the Planning Area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Also, during a drought, allocations go down, which results in reduced water availability. Voluntary conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Drought in the United States is monitored by the National Integrated Drought Information System (NIDIS); a major component of this portal is the U.S. Drought Monitor. The Drought Monitor concept was developed jointly by the NOAA's Climate Prediction Center, the NDMC, and the USDA's Joint Agricultural Weather Facility in the late 1990s as a process that synthesizes multiple indices, outlooks and local impacts, into an assessment that best represents current drought conditions. The final outcome of each Drought Monitor is a consensus of federal, state, and academic scientists who are intimately familiar with the conditions in their respective regions.

According to the NDMC Drought Impact Reporter, Santa Fe County (no city-specific data was available) recorded a total of 110 impacts to drought in the survey period between 1/1/1950 and 12/31/2018. Figure 4-9 above shows the total number of impacts recorded for the county.

Using the NDMC Drought Impact Reporter impacts to determine relative exposure/vulnerability to drought has limitations because the methodology can double-count impacts that are recorded at the state level, then counted again for each county within that state. Rather, the NDMC data should be used to develop an ongoing record of drought impacts to sector assets that relate the specific impacts to different intensity and duration droughts at a location. Over time a detailed impact profile could be developed for vulnerable sectors so that the impact of future drought vulnerability could be better defined based on historic impacts.

People

The most significant qualitative impacts associated with drought in the Planning Area are those related to water intensive activities such as wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts, which can affect people.

Drought may cause health problems related to low water flows and poor water quality; it may also cause health problems due to dust. Generally, drought may require conservation of water resources, which could mean that water use is restricted to critical uses; this could impact how people use water on a daily basis. Low-to-moderate income households will be most impacted because they will be unable to insulate themselves from the water shortage impacts.

Economy

Drought could have a devastating impact on the City of Santa Fe's economy. As water resources become impacted, effects may be felt by any industry that uses large amounts of water. Prolonged drought would intensify these issues.

Recreation and tourism can also be negatively impacted by drought or drought-enhanced wildfires. Potential impacts include reduced snow for skiing and restrictions on water-based recreation. While it is generally agreed that drought does have an impact on recreation, data is not available to quantify those impacts.

Built Environment

Direct structural damage from drought is rare, though it can happen. Drought can affect soil shrinking and swelling cycles and can result in cracked foundations and infrastructure damage.

Critical Facilities and Infrastructure

Because of their long-lasting nature, the biggest impact of drought is on the water supply. Because of this, critical facilities and lifelines that rely on a steady supply of water could see the greatest impacts if a long-term drought occurred. Examples of these facilities include hospital and medical facilities. Drought can also directly impact water storage, treatment and distribution systems. Low water levels in the City-owned dams can affect water quality and increase water treatment costs.

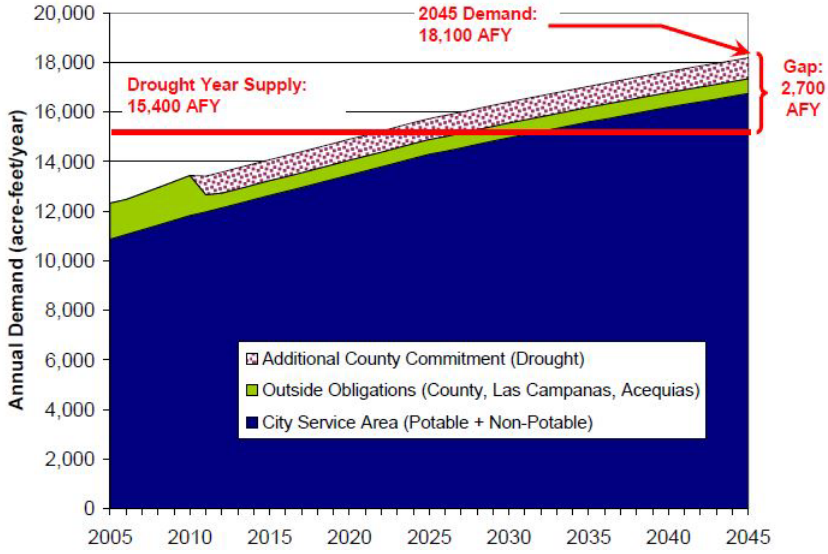
Historic, Cultural, and Natural Resources

While impacts to the City's historic and cultural building inventory may be negligible, severe, prolonged drought can impact the natural environment. Wildlife and natural habitats can be affected, including the shrinkage of habitat, dwindling of food supplies and the migration of wildlife to more palatable areas. Prolonged drought can cause poor soil quality, loss of wetlands, and increased soil erosion. One of the prevailing impacts of drought to the natural environment is the increased risk of wildfires that burn larger and more intensely during dry conditions. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Future Development

The City of Santa Fe Long-Range Water Supply Plan (2008) a document whose primary purpose is to assess future water needs in relationship to the supply of water rights owned by the City project water supply needs through 2045. According to analysis in the plan, the City will need to supply over 18,000-acre feet per year to about 120,000 persons which fall short of meeting projected demands by 2021.

Figure 4-10 City of Santa Fe Projected Water Demand and Supply Balance



Source: City of Santa Fe Long-Range Water Supply Plan, September 2008

The City has taken steps to prevent a water shortage through the development and implementation of the Water Conservation and Drought Management Plan (WCDMP) (2015) which outlines current conditions and water conservation goals and programs. The availability of water resources currently informs land use decisions that are brought before the Governing Body. According to the WCDMP, City Council has enacted fundamental changes to their approach in acquiring water rights to serve new development. New development in the City of Santa Fe is required to either offset any new water demands by water conservation with the existing demand or new development must acquire water rights from the Rio Grande and transfer them to the City.

Risk Summary

- Drought has a cyclical occurrence in the City of Santa Fe and typically every decade has multiple years of drought.
- Santa Fe County has received 16 disaster designations from the USDA Secretary of Agriculture in the past 6.5 years (2012- March 2019). Most designations were associated with high wind, fire, excessive heat and insects.
- The recreation and tourism industries are also vulnerable to drought induced snowpack shortages, water-based recreation, and forest closures due to wildfires or elevated wildfire risk.
- *Related hazards:* Wildfire, flood, severe weather

Location	Probability of Future Occurrence	Extent (Magnitude/Severity)	Overall Significance
Extensive	Likely	Limited	Medium

4.3.3 Flood

Hazard Description

Flooding is the rising and overflowing of a body of water onto normally dry land or the inundation of land or property in a built environment caused by rainfall overwhelming the capacity of drainage systems. Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities, as well as causing life safety issues. Floods can be extremely dangerous; six inches of moving water can knock over a person given a strong current. A car will float in less than two feet of moving water and can be swept downstream into deeper waters. These are some reasons why floods kill more people trapped in vehicles than anywhere else during inundation events. During a flood, people can also suffer from electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream, which can damage or remove stationary structures. Ground saturation due to excess waters can result in soil instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utilities lines and interrupt services. Standing water can cause damage to crops, roads, building foundations, and electrical equipment.

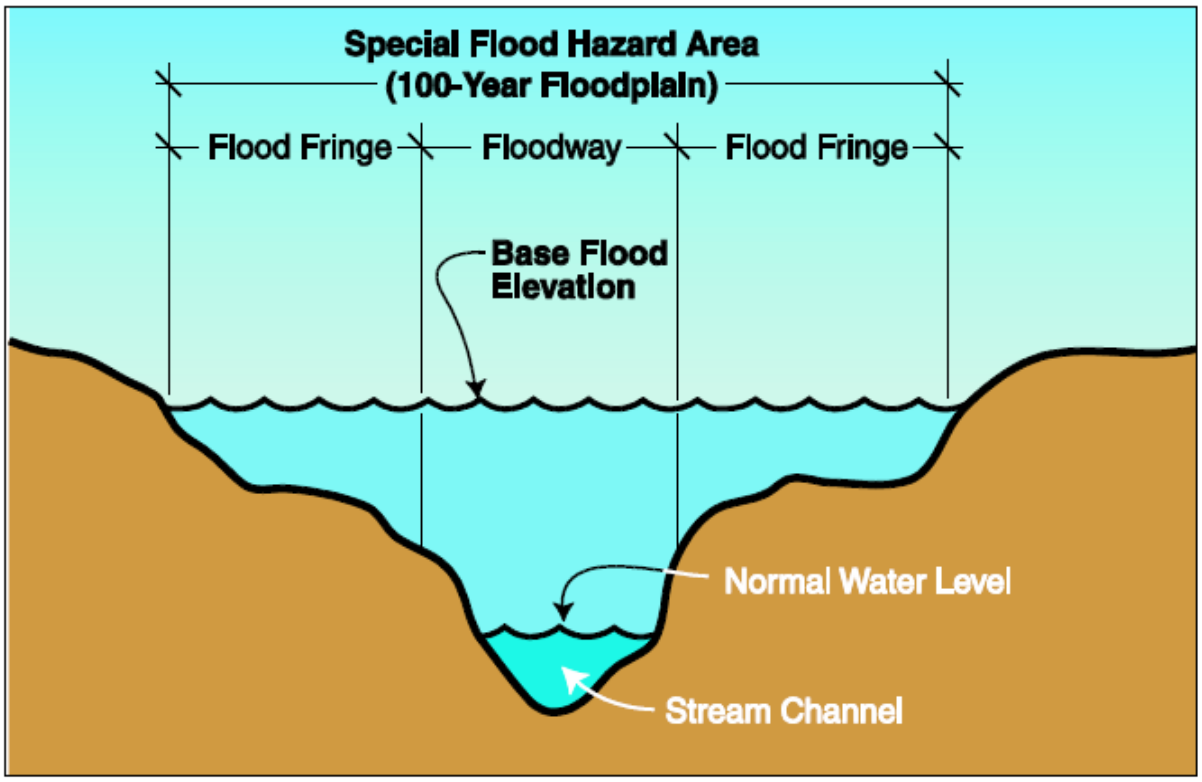
Direct impacts such as drowning can be limited with adequate warning, evacuations, and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be of critical importance to reduce life and safety impacts from any type of flooding.

Floodplains

The area adjacent to a channel is the floodplain. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to the FEMA regulatory inundation areas. Particularly, the 100-year flood, or the flood that has a 1% chance in any given year of being equaled or exceeded, is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP). The other commonly studied and considered floodplain for development and regulatory purposes is the 500-year flood, or the flood that has a 0.2% chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to the land surface, which could result in a change to the floodplain. A change in environmental conditions can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

Figure 4-11 below graphically displays the structure of floodplains when compared to a river's normal stream channel, in the context of FEMA's special flood hazard areas, or SFHAs.

Figure 4-11 Floodplain Definitions



Source: 2013 New Mexico State Hazard Mitigation Plan

According to the latest Flood Insurance Study (FIS) report for Santa Fe County, revised as of December of 2012, the storms that produce large amounts of runoff in the Planning Area and surroundings occur during the Monsoon season. The monsoon season in Santa Fe County starts in June and lasts through October. It is characterized by heavy to severe downpours, lasting anywhere from five minutes to an hour. Such downpours can create flash floods and put people and property at risk.

The City of Santa Fe and its surroundings are susceptible to various types of flood events: riverine, flash, and localized stormwater flooding. The area is also at risk of flooding resulting from dam failures (discussed separately in 4.3.1). Regardless of the type of flood, the cause is often the result of severe weather and excessive rainfall, either in the flood area or upstream reach.

- Riverine flooding – Riverine flooding takes place when a watercourse exceeds its "bank-full" capacity, generally occurring as a result of prolonged rainfall or rainfall that is combined with snowmelt and/or already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. Riverine flooding is the type of flooding that more strongly influences floodplain studies and data development for FEMA purposes (since these floodplains are usually adjacent to main waterways/rivers).
- Flash flooding – Flash floods are intense, short-duration floods. Usually they abate within an hour but can last as long as 24 hours. They occur throughout the southwest, and generally start high up on a mountain or in a canyon. Rain torrents follow the path of least resistance, initially canyons and arroyos. But along the way they pick up speed and debris. They can roll boulders, destroy footbridges, and uproot cottonwoods and pinyons. This is the most prevalent type of flooding in the Planning Area and across Santa Fe County.

- Localized flooding – Localized, stormwater flooding problems are often caused by flash flooding, severe weather, or an unusual amount of rainfall. Flooding from these intense weather events usually occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems.

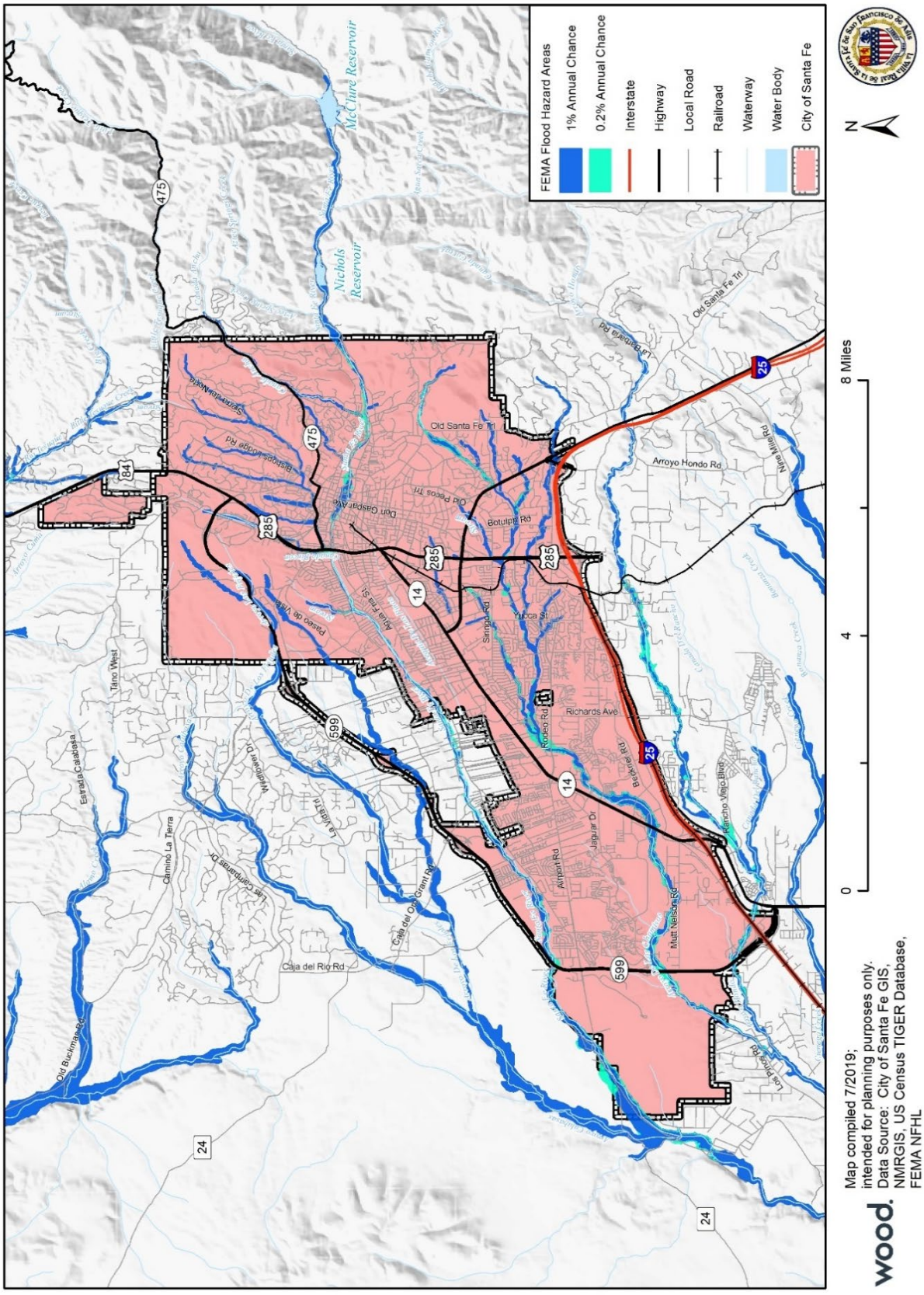
In addition, the often-dry arroyos in the City are prone to erosion and channel migration caused by high waters. This can cause shifting and meandering water channels that can erode sediment and cause damage to adjacent infrastructure and property, including areas not mapped in the official floodplains.

Location

The City of Santa Fe encompasses multiple rivers, streams, creeks, and arroyos. Flood hazards associated with these drainages are shown under Figure 4-12. Main areas where flooding occurs in the City include: along the Santa Fe River, Arroyo De Los Chamisos, Canada Ancha, Arroyo Los Frijoles, Arroyo Hondo, and smaller tributaries from these waterways. During most of the year, these watercourses are often dry. Damaging floods in the Planning Area occur when they impact the developed areas or populations found in or near those waterways. Flood flows generally follow defined stream channels, drainages, and watersheds and described herein.

Floods are often exacerbated by wildfire events because of leaving the ground charred, barren, and unable to absorb water, creating conditions ripe for flash flooding and debris flow activity. Flood risk remains significantly higher until vegetation is restored—up to five years after a wildfire. Wildfire hazards are discussed in more detail in Section 4.3.6.

Figure 4-12 City of Santa Fe FEMA Special Flood Hazard Areas



FEMA Floodplain Mapping and the NFIP

As part of the County's ongoing efforts to identify and manage their flood prone areas, the City of Santa Fe generally relies on FEMA mapping efforts. What follows is a brief description of FEMA mapping efforts covering the City's Planning Area.

FEMA established standards for floodplain mapping studies as part of the National Flood Insurance Program (NFIP). The NFIP makes flood insurance available to property owners in participating communities adopting FEMA-approved local floodplain studies, maps, and regulations. Floodplain studies that may be approved by FEMA include federally funded studies; studies developed by state, city, and regional public agencies; and technical studies generated by private interests as part of property annexation and community development efforts. Such studies may include entire stream reaches or limited stream sections depending on the nature and scope of a study. A general overview of floodplain mapping and associated products is provided in the following paragraphs.

Flood Insurance Study (FIS)

The FIS develops flood-risk data for various areas of the community that will be used to establish flood insurance rates and to assist the community in its efforts to promote sound floodplain management. The current Santa Fe County FIS is dated December 4, 2012. This study covers the entire City of Santa Fe.

Flood Insurance Rate Map (FIRM)

The FIRM is designed for flood insurance and floodplain management applications. For flood insurance, the FIRM designates flood insurance rate zones to assign premium rates for flood insurance policies. For floodplain management, the FIRM delineates 100- and 500-year floodplains, floodways, and the locations of selected cross sections used in the hydraulic analysis and local floodplain regulations. The local FIRMs have recently been replaced by digital flood insurance rate maps (DFIRMs) as part of FEMA's Map Modernization program and can be accessed and used for analysis purposes in spatial (GIS) format.

These digital maps:

- Incorporate the latest updates (Letter of Map Revisions, or LOMRs, and Letters of Map Amendments, or LOMAs)
- Utilize community supplied data
- Verify the currency of the floodplains and refit them to community supplied base maps
- Upgrade the FIRMs to a GIS database format to set the stage for future updates and to enable support for GIS analyses and other digital applications
- Solicit community participation.

Special Flood Hazard Areas (SFHAs) in digital format, available from FEMA's Flood Map Service Center via the National Flood Hazard Layer datasets, or NFHL, are dated November 2018 for Santa Fe County. The applicable SFHAs can be found in Figure 4-12 above for the City of Santa Fe.

As previously introduced, localized, stormwater flooding also occurs throughout the City that may not be shown on FEMA flood maps. Urban storm drain pipes and pump stations have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in the street until it reaches a level of overland release. This type of flooding may particularly occur when intense storms move over areas of development or wildfire burn areas.

Extent (Magnitude/Severity)

Figure 4-12 above illustrates the location of mapped flood hazard areas susceptible to the 1% and 0.2% annual chance floods. Flood damage is typically directly proportional to the depth of flooding in a structure; thus, flood depth can be used as an indicator of extent. In terms of the extent, or range of

magnitude, floods can fluctuate greatly in the City as well as Santa Fe County, based on the type of flood and other weather or infrastructure conditions, varying from localized drainage issues to dangerous flash floods with significant depths and high velocities.

It is difficult to characterize an 'average' or 'extreme' event as the nature of the flooding can be extremely variable based on the duration and intensity of a rainfall event and the location and topography of the watershed upon which the rain occurs. In the eastern portions of the City, where the terrain is more varied, flood depths of two feet greater could occur where variations in topography influence the depth and velocity of floods. Lower elevations with generally flatter terrain, such as the lower Santa Fe River near the airport, can experience broad and shallow flooding ranging from approximately several inches a couple feet, similar to sheet flow or alluvial fan flooding. Flash floods are more common in all areas of the city and by their nature, typically short-lived in duration.

Table 4-15 below summarizes the general FEMA available flood zones for context. Overall, flooding hazards are critical in terms of magnitude or severity for the City of Santa Fe.

Table 4-15 FEMA Special Flood Hazard Zone Descriptions

Flood Zone	Definition
FEMA Special Flood Hazard Areas (SFHA) Subject to Inundation by the 100- or 500-Year Floods	
Zone A	100-year floodplain, or areas with a 1% annual chance of flooding. Because detailed analyses are not performed these areas, no depths or base flood elevations are shown in Zone A areas.
Zone AE	Detailed studies for the 100-year floodplain. The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 zones.
Zone AH	Areas with a 1% chance of shallow flooding, usually in the form of a pong with an average depth ranging from 1 to 3 feet. These are flood elevations derived from detailed analyses.
Zone 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. Average flood depths derived from detailed analyses.
0.2 Percent Annual Chance Flood Hazard	500-year floodplains.
Other Flood Areas	
Floodway	A regulatory floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.
Zone X (shaded)	Areas with a 0.2% annual chance flooding (1 in 500 chance), between the limits of the 100-year and 500-year floodplains. This zone is also used to designate base floodplains of lesser hazards, such as areas protected by levees from the 100-year flood, shallow flooding areas with average depths of less than one foot, or drainage areas less than 1 square mile.
Zone X (unshaded)	500-year floodplain (0.2% annual chance). Area of minimal flood hazard.

Source: FEMA Flood Map Service Center, 2018

Previous Occurrences

Historically, portions of the City have always been at risk of flooding because of monsoon rainfall, topography, and the location of development adjacent to flood-prone areas. Flooding events generally

occur across the entire Planning Area and have caused significant damage in the populated areas in terms of structures and even injuries or deaths. Flooding has occurred both within mapped floodplains and in other localized areas.

Most of the storms that produce large amounts of runoff occur in the months of July through August. Over 70 percent of the average precipitation is received during this time. Summer rainfall is usually a result of thunderstorm activity with maximum rainfall occurring in July. Flood stages sometimes occur in these months when moist tropical air moves north out of the Gulf of Mexico forming intense thunderstorms across the hot New Mexico land. Runoff occurring from these storms is generally termed flash flooding due to the large volumes of water that surge down the normally dry arroyo channels with high velocities.

According to the 2011 County Santa Fe Flood Insurance Study, or FIS report, major floods have been recorded in the area in 1872, 1904, 1914, 1921, 1929, 1957 and 1968. Since 1996 flooding in Santa Fe County and particularly the City of Santa Fe has caused hundreds of thousands of dollars in property and crop damages, 3 deaths, and 1 injury according to the National Oceanic and Atmospheric Administration National Centers for Environmental Information (NCEI). The City was impacted by a 500-year storm event on July 23, 2018. The flood event had moderate impacts to structures mainly impacting private property as well as erosion to arroyo and river channels.

Past events as noted in the NCEI Storm Events database are found in Table 4-16. Only those events which caused property or crop damages or injured or killed people are noted below. All events summarized caused flash flooding, mostly from heavy rains.

Table 4-16 Flood Event History in the City of Santa Fe from 1996 to 2019

Specific Location	Date	Deaths	Injuries	Property Damage	Crop Damage	Event Description
La Cienega	7/9/1996	--	--	$60,000	$10,000	Mud and debris moving swiftly down the Santa Fe River at La Cienega destroying several corrals, covering alfalfa pastures in 1-2 feet of muck and washing away several horses and a half dozen sheep on the Gallegos Ranch. Debris filled in 200 feet of acequia (irrigation channel). Water also destroyed several rock structures dating back 60 years to the Civilian Conservation Corps.
Santa Fe	8/25/1996	--	--	$90,000	--	Heavy rains just south of Santa Fe along New Mexico Highway 14 flooded a home with 5 feet of water, mud and debris and carried away several automobiles.
Santa Fe	7/23/1998	--	1	--	--	A brief heavy thunderstorm produced copious small hail and gusty winds at Santa Fe. Runoff into the Santa Fe River nearly swept away a truck. A man, rescued by a tow truck, was slightly injured. Another man was slightly injured when a large tree blew down on his construction truck.
Santa Fe	8/15/2004	--	--	$50,000	--	Several vehicles were damaged and a number of rooms at a guest lodge were flooded by mud and debris when a small flash flood formed along Bishop's Lodge Road in eastern Santa Fe.
Santa Fe	7/19/2007	--	--	$70,000	--	Thunderstorms produced up to 2.5 inches of rain in the foothills and mountains just east of Santa Fe. Runoff into arroyos flooded 3 nearby homes. One house had water up to a foot deep in it. Runoff forced the closure of Cerro Gordo Road.
Santa Fe	7/21/2007	--	--	$5,000	--	Thunderstorms produced heavy rain which caused street flooding between 1 and 2 feet deep at the intersection of Cerillos Road and Camino Carlos Rey. Cars were stalled in the intersection. A section of Rodeo Road was closed due to flooding. Two homes on the east side of town experienced flooding.
Santa Fe	7/14/2008	1	--	$25,000	--	Flash flooding struck the northeast part of Santa Fe. Arroyos became torrents and overflowed their banks in some instances. Major street flooding ensued in some locations, especially along Lorenzo Road which saw mud deposited two feet deep. One man drowned when he was swept down an arroyo. An unoccupied automobile was damaged when it was also swept down an arroyo. Flash flooding occurred at the Morales Bridge on the north side of town, and a home was flooded on Circle Dr nearby. Deep subtropical moisture brought heavy rain to the Santa Fe area, resulting in flash flooding on the northeast side of town as arroyos became torrents and streets flooded. Locations affected include Morales Bridge, Circle Drive, Lorenzo Road and Cerro Gordo Road. One fatality occurred in this flash flood.
Santa Fe	7/15/2008	--	--	$10,000	--	Heavy rain caused major street flooding for the second consecutive evening in northeast Santa Fe. Lorenzo Road had mud deposited nearly 2 feet deep. Rich moisture and slow storm movement provided a good environment for thunderstorms to produce flooding rains.
(SAF) Santa Fe Muni Airport	8/4/2008	--	--	$1,000	--	Homeowners on Emblem road were stranded from their own due to high water levels around their house. A southerly flow of moist, unstable air poured into New Mexico, causing |a few reports of flash flooding and large hail around the towns of Albuquerque and Bernalillo, and in the Jemez mountains.

Specific Location	Date	Deaths	Injuries	Property Damage	Crop Damage	Event Description
Agua Fria	7/4/2009	--	--	$2,000	--	Monsoonal moisture was responsible for a thunderstorm with heavy rain west of Santa Fe, which resulted in water flowing out of an arroyo at a height of two feet. Lightning from a thunderstorm in Rio Rancho struck and killed a 26-year-old man. Six other members of his family sustained injuries.
Agua Fria	7/3/2010	--	--	$5,000	--	A couple driving home from dinner was caught in the swollen Santa Fe River at San Ysidro Crossing. The couple attempted to drive through the flooded roadway, when the river surged, and a tree came down changing the flow of the river. Santa Fe fire department successfully rescued the couple who only sustained minor injuries. At the time of the rescue, the water was up to the car windows. After the rescue, the car floated and flipped over San Ysidro Falls, where later it was found to be totaled. A deep layer of moisture over northeast New Mexico helped to fuel thunderstorms with heavy rain over Union and Santa Fe counties. This resulted in the flooding of State Highway 370 from Clayton to Clayton Lake State Park, as well as caused the Santa Fe River to swell.
Agua Fria	7/31/2010	--	--	$500	--	Cerrillos Rd. between St. Michael's Dr. and Camino Carlos Rey was flooded and impassable. Deep moisture combined with a weak upper level disturbance allowed slow moving thunderstorms to develop across central and western New Mexico. Torrential rainfall affected many areas, including Gallup, Albuquerque, Los Lunas, and Jemez Springs, where localized flash flooding was reported.
Santa Fe	7/31/2010	--	--	$5,000	--	Heavy rain caused an awning at the Giant gas station to collapse and fall on three cars at the intersection of Sawmill Rd. and St. Francis Dr. Deep moisture combined with a weak upper level disturbance allowed slow moving thunderstorms to develop across central and western New Mexico. Torrential rainfall affected many areas, including Gallup, Albuquerque, Los Lunas, and Jemez Springs, where localized flash flooding was reported.
Santa Fe	8/21/2011	--	--	$50,000	--	Flash flooding was reported in homes on Galisteo Street, within the Forest Circle Street and Calle Torreador subdivisions, Miguel Chaves Road and the Tuscany at St. Francis Apartments. Street flooding was also reported on portions of Cerrillos, St. Francis Dr., and St. Michaels Road. The first day of flash flooding over the Las Conchas burn scar was widespread as weak upper level disturbances rounded the west side of the upper high. Early in the afternoon, showers and thunderstorms developed over the central and northern portions of the burn scar. These storms generally produced 1 to 2 inches of rainfall. Later in the afternoon and early evening, even stronger and very slow-moving storms developed across the southern portions of the burn scar. Radar estimated 3 to 4 inches of rain across a widespread area. Flash flooding was reported with each of these storms. The storms moved eastward over Santa Fe in the evening and produced additional flooding.
Tesuque	7/26/2012	--	--	$10,000	--	Over 1 foot of mud and rocks washed over roadways in Tesuque around the Village Market and Elementary School. Public works crews spent multiple hours removing mud and rocks with several dump trucks. One car was stranded in the mud. Slow-moving, heavy thunderstorms produced

Specific Location	Date	Deaths	Injuries	Property Damage	Crop Damage	Event Description
						torrential rainfall over mesas to the east of Tesuque that resulted in flash flooding in the village center. Mud and rocks covered the roadways more than 1 foot deep at the village market and elementary school.
Agua Fria	7/8/2013	1	--	$0	--	The body of an adult female was recovered from an arroyo on the south side of Santa Fe during the late evening hours. Additionally, one to two feet of water was reported on some roads on the south side of Santa Fe. Rainfall reports ranged from 0.50-1.41. Dry arroyos and streams in the area ran deep and fast well into the evening as a result of runoff from the storm. Arroyos were reported to be filled with about 8 feet of fast-moving water at the peak of the flooding. An upper level high centered over New Mexico continued to dominate the weather pattern. Ample moisture in place provided for a 'recycle' mode pattern. Slow-moving storms with significant moisture caused flooding in areas of central New Mexico throughout the afternoon and evening hours. Storms initially developed across the northern high terrain and drifted slowly east onto the adjacent plains and highlands. Storms continued to develop into the late evening hours in the Albuquerque South Valley prompting evacuations in some areas due to flooding.
(SAF) Santa Fe Muni Airport	7/27/2014	--	--	$5,000	--	After a brief break from heavy rainfall across the state, yet another strong and very moist back door frontal boundary sagged southwest into New Mexico. The upper level high pressure center was generally over far southeast New Mexico allowing for moist southerly flow in the mid and upper levels of the atmosphere to impact the area as well. Slow-moving thunderstorms produced torrential rainfall across many areas during the early to midafternoon hours, including Santa Fe, Rio Rancho, and Albuquerque. The heaviest rainfall occurred over northeast New Mexico during the evening and overnight hours. Raton Crews Airport picked up a record 3.99 inches of rainfall with an impressive 4.91 inches at Mosquero. Incredibly, no reports of damage or flash flooding were received across northeastern New Mexico. However, rises were noted on several area creeks. Photo passed along from KOAT showed a wash out along an arroyo in Santa Fe. The berm estimated to be 4 or 5 feet high was completely gone and remnant water was still flowing through the area.
Santa Fe	8/26/2014	--	--	$0	--	Local Broadcast media shared a photo of a car that was stranded due to flooding at 5th Street and St. Michaels Dr. in Santa Fe. The driver drove into deep water that had accumulated on roadways from short duration, very heavy rainfall. A slow-moving upper level low pressure system over the Great Basin steered rich monsoonal moisture into New Mexico. This system generated widespread showers and thunderstorms along and west of the central mountain chain. Since the system was slow -moving and moisture rich, some storms produced locally heavy rainfall. One such thunderstorm in the Santa Fe area produced enough rain to strand a vehicle at an intersection. Rainfall amounts around the Santa Fe area were near 2 inches.
(SAF) Santa Fe	9/22/2014	1	--	$20,000	--	An upper level impulse moving very slowly northeast over New Mexico after multiple days of heavy rainfall produced areas of flash flooding yet again. A wave of heavy rainfall early in the day over Chaves County produced flash flooding along U.S. 285 north of Roswell. The most serious flash

Specific Location	Date	Deaths	Injuries	Property Damage	Crop Damage	Event Description
Muni Airport						flooding occurred later in the day around Santa Fe as a slow-moving thunderstorm dropped more than 2 inches of rainfall. A 50-year-old man in the Santa Fe River was washed away and drowned by flood waters late in the evening of the 22nd. Local news station reporting that the body of a 58-year-old man was found in the Santa Fe River after heavy rainfall and flash flooding. Reports say that he may have been sleeping in or near the river and drowned when he was swept away from rushing waters.
Agua Fria	7/8/2015	--	--	$1,000	--	An unseasonably deep upper level low over the Great Basin forced a strong jet streak over New Mexico while the monsoon moisture plume was centered from southwest to northeast over the state. This moist and unstable pattern allowed for the development of several severe thunderstorms with large hail and torrential rainfall. A slow-moving storm near Santa Fe dumped quarter to ping pong ball size hail in Santa Fe. Flash flooding was observed as well. A storm around Isleta Pueblo produced quarter size hail. A mudslide was captured on video near Red River. Highway 38 was closed until the flow subsided and the mud was cleared. Significant flooding with estimated 6 inches of flowing water at the corner of Cerrillos and Richards. Gravel washed across the road at the corner of West Alameda and Siler. Landscaping material washed out.
Santa Fe	8/1/2015	--	--	$5,000	--	Public weather station reported 3.35 inches of rainfall in 1 hour near Las Campanas. Video showed flash flood waters flowing quickly over East Sunrise Road northwest of Santa Fe, making it impassable. The water depth was reported to be between 1 and 1.5 feet. Strong to severe thunderstorms moved slowly over portions of northern and eastern New Mexico during the afternoon and evening of the 1st. The strongest of these storms rolled through the Santa Rosa area, dropping quarter size hail and producing damaging wind gusts up to 60 mph that caused roof damage to several buildings. The 1.5 to 2 inches of rain that accompanied the storm also caused flash flooding that resulted in one road being closed due to being submerged in water. Between 1.5 and 3.35 inches of heavy rain also fell near Santa Fe, leading to flash flood waters between 1 and 1.5 feet high making a road impassable. No other significant flooding as a result of heavy rains was reported.
Santa Fe	7/5/2018	--	--	--	--	The first significant surge of monsoon moisture of the 2018 season generated numerous showers and thunderstorms with heavy rainfall across New Mexico. The first thunderstorms of the day developed over the northeast and east central plains followed by scattered activity around the higher terrain of central and western New Mexico. Storm motions were slow to the west with localized areas of heavy rainfall. Heavy rainfall along NM-38 west of Red River forced a mud slide over the highway. Moderate rainfall over the Ute Park burn scar also generated a mud slide and the closure of U.S. Highway 64. Flooding also occurred around Santa Fe where roads were closed around the north side of town. A torrential downpour along U.S. Highway 550 near Rio Rancho produced flash flooding and the closure of several intersections. A levee breach in Belen near

Specific Location	Date	Deaths	Injuries	Property Damage	Crop Damage	Event Description
						Hansen Road flooded a large section of town near the Belen High School. Shelters were open for those affected by flooding in Belen.

Source: NOAA's NCEI, 2019

Probability of Future Occurrences

A "100-year flood" is the flood elevation (or depth) that has a 1- percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The "500-year flood" is the flood elevation or depth that has a 0.2 percent chance of being equaled or exceeded each year, respectively. Based on historical data, flooding events less severe than a 100-year flood and those outside of the 100-year floodplain occur frequently in Santa Fe during periods of heavy rains. The State Hazard Mitigation plan made efforts to determine a probability of occurrence for flash flooding; Santa Fe County falls in Preparedness Area 3. The State determined Preparedness Area 3 has a 29 percent chance of flash flooding occurring in a given year.

While based on a relatively small sample size, Santa Fe County has experienced 22 recorded flooding events in the past 53 years, equating to a 42 percent chance of a flood event in a given year. Overall, the likelihood of some level of flood incident in the City of Santa Fe is likely.

Climate Change Considerations

Climate projections across the United States have shown that while total annual precipitation will likely decrease in the Southwest region, the heaviest annual rainfall events will become more intense. As a result, high frequency flood events will increase with climate change. Also, with wildfires already being a problem in New Mexico, increasing periods of drought and lack of precipitation are expected to exacerbate conditions for fires to occur, and in turn worsen the potential for runoff and flooding associated with burned areas.

Vulnerability Assessment

The City of Santa Fe has mapped flood hazard areas as portrayed in the figures contained throughout this chapter. For the following vulnerability assessment, GIS was used to identify and quantify the possible impacts of flooding within the City's Planning Area. The following methodology was followed in creating these flood vulnerability maps and determining values at risk to the 100- and 500-year flood events.

The City's parcel layer was used as the basis for the inventory of developed parcels, and this was originally developed by the Santa Fe County Assessor's Office. A flood vulnerability assessment was performed for the City of Santa Fe using GIS. The county's parcel layer and associated assessor's building improvement valuation data were provided by the county and were used as the basis for the value of improvements. Santa Fe County's effective 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. Santa Fe County's effective FEMA DFIRM, dated December 4, 2012, was determined to be the best available floodplain data.

GIS was used to intersect the parcel boundaries with a structure location layer to obtain the number of structures and count of improved parcels within flood hazard areas. The DFIRM flood zones were overlaid in GIS on the structure data to identify structures that would likely be inundated during a 1% annual chance and 0.2% annual chance flood event. Structure improvement and agriculture values and counts for those points were extracted from the parcel/assessor's data and summarized for the unincorporated county, jurisdictions and Pueblos. More specifics on the content valuations and other calculations related to the parcel analysis are contained under the Built Environment subsection herein. The latest NFHL-based Special Flood Hazard Areas from FEMA were used as the floodplain layers in mapping and analysis of riverine flooding potential. These datasets are the most comprehensive electronic representation of the 100- and 500-year floodplains for the entire Planning Area.

Flood Insurance Coverage and NFIP Claims and Losses

The City of Santa Fe joined the NFIP through an emergency entry on February 13, 1975 and regular entry on July 2, 1980. The current effective map is from December 4, 2012. According to the NFIP Community Information System (CIS) insurance data indicates that as of November 2018 the City has 286 policies in force with $95 million in coverage; there have been 9 claims totaling $159,697 since 1978. Of these policies a majority (222) were for single family residential homes followed by nonresidential (43), multi-family (13) and other residential (8). The NFIP defines repetitive loss properties as having 2 or more claims of $1,000 or more in a 10-year period; severe repetitive loss properties are defined as having 4 or more claims of more than $5,000 each, or 2 or more claims where the total of the payments exceeds the value of the property. There are no repetitive loss or severe repetitive loss properties in the City of Santa Fe.

People

Drowning is a major concern during flooding. Rising waters can quickly envelop people in vulnerable areas and people can also be trapped by floodwaters and need rescuing. According to the HMPT during the July 2018 flood event many first responders were required to respond to the incident causing them to be less available for other emergencies.

According to the previously described GIS analysis, there are 324 residential type parcels in the floodplains across the city, with 97 parcels in the 100-year (1% annual chance event) floodplain, and 227 parcels in the 500-year (0.2% annual chance event) floodplain. Single family residential is the most common parcel type found in the floodplain.

Certain health hazards are common to flood events. While such problems are often not reported, there are general types of health hazards accompany floods. First comes from the water itself; floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where cattle and hogs are kept, or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as E. coli and other disease-causing agents. Flooding can also impact drinking water quality. If a water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

Stagnant pools of floodwater can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly. Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

There is also the risk of long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. According to the HMPT, many homeowners in the City own their homes outright and thus are not required to have flood insurance as a condition of receiving a federally backed loan. Individuals with less financial means to conduct repairs or ability to temporarily relocate are generally the most impacted. The resulting stress on flooded residents takes its toll in the form of aggravated physical and mental health problems.

Economy

Flooding can have a major economic impact on the economy. Based on the flood loss analysis, there are 62 commercial structures worth an estimated $76 million in total value directly at risk to flooding in the 1% annual chance zone, and 187 additional in the 0.2% annual chance zone. Based on the loss analysis (described further below) this could result in approximately $439 million in direct losses. This does not account for other indirect losses such as business interruption, lost wages and other downtime costs.

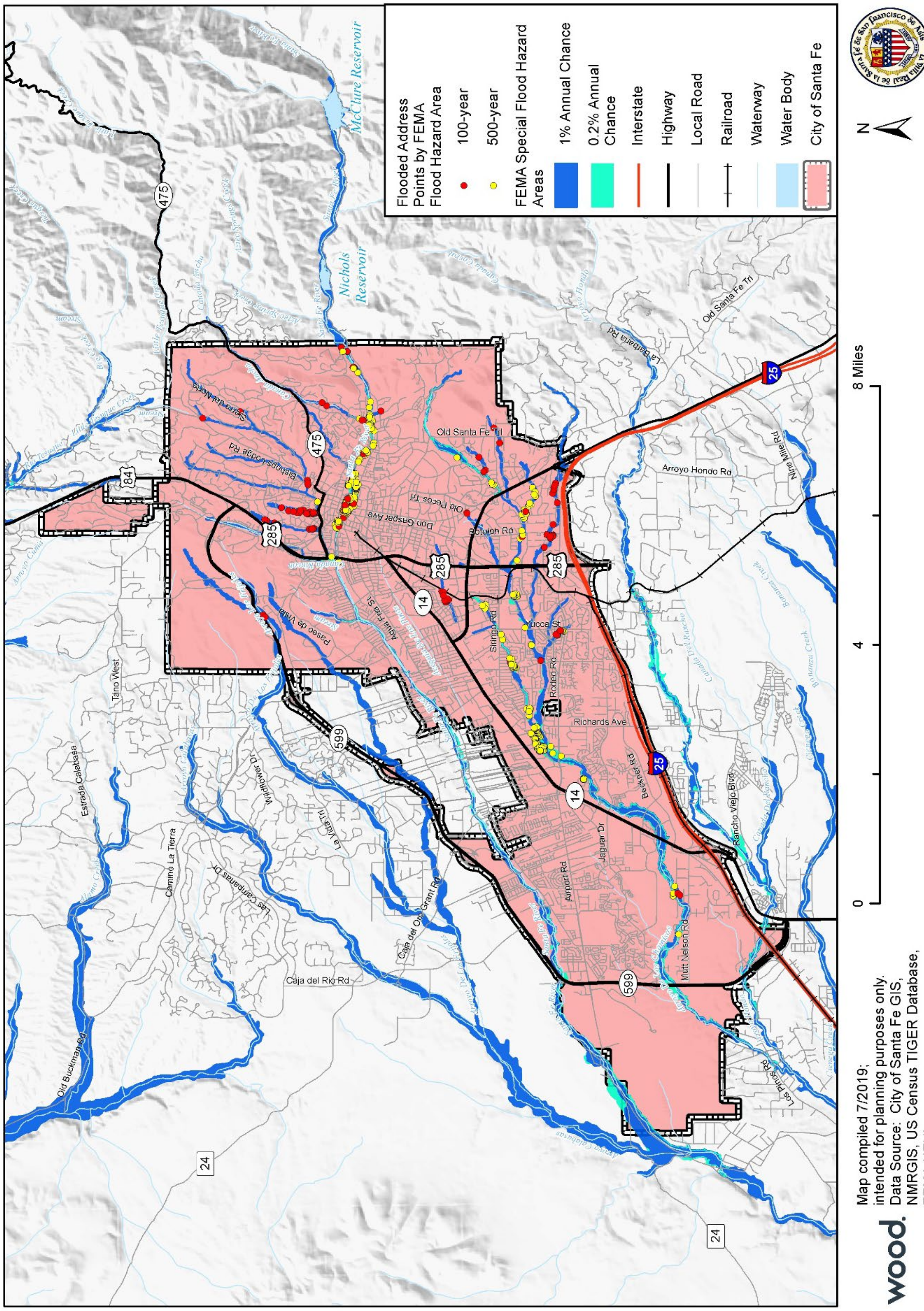
Built Environment

Floods can have devastating impacts on the built environment and is often experienced disproportionately by low-to-moderate income household due to lack of financial means to take care of necessary repairs. Flood recovery can take years for affected communities to be rebuilt, depending on the severity of the flood. According to the HMPT, the July 2018 flood event resulted in silting of roads and culverts and power outages.

The location of properties at risk to flooding is shown in Figure 4-13; The map shows flood risk throughout the city, with a greater concentration in the northern portion. Notable areas of risk include the branches off of the Arroyo De Los Chamisos and the north and southwest along the Santa Fe River and its tributaries (La Cienega, Auga Fria, Tesuque and Chupadero). Flooding also poses a risk to the parcel near the drainages adjacent to the I-285 corridor on the northeastern portion of the City. According to the GIS analysis conducted there are a total of 573 structures with a loss estimates totaling over $483 million in the City of Santa Fe. A majority of property types at risk are commercial (249) followed by single family residential (245).

Tabular results of the overlay analysis area are shown in Table 4-17 and Table 4-18 and are sorted by flood zone and the parcel's property type. Property type refers to the land use of the parcel and includes commercial, exempt (county, federal, state), open space, other, park, residential (condominium, mobile home, single family) and vacant. Contents values were estimated as a percentage of building value based on their property type, using FEMA/HAZUS estimated content replacement values. This includes 100% of the structure value for commercial, exempt, open space, other and park structures, 50% for residential structures and 0% for vacant structures. Improved, agriculture and contents values were summed to obtain a total exposure value. A loss estimate analysis was also performed based on flood depth-damage relationships developed by the Corp of Engineers. An average depth-damage of 25% was applied to the total value to estimate flood loss. This is generally equivalent to the damage associated when buildings are inundated with a two-foot-deep flood.

Figure 4-13 City of Santa Fe FEMA Flood Hazard Areas and Exposed Properties



According to the GIS analysis, there are 159 structures at risk that could be lost in a 1% annual chance flood event with an estimated $88 million in direct damages. A 0.2% annual chance flood would add an additional 414 structures to the total at risk to flooding; the majority of which are residential parcel types as discussed above. This analysis does not account for flood losses that may occur outside of mapped flood hazard areas.

Table 4-17 Property Values and Loss Estimates for Structures in the FEMA 100-Year Flood Hazard Areas

Parcel Type	Address Point Count	Improved Value	Content Value	Total Value	Loss Estimate
Commercial	62	$153,958,778	$153,958,778	$307,917,556	$76,979,389
Multi-Unit Residential	7	$1,073,980	$536,990	$1,610,970	$402,743
Residential: Condo	19	$6,712,633	$3,356,317	$10,068,950	$2,517,237
Single Family Residential	71	$22,076,234	$11,038,117	$33,114,351	$8,278,588
Total	**159**	**$183,821,625**	**$168,890,202**	**$352,711,827**	**$88,177,957**

Source: City of Santa GIS Dept., FEMA NFHL, Wood Plc analysis

Table 4-18 Property Values and Loss Estimates for Structures in the FEMA 500-Year Flood Hazard Areas

Parcel Type	Address Point Count	Improved Value	Content Value	Total Value	Loss Estimate
Commercial	187	$724,741,829	$724,741,829	$1,449,483,658	$362,370,915
Multi-Unit Residential	13	$30,438,731	$15,219,366	$45,658,097	$11,414,524
Residential: Condo	40	$11,641,228	$5,820,614	$17,461,842	$4,365,461
Single Family Residential	174	$46,663,146	$23,331,573	$69,994,719	$17,498,680
Total	**414**	**$813,484,934**	**$769,113,382**	**$1,582,598,316**	**$395,649,579**

Source: City of Santa Fe GIS Dept., FEMA NFHL, Wood Plc analysis

Critical Facilities and Infrastructure

Analysis of critical facilities in both the 1% and 0.2% annual probability floodplain was conducted for the City. Table 4-19 contains the number of critical facilities in the 1% and 0.2% annual chance flood zones. An additional three critical facilities were identified under the Stormwater Pond subtype as falling under floodplains, but due to their facility nature they were not deemed to be at risk of this Flooding hazard. As such they were excluded from these summaries.

Table 4-19 Critical Facilities in FEMA Flood Hazard Areas, by Lifeline and Component

Flood Hazard Area	Lifeline	Component	Subtype	Critical Facility Count
100-year	Transportation	Mass Transit	Public Works	1
Total				**1**
500-year	Communications	Infrastructure	Cell Tower	1
Total				**1**
Grand Total				**2**

Source: City of Santa GIS Dept., FEMA NFHL, HIFLD, Wood Plc analysis

Historic, Cultural, and Natural Resources

The City's historic and archaeological districts may be more affected by these flooding hazards, given their likely older construction methods, weaker materials, and potential failure to meet current building code standards.

Natural resources are generally resistant to flooding except where natural landscapes and soil compositions have been altered for human development or after periods of previous disasters such as drought and fire. Wetlands, for example, exist because of natural flooding incidents. Areas that are no longer wetlands may suffer from oversaturation of water, as will areas that are particularly impacted by drought. Areas recently suffering from wildfire damage may erode because of flooding, which can permanently alter an ecological system. This took place after the Las Conchas fire, the burn scar experienced multiple instances of flash flooding from heavy rains. Flood water can also contain contaminants that may adversely affect the environment.

Future Development

Future plans to reduce the risk of future development to localized stormwater/flash flooding can be enhanced by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater or choosing not to develop in areas that often are subject to localized flooding will reduce future risks of losses due to stormwater/localized flooding.

The City of Santa Fe's continued population, housing, and employment growth creates pressure for land use change and the supporting infrastructure improvements. The City's future annexation plans should take flooding risk into consideration. Floodplain management practices implemented through local floodplain management ordinances should mitigate the flood risk to new development in floodplains. Urbanization and increasing impervious surface areas tend to increase both the rate and the volume of stormwater runoff. Thus, the largest issue with future development trends is urbanization and stormwater drainage issues that add to the peak discharge and volume of floodwaters in floodplains.

Risk Summary

- Based on a GIS analysis of mapped flood hazard areas by Wood, 573 structures worth approximately $483 million are potentially at risk to flooding citywide.
- 249 commercial structures with a total value of $439 million are most at risk followed by 245 single family residential structures.
- According to the NFIP the City has 286 policies with $95 million in coverage; there have been 9 claims totaling $159,697 since 1978.
- *Related hazards*: Severe weather, transportation accidents

Location	Probability of Future Occurrence	Extent (Magnitude/Severity)	Overall Significance
Significant	Likely	Critical	High

4.3.4 Severe Weather (Thunderstorm, Hail, Lightning, Extreme Temperatures, High Wind, Winter Storm)

Hazard Description

Severe weather in the City of Santa Fe can take a variety of forms, mostly tied to the season the weather occurs. Warmer weather brings summer hazards related the thunderstorms, including hail, lighting and monsoons. Colder weather can bring winter storms. Wind and extreme temperatures can occur year-round.

This chapter profiles several severe weather sub-hazards that can impact the City of Santa Fe in different ways – thunderstorms, hail, lightning, extreme temperatures, high wind, and winter storms. Tornadoes are addressed separately in the next section.

Thunderstorm

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

The City of Santa Fe experiences a rainy season in the summer, often referred to as the "monsoon" season. The term monsoon generally refers to a seasonal wind shift, or monsoon circulation, that produces a radical change in moisture conditions in a given area or region and is often accompanied by thunderstorm hazards. In the southwestern United States, this shift in wind direction is primarily the result of two meteorological changes:

The movement northward from winter to summer of the huge upper level subtropical high-pressure system, specifically known as the Bermuda High, and the intense heating of the Mojave Desert creates rising air and surface low pressure, called a thermal low.

These two features then combine to create a strong southerly flow that helps bring in moisture (i.e., from the Gulf of Mexico, the Gulf of California, and the Pacific Ocean) that lifts and forms thunderstorms when it encounters the higher terrain of New Mexico, including Santa Fe.

Hail

Hail is formed when water droplets freeze and thaw as they are thrown high into the upper atmosphere by the violent internal forces of thunderstorms. Hail is sometimes associated with severe storms within the City of Santa Fe Planning Area. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 miles per hour (mph). Severe hailstorms can be quite destructive, causing damage to roofs, buildings, automobiles, vegetation, and crops.

Lightning

Lightning is defined as any and all of the various forms of visible electrical discharge caused by thunderstorms. Thunderstorms and lightning are usually (but not always) accompanied by rain. Cloud-to-ground lightning can kill or injure people by direct or indirect means. Objects can be struck directly, which may result in an explosion, burn, or total destruction. Damage may also be indirect, when the current passes through or near an object, which generally results in less damage.

Cloud-to-ground lightning is the most damaging and dangerous type 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.

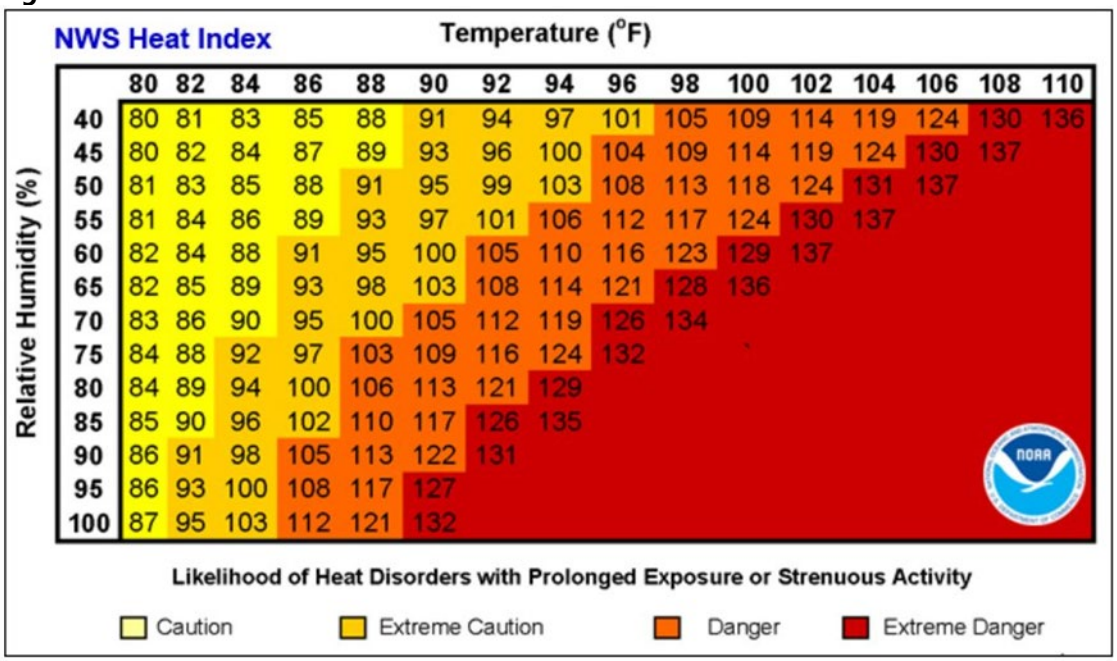
Extreme Temperatures

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. 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, those with chronic illnesses, 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. Figure 4-14 illustrates the relationship of temperature and humidity to heat disorders.

Figure 4-14 National Weather Service Heat Index



Source: National Weather Service

Heat Index values were devised for shady, light wind conditions. Exposure to full sunshine can increase values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

The NWS has in place a system to initiate advisories or warnings when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for the issuance of excessive heat alerts is when the maximum daytime high is expected to equal or exceed 105°F and a nighttime minimum high of 80°F or above is expected for two or more consecutive days**.**

Extreme Cold

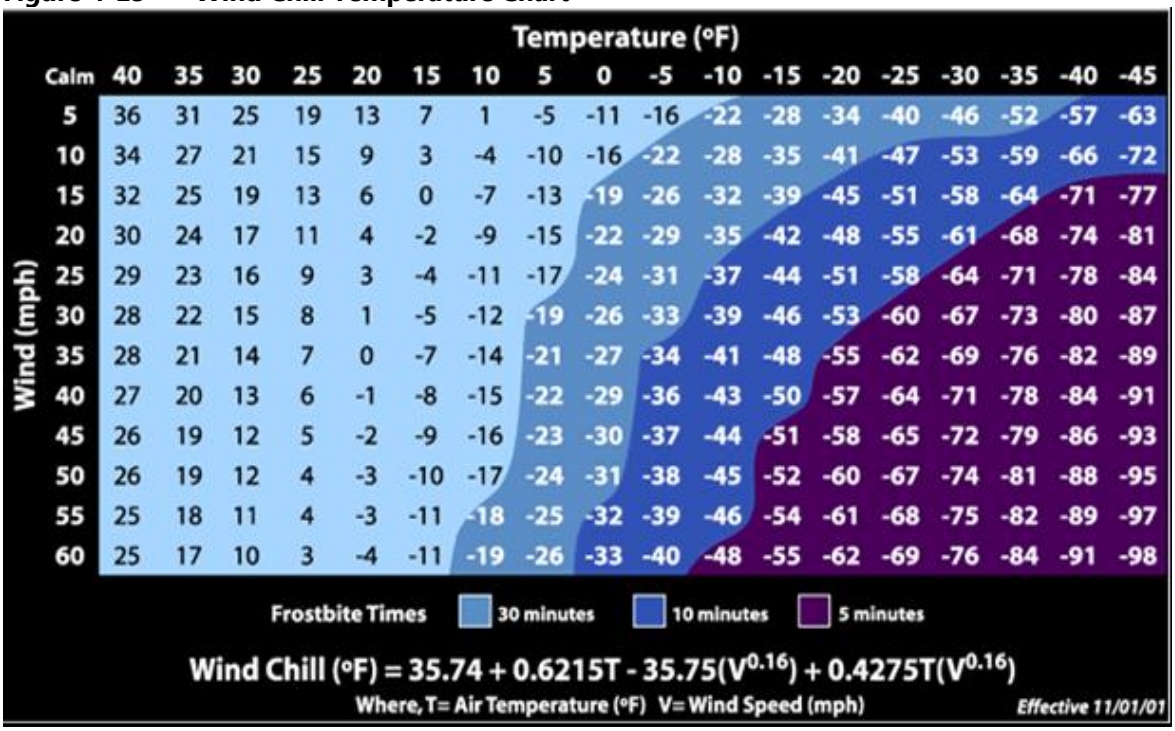
What constitutes extremely cold temperatures varies across different areas of the United States, based on normal climate temperatures for the time of year. In New Mexico, cold temperatures are normal during the winter. When temperatures drop at least 20 degrees below normal winter lows, the cold is considered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

Extreme cold can occur on its own, but 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. Prolonged exposure to the cold can cause frostbite or hypothermia and can be 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. 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 NWS implemented an updated Wind Chill Temperature index, which is provided in Figure 4-15 as a measure of extreme cold. This index was developed to describe the relative discomfort/danger

resulting from the combination of wind and temperature. At -15 degrees Fahrenheit, with no wind, frostbite can occur to exposed skin within 30 minutes and defines the upper end of extreme cold. 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.

Figure 4-15 Wind Chill Temperature Chart



Source: National Weather Service

High Wind

Wind is defined as the motion of air relative to the earth's surface, and the hazard of high wind is commonly associated with severe thunderstorm winds (exceeding 58 mph) as well as tornadoes, hurricanes, and tropical storms. High winds can also occur in the absence of other definable hazard conditions, events often referred to as simply "windstorms." High wind events might occur over large, widespread areas or in a very limited, localized area. They can occur suddenly without warning, at any time of the day or night.

Typically, high winds occur when large air masses of varying temperatures meet. 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. Rapidly rising warm moist air serves as the "engine" for severe thunderstorms, tornadoes and other windstorm events. These storms can occur singularly, in lines or in clusters. They can move through an area very quickly or linger for several hours. Winds in the Planning Area are typically straight-line winds, which are generally any thunderstorm wind that is not associated with rotation or tornadic. These winds can overturn mobile homes, tear roofs off houses, topple trees, snap power lines, shatter windows, and sandblast paint from cars. Other associated hazards include utility outages, arcing power lines, debris blocking streets, dust storms, and an occasional structure fire. While straight line winds are the most common, microbursts and tornadoes may also occur in the city.

Winter Storm

The Planning Area receives snowfall on a regular seasonal basis, mostly between the months of October and April. Because of the size of average storms, every area of the city is usually affected. Winter storms occur when precipitation and freezing temperatures mix to produce a significant accumulation of snow or ice. Winter storms are often worsened by wind that produces blowing and drifting snow and reduced visibility. Winter storms can be quite disruptive. Road closures can occur causing people to become stranded; accidents occur; power, water and sewer services can be temporarily interrupted. These events can cause great impact to the city depending on the severity and duration of a storm.

Location

The entire city is susceptible to the impacts of the severe weather types included in this chapter.

Extent (Magnitude/Severity)

The different sub-hazards profiled as part of the Severe Weather chapter have a variety of references to extent. The even in the absence of historical occurrence, the City of Santa Fe is vulnerable to the full extent of these hazards.

Hail

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4-20 indicates the hailstone measurements utilized by the National Weather Service.

Table 4-20 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
3.0 inch	Teacup
4.0 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

The largest hailstones recorded by the NCEI in the City of Santa Fe had a diameter of 1.75 inches, or the size of a golf ball, recorded in June 1995; NCEI recorded no property damages for this incident.

The largest hailstones recorded in Santa Fe County had a diameter of 2.5 inches or the size of a tennis ball; these were recorded in June of 2017, causing at least $1 million in property damage.

While a 1.75-inch diameter is a historical maximum size for the city, Santa Fe could be susceptible to larger stones that could do even more damage. The largest hailstones recorded in New Mexico had a

diameter of 4.50 inches or the size of a softball; this size hail has been recorded nine times across the state since 1982.

Lightning

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the National Weather Service to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide. The LAL is reproduced in Table 4-21.

Table 4-21 Lightning Activity Level Scale

LIGHTNING ACTIVITY LEVEL	
LAL 1	No thunderstorms.
LAL 2	Isolated thunderstorms. Light rain will occasionally reach ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent and intense, 11 to 15 cloud to ground strikes in a five minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning.

Source: National Weather Service

Santa Fe is at risk to experience lightning in any of these categories.

Extreme Temperatures

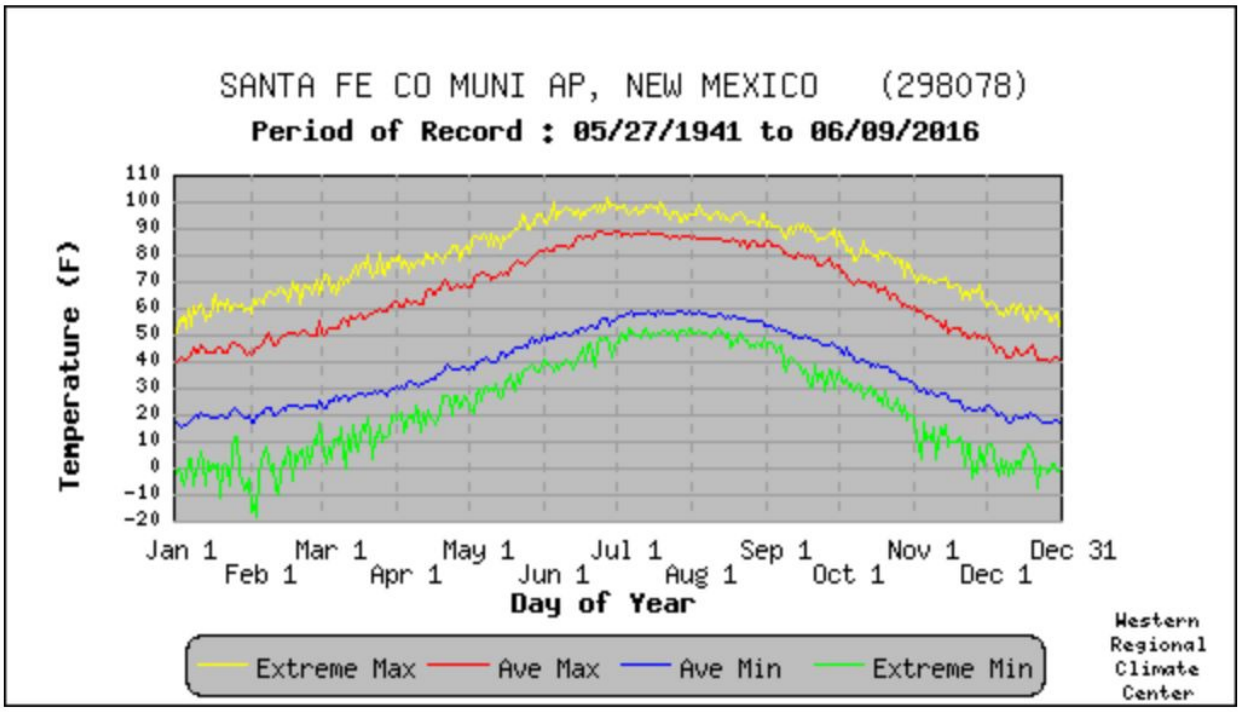
Data was obtained from the Western Regional Climate Center from the weather station located at the Santa Fe County Municipal Airport. Table 4-13 contains temperature summaries for the station. Figure 4-14 graphs the daily temperature averages and extremes recorded between 1941 and 2016 at the Santa Fe County Municipal Airport weather station. The coldest temperature recorded was -18 degrees Celsius on February 3rd, 2011 (see Table 4-23).

Table 4-22 Santa Fe County Municipal Airport Temperature Summaries: May 1941 – June 2016

Station	Winter* Average Minimum Temperature	Summer* Average Maximum Temperature	Average Annual Maximum Temperature	Average Annual Minimum Temperature	# Days >90°F/Annually	# Days <32°F/Annually
Santa Fe CO Municipal Airport	32.2°F	70.1°F	64.9°F	36.9°F	22	156.4

Source: Western Regional Climate Center, https://wrcc.dri.edu/
* Winter Months: December, January, February
*Summer Months: June, July, August

Table 4-23 Santa Fe County Municipal Airport Station Daily Temperature Averages and Extremes 1941-2016



Source: Western Regional Climate Center

High Wind

Table 4-24 outlines the Beaufort scale, which describes the damaging effects of wind speed. The City of Santa Fe has suffered from wind speed in the past that have resulted in trees being downed and property being damaged, which is indicative of Beaufort scale 10, though it is possible for stronger winds to occur.

Table 4-24 Beaufort Wind Scale

Wind Speed (mph)	Scale and Description – Visible Condition
0	0- Calm; smoke rises vertically
1-4	1-Light air; direction of wind shown by smoke but not by wind vanes
4-7	2-Light breeze; wind felt on face; leaves rustle; ordinary wind vane moved by wind
8-12	3-Gentle breeze; leaves and small twigs in constant motion; wind extends light flag
13-18	4-Moderate breeze; raises dust and loose paper; small branches are moved
19-24	5-Fresh breeze; small trees in leaf begin to sway; crested wavelets form on inland water
25-31	6-Strong breeze; large branches in motion; telephone wires whistle; umbrellas used with difficulty
32-38	7-Moderate gale whole trees in motion; inconvenience in walking against wind
39-46	8-Fresh gale breaks twigs off trees; generally, impedes progress
47-54	9-Strong gale slight structural damage occurs; chimney pots and slates removed

Wind Speed (mph)	Scale and Description – Visible Condition
55-63	10-Whole gale trees uprooted; considerable structural damage occurs
64-72	11-Storm very rarely experienced; accompanied by widespread damage
73+	12-Hurricane devastation occurs

Source: NWS

According to NCEI records, there have been 110 high wind events in Santa Fe County in the past 68 years (1950-2018) of these records 7 events are recorded as taking place in the Santa Fe Metro Area weather zone. The 7 recorded events resulted in $106,000 in property damages. The average annual property damages the metro area may experience from a high wind event in a given year is $15,296. The highest recorded windspeed for the Santa Fe Metro Area weather zone was 57mph on March 18, 2012 and resulted in $5,000 in property damages. An event on April 18, 2018 is the costliest event recorded in the NCEI database for the City; the high wind event resulted in $100,000 in property damages including power lines being blown down and numerous power outages. Refer to the Previous Occurrences section below for further details on past high wind events in Santa Fe.

Winter Storm

Overall, severe winter storm impacts could be limited, but the potential for heavy snow and blizzard events as defined by the National Weather Service are possible. The most dangerous of all winter storms is the blizzard and is considered the upper extent for the winter storm hazard in Santa Fe. A blizzard warning is the extent rating scale for the purposes of this plan. A blizzard warning is issued when winds of 35 miles an hour will occur in combination with considerable falling and/or blowing snow for at least 3 hours. Visibilities will frequently be reduced to less than 1/4 mile and temperatures are usually 20 degrees Fahrenheit or lower. City residents take the weather in stride as part of high elevation living and the HMPT notes that typically snow melts quickly. Most property damages with winter storms are related to downed trees and transportation accidents. The highest risk will be to travelers that attempt to drive during adverse conditions. Despite flat roofs being a common architectural feature in the City the HMPT did not have knowledge of past roof collapses due to snow loading.

The Western Regional Climate Center reports data from weather stations in and around the City of Santa Fe. The data from the Santa Fe County Municipal Airport weather station for the average snowfalls and records of highest monthly snowfall and seasonal snowfall for the City of Santa Fe.

Table 4- 25 Santa Fe County Municipal Airport Winter Weather Summaries in Inches[1]

Average Annual Total Snowfall (in.)	Snowiest Month/Average Snowfall (in)	Highest Monthly Snowfall (in.)	Highest Seasonal Snowfall (in.)	Coldest Recorded Temperature (F)
17.7	January/5.2 in.	16.9 in.	33.4 1949	-18 Feb. 3, 2011

[1]Period of Record: 1924- 2012

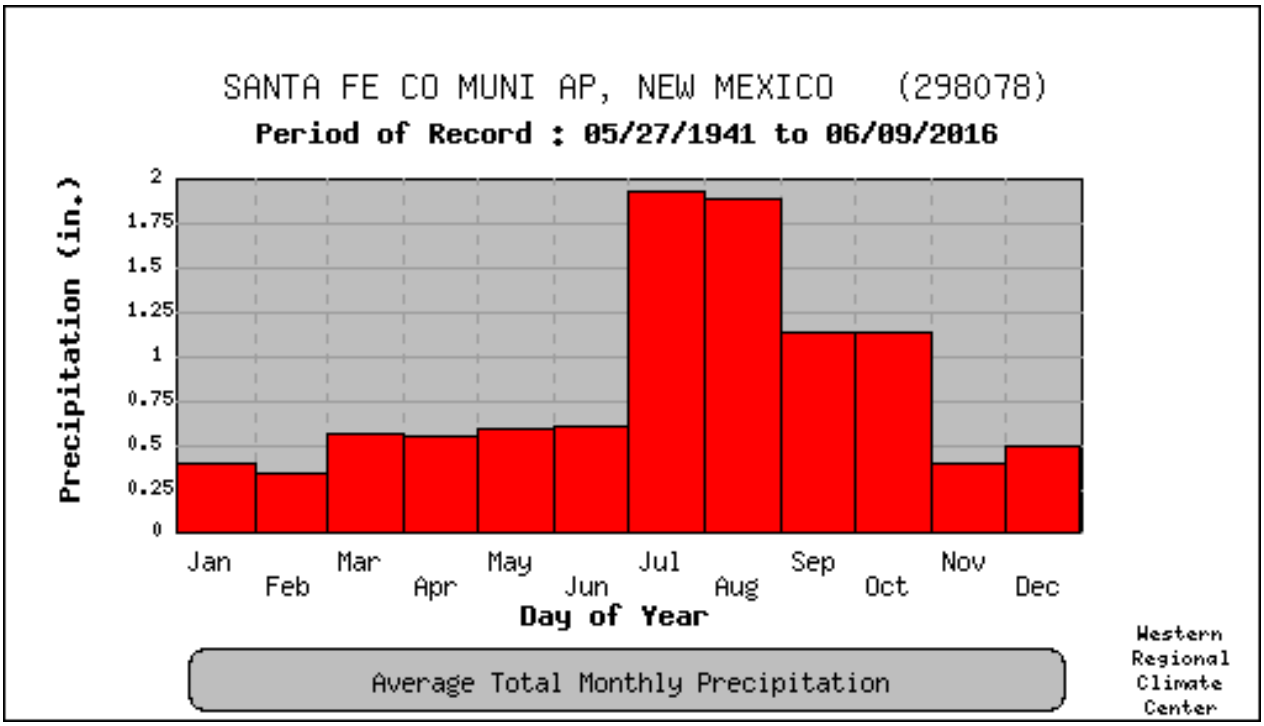
Previous Occurrences

Thunderstorms

Summer begins with warm, and often dry, conditions in June across the Planning Area, followed by a 2-month rainy season. Often referred to as "monsoon" season, July and August brings predictable afternoon thunderstorms. However, the annual total precipitation fluctuates considerably from year to year and the

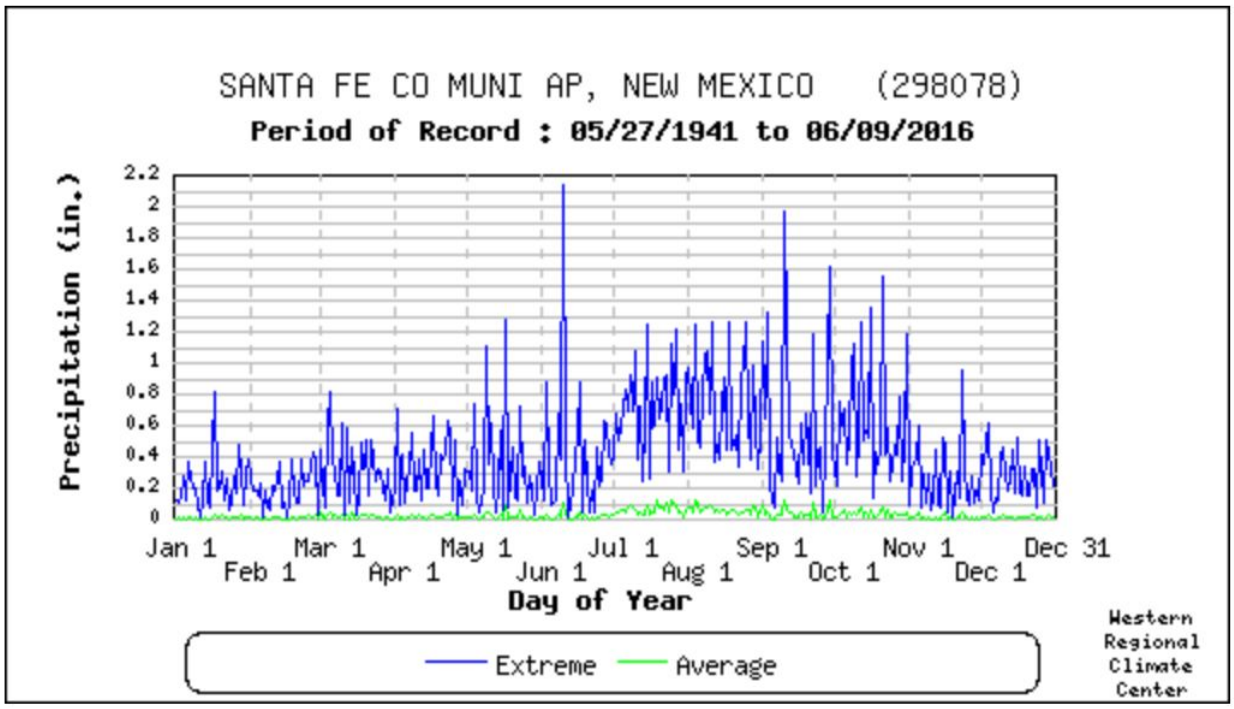
monsoon can start as early as mid-June. Average monthly precipitation totals for the Santa Fe County Municipal Airport weather station, the closest to the City of Santa Fe are shown in Figure 4-16. Precipitation extremes for the same station are shown in Figure 4-17.

Figure 4-16 Monthly Average Total Precipitation Recorded at Santa Fe County Municipal Airport



Source: Western Regional Climate Center

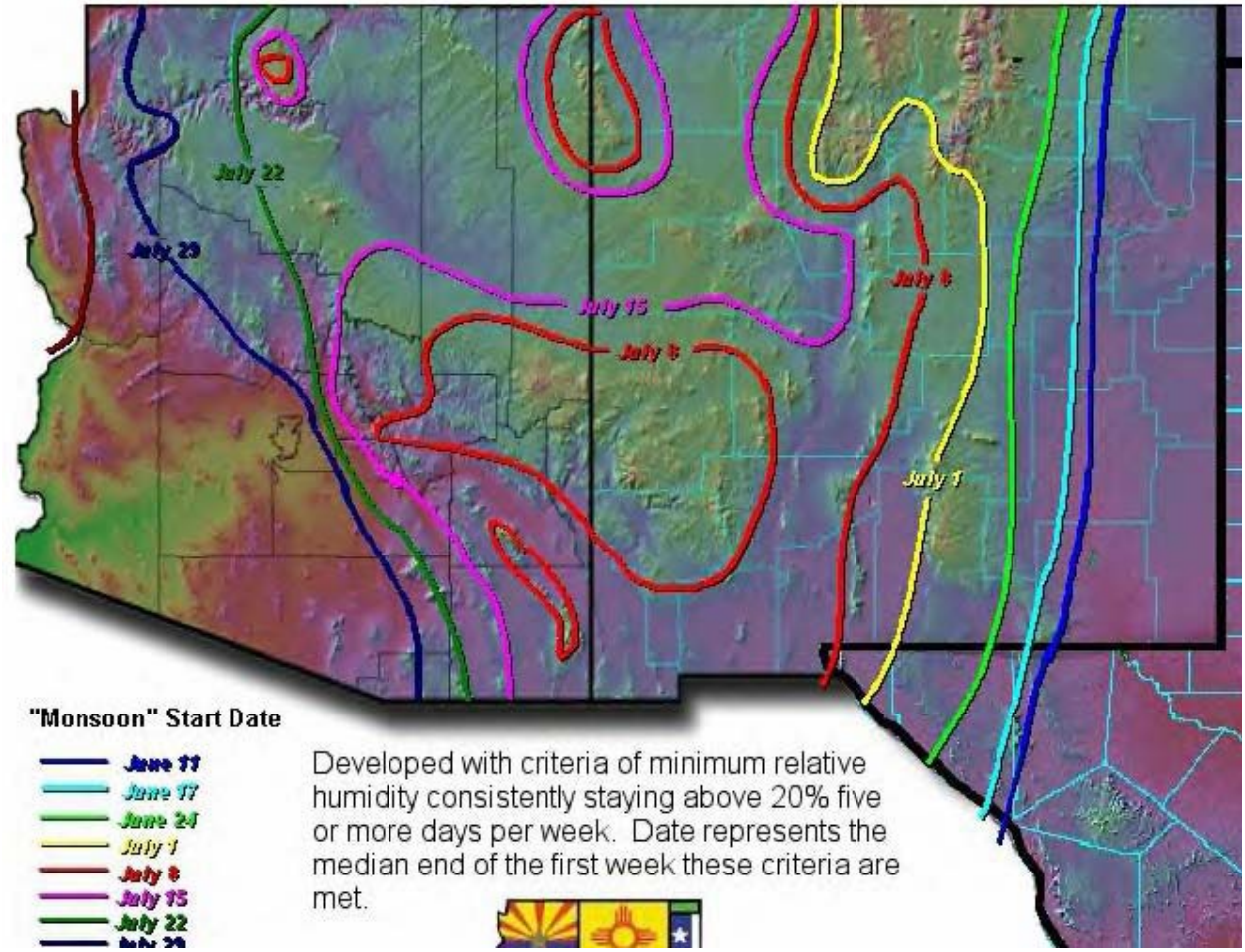
Figure 4-17 Santa Fe County Daily Precipitation Average and Extremes



Source: Western Regional Climate Center

Consistent with the monthly annual precipitation records, Figure 4-18 illustrates the typical monsoon season "start date" in New Mexico and the City of Santa Fe.

Figure 4-18 Monsoon Start Dates in New Mexico and the City of Santa Fe



Source: Southwest Area Predictive Services

Thunderstorms events that include heavy rain, lightning, or hail in Santa Fe are many in number and occur on a yearly basis. The NCEI has not recorded a heavy rain incident between 1950 and 2018, although a search for "flash flood" or "flooding" in the Storm Events Database show that 12 heavy rain events have occurred in the City since 1996 and resulted in severe flooding events. Refer to Table 4-16Flood Event History in the City of Santa Fe from 1996 to 2019 in Section 4.3.3 for detailed information on the events.

Winter Storm and Extreme Cold Temperatures

Winter storms and winter related weather including extreme cold temperatures were the most recorded hazard event in the NCEI Storm Events Database specific to the Santa Fe Metro Area resulting in $30,000 in property damages. None of the recorded events resulted in damages to crops or direct injuries or fatalities. According to the HMPT, a winter storm in 2006 dumped heavy amounts of snow that temporally immobilized the City though the snow melted quickly. The following is a breakdown of events recorded in the NCEI database that resulted in impacts (i.e. property or crop damages, injuries or fatalities). Refer to Tables 4-24 and 4-25 for additional breaks downs of winter storm and extreme cold temperature impacts.

December 7, 2009 - The strong winds combined with the heavy snow resulted in blizzard conditions across the southwest mountains as well as portions of central New Mexico. Wind gusts near 135 mph were measured across Magdalena Peak, which set a new record for the highest wind gust measured in the

state. Across the south central mountains and eastern plains, the high winds were a bigger concern than the snow. Widespread surface wind gusts in excess of 60 mph were measured across this area. Several buildings, vehicles and trees sustained damage. A total of $10,000 in property damages is recorded.

December 23, 2009 - Between 2 and 7 inches of snow fell across the Santa Fe Metro Area, with the heaviest amounts falling in the Santa Fe Foothills. Icy roads lead to a three-car crash 7 miles south of El Dorado on Highway 285 on the morning of the 23rd. A 59 year old man died when his Volkswagen Beetle was struck head-on by a car that slid on the ice at mile marker 282. The man's car was then struck from behind by another vehicle that couldn't stop in time. Three other people were also injured in the accident. The highway was closed for several hours after the crash.

November 12, 2018 - An unseasonably cold upper level storm system moved slowly south from the northern Rockies with an associated potent surface cold front. Very heavy snow fell in the Sangre de Cristo Mountains where up to a foot was reported in less than 12 hours. Severe travel conditions developed over the area with numerous rollovers and closed roadways. Snow gradually ended over the eastern plains during the overnight hours but persisted through the 12th over the high terrain of northern New Mexico. Storm total accumulations in the higher terrain of northern New Mexico ranged from 12 to 20 inches. Clearing skies, exceptionally dry air, and snowpack led to record temperatures across parts of New Mexico in the wake of this system. A total of $20,000 in property damages was recorded.

Hail, Lightning and High Wind

The NCEI recorded 109 hail events between 1960 and 2018 in Santa Fe County, though there were no damages to crops or any direct injuries or fatalities the events there was a total of $1,220,000 in property damages. Of the events, 51 recorded hail with a diameter under one inch, and 58 recorded hail with a diameter between one inch and two inches. The average diameter of hailstone in the Santa Fe Metro Area was 1.25", with the largest recorded hailstorm diameter being 1.75". According to the HMPT, in May 2018 a severe storm resulted in 6 inches of hail in the City causing transportation and traffic issues.

Wind damage has occasionally occurred in the past and caused tree damages and car damages in the downtown area. The HMPT noted that a severe wind event in May 2019 led to $250,000 in property damaged to the Arts Campus. Lightning in the City of Santa Fe occurs on a yearly basis throughout the Planning Area. The following tables shows the high wind events recorded in the NCEI database for the Santa Fe Metro Area weather zone. None of the events had recorded causalities.

Table 4-26 NCEI High Wind Events in Santa Fe Metro Area, 2011-2018

Date	Location	Magnitude (mph)	Property Damage
5/9/2011	Santa Fe Metro Area	52	$0
3/18/2012	Santa Fe Metro Area	57	$5,000
9/17/2012	Santa Fe Metro Area	51	$0
12/4/2013	Santa Fe Metro Area	52	$0
11/17/2016	Santa Fe Metro Area	54	$1,000

Date	Location	Magnitude (mph)	Property Damage
4/17/2018	Santa Fe Metro Area	52	$0
4/19/2018	Santa Fe Metro Area	50	$100,000
		Total	**$106,000**

Source: NOAA Storm Events Database

Not all lightning causes damages. Specific events are detailed by the NCEI database and are noted in Table 4-27. NCEI records any "sudden electrical discharge from a thunderstorm, resulting in a fatality, injury or damage". Injuries and fatalities recorded for Santa Fe County from lightning included hikers, construction workers and others who were not under shelter during a thunderstorm. Property damage was mostly centered on damage to homes. According to the HMPT, severe thunderstorms and lighting have periodically caused power outages in the downtown Santa Fe area.

Table 4-27 NCEI Lightning Incidents in Santa Fe County, 1996 to 2018

Date	Location	Time	Injuries	Fatalities	Property Damage
07/09/1996	Santa Fe	20:30	0	0	$60,000
08/03/1997	Santa Fe	11:30	1	2	-
08/12/1998	Santa Fe	16:30	0	1	-
08/30/1998	Santa Fe	20:30	0	1	-
08/17/2006	Santa Fe	14:00	0	2	-
07/24/2007	Santa Fe	17:55	0	0	$2,000
07/12/2013	Santa Fe	17:00	0	0	-
08/04/2014	Santa Fe	16:30	0	0	$1,000
Totals			**1**	**6**	**$63,000**

Source: NOAA Storm Events Database

Probability of Future Occurrences

Highly Likely – The types of severe weather described in this plan are well-documented hazards that will continue to occur in the Planning Area. The City of Santa Fe is highly likely to experience some type of severe weather annually.

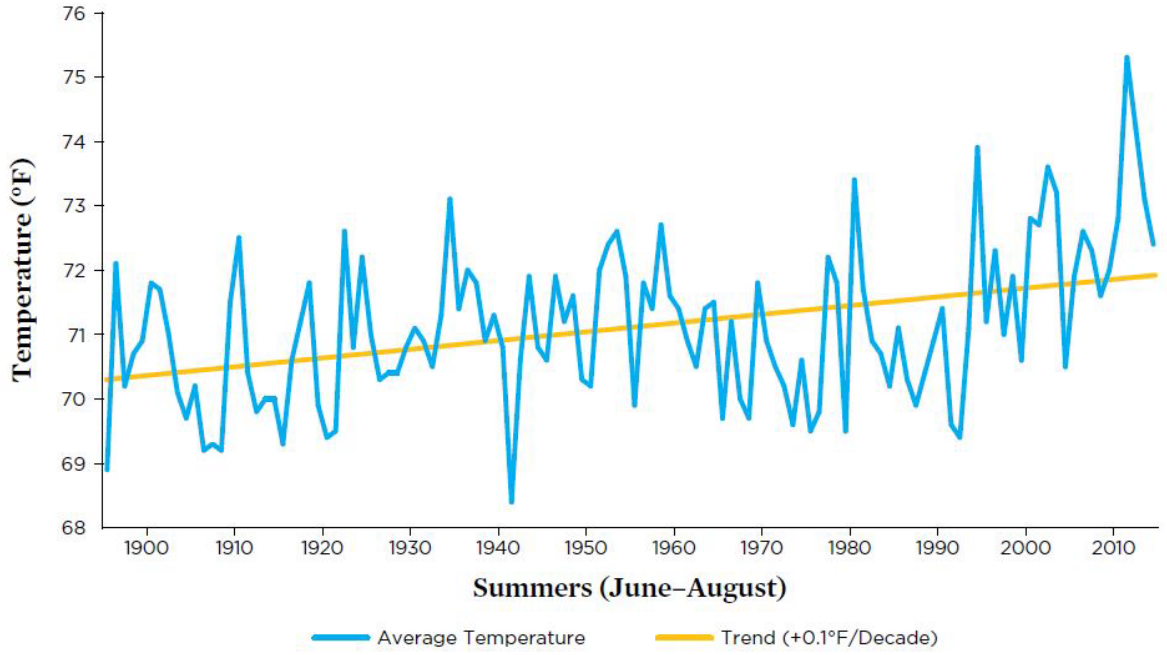
Climate Change Considerations

Climate change studies have shown an increased variability in weather patterns across New Mexico. While extreme rainfall events associated with the monsoon system are common in New Mexico, climate projections predict the heaviest annual rainfall events will decrease in the number of events but could become more intense.

Throughout the southwestern region of the United States heat waves have become more common. The extreme heat events have been less pronounced of an issue for the City of Santa Fe due to its high

elevation. Scientific studies have shown that New Mexico is the sixth-fastest warming state in the U.S., with temperature increases of 0.6°F per decade since 1970 or around 2.7°F over the past 45 years, refer to Figure 4-19 below. (Union of Concerned Scientists 2016). In the summer of 2013 temperatures at the Santa Fe Municipal Airport reached the highest even temperatures recorded there at 102 degrees Fahrenheit. Higher temperatures are expected to reduce snowpack and earlier snowmelt.

Figure 4-19 Warming Trend of Summer Temperatures in New Mexico



Source: NOAA, Union of Concerned Scientists, 2016 ucsusa.org

Vulnerability Assessment

People

Thunderstorm, Hail, Lightning

Exposure is the greatest danger to people from severe thunderstorms. People can be hit by lightning, pelted by hail, and caught in rising waters from heavy rain. Serious injury and loss of human life is rarely associated with hailstorms.

While national data shows that lightning causes more injuries and deaths than any other natural hazard except extreme heat, there doesn't seem to be any trend in the data to indicate that one segment of the population is at a disproportionately high risk of being directly affected. Anyone who is outside during a thunderstorm is at risk of being struck by lightning. Aspects of the population who rely on constant, uninterrupted electrical supplies may have a greater, indirect vulnerability to lightning. As a group, the elderly or disabled, especially those with home health care services rely heavily on an uninterrupted source of electricity. Resident populations in nursing homes, residential facilities, or other special needs housing may also be vulnerable if electrical outages are prolonged.

High Wind

Beyond tornadoes, the planning area is subject to potentially destructive straight-line winds. High winds are common throughout the planning area, throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Extreme Temperatures

The elderly population in the planning area is most vulnerable to temperature extremes. Children, people in poor physical health and homeless are also vulnerable to exposure. Exposure to extreme cold can cause frostbite or hypothermia and, in some cases, even death. Extreme heat can cause heat stroke or even fatality. Homes with little or no air conditioning can be dangerous during high heat days. Those most vulnerable to heat-related illness include people 65 years of age and older, young children, people with chronic health problems such as heart disease, people who are obese, people who are socially isolated, and people who are on certain medications. Low income families are less likely to have air conditioning and may be disproportionately impacted by rising water costs. Even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather or are not acclimated to hot weather.

Winter Storm

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. While virtually all aspects of the population are vulnerable to the potential indirect impacts of a winter storm, others may be more vulnerable, such as the elderly, particularly if there is a loss of electrical power. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers.

According to the NCEI Storm Events Database there have been 533 severe weather events in Santa Fe County in the past 58 years (1960-2018), of which seven injuries and one fatality has been recorded. Lighting was responsible to the majority of fatalities and injuries (refer to Table 4-28 below).

Table 4-28 Injuries and Fatalities from Severe Weather Events in Santa Fe County, 1950-2018

Hazard	Number of Events	Total Injuries Recorded	Total Fatalities Recorded
Hail	109	0	0
Lightning	10	6	1
Extreme Heat	1	0	0
Extreme Cold/Cold/Wind Chill	8	0	0
High Wind	110	0	0
Blizzard	7	0	0
Heavy Snow	267	0	0
Winter Storm	10	0	0
Winter Weather	11	1	0
Totals	**533**	**7**	**1**

Source: NOAA NCEI Storm Events Database

Economy

Thunderstorm, Hail, Lightning

Economic impacts of severe thunderstorms are typically short-term in duration. Lightning can cause power outages and fires. Hail can destroy exposed property; an example is car lots, where entire inventories can be damaged. Generally, long-term economic impacts center more around hazards that cascade from a severe thunderstorm, including wildfires ignited by lightning.. Table 4-29 below shows the total property damages due to severe weather events in Santa Fe County.

Extreme Temperatures

Both extreme cold and extreme heat can have impacts on outdoor workers daily activities due to exposure. Loss of work can lead to local economic impacts, although these are typically minor and short lived.

High Wind

High winds can impact exposed critical infrastructure; depending on the impact and the function, this could cause a short-term economic disruption. The most common problems associated with high winds are loss of utilities. Downed power lines can cause power outages, leaving parts of the city isolated, and without electricity, water, and communication. Damage may also limit timely emergency response and the number of evacuation routes. Downed electrical lines following a storm can also increase the potential for lethal electrical shock and can also lead to other hazard events such as wildfires.

Winter Storm

Closure of major road into and out of the City during winter storms could temporarily isolate portions of the City. Depending on the length of the closure it could also hinder the local economy and the movement of goods through the county. An extended power outage after a winter storm event could impact local businesses, hindering the local economy.

Built Environment

Thunderstorm, Hail, Lightning

Thunderstorms can include significant precipitation, lightning, winds, and hail. Utility outages, downing of trees, debris blocking streets and damage to property can be a direct result of these storm events. Given the nature of these types of storms, the entire Planning Area is potentially at risk.

Lightning in particular can cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning strikes cause intense but localized damage. Structural fires, localized damage to buildings, damage to electrical powerlines and communications outages are typical consequences of a lightning strike. Hail can severely damage buildings and other infrastructure. Hail primarily causes property and vehicle damage in the planning area including impacts to roofs, automobiles, trees and windows.

High Winds

High winds in the planning area often result in downing of trees and damage to properties. Given the nature of these types of storms, the entire city is potentially at risk.

Extreme Temperatures

Extreme cold temperatures can lead to frozen pipes disrupting services to customers and may lead to burst pipes that can causing flooding and property damages. Extreme heat is not anticipated to have structural impact to buildings.

Winter Storms

A common impact of winter storms on the planning area is power loss. The weight of heavy continued snowfall and/or ice accumulating on power lines often brings them to the ground causing service disruptions for thousands of customers. This can cause a loss of community water and sewer services, as well as the supply of gasoline, as these services almost always require electrical pumps. In addition, prolonged power outages can mean loss of food to grocery stores and other facilities that provide food services.

The NCEI records a total of $521,100 in property damage for the Santa Fe Metro Area from each of the severe weather hazards profiled in this chapter. Table 4-29 shows property damage recorded by the NCEI related to severe weather, along with the number of damaging events. These figures do not include insured loss.

Table 4-29 Property Damages as a result of Severe Weather Recorded for Santa Fe Metro Area

Hazard	Number of Events	Total Property Damage Recorded	Total Crop Damage Recorded
Hail	22	$0	$0
Lightning	8	$63,000	$0
Extreme Heat	0	$0	$0
Extreme Cold	1	$0	$0
High Wind	7	$428,100	$0
Heavy Snow	31	$10,000	$0
Winter Weather	4	$20,000	$0
Totals	**73**	**$521,100**	**$0**

Source: NOAA NCEI Storm Events Database

Based on historic information, the primary effect of these storms has not resulted in significant injury or damages to people and property, or the losses are typically covered by insurance. It is the secondary hazards caused by weather, such as floods, that have had the greatest impact on the Planning Area.

Critical Facilities and Infrastructure

Thunderstorm, Hail, Lightning

Because of the unpredictability of severe thunderstorms, hail and lightning strength and path, most critical infrastructure that is above ground is equally exposed to the storm's impacts. All city critical facilities/lifelines are considered to be equally exposed to severe weather hazards.

High Wind

Because of the unpredictability of wind events' strength and path, most critical infrastructure that is above ground is equally exposed to the storm's impacts.

Extreme Temperatures

Secondary impacts of extreme cold can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may

be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses.

Prolonged heat exposure can have impacts on infrastructure. Prolonged high heat exposure increases the potential of pavement deterioration, as well as railroad warping or buckling. High heat also puts a strain on energy systems and consumption, as air conditioners are run at a higher rate and for longer. Extreme heat can also reduce transmission capacity over electric systems.

Winter Storm

Roads are especially susceptible to the effects of a winter storm, which can temporarily hinder transportation and require resources for snow removal. As noted under the people section, heavy snow accumulation may also lead to downed power lines not only causing disruption to customers but also have potentially negative impacts on critical facilities in the county which may have cascading impacts on the City's ability to operate.

Historic, Cultural, and Natural Resources

Thunderstorm, Hail, Lightning and High Wind

Severe weather is part of a natural environmental process. As a natural process, the impacts of most severe weather by themselves are part of the overall natural cycle and do not cause long-term consequential damage. Historic buildings within any of the City's Historic Districts could potentially be more vulnerable to roof and structural damage from any of the severe weather hazards profiled in this section. Environmental impacts include the sparking of potentially destructive wildfires by lightning and localized flattening of plants by hail, broken tree branches and wildfire spread caused by wind.

Extreme Temperatures

Both extreme cold and heat can cause stress to natural vegetation. Large amounts of dead vegetation may increase vulnerability to other natural hazards such as wildfire.

Winter Storm

Natural resources may be damaged by the severe winter weather, including broken trees and death of wildlife. Unseasonable storms may damage or kill plant and wildlife, which may impact natural food chains until the next growing seasons. Most of these impacts would be short-term.

Future Development

Severe Weather: Thunderstorm, Hail, Lightning, Extreme Temperatures, High Wind, and Winter Storms

New critical facilities, such as communication towers should be built to withstand heavy rain, high wind and hail damage. Future development projects should consider severe weather hazards at the planning, engineering, and architectural design stage with the goal of reducing vulnerability. Development trends in the City are not expected to increase overall vulnerability to the hazard, but population growth will increase potential exposure to hazards such as lightning. Future buildings that conform to current building codes should be able to withstand snow loads from severe winter storms.

Risk Summary

- The City of Santa Fe is vulnerable to a variety of impacts from different types of severe weather.
- Regular snowfall occurs between the months of October and April. Heavy summertime precipitation occurs between July and August.

- The NOAA NCEI Storm Events Database has recorded a total of 533 severe weather events for the Santa Fe County since 1960. Winter weather hazards were the most common recorded event for the Santa Fe Metro Area.
- Recorded NCEI events show a total of 7 fatalities, 1 injury and $521,100 in property damages. Lighting only has resulted in $63,000 in property damages. High wind alone resulted in $428,100 in property damages.
- Hail has the majority of recorded events for the County with 109 events. The average hail size for the City of Santa Fe is between 1.25" and 1.75".
- Climate change has the potential to affect the variability and intensity of severe weather events, including the increase of intensity of monsoon precipitation events and reduce the frequency of extreme cold, snow and winter storm events.
- *Related hazards:* Flood, Wildfire, Tornado

Location	Probability of Future Occurrence	Extent (Magnitude/Severity)	Overall Significance
Extensive	Highly Likely	Limited	Medium

4.3.5 Tornado

Hazard Description

Tornadoes affect the City of Santa Fe primarily during the rainy season in the late fall and early spring. Tornadoes form when cool, dry air sits on top of warm, moist air. 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 across a path only 300 yards wide or less as 300-mile-wide hurricanes.

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, the majority of injuries and deaths generally 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. Access roads and streets may be blocked by debris, delaying necessary emergency response.

Location

A tornado can strike anywhere in the city, and all areas of the city are equally susceptible to tornado hazards. Size and length of a tornado can be extrapolated using surrounding county data. While the average length of the NCEI recorded tornadoes in Santa Fe County is 1.4 miles, the maximum length is 15.8 miles. The average recorded tornado width in the county is 30 yards, with 60 yards being the recorded maximum.

Due to varying atmospheric conditions and characteristics of the thunderstorm, it is difficult to extrapolate potential dimensions for an EF5 tornado. With the correct conditions, though, the city could experience an EF5 tornado.

Extent (Magnitude/Severity)

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 and better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 4-30 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity. Table 4-30 shows the wind speeds associated with the Enhanced Fujita Scale ratings.

Table 4-30 Fujita Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
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 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.
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.

Source: National Oceanic and Atmospheric Administration Storm Prediction Center

Table 4-31 Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center

Historically, the highest-rated tornado occurring in the county was rated F1 on the Fujita Scale; once the switch was made to the Enhanced Scale, the highest-rated historical tornado was an EF0, with the last

recorded on May 9, 2017. Nationally, 80% of tornadoes are rated EF0 or EF1. According to the records of the NCEI the highest rated tornadoes occurring in the state of New Mexico was rated F3, with the last F3 occurring in May 1977. This provides a historical basis to suggest a likely maximum tornado strength in the county and the planning area, though atmospheric conditions could hypothetically still produce a tornado that could rate up to an EF5.

Previous Occurrences

According to the National Weather Service notes the following tornadoes striking the City of Santa Fe:

May 12, 1883 – a small home was destroyed in Santa Fe, two homes were unroofed, and a bank and other businesses were damaged by an F2 tornado.

April 15, 1971 – an F1 tornado moved in the southwestern part of the City of Santa Fe, damaging 12 homes. Most of the damage was confined to roofs, fences, windows, carports and outbuildings.

June 29, 1991 – the public reported an F0 tornado during the mid-afternoon hours which ripped eight trees out of the ground and snapped off another. It also caused damage to a workshop roof but left a mobile home fifty yards away untouched.

The HMPT added that in 2017 an event caused a small amount of damage near the City in the Agua Fria area. In surrounding Santa Fe County, 26 tornadoes occurred between 1950 and 2018 (NCEI). The vast majority of these incidents were rated F0/EF0, with remaining three rated as F1. The storms caused $442,280 in property damage, one injury and no fatalities or crop damage.

Probability of Future Occurrences

Between 1950 and 2018, 26 tornadoes have been recorded in greater Santa Fe County. Given the footprint of the City is much smaller it is less likely a tornado will hit the city limits, but the exact probability is difficult to refine due to the difficulty in predicting where and when tornadoes will occur. With two recorded tornadoes in the last 50 years in City limits that equates to roughly a 4% chance per year.

Climate Change Considerations

Currently, there is not enough data or research to quantify the magnitude of change that climate change may have related to tornado or wind frequency and intensity. NASA's Earth Observatory has conducted studies which aim to understand the interaction between climate change and tornadoes. Based on these studies meteorologists are unsure why some thunderstorms generate tornadoes and others don't, beyond knowing that they require a certain type of wind shear. Tornadoes spawn from approximately one percent of thunderstorms, usually supercell thunderstorms that are in a wind shear environment that promotes rotation. Some studies show a potential for a decrease in wind shear in mid-latitude areas. 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. The level of significance of this hazard should be revisited over time.

Vulnerability Assessment

People

Populations are the most vulnerable to tornadoes, but the low probability and likely low intensity of tornadoes in and around Santa Fe temper this vulnerability. The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. However, there are also segments of the population

that are especially exposed to the indirect impacts of tornadoes, particularly the loss of electrical power. These populations include the elderly or disabled, especially those with medical needs and treatments dependent on electricity. The 30 medical care facilities in the City include senior centers and the VA Medical Facilities as well as Community Based Residential Facilities, and other special needs housing facilities are especially vulnerable if electrical outages are prolonged, since backup power generally operates only minimal functions for a short period of time.

Between 1950 and March 2019, Santa Fe has experienced no injuries or fatalities due to a tornado. In the same timeframe, Santa Fe County has experienced one recorded injury and no fatalities directly caused by a tornado - on July 7, 2015, a metal barn used for hay storage was tossed a quarter of a mile by an EF0 tornado and slammed into a house where a woman inside was injured by flying glass. Statewide, New Mexico has seen five deaths and 162 injuries as a direct result of a tornado. The majority of these were due to building collapses and flying debris. Two fatalities and 45 injuries were caused by a tornado outbreak on March 23, 2007; the outbreak occurred in Quay, Chaves, De Baca, Union, Roosevelt and Curry counties simultaneously.

Economy

Economic impacts are dependent on the size and path of the tornado. A tornado with a path through the city could potentially have tremendous economic impacts, including loss of business, transportation system impacts and rebuilding costs. These impacts will be felt more strongly by individuals who lack the means to rebuild or relocate.

Built Environment

General damages are both direct (what the tornado physically destroys) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the tornado, or due to the damages caused by the tornado. Depending on the size of the tornado and its path, a tornado is capable of damaging and/or destroying almost anything. Construction practices and building codes can help maximize the resistance of the structures to damage. It should also be noted that few homes in Santa Fe have basements, removing a normal "safe space" for shelter if tornadoes do occur.

Secondary impacts of tornado damage often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These indirect impacts of a tornado put tremendous strain on a community. In the immediate aftermath, the focus is on emergency services.

No tornado damages were recorded for the city specifically. Historically damaging tornadoes in the County cause an average of $49,000 worth of damage to property, and no reported damage to crops, according to NCEI data.

According to data derived from the NWS, property damages included damage to homes, roofs, fences, windows, carports, outbuildings and tree damages.

Critical Facilities and Infrastructure

All city critical facilities/lifelines that is above ground are considered to be equally exposed to tornado hazards. Due to the random nature of a tornado's strength and path, a more specific risk assessment was not conducted for this plan.

Historic, Cultural, and Natural Resources

Tornadoes can cause damage to the natural environment, uprooting trees and other debris; there is historical precedent for this in the city. This is seldom permanent, however, and the environment will

return to its original state in time. Historic buildings built prior to modern building codes within any of the City's Historic Districts could potentially be more vulnerable to roof and structural damage from a tornado event.

Future Development

As the City continues to add population, the number of people and housing developments exposed to the hazard increases. Proper education on building techniques and the use of sturdy building materials, basements, attached foundations, and other structural techniques may minimize the property vulnerabilities. Public shelters at parks and open spaces may help reduce the impacts of tornadoes on the recreational populations exposed to storms.

Risk Summary

- 3 tornado events have occurred in the City of Santa Fe but damage has been limited and sporadic.
- Tornadoes mainly occur during the late fall and early spring.
- Specific impacts and vulnerabilities are difficult to predict due to the random nature of tornadoes, but a lower likelihood of occurrence suggests the overall significance is low.
- Related hazards: Severe Weather

Location	Probability of Future Occurrence	Extent (Magnitude/Severity)	Overall Significance
Limited	Occasional	Limited	Low

4.3.6 Wildfire/Wildland Urban Interface

Hazard Description

A wildfire is a fire burning uncontrolled on lands covered wholly or in part by timber, brush, grass, grain or other inflammable vegetation. There are several types of wildfires. Prescribed fires are planned fires ignited by land managers to accomplish specific natural resource improvement objectives. Fires that occur from natural causes, such as lightning, that are then used to achieve management purposes under carefully controlled conditions with minimal suppression costs are known as wildland fire use (WFU). Wildfires are unwanted and unplanned fires that result from natural ignition, unauthorized human-caused fire, escaped WFU, or escaped prescribed fire. A wildland-urban interface (WUI) fire is a wildfire occurring in areas where structures and other human developments meet or intermingle with wildland vegetation-fuels. WUI fires are a specific concern because they directly pose risks to human lives, property, structures, and critical infrastructure more so than the other types of wildland fires.

Wildland fire is an ongoing concern for all jurisdictions include the City within Santa Fe County. Generally, the worst fires occur from May to July of each year, before monsoon rains temper the risk during hotter, drier months. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds.

WUI fires are the most damaging because they occur where the natural and urban development intersect. Even relatively small acreage fires can result in disastrous damages. In the WUI, structures and vegetation are sufficiently close so that a wildland fire could spread to structures or a structure fire could ignite vegetation.

Generally, there are three major factors that sustain wildfires and allow for predictions of a given area's potential to burn. These factors include fuel, topography, and weather. The WUI/Wildland Fire Hazard and Risk Analysis for the City of Santa Fe (2006) and the Community Wildfire Protection Plan (CWPP) for Santa Fe County both give great details regarding these factors, which are summarized below.

Fuel

Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also, to be considered as a fuel source, are man-made structures and other associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for fire spread. Fuel is the only factor that is under human control.

Vegetation in the City ranges from open grasslands to dense canopies of mixed conifer. The most common native vegetation found in the Planning Area is piñon/juniper. The type of vegetation in the City depends on the elevation. According to the 2006 WUI/Wildland Fire Hazard and Risk Analysis document, other significant vegetation in the City of Santa Fe are as follows; grasslands found primarily in the western portion of the Planning Area at lower elevations, Ponderosa/Gambel Oak found at high elevations in the eastern portion of the City on slopes and in canyons of the foothills, and riparian plants found throughout the urban and semi-urban areas of the City near streams, arroyos, and seeps or springs. Each plant association type offers distinct characteristics of potential fire intensity, fire rate of spread, and probability of fire ignition.

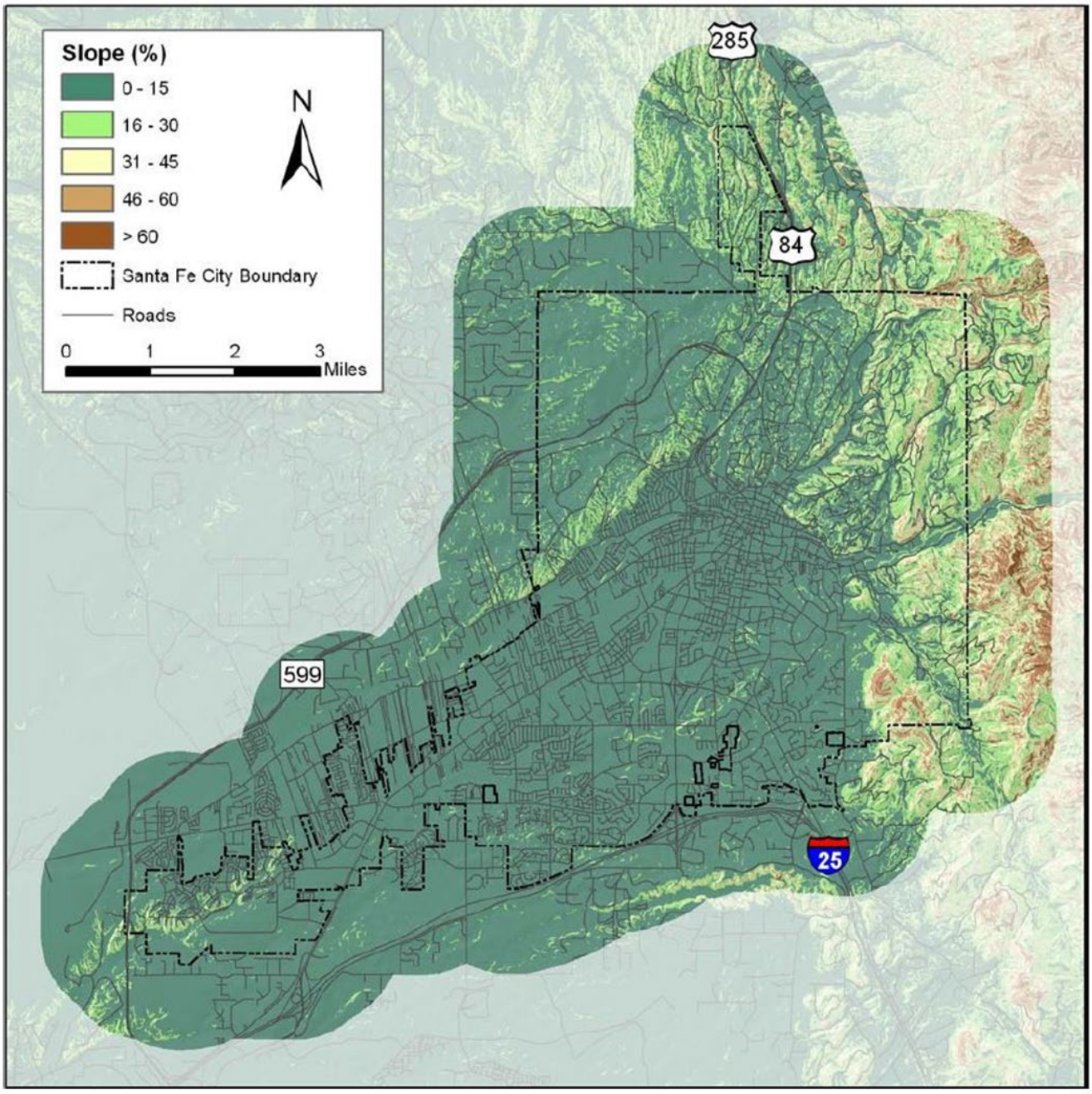
Topography

An area's terrain and land slopes affect its susceptibility to wildfire 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. Terrain factors influencing fire behavior cannot be modified. Fires often run rapidly up steep slopes and are often pushed up or down canyons by daily cycles of wind direction.

The City has dramatic elevations varying from 5,935 feet (ft) in the western portion of the City to over 8,000 ft. in the eastern portion of the City. Wildfires tend to spread faster uphill and the percent of slope is an important factor in determining the types of treatments that should be implemented.

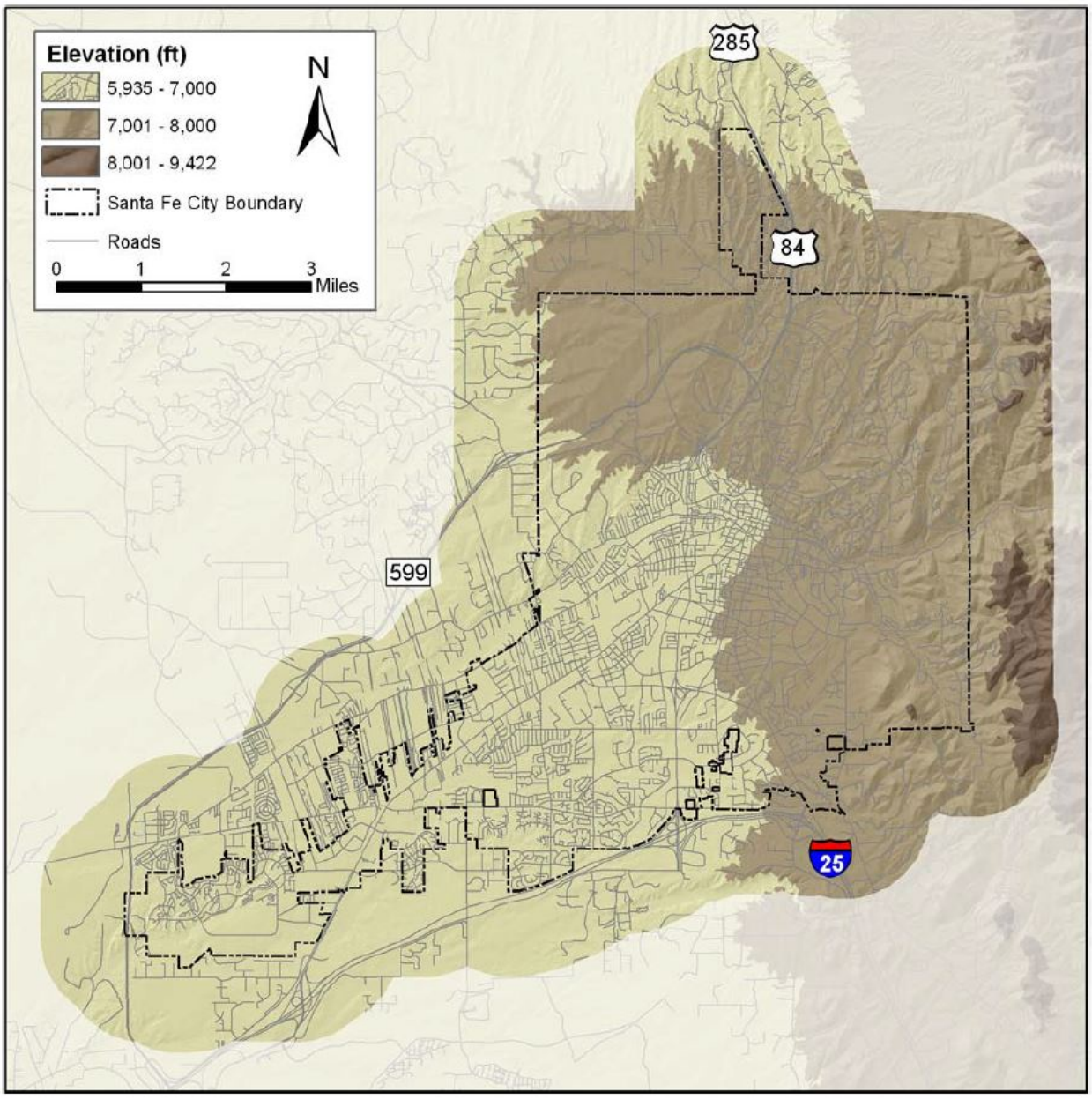
The following maps from the 2006 WUI/Wildland Fire Hazard and Risk Analysis document show the varying elevation and topography of the Planning Area.

Figure 4-20 City of Santa Fe Percent Slope



Source: City of Santa Fe Wildland Urban Interface/Wildland Fire Hazard and Risk Analysis, 2006

Figure 4-21 City of Santa Fe Elevation



Source: City of Santa Fe Wildland Urban Interface/Wildland Fire Hazard and Risk Analysis, 2006

Weather

Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out the fuels that feed wildfire, creating a situation where fuel will more readily ignite and burn more intensely.

Differences in topographical characteristics throughout Santa Fe County and the City of Santa Fe contribute to the weather patterns in the Planning Area. The state generally has a mild, arid to semi-arid continental climate characterized by abundant sunshine, light total precipitation, low relative humidity, and relatively large annual and diurnal temperature ranges. July is generally the warmest month. The mean annual precipitation within Santa Fe County is typically light. July and August mark the onset of the

region's monsoonal weather patterns and are typically the hottest and wettest months of the year, accounting for 30% to 40% of the state's annual precipitation as a whole. These storms also generate frequent lightning activity, which may result in multiple fire ignitions from each storm.

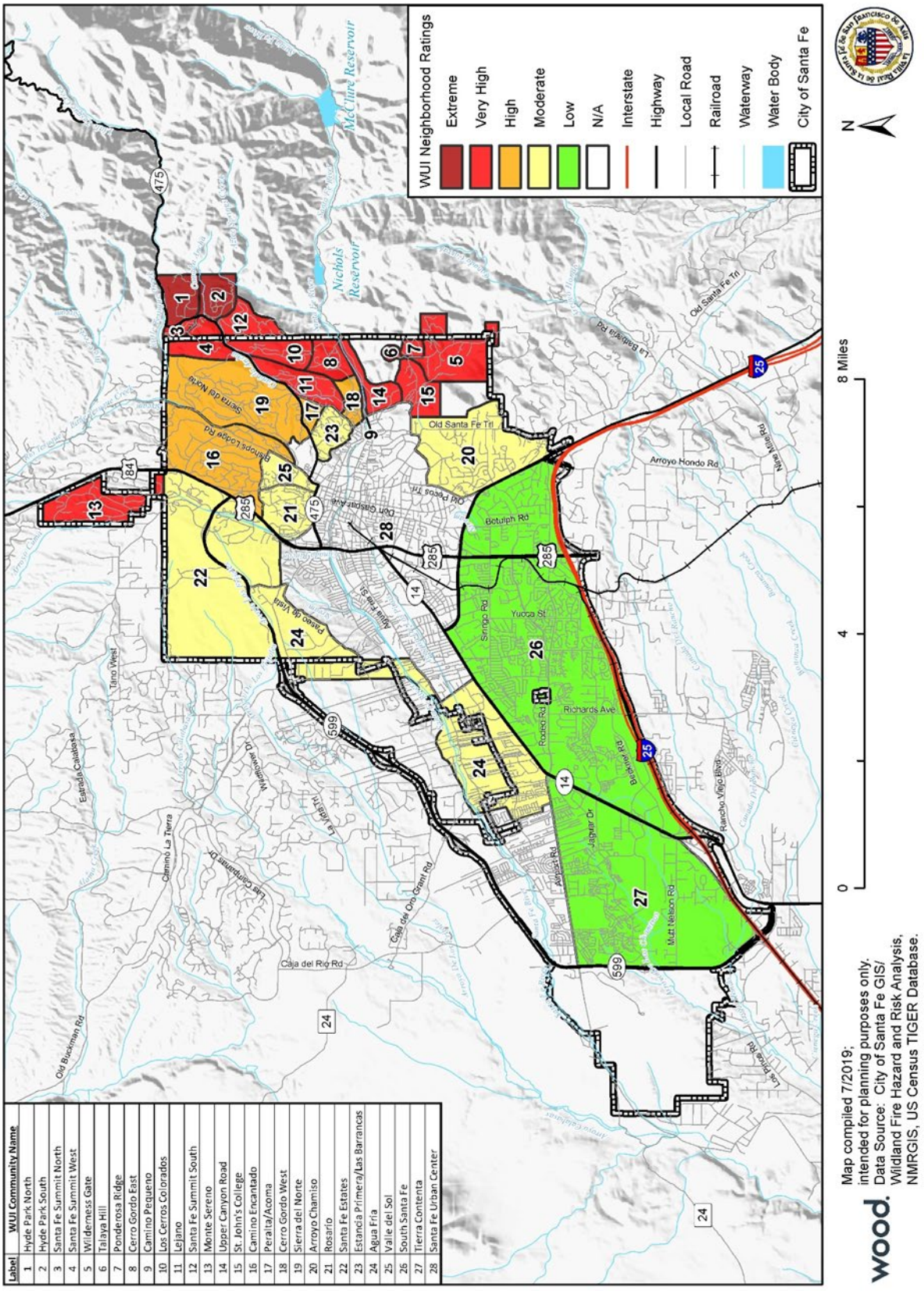
Winter is the driest season in New Mexico. Overall, the climate in the State of New Mexico consists of cyclical drought/wet year patterns. The 2018 National Climate Assessment Report indicates increased drought in New Mexico and projects this pattern to continue through 2050.

Location

The neighborhoods within the WUI, as defined in the City of Santa Fe Wildland Urban Interface – Wildland Fire Hazard and Risk Analysis (Anchor Point September 2006), and their hazard ratings are shown in the figure below. Two neighborhoods, South Santa Fe and Tierra Contenta (numbers 26 and 27 on map) as well as the Urban Center are considered to be at low risk of wildfire. The remaining 25 neighborhoods identified in the WUI are at moderate to extreme risk. With the highest concentration of high, very high and extreme risk being on the northern and eastern portions of the City which also have the greatest percentage of steep slopes and higher elevation. Refer to the Vulnerability Assessment below for a more in-depth parcel analysis for the WUI neighborhoods.

The City's close proximity to the Santa Fe National Forest, which borders the City limits on the east and is also approximately 5 miles west of the City, poses a risk of direct and indirect impacts of wildfires if they were to occur in the Forest as well an increased risk for those neighborhoods in the eastern portion of the city.

Figure 4-22 Wildland Urban Interface (WUI) Neighborhood Hazard Ratings



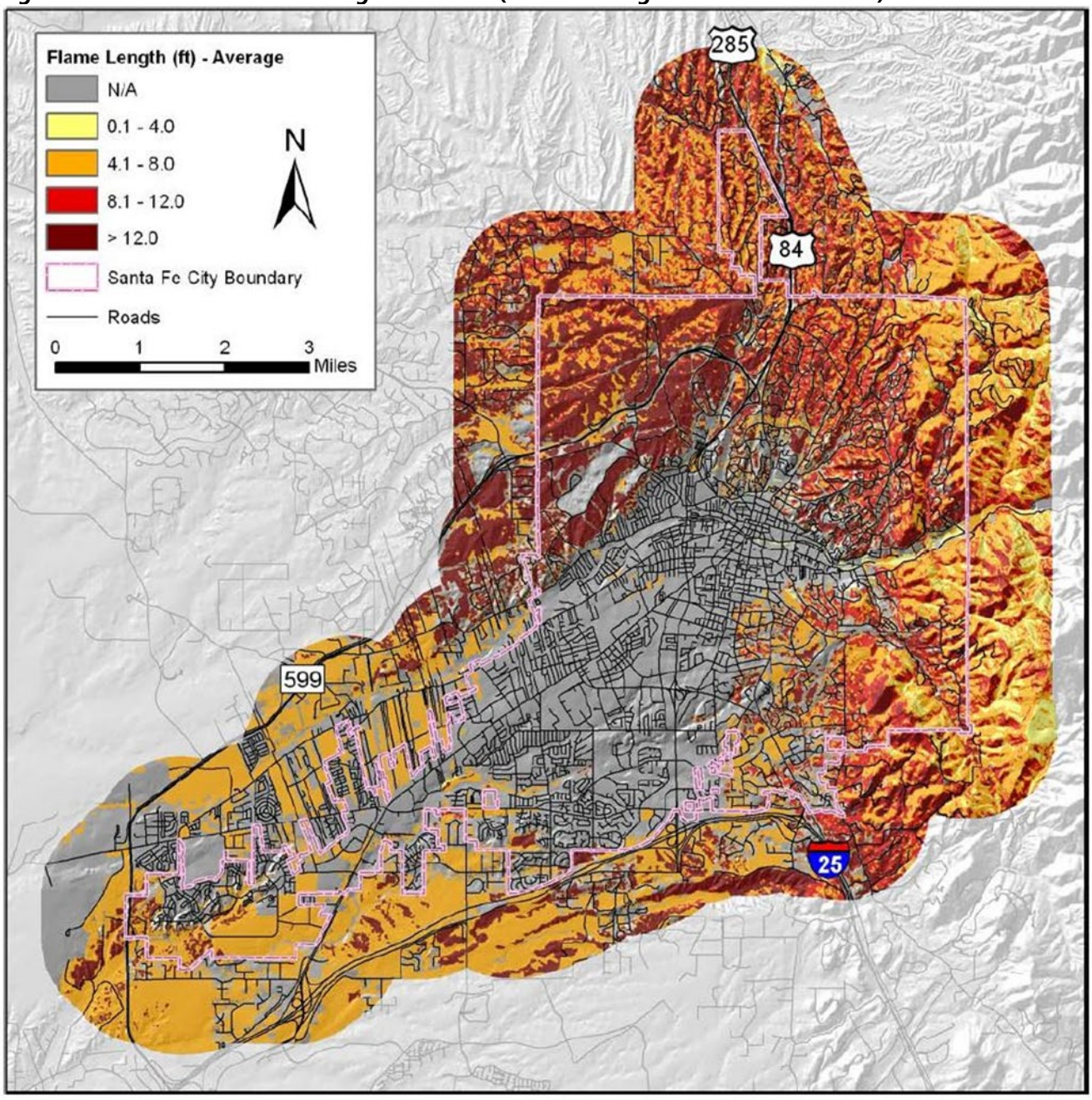
Extent (Magnitude/Severity)

As shown in Figure 4-12 above, almost every neighborhood in the City of Santa Fe is located within the WUI although the risk various depending on certain factors within the neighborhood (i.e. fuels, topography, and other environmental conditions). Risk refers to the potential and frequency with which wildfire ignitions might occur; hazard refers to those conditions of fuels, topography, and other environmental conditions, as well as the relative degree of defensibility that affect the behavior of fires within the interface. According to the HMPT, high risk areas have undergone thinning and fuel reduction projects for several years but there continues to be large sections of the Fire Department's response area that is vulnerable and due to its geographic location, it could make evacuating those areas challenging.

The City's Wildfire Hazard and Risk Assessment study generated Fire Behavior Potential maps for average weather conditions of a fire season day to show the potential flame length and rate of spread that could be generated. Flame length is defined as the distance between the flame tip and the midpoint of the flame depth at the base of the flame and is an indicator of fire intensity.

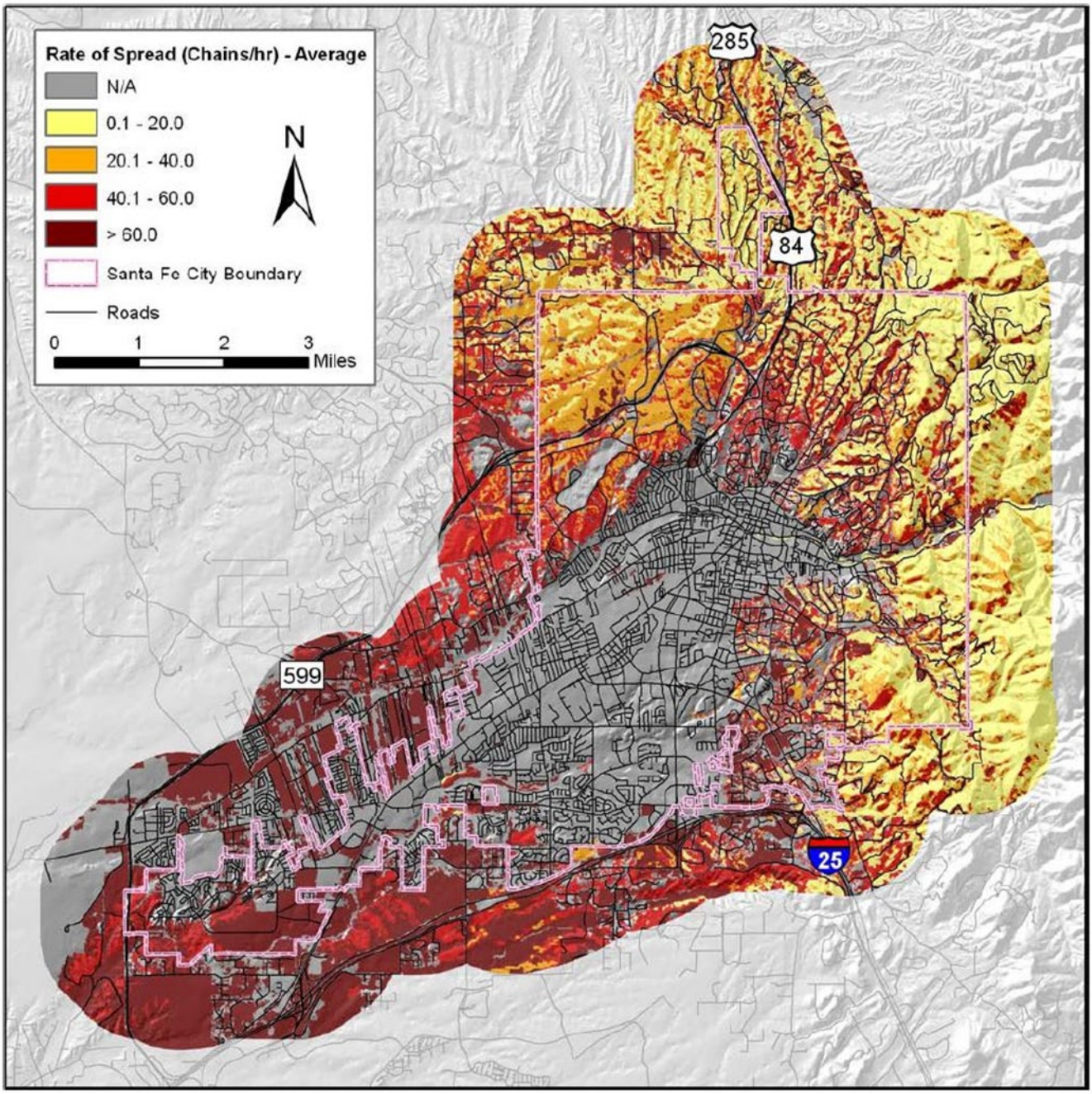
According to a nationwide analysis of wildfire risk (Core Logic 2019 Wildfire Risk Report) the City of Santa Fe ranks 12th out of 15 metropolitan areas in the western United States, based on a count of combined high- and extreme-risk properties (23,546) and reconstruction cost value ($7.28 Billion).

Figure 4-23 Wildfire Flame Length Potential (Under Average Weather Conditions)



Source: City of Santa Fe Wildland Urban Interface/Wildland Fire Hazard and Risk Analysis, 2006

Figure 4-24 Wildfire Rate of Spread Predications (Under Average Weather Conditions)



Source: City of Santa Fe Wildland Urban Interface/Wildland Fire Hazard and Risk Analysis, 2006

*Chain is a logging and fire line measurement 1 chain = 66 feet 80 chains/hour = 1 MPH

Previous Occurrences

There have been numerous wildfires within Santa Fe County and in the vicinity of the City of Santa Fe. The Federal Wildland Fire Occurrence database, maintained by the USGS and other agencies, includes perimeter and point GIS layers for fires on public lands throughout the United States. The data includes fires dating back to 1980. The National Park Service, Bureau of Land Management, and US Forest Service reports include fires of 10 acres and greater. The database is limited to fires on federal lands. Some fires

may be missing altogether or have missing or incorrect attribute data. Some fires may be missing because historical records were lost or damaged, fires were too small for the minimum cutoffs, documentation was inadequate, or fire perimeters have not yet been incorporated into the database. Also, agencies are at different stages of participation. For these reasons, the data should be used cautiously for statistical or analytical purposes. According the County's 2018 Hazard Mitigation Plan, there have been 17 wildfires recorded in the Federal database for the County that exceed 100 acres since 1970, some of which have burned close to the city.

The June 2003 Molina Complex Fire, which was caused by lightning, burned 900 acres and was within 10 miles of city limits. The June 2011 Pacheco Fire came within 2 miles of Ski Santa Fe ski area and threatened the Santa Fe Municipal Watershed, an important source of drinking water for the City of Santa Fe; this watershed was also threatened by the McClure Fire in 2016. The Las Conchas Fire which also took place in June of 2011, started in the Santa Fe National Forest north of the City and burned more than 150,000 acres, threatening the Los Alamos National Laboratory and the town of Los Alamos. Despite these fires burning outside of the City of Santa Fe limits, residents were affected by smoke and it had an economic impact to tourism as well as the closing of the Los Alamos National Laboratory (LANL), a large employer in the City of Santa Fe area.

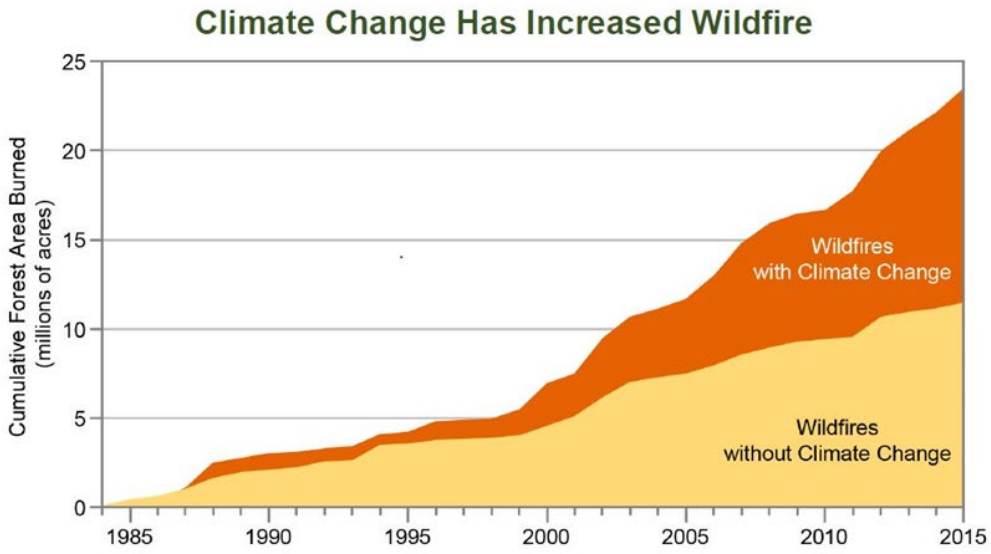
Probability of Future Occurrences

According to the US Forest Service, wildfires can occur at any time of day and during any month of the year, but the peak fire season in New Mexico is normally from May through July. There have been several large wildfires in recent history that have come in close proximity of the City limits and the City's assets. The threat of wildfire and potential losses constantly increase as human development and population increase in the wildland urban interface area in the City. This results in a likely rating of future occurrence.

Climate Change Considerations

The effects of climate change can already be seen in the Southwest region of the United States; including rising temperatures, intensified drought events, and increased susceptibility to invasive species. According to the Fourth National Climate Assessment (2018), wildfires have burned twice as many acres across the western United States between 1985 and 2015 than would have burned had climate change not been occurring.

Figure 4-25 Climate Change and Wildfire Events



Source: Fourth National Climate Change Assessment, 2018

Under current climate change scenarios, hotter and drier temperatures are expected to continue. With higher temperatures and prolonged drought events the severity, frequency, and geographic extent of wildfire events are likely to also increase. The changing climate has also been shown to contribute to tree mortality due to invasive species and drought making vegetation more susceptible to burning. This combination of increased wildfire events and drier conditions may also expand deserts and even change parts of New Mexico's landscape (Environmental Protection Agency 2016).

Vulnerability Assessment

People

The most exposed population are those living in the wildland-urban interface (WUI) zones, where residential properties are directly intruding into traditional wildland areas. The exposure of the population in these zones increases with the exposure of the corresponding built environment, examined in the section below. Other exposed groups include children, the elderly, or those with breathing conditions who may be exposed to high levels of smoke. Populations living in long term care facilities or other skilled care facilities face additional exposures because of increased evacuation times and the potential that the population may be required to shelter in place. Low-to-moderate income households are also more vulnerable due to the financial burdens caused by property damages or health impacts.

Economy

A major wildfire can cause many economic impacts, depending on the location and size of the fire. Economic impacts could include direct fire damage to buildings and facilities, with cascading impacts associated with road closures and the accumulation of fire suppression costs. Since the economy of the City relies heavily on recreation and tourism, wildfires can have a significant indirect impact when tourists avoid the City during times of fire. A wildfire affecting the Santa Fe National Forest and the local ski areas could have significant economic impacts on the City itself. A wildfire event outside of city limits could also have an impact of workers being able to commute to and from work as was seen in the 2011 Las Conchas Fire.

Built Environment

Any flammable materials are vulnerable during a wildfire, including structures and personal property. The vulnerability of general property increases as the distance of the property to wildfire-prone areas decreases and is particularly high for structures located in the WUI. These structures receive an even higher level of vulnerability if the properties surrounding them are not properly mitigated for fire. Appropriate mitigation techniques include using non-flammable materials such as ignition-resistant construction, leaving appropriate spaces between buildings and vegetation, landscaping with non-flammable materials (such as decorative rock or stone), and clearing of underbrush and trees. If a wildland fire were to cross completely into an urban zone, the damage could be extensive and there would likely be a higher exposure of property and homes themselves become fuel in extreme fire weather conditions.

Potential losses to the City of Santa Fe from wildfire was analyzed by using the WUI Community layer from the 2006 WUI/Wildland Fire Hazard and Risk Analysis with parcel data and structure address point data provided by the City of Santa Fe GIS Department.

The WUI layer contains communities throughout the county with associated hazard ratings that range from Low, Moderate, High to Very High. The community ratings are based on the methodology described in the 2006 WUI/Wildland Fire Hazard and Risk Analysis.

GIS was used to intersect the address points layer to obtain number of buildings per parcel. The WUI layer was overlaid in GIS on the structure data to identify structures in each WUI community. Structure improvement values and counts for those points were then extracted from the parcel/assessor's data and summed for the WUI Communities. Contents values were also estimated (see discussion in flood vulnerability discussion). Results of the overlay analysis area shown in

Table **4-32** and Table 4-33 and are sorted by property type, and by WUI community.

The results indicate that over $51 billion in total property value and 25,196 structures (64% of all structures within the city limits) are potentially exposed to wildfire hazards. A majority of these structures are located in neighborhoods that have a low WUI rating, while over 8,000 structures are located within the moderate to extreme WUI rating. The exposure values for wildfire can be considered equivalent to loss estimates, as typically the entire structure and contents are consumed by wildfires. It would be extremely rare, however, for a wildfire to affect all the at-risk communities simultaneously.

Property type refers to the land use of the parcel and includes commercial, exempt (county, federal, state), lot with mobile home, open spaces/parks, residential (condominium, multi-unit, single family) and vacant. Based on the analysis 64% of properties exposed are residential properties. A majority of the exposed residential properties are single family (15,864) followed my multi-unit residential properties (3,790) and condominiums (3,558). Commercial properties are the second parcel type that most at risk of a wildfire event, with nearly 2,000 properties located within the WUI. The following tables show the exposure by property type within the WUI and the neighborhoods in which they are located in.

Table 4-32 Property Type Exposure Within the WUI

Parcel Type	WUI Rated Address Point Count	Estimated Improved Value per WUI Rated Address Point	Content Value for WUI Rated Address Points	Total Value of WUI Rated Address Points
Commercial	1,878	$5,846,752,361	$5,846,752,361	$11,693,504,722
Exempt	19	$15,929,277	--	$15,929,277
Lot with Mobile Home	66	$1,848,812	$924,406	$2,773,218
Multi-Unit Residential	3,790	$22,081,836,375	$11,040,918,187	$33,122,754,562
Open Spaces/Parks	4	$62,824	--	$62,824
Residential: Condo	3,558	$916,361,307	$458,180,653	$1,374,541,960
Single Family Residential	15,864	$3,776,792,239	$1,888,396,119	$5,665,188,358
Vacant	17	$22,033,615	--	$22,033,615
TOTAL	**25,196**	**$32,661,616,810**	**$19,235,171,727**	**$51,896,788,537**

Source: City of Santa Fe GIS Dept., Wood Plc analysis

Table 4-33 WUI Rated Address Points by Community*

WUI Community Name	WUI Rating	Address Point Count
Agua Fria	Moderate	3,032
Arroyo Chamiso	Moderate	1,070
Camino Encantado	High	604
Camino Pequeno	Very High	13
Cerro Gordo East	Very High	130
Cerro Gordo West	High	279
Estancia Primera/Las Barrancas	Moderate	313
Lejano	Very High	143
Los Cerros Colorados	Very High	87
Monte Sereno	Very High	63
Peralta/Acoma	High	61
Ponderosa Ridge	Very High	14
Rosario	Moderate	619
Santa Fe Estates	Moderate	1,001
Santa Fe Summit West	Very High	19
Sierra del Norte	High	473
South Santa Fe	Low	11,977
St. John's College	Very High	117
Talaya Hill	Very High	10
Tierra Contenta	Low	4,593
Upper Canyon Road	Very High	217
Valle del Sol	Moderate	311

WUI Community Name	WUI Rating	Address Point Count
Wilderness Gate	Very High	50
TOTAL		**25,196**

Source: City of Santa Fe GIS Dept., Wood Plc analysis

*Analysis accounts for address points within city limits

Critical Facilities and Infrastructure

The following tables show the results from the GIS analysis to identify facilities at increased risk from a wildfire. In total there are 162 critical facilities within the WUI area. The most common type of facility are communication towers (64) followed by government services (33). While the very high risk WUI area has the fewest amount of critical facilities (4), the majority of the facilities are schools (2) and a preschool/daycare. Table 4-34 is a summary of critical facilities located in each WUI rating. Table 4-35 shows the breakdown by lifeline and component.

Table 4-34 Summary of Critical Facilities in WUI Rated Areas

WUI Rating	CF Total
Low	111
Moderate	46
High	1
Very High	4
TOTAL	**162**

Source: City of Santa Fe GIS Dept., Wood Plc analysis

Table 4-35 Summary of Critical Facilities in WUI Rated Areas by Lifeline and Component

Lifeline	Component	CF Total
Safety and Security	Law Enforcement/Security	3
	Fire Services	5
	Government Services	33
Food/Water/Shelter	Water	15
	Shelter	6
Health and Medical	Medical Care	12
	Public Health	1
Energy	Power	3
Communications	Infrastructure	64
Hazardous Materials	Facilities	1
Other	Community Services	2
	Daycare	10
	Schools	7
TOTAL		**162**

Source: City of Santa Fe GIS Dept., Wood Plc analysis

The following table show the breakdown of critical facilities by WUI community.

Table 4-36 Summary of Critical Faculties by WUI Community

WUI Rating	WUI Community Name	CF Total
Moderate	Agua Fria	23
Moderate	Arroyo Chamiso	9
High	Camino Encantado	1
Very High	Los Cerros Colorados	1
Moderate	Santa Fe Estates	9
Low	South Santa Fe	74
Very High	St. John's College	1
Low	Tierra Contenta	37
Very High	Upper Canyon Road	2
Moderate	Valle del Sol	5
TOTAL		**162**

Source: City of Santa Fe Dept., Wood Plc analysis

Historic, Cultural, and Natural Resources

The City is home to six historic districts and three archeological districts as summarized under Section 4.2 of this document. The historic structures within these districts are sensitive in nature and may not have been built according to the latest building codes due to their age, it is expected that they might be at risk of wildfires (e.g. because of their potential inability to withstand significant heat). However, many of the historic buildings are adobe which is less prone to ignition and generally more wildfire resistant.

Fire is a keystone process in the natural environment, providing many benefiting impacts to the surrounding habitat. Some natural resources and natural areas may benefit from wildland fire, as at some level they must also be exposed to wildfire for a healthy ecological development of the area. However, years of fire suppression has led to more intense wildfire events. Extremely hot fires can result in habitat loss, watershed damage and increased erosion, and other impacts that could take decades to recover.

The Santa Fe Watershed accounts for 17,520 acres and provides 40% of the City's water supply is vulnerable to wildfire events due to the dense vegetation of ponderosa pine, white fir, and douglas fir (Santa Fe County CWPP 2008). A fire on the watershed would also have secondary impacts such as an increased risk of flooding in the City and erosion issues. This type of post-wildfire erosion occurred after the 2011 Las Conchas Fire which generated the largest local erosion event in 1,000 years (Fourth National Climate Assessment 2018). Consecutive large wildfires in New Mexico have led the destruction of habitat for many native species including a reduction of 6 out of the 7 native cold-water fish and some native insects (Fourth National Climate Assessment 2018).

Future Development

According to the HMPT recent development has mostly occurred outside the WUI areas, although the land that is available is more remote and isolated compared to existing development. The City has gone through great lengths to address wildfire risk through land use planning and regulations. The City's Escarpment Overlay District is one of the tools used to address wildfire risk early in the development process. The regulation was established to protect viewsheds along the ridgetop and foothills along escarpment areas which covers 500 acres within the city and contains a majority of the high wildfire risk areas. Applications to develop within the Escarpment Overlay allows the City to also review the proposed development and determine wildfire risk reduction measures that can be taken for each application.

Wildfire will continue to pose a threat to the City of Santa Fe but through planning, a close review of proposed development applications, and general public awareness, the risk can be minimized.

Risk Summary

- 17 wildfires in the County have exceed 100 acres since 1970. 3 of fires have come in proximity to city limits
- 27 neighborhoods are within the WUI. 25 of which are considered to be at moderate to extreme risk
- 25,196 structures are located within the WUI with over $51 billion in total property value at risk.
- Residential properties are most at risk with over 23,000 properties or 64% of all structures in the City located in the WUI. Commercial properties are the second most prominent property type with almost 2,000 potentially exposed.
- 162 critical facilities are located in the WUI. Communication infrastructure is the most common type found in the WUI
- 4 schools are located in the very high risk WUI area.
- The Santa Fe Watershed supplies 40% of the City's water and is considered to be at risk of wildfire
- Wildfire events can have direct and indirect impacts on the local economy.
- Degraded air quality and negative health impacts place already vulnerable populations at further risk.
- Wildfire can lead to secondary hazards such as post-fire erosion and the loss of habitat and native species.
- Climate change will increase the risk of wildfire and lead to more frequent and more intense events.
- The City has in place land use regulations to address wildfire risk in new development.

Location	Probability of Future Occurrence	Extent (Magnitude/Severity)	Overall Significance
Significant	Likely	Catastrophic	High

4.3.7 Human Caused Hazards

The following Human Caused hazards are addressed in Annex A.

- Active Shooter
- CBRNE
- Cyber Attack
- Hazardous Materials Release
- Pipeline Explosion
- Pandemic
- Transportation Accident
- Utility Disruption

4.4 Capability Assessment

Thus far, the planning process has identified the natural hazards posing a threat to the Planning Area and described, in general, the vulnerability of the City to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the City's net vulnerability to disasters, and more accurately focuses the goals and proposed actions of this plan.

The HMPT used a two-step approach to conduct this assessment for the City. 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, needed improvement, or could be undertaken if deemed appropriate. Second, the HMPT conducted an inventory and review of existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

Similar to the HMPT's effort to describe hazards, risks, and vulnerability of the City of Santa Fe, this mitigation capability assessment describes the City's existing capabilities, programs, and policies currently in use to reduce hazard impacts or that could be used to implement mitigation activities. This assessment is divided into four sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, and mitigation outreach and partnerships. A discussion of other mitigation efforts follows the assessment.

The City of Santa Fe has a number of resources that can be called on to help implement mitigation actions. These resources are both private and public, and exist at the local, state, and federal levels. The diversity of Santa Fe's landscape, culture, and residents is reflected in the varying level of community services found in the City. The areas surrounding the City of Santa Fe benefit from the readily available public services such as police and fire protection, hospitals, and clinics.

4.4.1 Regulatory Mitigation Capabilities

Table 4-37 lists planning and land management tools typically used by local jurisdictions to implement mitigation activities and indicates those that are in place in the City of Santa Fe.

Table 4-37 City of Santa Fe Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General/Comprehensive plan	Yes	Update in progress
Zoning ordinance	Yes	Chapter 14
Subdivision ordinance	Yes	14-3.7
Growth management ordinance	Yes/No	Growth Management Chap of General Plan (adopted 1999 and not updated since)
Floodplain ordinance	Yes	Ordinance 14-8.3
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	International Fire Code, Terrain Management-Chapter 14/ MS4 Permits, 14-5.6 Escarpment Overlay District
Building code	Yes	The City has adopted numerous NM building and construction codes.
Fire department ISO rating	Yes	The City of Santa Fe has a rating of 2
Erosion or sediment control program	Yes	Terrain Management – Chapter 14 / MS4 Permits
Stormwater management program	Yes	Stormwater Management Strategic Plan / MS4 Permits
Site plan review requirements	Yes	14-3.9 Development Plans
Capital improvements plan	Yes	Impact Fee Capital Improvements Plan 2020
Economic development plan	Yes	
Local emergency operations plan	Yes	Comprehensive Emergency Management Plan
Other special plans	Yes	https://www.santafenm.gov/river_and_watershed

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
		Santa Fe Municipal Watershed Plan providing source water protection through prescribed burning and vegetation management with USFS. https://www.santafenm.gov/river_and_watershed Fire Department Standard Operating Guideline, Rules and Regulations, and EMS Protocols. Sustainable Santa Fe 25-Year Plan
Flood insurance study or other engineering study for streams	Yes	Stormwater Management Strategic Plan
Elevation certificates (for floodplain development)	Yes	
Other	Yes	Sustainable Santa Fe 25-Year Plan

As indicated in the table above, Santa Fe has several plans and programs that guide the City's mitigation of development of hazard-prone areas. Several of these are described in more detail below.

City of Santa Fe Comprehensive Emergency Management Plan

The Comprehensive Emergency Management Plan (CEMP) outlines the City's approach to emergency management. It provides general guidance for emergency management activities and an overview of methods of mitigation, preparedness, response, and recovery. The plan describes the City's emergency response organization, assigns responsibilities for various emergency tasks, and provides a framework for the more detailed functional and hazard-specific plan sections that are outlined in the Response Plan.

City of Santa Fe Land Use & Urban Design Plan

This update to the City of Santa Fe's 1999 General Plan is currently in draft form as of July 2019. It is intended to reflect changing demographic and economic conditions in the community by looking at recent and anticipated development trends and incorporating a vision for future growth. Within the plan, the City acknowledges that the region's environment has experienced significant changes that are likely to continue to occur. The plan has a set of goals and policies for how the City should develop and grow in the future. The City sets forth five "unifying policies", two of which have a connection to planning for future environmental uncertainty:

Policy #1: Response to Environmental Changes - This plan recognizes that significant changes in the region's environment have occurred and are likely to continue to occur. The city will study, plan and prepare for likely changes, and take responsible actions to lessen or prevent changes that adversely affect the health, safety, welfare and economic strength of the community.

Policy #3: Evaluation of Alternative Scenarios - This plan recognizes that there have been significant changes to economic, environmental and demographic factors affecting the community in recent years, and that it will continue to be difficult to accurately forecast future trends. These circumstances mean that the policies in this plan will take into account the likely range of possible future conditions, and that progress in implementing the plan will need to be evaluated periodically.

The Plan's Sustainability and Energy goals also have a connection to hazards and planning for changing climate. This goal has three guiding principles including, "Resiliency: Increase Santa Fe's resiliency to adapt to the effects of climate change, by reducing greenhouse gas emissions." The following policies under this goal relate to mitigation:

Policy #2: Mitigate and Adapt to the Effects of Climate Change- Addressing the complex challenges caused by a changing climate, the city will work with others to analyze the impacts of climate change on Santa Fe's environment and develop mitigation and adaptation strategies to reduce and reverse the negative impacts of climate change.

Policy #7: Storm Water - Capture, infiltrate and utilize storm water on-site and integrate into the design of all projects, including roadways. Coordinate storm water management such as good grading practices, bio-remediation and landscape development and support.

Policy #9: Wastewater - Optimize reclaimed wastewater for re-use and make it a significant part of integrated water resources planning.

Policy #11 Groundwater - Reduce groundwater use through the retirement of domestic wells.

Stormwater Management Strategic Plan

Implementation of the City's Stormwater Management Strategic Plan has begun. The City is identifying locations and conditions of existing structures within the urban watershed, and modeling stormflows for identification of flood hazards and sedimentation and erosion potential. The City is actively pursuing infiltration projects that would reduce volume and velocities within Santa Fe's river and arroyos. River Restoration is projected. GIS analysis of stormwater facilities has begun; however better mapping and evaluation of stormwater structures has been identified as a need.

Santa Fe River Corridor Master Plan

Adopted in 1995, the Santa Fe River Corridor Master Plan is a comprehensive plan to develop a system connecting the parks and natural preserves along the Santa Fe River corridor. The plan's guiding principles are "riparian restoration, flood protection, erosion control, aesthetic design considerations, recreational and community uses, sound engineering, public safety, and cost effectiveness."

Santa Fe Basin Study: Adaptations to Projected Changes in Water Supply and Demand

In partnership with the Santa Fe County the City of Santa Fe received funding from the Bureau of Reclamations' WaterSMART program to develop a study to better understand the effects on and associated risks from surface water use on the Santa Fe Basin. The study, completed in 2015, evaluates the projected changes and lists potential strategies for adaption to be used for future planning.

City of Santa Fe Water Conservation and Drought Management Plan

The City adopted the Water Conservation and Drought Management Plan in 2015 an update of the City's 2005 plan. The update includes data on current water use as well as projections on water supply based on development trends in the city. The plan establishes goals and implementation strategies for future water conservation. The plan update meets both state and federal regulatory requirements allowing the City to be eligible for grant funding related to water and water conservation. This document was recently updated with a 2020 Addendum and serves as a guiding document for the City of Santa Fe Water Division's Water Conservation Office (SFWCO). The SFWCO offers rebates, enforces water waste and time of day restrictions, conducts educational and community outreach programs, coordinates with other city departments to identify conservation opportunities, assists with the development of land use and zoning code relative to water conservation, and assists the department by tracking water user efficiency and water system efficiency (non-revenue water audits).

Santa Fe River and Arroyo de Los Chamisos Modeling Report

This report contains the updates to the Santa Fe River and Arroyo de Los Chamisos Drainage Master Plans that were completed in 1997 and 1998 respectively. The report provides the background on development of new EPA SWMM based flood event models and LSPC based water quality models of the two watersheds. In addition, recommendations for new data collection efforts, modeling, stormwater program implementation and monitoring are provided.

Sustainable Santa Fe 25-Year Plan (2018)

The Sustainable Santa Fe 25-Year Plan includes 91 strategies designed to achieve carbon neutrality and improve ecological resilience, economic vitality, quality of life, and social equity in Santa Fe. The plan strategies include development of a drought preparedness plan; expanding the water conservation program; and enhancing wildfire mitigation, preparedness, and resiliency efforts. Achieving carbon neutrality in Santa Fe will reduce impacts of climate change effects on hazards. The Sustainable Santa Fe 25-Year Plan is a "living document" that will be updated to integrate risk information from this mitigation plan.

Zoning, Building Codes, & Land Use Regulations

Building codes are important mitigation tools because they can be tailored to fit specific hazards present in each region. At a minimum the City has adopted the 2015 State of New Mexico Commercial and Residential Building Codes.

The City of Santa Fe have adopted several development regulations. The 2015 International Building Code (IBC), implemented statewide, and the floodplain ordinance, implemented locally, are two of the most important capabilities that the City utilizes to prevent potential damage from floods, wind, and other hazards.

- International Building Code—Building codes are important mitigation tools because they are tailored to fit specific hazards present in each region. Consequently, structures that are built to applicable codes are resistant to hazards such as strong winds, floods, and wildfires, and can help mitigate the effects of these hazards. New Mexico has adopted the 2015 IBC code as a minimum standard for all communities and provides inspection services through the Construction Industries Division of the State Regulations and Licensing Department.
- Residential Green Building Code – Applies to new single-family attached and detached including guests houses as well as all additions and remodels. According to the HMPT, it will also apply to multi-family residential dwellings in the future. Development of new single-family houses require a minimum performance on HERS (Home Energy Rating System) and WERS (Water Efficiency Rating Score) rating completed by a City approved professional.
- Code of Ordinances – Updated August 27, 2019, the Code of Ordinances contains the City's Land Use Codes (Chapter 14) including Subdivision Regulations (1973) (Section 14-3.7), a Terrain Management Plan, the Santa Fe Water Conservation Ordinance (2002), the Santa Fe Extraterritorial Zoning Ordinance (1997), and the Santa Fe Flood Plain Ordinance (1996).
- Floodplain Ordinance—Through administration of floodplain ordinances, the City ensures that all new construction or substantial improvements to existing structures located in the 100-year floodplain are built with first-floor elevations at least one foot above the base flood elevation.

City Ordinances

Escarpment Overlay District Ordinance

City Ordinance 14-5.6 creates an overlay district in the area of the escarpment (ridgetop). Stricter regulations and more plans are required to build in the escarpment area. No new subdivisions may be permitted that are entirely in the escarpment overlay district. The Ordinance intends to reduce the risk to life and health of residents in the escarpment by reducing wildfire risk; and encourage the conservation of water, especially for maintaining landscaping materials.

West Santa Fe River Corridor Overlay Zoning District

City Ordinance 14-5.11 restricts residential density in all non-residential zoning districts, and includes mandatory building setbacks minimum of fifteen feet from whichever one of the following is the most restrictive:

(1) River Greenway Boundary,

(2) FEMA 100-year Floodplain Boundary, or

(3) City code setback measurement for streams and watercourses,

Terrain and Stormwater Management

City Ordinance 14-8.2 addresses erosion control, stormwater management, and standards for arroyos, streams, or watercourses.

Flood Regulations

City Ordinance 14-8.3 adopts the special flood hazard areas identified by FEMA and regulates development in those areas. The ordinance goes above minimum FEMA requirements by requiring new residential or nonresidential structures to be constructed or substantially improved in the flood fringe to have the elevation of the lowest floor at least one foot above the base flood elevation.

Dam Emergency Action Plans

Having an effective Emergency Action Plan at all high and significant hazard potential dams in the county is critical to reducing the risks of loss of life and property damage from dam failures. An EAP is a written document that identifies potential emergency conditions at a dam and specifies pre-planned actions to be followed to minimize property damage or loss of life as a result of failure or mis-operation of the plan. The dam owner is responsible for development, maintenance and exercise of the EAP. Both McClure and Nichols dams are owned by the City and have EAPs and inundation maps.

Santa Fe County Plans/Studies

Santa Fe County Hazard Mitigation Plan

The most recent update of the County's Hazard Mitigation Plan was approved by FEMA on May 30, 2018. It contains detailed information hazard information, capability assessment, and mitigation strategies for Santa Fe County as a whole.

Santa Fe County Emergency Operations Plan

Santa Fe County has a current Emergency Operations Plan (EOP). This EOP covers countywide response to all hazards identified in the county's hazard analysis.

Community Wildfire Protection Plan - 2008

The Santa Fe County Community Wildfire Protection Plan (SFC CWPP) addresses hazards and risks of wildland fire throughout Santa Fe County (County) and makes recommendations for fuels reduction projects, public outreach and education, structural ignitability reduction, and fire response capabilities.

Some of the recommendations for this plan include more than 55 fuels reduction projects; public education and outreach directed at homeowners to homeowners to help them prepare for wildland fire through events like preplanned triages; strategies for fire responders to improve their capabilities through improved communication, professional training, and equipment; and the reduction of structural ignitability by providing public education on defensible space. Goals for the CWPP are as follows:

- Collaboration: Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP (Society of American Foresters [SAF] 2004).
- Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more at risk communities and their essential infrastructure (SAF 2004).
- Treatments of Structural Ignitability: A CWPP must recommend measures that communities and homeowners can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).
- To meet these stated goals, the CWPP recommends a series of actions that fall into 4 different categories: 1) fuels reduction projects, 2) public education and outreach, 3) reduction of structural ignitability, and 4) improved fire response capabilities.

Santa Fe County Evacuation Planning Guide

The County's Office of Emergency Management has a page dedicated to evacuation planning that outlines steps to take to prepare for an emergency wildfire evacuation. The Guide includes 3 elements: 1) Get Ready – Preparation and Planning; 2) Get Set – Putting the Plan into Action; and 3) Go – What to do in the Event of a Fire.

The Office of Emergency Management also has an emergency communications network station (770 AM) that serves as a method of information dissemination in the case of a wildfire event.

Santa Fe County Sustainable Growth Management Plan, 2010

The Santa Fe County Sustainable Growth Management Plan (SGMP) is a comprehensive, long-term framework for the protection of the County's resources and for development in the County. State statutes and the County Code require that the County have and maintain a Comprehensive Plan, and give the responsibility for plan updates to the Planning and Zoning Commission subject to final approval by the County Council.

Water Conservation

Santa Fe County includes numerous water conservation requirements as part of the SLDC (SLDC Section 7.13.11). Ordinance 2002-13 applies to all residential and commercial water uses in the County and is intended to limit water wasting actions by means of a schedule of fines for infractions, as well as a listing of County personnel authorized to issue those fines. Outdoor watering or irrigation is prohibited between 11 am and 7 pm from May through September of each year with only a few exceptions.

Activities are compiled into: outdoor conservation (irrigation and car washing), indoor conservation (remodeling/construction and leaks) conservation signage, domestic well use, and water harvesting. The water harvesting provisions include requirements for rainwater catchment systems for all new construction with a roof area of 2,500 sq. ft or more. Rainwater harvesting provisions include cisterns to capture runoff from roofed areas that are linked to a pump and a drip irrigation system to serve landscaped areas.

4.4.2 Administrative/Technical Mitigation Capabilities

Table 4-38 identifies the personnel responsible for activities related to mitigation and loss prevention in the City of Santa Fe.

Table 4-38 City of Santa Fe Administrative/Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position/Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Land Use Dept. City Drainage Engineer
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Public Works/ Streets and Drainage
Planner/engineer/scientist with an understanding of natural hazards	Yes	Public Works/River & Watershed Manager
Personnel skilled in GIS	Yes	GIS
Full time building official	Yes	Chief Building Official in Land Use Department
Floodplain manager	Yes	Land Use Drainage Engineer
Emergency manager	Yes	Emergency Management Office
Grant writer	Yes	Public Works – Grant Writer
Other personnel	Yes	Streets and Drainage Maintenance Division Director; Fire Marshal & Inspectors; Water Conservation Office; Sustainability Officer
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	GIS
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning, text messages)	Yes	Alert Santa Fe. https://www.santafenm.gov/alertsantafe This system is provided by Rave Mobile Safety and powered by Smart911 to send notifications by phone, email, text and social media to keep citizens informed of emergencies. Includes geotargeted messages (calls, texts, emails)
Other	Yes	Buckman Direct Diversion/ Wastewater

4.4.3 Fiscal Mitigation Capabilities

Table 4-39 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 4-39 City of Santa Fe Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Potentially	
Capital improvements project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric services	Yes	
Impact fees for new development	Yes -- Roads	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	
Incur debt through private activities	Potentially	
Withhold spending in hazard prone areas	No	
Other		

4.4.4 Mitigation Outreach and Partnerships

The Santa Fe Municipal Watershed Plan adopted in 2009 and updated in 2013 by the governing body. This plan was updated in 2013 and is unique in that it seeks to fund forest restoration activities through a 50/50 cost-share collection agreement between the City of Santa Fe and the Santa Fe National Forest as an insurance policy against future threats, particularly of catastrophic wildfire, to the municipal water supply. In addition, the City has partnered with the Nature Conservancy and Forest Stewards Guild regarding watershed health and wildfire mitigation.

The Santa Fe Pojoaque Soil and Water Conservation District participated as a stakeholder in the mitigation plan update process in 2020. There is the potential for expanded partnerships with this district particularly related to wildfire mitigation on private lands.

4.4.5 Opportunities for Enhancement

The 2020 update provided the City an opportunity to review and update the capabilities currently in place to mitigate hazards. This also provided an opportunity to identify where capabilities could be improved or enhanced. Specific opportunities could include:

Join the CRS: The City may consider joining the Community Rating System to improve flood insurance affordability, public flood hazard notification, and enhanced floodplain management. The City is already going above and beyond some of the minimum NFIP standards by requiring a one foot above base flood elevation freeboard requirement for all new structures permitted in flood hazard areas. The City can get credit for this and potentially lower the cost of flood insurance for residents in the unincorporated areas. A mitigation action specific to exploring the cost/benefit of the CRS has been added to this plan's mitigation strategy.

Training: Provide training opportunities to help inform City staff on how best to integrate hazard information and mitigation projects into their departments planning efforts.

Planning: Implementation of the Stormwater Management plan as well as funding projects list in the plan. The City's Land Use Plan is being updated (currently in draft) and has the opportunity to cross-reference the mitigation plan including acknowledging dam failure hazards.

Technology: Continued use of GIS and other technology for hazard awareness and warning capabilities.

Other opportunities include becoming a Firewise and/or a StormReady Community, as well as ensuring the alignment of future planning efforts with the local Mitigation Plan.

5.0 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.

5.1 Mitigation Strategy: Overview

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 City of Santa Fe Mitigation Plan. It describes how the City met the following requirements from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the HMPT are captured in this mitigation strategy and mitigation action plan. As part of the 2020 plan update process, a comprehensive review and update of the mitigation strategy portion of the plan was conducted by the HMPT. Some of the goals and objectives from the 2014 plan were revisited, reaffirmed, and refined. The end result is a mitigation strategy that reflects the updated risk assessment, progress on mitigation actions, and the new priorities of this plan update. To support the updated goals, the mitigation actions from 2014 were reviewed and assessed for their value in reducing risk and vulnerability to the planning area from identified hazards and evaluated for their inclusion in this plan update (See Section 5.4.1). Section 5.2 below identifies the current goals and objectives of this plan update and Section 5.4.2 details the updated mitigation action plan.

5.2 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 HMPT has organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals, objectives, and mitigation actions were developed based on these tasks. The HMPT held a series of meetings designed to achieve a collaborative mitigation strategy as described further throughout this section.

During the initial goal-setting meeting, the HMPT reviewed the results of the hazard identification, vulnerability assessment, and capability assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPT to formulate planning goals and objectives, and to develop the mitigation strategy for the City of Santa Fe.

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 to implementation. Implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that they 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.

To facilitate the development of plan goals the HMPT members were provided a worksheet that explained goals, objectives and actions and listed examples of each. Related plan goals were listed on the worksheet including the City's 2014 mitigation plan and OEM Strategic Plan as well as the State of New Mexico Multi-Hazard Mitigation Plan (2018) and Santa Fe County Hazard Mitigation Plan (2018) (see worksheet in Appendix B). This review was to ensure that this plan's mitigation strategy was aligned and integrated with existing plans and policies. The 2014 goals were hazard specific. Based on the discussion at the HMPT meeting the group decided to make them broader and added a new goal related to increasing public education.

Based on the risk assessment review and goals development process, the HMPT identified the following goals and objectives which provide the direction for reducing future hazard-related losses within the City of Santa Fe.

Goal 1: Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure including the watershed due to hazards.

1.1: Reduce the exposure to critical facilities in high or extreme wildfire hazard areas.

1.2: Reduce the exposure of residential structures to wildfires.

1.3: Educate the public in defensible space and other preventative measures to minimize wildfire risk.

1.4: Educate the population on damage and loss due to drought.

1.5: Continue efforts to encourage residents to use water-saving landscaping techniques.

1.6: Reduce exposure of structures and roads to flooding.

1.7: Build and support local capacity to enable the public to prepare for, respond to and recover from disasters.

1.8: Identify critical facilities and buildings that are vulnerable to severe weather events including high winds.

1.9: Develop a comprehensive approach to reducing the possibility of damage and loss of function to identified vulnerable buildings and critical facilities, due to the effects of severe weather hazards.

1.10: Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, compliance with current building codes, etc.

1.11: Protect the public water system and other critical facilities from contamination from hazardous materials incidents.

Goal 2: Reduce possibility of injury and death from hazards

2.1: Increase public awareness of actions to take during all types of severe weather.

2.2: Increase awareness of hazards and actions to take during an emergency.

2.3: Protect communication systems and other critical facilities from hazard events.

2.4: Increase awareness of the impact of hazard events on the community.

2.5: Increase public awareness of actions to take during extreme heat events.

2.6: Protect the general population and special populations from hazardous materials incidents.

2.7: Improve communications with facilities housing special populations, such as nursing homes, senior centers, and daycare centers.

2.9: Develop a comprehensive approach to reducing the possibility of injury and loss of life for residents and occupants of existing structures and critical facilities with the highest relative vulnerability to the effects of hazardous material releases from discrete locations.

Goal 3: Promote disaster-resistant development.

3.1: Encourage and facilitate the development or revision of comprehensive plans and zoning ordinances to limit development in high hazard areas and improve the ability to identify vulnerable structures.

3.2: Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.

3.3: Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.

Goal 4: Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.

4.1: Provide public education to increase awareness of hazards and opportunities for mitigation.

4.2: Increase participation in and number of storm watcher programs throughout City.

4.3: Promote partnerships to continue the development of a citywide approach to identifying and implementing mitigation actions.

Goal 5 (NEW): Increase awareness and understanding of risks and opportunities for mitigation among citizens and elected officials.

5.3 Identification and Analysis of Mitigation Actions

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. Once it was determined which hazards warranted the development of specific mitigation measures, the HMPT analyzed a set of viable mitigation alternatives that would support identified goals and objectives. Each HMPT member was provided with the following list of categories of mitigation measures, which originate from the 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.

In order to identify and select mitigation actions to support the mitigation goals, each hazard identified and profiled in Chapter 4 was evaluated. At the mitigation strategy meeting the HMPT was also provided with a matrix showing examples of potential mitigation action alternatives for each of the above categories, for each of the identified hazard. The HMPT was also provided a handout that explains the categories and provided further examples. Another reference document titled "Mitigation Ideas" developed by FEMA was distributed to the HMPT via an online link. This document lists the common alternatives for mitigation by hazard. A facilitated discussion then took place to examine and analyze the options while considering both future and existing building in considering possible mitigation actions. Appendix B provides the matrix of alternatives considered. Each proposed action was written on a large sticky note and posted on flip charts underneath the hazards it addressed in the meeting room.

Based upon the key issues identified in the risk assessment, including the capability assessment, and the overall political, technical, and financial feasibility of the potential actions, the HMPT came to consensus on proposed mitigation actions for each hazard. Certain hazards were best addressed through multi-hazard actions. A lead for each new action was identified. The leads were responsible for filling out worksheets with additional details on the project so they could be captured in the plan. Additional discussion and refinement of proposed mitigation actions took place within follow-up meetings of the HMPT and individual departments. The refined mitigation actions were provided to the HMPT lead and planning consultant by filling out details on a mitigation action worksheet (See Appendix B). The final action strategies are captured in Section 5.4.

5.3.1 Prioritization Process

Once the mitigation actions were identified, the HMPT was provided with several decision-making tools, including FEMA's recommended prioritization criteria STAPLEE to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE is an acronym for the following:

- Social: Does the measure treat people fairly? (e.g., different groups, different generations)
- Technical: Is the action technically feasible? Does it solve the problem?
- Administrative: Are there adequate staffing, funding, and other capabilities to implement the project?
- Political: Who are the stakeholders? Will there be adequate political and public support for the project?
- Legal: Does the jurisdiction have the legal authority to implement the action? Is it legal?
- Economic: Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- Environmental: Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

In accordance with the DMA 2000 requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority. Other criteria used to assist in evaluating the benefit-cost of a mitigation action includes:

- Does the action address a hazard or areas with the highest risk?

- Does the action protect lives?
- Does the action protect infrastructure, community assets or critical facilities?
- Does the action meet multiple objectives (Multiple Objective Management)?
- What will the action cost?
- What is the timing of available funding?

The mitigation categories, multi-hazard actions, and criteria are included in Appendix B.

At the mitigation strategy meeting the HMPT used STAPLEE to determine which of the identified actions were most likely to be implemented and effective. Keeping the STAPLEE criteria in mind, each member 'voted' for the new mitigation actions by sticking a colored dot on the sticky note on which the action was written. The number of dots next to each action was totaled as an indication of relative priority and translated into 'high,' 'medium' and 'low.' The priority levels on existing mitigation actions continuing in the plan from 2014 were also revisited using this process, and in some cases revised to reflect current priorities. The results of the STAPLEE evaluation process produced prioritized mitigation actions for implementation within the City.

The process of identification and analysis of mitigation alternatives allowed the HMPT to come to consensus and to prioritize recommended mitigation actions. During the voting process, emphasis was placed on the importance of a benefit-cost review in determining project priority; however, this was not a quantitative analysis. Recognizing the federal regulatory requirement to prioritize by benefit-cost, and the need for any publicly funded project to be cost-effective, the HMPT decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, in addition to the priorities identified in this plan. Cost-effectiveness will be considered in additional detail when seeking FEMA mitigation grant funding for eligible projects identified in this plan.

Benefit-cost was also considered in greater detail in the development of the Mitigation Action Plan detailed in Section 5.3. Specifically, each action developed for this plan contains a description of the problem and proposed project, the entity with primary responsibility for implementation, any other alternatives considered, a cost estimate, expected project benefits, potential funding sources, and a schedule for implementation. Development of these project details for each action led to the determination of a high, medium, or low priority for each.

5.4 Mitigation Action Plan

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 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.

5.4.1 Progress on Previous Mitigation Actions

During the 2020 update process the HMPT reviewed and evaluated the 2014 mitigation strategy to determine the status of the actions. The purpose of this was to measure progress by determining which actions were completed, and to revisit the remaining actions to determine if they should be carried forward or removed from the plan.

The 2014 mitigation strategy contained 60 separate mitigation actions. Of these 60 actions, 7 have been completed. Fifteen (15) have not yet been started due to a variety of reasons such as changes in priorities, lack of funding, or changes to the projects themselves but are continuing projects. Three (3) actions were deleted; one (1) related to space weather due to space weather is no longer considered a priority hazard under this plan and one (1) action related to the incorporation of hazard information into city operations which is already being done in the city and one (1) action related conducting assessments on city-owned assets. One (1) action was deferred because of the lack of staffing capacity to complete the project. Because many of these projects are implemented on an annual or other continuous basis, thirty-one (31) of the 2014 projects have been identified to be carried forward, with some modification, in this plan update. The following table (5-1) shows the mitigation actions that have been completed since 2014. Table 5-1 includes a status summary of the mitigation action projects that were continued from the 2014 Plan.

Table 5-1 Completed Mitigation Actions

Hazard(s) Mitigated	Mitigation Action	Priority	Comments
Drought, Dam Failure, Flood, Severe Weather, Tornado, Wildfire, Human Hazards	Promote partnerships among the city departments, non-profit organizations, and the private sector to develop a citywide approach to mitigation activities	Medium	Completed. 2017 Pre-Kickoff Meeting and 2020 Mitigation Plan Revision Process Underway
Drought, Dam Failure, Flood, Severe Weather, Tornado, Wildfire, Human Hazards	Establish a Hazard Mitigation Group	Low	Completed. City's Emergency Management Coordinating Group (EMCG)
Severe Weather; Tornado	Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).	Low	Completed. There is now a requirement that manufactured homes be tethered or anchored within the City.
Severe Weather	Work with social support agencies, homeowners associations and general public to develop and implement monitoring and warning systems focused on vulnerable populations and provision of adequate shelter facilities during extreme heat or cold emergencies.	Low	Completed. Rave Mobile Safety - Rave Prepare Module
Drought	Publish and distribute educational materials on water conservation techniques and drought management strategies.	High	Completed.
Flooding	Protect wells from actual and potential sources of contamination during flooding.	High	Completed. Well Head Protection is evaluated during a sanitary survey completed every 1-3 years.

Hazard(s) Mitigated	Mitigation Action	Priority	Comments
Human-Caused Hazards	Maintain and update equipment used to respond to hazardous materials incidents.	High	Completed. State Homeland Security Grant Program Funding

5.4.2 Continued Compliance with NFIP

Given the significance of the flood hazard in the planning area and as required by DMA 2000, an emphasis is placed on continued compliance with the National Flood Insurance Program (NFIP). The City, as an NFIP participant, will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining and updating the floodplain zoning ordinance.

As evidence of compliance, the City of Santa Fe has participated in the NFIP since 1980; initial flood hazard boundary maps were developed in 1977. The first official Flood Insurance Rate Maps were adopted July 2, 1980. Since then, the City has administered floodplain management regulations that go above and beyond some of the minimum requirements of the NFIP, including requiring a one foot above base flood elevation freeboard requirement for all new structures permitted in flood hazard areas. The City adopted new Digital Flood Insurance Rate Maps that became effective December 4, 2012. The City's Flood Prevention and Flood Control rules of City's Land Use Codes Chapter 14-3.10 are described in Section 4.4 in more detail and flood insurance coverage is discussed in Section 4.3.3.

Also, to be considered are the flood mitigation actions contained in this Mitigation Plan that support the ongoing efforts by the city to minimize the risk and vulnerability of the community to the flood hazard and to enhance their overall floodplain management program.

5.5 Updated Mitigation Action Plan

This action plan presents the recommendations developed by the HMPT outlining how the City of Santa Fe can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. The mitigation actions developed by the HMPT are summarized in Table 5-2. It identifies the mitigation action title, lead agency/department, hazards mitigated, priority and if the action mitigates losses to existing or future development (those with an * mitigate losses to future development).

It is important to note that the City of Santa Fe has numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as the community wildfire protection plan, capital improvement budgets, and other planning mechanisms. These actions are considered to be part of this plan, and the details, to avoid duplication, should be referenced in their original source document. The HMPT also realizes that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this plan.

Further, it should be clarified that the actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; and reprioritization due to funding availability and/or other criteria. The City is not obligated by this document to implement any or all of these projects. Rather this mitigation strategy represents the desires of the community to mitigate the risks and vulnerabilities from identified hazards.

Also, many of the action items included in this plan are a collaborative effort among County agencies and other local, state, and federal agencies and stakeholders in the City of Santa Fe planning area. Table 5-2 identifies the lead agency/department.

The following table provides project specifics and implementation details for mitigation actions identified. They are grouped by the type of hazard(s) they address. Status/Implementation Notes describe progress made on the actions so far, using the following categories:

- **In progress:** work has begun on the project and is ongoing.
- **Annual Implementation:** the project is being done on a recurring basis and the HMPT decided to keep the action in the updated plan.
- **Continue - Not completed:** little or no work has been done on the project to date and the HMPT agreed to carry over the action into the updated plan.
- **New in 2020:** The action is new to this plan update; little to no work has been completed.

Table 5-2 City of Santa Fe Mitigation Action Table

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
MH-1*	1,2,3	Multi-Hazard: Severe Weather, Tornado, Wildfire	**Building code enforcement and coordination.** Review buildings codes at state, county and city jurisdictions and revise where necessary to make them consistent. Further education of building code official to ensure the enforcement of building codes is consistent.	Building Permit Division	$0	Self-funded	Low	24 months	New in 2020.
MH-2*	1,2,3,5	Multi-Hazard: Flood, Severe Weather, Wildfire	**Building inspectors coordination.** Work with the State, County and municipal building inspectors to consistently enforce the building code from jurisdiction to jurisdiction.	Land Use	$0	Self-funded	Medium	Annual	Continue-Not completed. Action added in 2014.
MH-4	4,5	Multi-Hazard: Drought, Dam Failure, Flood, Severe Weather, Tornado, Wildfire, Human Hazards	**Hazard Mitigation Planning Team.** Convene regular meetings with the Mitigation Planning Team to discuss issues and progress related to the implementation of the plan.	OEM	$0	Self-funded; Federal and State grants	Medium	12 Months	Annual Implementation. Action added in 2014.
MH-5*	3,4,5	Multi-Hazard: Drought, Flood, Severe Weather Wildfire	**Incorporation of vulnerability information.** Distribute and promote the inclusion of the vulnerability analysis information as part of periodic plan review and revisions at the City level.	OEM	$0	Self-funded	Medium	12 Months	In progress. The 2014 Mitigation Plan was distributed to a variety of City Departments, but it is unclear what incorporation the vulnerability analysis had in their planning processes.

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
									Action added in 2014.
MH-6	2,4,5	Multi-Hazard: Drought, Dam Failure, Flood, Severe Weather, Tornado, Wildfire, Human Hazards	**Citizen Corps.** Develop opportunities for community participation in emergency preparedness programs, to include citizen advisory committees and Citizen Corps Programs.	OEM	$125,000	Self-funded; Federal and State grants; Private Sector donations	Low	18 Months	Continue-Not completed. The City of Santa Fe has not started a Citizen Corps program at this time. More research is needed to determine the benefit it would provide to the community. Action added in 2014.
MH-7	4,5	Multi-Hazard: Drought, Dam Failure, Flood, Severe Weather, Tornado, Wildfire, Human Hazards	**Mitigation success stories and hazard public awareness.** Identify and publicize success stories as part of an overall consistent public relations program. The focus would be on how the public can implement similar actions to reduce their risk, where feasible. The project will promote and build on the City's ArcGIS StoryMap, which includes access to maps of flood and dam failure hazards so the public can understand potentially hazardous areas to avoid in advance of an incident.	OEM	$10,000	Self-funded	Low	18 Months	Continue-Not completed. This will occur once mitigation projects from the July 2018 Flood Event have been completed as well as when other actions identified in this plan are completed. Action added in 2014.
MH-8*	1,2,3	Multi-Hazard: Flood, Wildfire	**Spatial analysis of sensitive areas.** Utilize a GIS for identifying "sensitive area" properties in the City.	GIS	$0	Self-funded	Low	24 Months	Continue-Not Completed.

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
									Action added in 2014.
MH-9	2,3,4	Multi-Hazard: Drought, Flood	**Neighborhood-Scale Water Conservation Pilot – Expansion.** Neighborhood-scale pilot project to reduce stormwater runoff severity through rooftop rainwater catchment on private property and utilize the captured water to offset potable water demand.	Public Works/Water Conservation Office	$50,000	Self-funded	Medium	12 Months	New in 2020. Benefits: Reduce flooding from the connection of rooftop to on-street stormwater flooding
D-1	1,3	Drought	**Domestic wells.** Fund program to meter domestic wells.	Water Division	$200,000	Self-funded	Medium	24 Months	Continue – Not Completed. Will require council direction and ordinance.
D-2	1,3	Drought	**Water metering and leak detection.** Implement water metering and leak detection programs followed by water main repair/replacement to reduce losses.	Water Division	$50,000,000	Self-funded Federal and State Grants	Medium	120 Months	In progress. Programs for leak detection and priority pipeline replacement.
D-3	1,3	Drought	**Non-potable uses.** Implement projects to use treated effluent for non-potable uses.	Water Division	$1,000,000	Self-funded	Medium	24 Months	In progress. Currently working to develop and/or implement reuse strategies including return flow pipeline, Aquifer Storage and Recovery, Direct Potable reuse.
D-4	4,5	Drought	**Drought awareness and education.** Conduct public meetings with local and visiting subject matter experts to educate the public on how to decrease their risk to drought.	Water Division OEM	$0	Self-funded Federal and State Grants	Medium	12 months	In progress. In 2018 completed audit of Marty Sanchez Golf Course. In 2020

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
						Private Sector Donations			completed 5-year conservation plan.
D-5	4,5	Drought	**Continue to expand public education on water conservation.** Encourage citizens to implement water conservation measures by distributing water saving kits which include replacement shower heads, flow restrictions and educational pamphlets which describe water saving techniques. Also encourage conservation by offering rebates for ultra-low-flow toilets. Provide water conservation education in schools and to adults. School programs begin in fourth grade and continue in fifth with information about the water cycle, the water-energy nexus, field trips to the watershed and water treatment facilities, a full day water fiesta with classes on many aspects of water production and management.	Water Division	$150,000	Self-funded Federal and State Grants Private Sector Donation	Low	60 Months	In progress. Completed in 5-year Conservation Plan, but education efforts to continue annually. High school educational outreach includes opportunities for peer-to-peer mentoring, promotional campaigns, and volunteer opportunities. In addition, continuing education is available for water conservation professionals in both irrigation and plumbing through collaboration with the Santa Fe Community College
D-6*	4,5	Drought	**Water conservation incentive program Expansion.** Expand City of Santa Fe water conservation incentive program to accomplish the goals of the 5-year plan and expand the basis and	Water Division	$200,000	Self-funded Federal and State Grants	Low	24 Months	In progress. Completed in 5-year Conservation Plan, but education efforts need

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
			beneficial potential of the rebate program.						continued expansion to meet the goals of the Conservation Plan.
D-7*	3	Drought	**Enforcement of zoning and building regulations related to water use.** Enforce existing zoning and building regulations on water use.	Water Division Land Use	$0	Self-funded Federal and State Grants	Low	12 Months	Annual Implementation. Water Division Construction Standards are enforced annually.
D-8	2,3,4	Drought	**Commercial Submetering Expansion.** Collect detailed usage data on commercial water users and expand existing restaurant water audit program into the rest of the commercial sector.	Water Conservation Office/ Santa Fe Community College Santa Fe Green Chamber of Commerce	$2,000 (per install)	Self-funded Federal and State Grants	Low	60 Months	New in 2020. Benefits: This will provide data to direct commercial water conservation projects.
D-9*	1,2,3	Drought	**40 and 80 Year Water Plans.** Develop 40 and 80 year water plans. A science based, community informed, five year planning cycle to develop an 80 year water resource plan, from which shorter plans may be developed as needed. The first cycle which will begin in 2020 and end at the end of 2024. Outcomes from the first planning cycle will include the planning approach, scenario development, preferred projects and initiatives, and 40 and 80 year water plans.	Water Division Santa Fe County Utilities	$500,000	Self-funded Federal and State Grants	Medium	48 Months	New in 2020. Benefits: Reliable water sourcing.
F-1	1	Flood and Dam Failure	**Implement improvements to Nichols and McClure Reservoirs outlet conduits and the raw water pipeline**	Water Division	$5,500,000	Self-funded	High	60 Months	New in 2020. A risk assessment of Probable

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
			to the Canyon Road Water Treatment Plant to mitigate dam failure and flood-related erosion.						Maximum Precipitation & Probable Maximum Flood for the reservoirs has been completed in 2019 and included in the Emergency Action Plan. Additional work is needed to apply studies to improve the outlet conduits and reduce the potential impacts to the raw water line.
F-2*	1,2,3	Flood	**Enhance and/or develop drainage in flood prone areas of the city.** The project includes implementation of priority projects identified in the City's Stormwater Management Strategic Plan.	Public Works	$10,000	Self-funded Federal and State Grants	High	60 Months	In progress. Adoption of Stormwater Management Strategic Plan has occurred and a priority project list is kept current; some work completed including a drainage study. The stormwater fee to fund maintenance and capital improvements has been increased. A Project

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
									Administrator has been hired to manage capital projects. The City is actively pursuing infiltration projects that would reduce volume and velocities within Santa Fe's river and arroyos. River Restoration is projected. GIS analysis of stormwater facilities has begun; however better mapping and evaluation of stormwater structures has been identified as a need.
F-3*	3	Flood	**Conduct updated floodplain studies.** Conduct studies and update floodplain and Floodway maps in the City of Santa Fe	Land Use	$300,000	Self-funded Federal and State Grants	High	60 Months	Continue-not completed. Action added in 2014.
F-4	1,2	Flood	**Conduct Arroyo de los Pinos drainage improvements including culverts, road repair, and arroyo stabilization.** The Arroyo de los Pinos is a tributary arroyo to the Arroyo de los Chamisos. At the intersection of Camino Consuelo and Corte de Princesa there is	Public Works USACE NMED	$2,000,000	Self-funded Federal and State Grants	High	24 Months	New in 2020 <u>Benefits:</u> Prevention of flooding to adjacent properties,

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
			a culvert crossing that spans the arroyo. During July 23, 2018 storm event, arroyo flows over-topped the culvert undermining the adjacent road, box culvert, retaining walls, washed sidewalks away, and flooded homes. Public infrastructure, sewer lines are present within the arroyo channel as well as electric overhead. The channel has increased scour and erosion and bank stabilization is needed. High flows and velocities have been reported in the area between Avenida de las Campana to the confluence of the Arroyo de los Pinos and Arroyo de la Chamisos. The project would include implementing arroyo stabilization measures to prevent future flood damages, and upsizing of the culvert to pass higher flows. A drainage study will be needed to determine what specific stabilization measures will be most effective.						protection of public infrastructure and utilities, and overall reduction in erosion and sedimentation.
F-5	1,2	Flood	**Implement an Arroyo San Antonio and Acequia Madre-Pinos drainage study and mitigation.** The Arroyo San Antonio and Acequia Madre-Pinos parallel Agua Fria Road until they meet the Santa Fe River. The channel characteristics are small channels (appx 4′ – 6′ w x 2′- 4′d) to moderate channels (6′ – 8′w x 4′d – 6′d) that are remnants of the traditional acequia system. The contributing areas are primarily private property but there are several areas	Public Works Land Use	$500,000	Self-funded Federal and State Grants	High	36 Months	New in 2020 Benefits: Prevention of flooding to adjacent properties, protection of public infrastructure and utilities, and overall reduction in

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
			that are city-owned or are park space. In the past, as development occurred inlets and curb cuts from local roads were made. During 2018 storm events, these areas flooded property adjacent the channels and other properties as flows made their way to the river. A drainage analysis needs to be done to determine if conditions can be improved in the public right of way. The study would allow the identification of mitigation alternatives that will be pursued by the City. Detailed specification of hydrologic cross section should be made available to property owners to ensure proper maintenance. Additionally, a public outreach effort should be done to educate resident as to impacts.						velocities that contribute to damages.
F-6	1,2	Flood	**Implement an Arroyo Chamisos, Tributary drainage channel (Nava Ade) drainage study and mitigation.** This drainage channel runs from Richards Avenue along Governors Mile Road to an open space that is bordered by Dancing Ground Road and Cactus Flower Lane in the Nava Ade subdivision. Homes along the open space were flooded during the 2018 storm events. A public trail was also destroyed. Drainage studies are required to evaluate the problem and determine appropriate mitigation alternatives. Both volumes and velocities should be evaluated. An	Public Works Land Use	$500,000	Self-funded Federal and State Grants	High	36 Months	New in 2020 <u>Benefits:</u> Prevention of flooding to adjacent properties, protection of public infrastructure and utilities, and overall reduction in velocities that contribute to damages.

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
			infiltration solution would be desirable mitigation alternative, pending the outcome of the drainage study.						
F-7*	1,2,3	Flood	**Implement Santa Fe River Flood Mitigation Enhancements.** The Santa Fe River is ones of two primary stormwater channels out of the city and bordered by both public and private property. Within the channel, stormwater improvements have been constructed to control volume and velocities of water to mitigate flood. During the storms of 2018, significant damages occurred to infrastructure within the channel and adjacent lands. The project would implement repairs and reconstruction of 4 to 6 grade-control cross vanes, 4 to 6 finger vanes, 5 stormwater rundowns, and construction of a 400 ft, three-tiered, retaining wall is needed for future flood control.	City of Santa Fe USACENMED	$1,300,000	Self-funded Federal and State Grants	High	24 Months	New in 2020. A drainage analysis was done in 2018. The city has shovel-ready 90% engineering plans. Benefits: Damage to existing stormwater and channel infrastructure, protection of public and private property.
F-8	1	Flood	**Implement Hospital Tank Drainage Improvements.** The retaining wall around the hospital tank experienced sinking due to the July 2018 rain event. A rain gauge located next to the tank site at Christus St Vincent Hospital recorded 2.86 inches in 30-minutes, or approximately a 500-year rain event. The site is not able to drain greater than a 100-year event. As a result, the retaining wall was compromised. Future risks include tank settling or cracking. This project would implement	Water Division	$250,000	Self-funded	High	6 Months	New in 2020

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
			drainage improvements to reduce the potential damage to the tank and retaining wall.						
F-9	1	Flood	**Implement the Buckman Pipeline Erosion Control Project.** This project will include the design and installation of mitigation measures to protect the Buckman water transmission pipeline from flood and erosion. This will include the construction of a concrete-lined low water crossing on a tributary arroyo and strategic berms and swales to divert drainage and minimize erosion. The project was identified as a need in the 2018 flood recovery.	Water Division	$500,000	Mitigation grants; Federal and State grants	High	12 Months	New in 2020 Some initial work has begun on the project in 2019 including preliminary design.
F-10	2,4,5	Flood	**Develop CERT program.** Develop, support and fund Citizen Corps Programs, to include Community Emergency Response Teams (CERT) that also includes a mitigation component.	OEM	$125,000	Self-Funded; Federal and State grants; Private Sector donations	High	18 Months	Continue-Not completed. While no progress has been made to date, OEM is still looking into the viability of a CERT program for the City of Santa Fe. Action Added in 2014.
F-11*	2,4,5	Flood	**Expand and disseminate GIS and other hazard information on the internet.**	GIS	$30,000	Self-funded	Low	12 Months	Continue-Not completed. Through the City's ESRI ArcGIS Enterprise Agreement more work will be done

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
									in the next planning period. Action Added in 2014.
F-12	2,4,5	Flood	**Develop a Flood Hazard Education/Outreach Plan**	Land Use Public Works OEM	$40,000	Mitigation grants; Self-funded	Medium	12 Months	Continue-Not completed. This will be incorporated in the OEM Public Outreach Strategy once developed.
F-13*	1,2	Flood	**Conduct flash flooding hydrology studies in flood prone areas of the city.**	Land Use Public Works	$300,000	Self-funded; Federal and State Grants	Medium	18 Months	Continue-Not completed.
F-14	2,4,5	Flood	**Enhance flood education and awareness.** Work with city officials to increase awareness among property owners including information mailings to property owners in the 100-year floodplain; and sponsoring a series of workshops about costs and benefits of acquiring and maintaining flood insurance coverage for property owners in the 100-year floodplain.	Land Use Public Works	$50,000	Mitigation grants; Self-funded	Medium	12 Months	Continue-Not completed.
F-15	1,3	Flood	**Create a virtual and physical library that contains all technical studies, particularly hazard mitigation and natural resources.**	Land Use	$150,000	Self-funded	Low	18 Months	Continue-Not completed.
F-16*	1,2,3,4,5	Flood	**Continued NFIP compliance.** Continue to meet the compliance requirements outlined in the NFIP.	Land Use	$0	Self-funded Federal and State Grants	Low	12 Months	Annual Implementation. Action added in 2014.

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
SW-1	4,5	Severe Weather (Lightning, Hail, Extreme Temps, Wind, Winter Storms) Tornado	**Pursue StormReady Santa Fe status.** Establish city as a StormReady City to enhance Mitigation and preparedness for the impacts of severe weather through better planning, education, and awareness.	OEM	$5,000	Self-funded Federal and State Grants Private Sector Donations	High	12 Months	Continue – Not Completed.
SW-2	2	Severe Weather (Extreme Temperatures)	**Enhance extreme temperature plans.** Review existing extreme heat or cold emergency response plans for enhancement opportunities to include hazard mitigation and education and awareness.	OEM	$0	Self-funded	Medium	12 Months	In progress. Code Blue Policy Form developed.
SW-3	3	Severe Weather (Winter Storm)	**Winter Weather Response.** Winter weather preparedness, mitigation and response: Improve equipment for snow removal and improve the placement of equipment in strategic equipment, improve response time for street safety, and improve public education on driving techniques for the community.	Public Works – Streets and Drainage	$0	Self-funded	Low	12 Months	New in 2020.
SW-4	1	Severe Weather (Lightning, Hail, Extreme Temps, Wind, Winter Storms	**Critical facilities evaluation.** Conduct non-technical evaluation process for critical facilities to determine relative severe weather vulnerability and gather information for subsequent refinements of this mitigation plan.	Land Use OEM	$0	Self-Funded; Federal and State grants;	High	12 Months	Continue-Not completed. Action added in 2014.
SW-5	1,2	Severe Weather (Lightning, Hail, Extreme Temps, Wind,	**Critical facilities identification.** Utilize existing critical facility data records in the city's Geographic Information System to target structures in need of updating.	GIS Land Use	$50,000	Self-funded	High	12 Months	In progress Critical facilities identified and updated in 2020 Mitigation Plan including

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
		Winter Storms)							alignment with FEMA Lifelines framework. Action added in 2014.
SW-6	1	Severe Weather (Lightning, Hail, Extreme Temps, Wind, Winter Storms	**City-owned critical facilities evaluation.** Utilize existing critical facility data records in the Santa Fe City Geographic Information System to target City-owned structures in need of updating.	GIS Land Use	$50,000	Self-funded	Low	12 Months	In progress. Critical facilities identified and updated in 2020 Mitigation Plan. An initial GIS assessment of facilities at risk was completed, but site specific evaluations is needed. Action added in 2014.
SW-7	1,2,3,5	Severe Weather (Lightning, Hail, Extreme Temps, Wind, Winter Storms	**Update GIS data.** Complete structure data records in the city's Geographic Information System to allow future revisions of this plan to more easily incorporate information about property values, construction types, etc.	GIS	$50,000	Self-funded	Medium	12 Months	Completed. This was completed as part of the 2020 HMP update. Action added in 2014.
T-1	2,4,5	Tornado, Severe Weather (Lightning, Hail, Extreme Temps, Wind, Winter Storms)	**Enhance Warning systems.** Install tornado warning-capable radios/televisions in all public buildings, parks, and recreational areas to announce alerts from the Emergency Alert System and National Weather Radio.	OEM	$15,000	Self-funded Federal and State Grants Private Sector Donations	Medium	12 Months	In progress. Alert Santa Fe has been expanded and implemented to enhance warning capabilities. Action added in 2014.

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T-2	2	Tornado, Severe Weather (Lightning, Hail, Extreme Temps, Wind, Winter Storms)	**Acquire Generators for critical facilities**. Acquire and install additional emergency generators to power essential buildings to ensure continuity of operations if power is knocked out by a tornado, high winds, thunderstorm, blizzard, lightning, or hail storm.	Facilities OEM	$2,000,000	Self-funded Federal and State Grants Private Sector Donations	High	36 Months	In progress. Some sites have had preliminary assessments done but more work is needed to determine appropriate locations and associated costs. Action added in 2014.
T-3	2,4	Tornado, Severe Weather (Lightning, Hail, Extreme Temps, Wind, Winter Storms)	**Expand weather radios in public buildings.** Purchase and install NOAA radio for public buildings to broadcast tornado and severe weather warnings.	OEM Safety Office	$5,000	Self-funded Federal and State Grants Private Sector Donations	Low	6 Months	In progress. Not all public buildings have weather radios and those that do need to be inventoried. Action added in 2014.
T-4	2,4	Tornado, Severe Weather (Lightning, Hail, Extreme Temps, Wind, Winter Storms)	**Expand Storm spotters.** Increase number of National Weather Service's SKYWARN on the ground storm spotters; recruit and train additional storm spotters. SKYWARN spotters enhance the National Weather Service's storm detection capabilities by identifying and reporting potentially dangerous weather conditions.	OEM	$5,000	Self-funded Federal and State Grants Private Sector Donations	Low	24 Months	In progress. OEM has not worked to increase the number of storm spotters in the area. Action added in 2014.
W-1	1,2	Wildfire	**Implement Fuel Reduction Projects.** Reduce fuel load on forested lands to build wildfire resilient landscapes. – Expand Fuel Thinning Program	FD	$300,000	Self-funded Federal	High	24 Months	Annual Implementation. Fuel thinning has occurred at various

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
						and State Grants			locations on an annual basis. Action added in 2014.
W-2	1,2	Wildfire	**Identify and implement defensible space for critical facilities.** Identify, create and maintain defensible space around critical facilities located in high or extreme wildfire hazard areas, such as schools, fire stations, etc.	FD OEM	$600,000	Self-funded Federal and State Grants	High	18 Months	Continue-Not Completed. Action added in 2014.
W-3*	2,4,5	Wildfire	**Enhance public education on defensible space.** Make educational materials available through the Land Use Department to inform citizens about Best Management Practices (BMPs) for defensible Space	FD Land Use	$30,000	Self-funded Federal and State Grants	High	60 Months	Continue- Not Completed Action added in 2014.
W-*	1,2	Wildfire	**Develop additional water sources for fire suppression.** Develop dependable sources of water for fire suppression in all residential areas of the City.	Water Division	$8,000,000	Self-funded Federal and State Grants	High	96 Months	In progress. Ongoing priority for pipeline replacement and construction standards improvements.
W-5	2,4,5	Wildfire	**Expand delivery of "Ready, Set, Go!" program.**	FD	$125,000	Self-funded Federal and State Grants	High	12 Months	Annual Implementation. FD continues to distribute Ready, Set, Go! (RSG) material to neighborhoods, printing about 200 booklets every quarter. RSG is an integral part of our mitigation program

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
									and education and outreach. Action added in 2014.
W-6*	2,3	Wildfire	**Implementation of WUI ordinance.** Ensure compliance with the recently adopted wildland-urban interface ordinance by hiring additional staff to do on-site inspections and enforcement.	FD	$0	Self-funded Federal and State Grants	Medium	Deferred	Continue- Not Completed. This action requires additional staff or direction on accomplishing this task. Capacity to accomplish this action is needed. Action added in 2014.
W-7	2,4	Wildfire	**WUI public education and awareness.** Educate the public on Wildland-Urban Interface (WUI) best practices through demonstration site and educational brochures.	FD	$60,000	Self-funded Federal and State Grants	Low	12 Months	Annual Implementation. Education and Outreach plays a critical role in the FD efforts to reach communities and make individual connections which further our wildfire mitigation goals. Action added in 2014.
W-8	2,4,5	Wildfire	**Evacuation routes awareness and education**. Educate the public on evacuation routes and evacuation procedures. Build upon existing evacuation routes.	FD OEM	$0	Self-funded Federal and State Grants	Low	18 months	Continue – not completed. OEM, Fire, and GIS need to assess one way in/out communities to determine

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
									appropriate education strategies. Action added in 2014.
W-9*	2,4,5	Wildfire	**Firewise**. Create Firewise Communities in high risk subdivisions	FD Neighborhoods	$60,000	Self-funded Federal and State Grants	Low	24 Months	In progress. The Monte Sereno neighborhood became a Firewise Community in 2014 and have continued to be renewed every year. The Fire Department continues to support Monte Sereno in their mitigation efforts with staff time to attend meetings, provide funding opportunities, and provide green waste pickups. Action added in 2014.
W-10	4,5	Wildfire	**Coalition for wildfire mitigation.** Establish a Fire Hazard Mitigation Coalition.	OEM	$0	Self-funded	Low	12 Months	Annual Implementation. Action added in 2014.
W-11	1,2	Wildfire	**Implement prescribed burns to reduce fuel loads.** Coordinate prescribed burning and regular	Water Division	$350,000	Self-funded; USDA –	High	60 Months	In progress. Implementing FY 2020-24 City of

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
			vegetation thinning on public lands near wildland urban interface with City of Santa Fe Fire Department. Work with defensible space on private properties.			Forest Service			SF/SF National Forest Collection Agreement beginning in FY2020 will be for a total of $480,000 ($240K City/$240K USFS).
W-12*	1,2,3	Wildfire	**Coordinate the defensible space planning with Santa Fe Pojoaque Soil and Water Conservation District to avoid gaps.**	SFPSWCD	Low cost-staff time	Self-funded, SFPSWCD	Medium	60 Months	New in 2020
W-13	2,3	Wildfire	**Wildfire Hazard Assessments.** Assessing wildfire hazards on private property to reduce the risk of wildfire to those properties. Rapid assessments-curbside assessments with no interaction. In-depth assessments – one-on-one assessments held with the property owner to discuss hazards and provide information on mitigation programs	FD	$60,000	Self-funded Federal and State Grants	High	12 Months	New in 2020.. Approximately 2400 assessments completed since 2013. About 30% are in-depth assessments. This is a critical part of our mitigation program as it provides the initial contact in most cases to build relationships in the community to facilitate mitigation actions.
W-14	2,3,4	Wildfire	**Wildfire Mitigation Agreement.** Labor-share agreement between private property owners and the Fire Department's Wildland Division to implement defensible space projects. The Fire Department cuts	FD	$60,000	Self-funded Federal and State grants	High	12 Months	New in 2020.. This project relies on the Wildfire Hazard Agreements to generate

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			the trees and the property owner removes the cut material off-site. Property owner agrees to maintain the property for 10 years. Implemented projects benefit the property and adjacent properties with reduced wildfire risk.						program awareness and agreement services and will average about 12 properties a year.
W-15	2,3,4,5	Wildfire	**Green Waste Pick-up.** Once a month during the first full week of every month between October and May residents in the wildland-urban interface can pile green waste on the street side for pick-up. Only tree branches and yard clippings removed to reduce wildfire risk are accepted.	FD	30,000	Self-funded Federal and State Grants	Medium	12 Months	New in 2020. Implemented in October-May annually, this program has essentially erased the need to use the department's chipper. The department's grapple truck is more efficient and effective. Approximately 100 tons a year is removed with this program.
HC-1	4,5	Human-Caused Hazards	**Hazardous materials public education and awareness.** Seek opportunities to inform individuals and business owners regarding recommendations for how to prepare for hazardous material releases. The recommendations will advise taking some of the same actions to prepare for	OEM	$0	Self-funded Federal and State Grants Private Sector Donations	High	12 Months	Annual Implementation. Ready Santa Fe iOS and Google Play Application; National Preparedness Month Annual

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
			earthquakes, floods, and fires, i.e., store a multi-day supply of food and water, make sure flashlights, portable radios, and spare batteries are on hand; and identify out-of-town contacts and a place to reunite if separated from family members. All residents can be better prepared by becoming more aware of surroundings and reporting suspicious activity to local officials.						Campaigns; National Wildfire Preparedness Day; General Social Media.
HC-2	1,2,3	Human-Caused Hazards	**Harden critical facilities**. Assess need to and methods to harden critical facilities against the effects of human-made hazards, e.g., the accidental or intentional release of chemical, biological, or radioactive material; the accidental or intentional detonation of explosives; or acts of random violence or terrorism.	OEM	$0	Self-funded Federal and State Grants	High	24 Months	In progress. Critical Infrastructure Survey; DHS Active Shooter Training.
HC-3	2	Human-Caused Hazards	**Review City EOP**. Ensure the Emergency Operations Plan meets or exceeds current state and federal hazardous materials emergency planning requirements.	OEM SFPD	$0	Self-funded Federal and State Grants Private Sector Donations	Medium	12 Months	In progress. The Emergency Operations Plan is under revision.

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
HC-4	2,4,5	Human-Caused Hazards	**Active shooter public education**. Educate the public on safety plans for a mass shooting and/or terrorist attack. "Harden" locations with armed security.	OEM SFPD	Staff Time	Dept. Budget	Low	12 Months	In progress. SFPD has been providing training to the public on Active Shooter Response and is not a new initiative. We conduct the training as a community outreach program and absorb the cost within our budget to pay for the instructor's time to put on the class. Any initiative by City Departments to include the use of armed or unarmed security personnel would be within the Department's respective budget.
HC-5	2,4	Human-Caused Hazards	**City-wide emergency communication systems.** Provide city-wide emergency communication systems that are not dependent on local telephone and electrical services.	OEM PD RECC	$500,000	Self-funded Federal and State Grants Private Sector Donations	Medium	24 Months	Action added in 2014.

ID	Related Goal(s)	Hazard(s) Mitigated	Title/Description/Background/ Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
HC-6	1,2,3	Human-Caused Hazards	**Coordination with hazardous materials facility owners and operators**. Work with facility owners and operators identified in Section One of this plan as having the greatest potential impact (based on population in the immediate vicinity) to ensure: Facilities are in compliance with all relevant local, state and federal requirements; Neighboring property owners understand the potential extent of the risk; and Alert and warning systems are appropriate to the situation. Pursue the installation of warning systems around hazardous material facilities if it is determined that existing warning systems are inadequate for the purposes of alerting neighboring property owners.	OEM	$125,000	Self-funded Federal and State Grants Private Sector Donations	Medium	12 Months	Continue-Not completed. No action has been made during the previous planning period. Action added in 2014.

5.5.1 Additional Actions Considered

Several additional mitigation actions were proposed at HMPT meeting 3 in 2020. These did not move forward as an action in the updated mitigation action plan for various reasons which may include duplication with an already existing action or ongoing program; some of these were suggested by outside stakeholders but a lead department within the City was not identified. These are shown in Table 5-3. These may be considered for formal implementation in future planning efforts.

Table 5-3 Additional Mitigation Actions Identified and Considered in 2020 Mitigation Strategy

Hazard(s)	Proposed Mitigation Action
Dam Incident	Coordinate with dam owners to make sure inundation mapping is correct and current.
Dam Incident	Enhance monitoring and coordination of dams to reduce catastrophic impacts. Improve public warning capability below high hazard dams.
Drought	Low-flow toilet rebate program: Mailer rebate with Lowe's, Home Depot, or other local supports to have homeowners convert to low-flow toilets. Could also include low-flow sprinklers, shower heads, and faucet aerators.
Drought	Herd management: Reduction of herd numbers by Department of Agriculture or Game & Fish.
Flood	NFIP/insurance outreach to those in the floodplain (water bill inserts/mailers, door-to-door)
Flood	Install backup power sources that will keep critical infrastructure and critical facilities operational during prolonged power outages.
Flood	Install remote sensing water flow in drainage next to Sam's, below mall, and below Walmart.
Flood and Dam Incident	Develop a flood warning/flow rate monitoring capability. Include cameras at key streams gages for confirmation; overflow sensors for spillways.
Severe Weather	Work with NWS/NOAA on Storm Watcher program and see if there are gaps in weather monitoring with weather stations throughout the city. Trainings for citizens. Purchase weather stations to fill any gaps in Santa Fe.
Tornado	Identify tornado shelter options for all public school sites.
Wildfire	Reduce hazard of vegetation fuels on both public and private lands with City Fire, Santa Fe County fire, State Forestry, and USFS.
Multi-Hazard	Develop education programs for schools to raise awareness of proactive approaches.
Human-Caused	Cyber security threat assessment to evaluate the ability to recover from a large-scale cyber terrorist attack on city infrastructure.
Human-Caused	Communications redundancy for police and fire departments because an accident within the 911 center would cripple the city.
Human-Caused	To mitigate a cyber-attack on city infrastructure, have backup radio towers, security firewalls, and active monitoring.

6.0 PLAN ADOPTION

Requirement §201.6(c)(5): [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 the City of Santa Fe, 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, in accordance with the requirements of DMA 2000. Following FEMA's initial approval, the City of Santa Fe will re-adopt this Mitigation Plan by passing a resolution. A copy of the resolution is included in Appendix C and will be submitted as documentation to FEMA Region VI through the New Mexico Department of Homeland Security and Emergency Management.

7.0 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 mitigation planning. This is Planning Step 10 of the 10-step planning 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

Once adopted, the plan faces the truest test of its worth: implementation. While this plan contains many worthwhile actions, the City will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned the actions in the planning process and funding availability. Low or no-cost actions most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action (see Section 5 for mitigation actions), and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits of each project to the Santa Fe community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the benefits to each program and the City of Santa Fe community and its stakeholders. This effort is achieved through the routine actions of monitoring meeting agendas for hazard mitigation related initiatives, coordinating on the topic at meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the City will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

7.1.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance

With adoption of this plan, the City will be responsible for the plan implementation and maintenance. Led by the Office of Emergency Management (OEM), the HMPT/EMCG will reconvene for plan implementation and maintenance. This HMPT will be the same committee (in form and function, if not actual individuals) that developed this MP and will also be responsible for the next formal update to the plan in five years. The HMPT will:

- 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;
- Ensure hazard mitigation remains a consideration for community decision makers;
- Maintain a vigilant 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 Santa Fe City Council; and
- Inform and solicit input from the public.

The HMPT will not have any powers over City staff; it will be purely an advisory body. The primary duty is to see the plan successfully carried out and to report to the City Council Members and the public on the status of plan implementation and mitigation opportunities. 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 City website (and others as appropriate).

7.2 Maintenance, Monitoring and Evaluation

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized.

7.2.1 Maintenance and Monitoring Schedule

The City of Santa Fe OEM is responsible for initiating plan reviews and consulting with the heads of participating departments. In order to monitor progress and update the mitigation strategies identified in the action plan, City of Santa Fe OEM and the standing HMPT will conduct an annual review of this plan and/or following a hazard event. An annual mitigation action progress report will be prepared by the HMPT and kept on file to assist with for future updates. The annual review will be conducted by re-convening the HMPT in November of each year. At a minimum, the meeting will include the review of the mitigation actions ranked high and medium priority.

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 unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. The City will inquire with NMDHSEM and FEMA for funds to assist with the update. It is recommended to begin seeking funds in 2024 as most applicable grants have multiple years to expend the funds. Funding sources may include the Emergency Management Performance Grants, Pre- Disaster Mitigation, Hazard Mitigation Grant Program (if a presidential disaster has been declared), and Flood Mitigation Assistance grant funds. The next plan update should be completed and reapproved by NMDHSEM and FEMA Region VI within five years of the FEMA final approval date. The planning process to prepare the update should begin no later than 15 months prior to that date. If grant funding is needed to complete the update OEM will need to seek funding two years prior to this plan's expiration.

7.2.2 Maintenance Evaluation Process

The planning team will continually observe the incorporation process, evaluation method, updating method, continued public participation, and completion of the action/projects to assure that the planning team and the plan itself are performing as anticipated. By monitoring these processes, the planning team will then be able to evaluate them at the time of the plan update, determining if any changes are needed.

The Mitigation Plan update every five years provides an opportunity to determine whether there have been any significant changes in the City that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, the increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Mitigation Plan.

The plan review provides city officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses that were avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned.

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of new or altered hazards, and
- Increased vulnerability as a result of new development.

Updates to this plan will:

- Consider changes in vulnerability due to action 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;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to infrastructure inventories; and
- Incorporate new action recommendations or changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the City will adhere to the following process:

- A representative from the responsible office identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the department lead on action status and provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the lead will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.

Changes will be made to the plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as the HMPT deems appropriate and necessary, and as approved by the City of Santa Fe City Council. In keeping with the five-year update process, the HMPT will convene public meetings to solicit public input on the plan and its routine maintenance and the final product will be adopted by the governing council.

7.2.3 Disaster Proclamation or Declaration

Following a disaster proclamation or declaration, the Mitigation Plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of OEM to reconvene the Hazard Mitigation Planning Committee and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

7.2.4 Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the mitigation plan recommendations and their underlying principles into other City plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. This plan should also be cross-referenced when related planning mechanisms are updated. As previously stated above, mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. As described in this plan's capability assessment, the City already implements policies and programs to reduce losses to life and property from hazards.

The 2014 HMP was incorporated into other City planning mechanisms, to include:

- The City's Comprehensive Emergency Management Plan (CEMP) lists the HMP as a related plan.
- SFOEM's Strategic Plan (which is part of the CEMP) lists five strategic goals, the first of which is "Develop a comprehensive planning strategy encompassing the threats and hazards of the City of Santa Fe for prevention, protection, mitigation, response, and recovery." The plan also lists maintaining an updated mitigation plan as a priority, and states "a community that is aware of the hazards they face and the steps they can take to prepare for emergencies is the cornerstone of effective emergency management."
- The Sustainable Santa Fe 25-Year Plan also lists the HMP as a related plan, although it does not go into details about how the HMP was incorporated into that plan.

This updated plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include (but not limited to) the following:

- City Comprehensive Plan
- City Land Development Code
- City Emergency Operations Plan
- Community Wildfire Protection Plan
- Transportation Master Plan
- Sustainable Santa Fe 25-Year Plan
- Capital improvement plans and budgets
- Recovery planning efforts
- Watershed planning efforts
- Wildfire planning efforts on adjacent public lands
- Master planning efforts
- Greenway or river corridor planning efforts
- Other plans, regulations, and practices with a mitigation aspect

HMPT members involved in the updates to the planning mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, programs, etc., as appropriate. As an action step to ensure integration with other planning mechanisms the City Office of Emergency

Management Director or designee will discuss this topic at the annual meeting of the HMPT described in subsection 7.2.1. The HMPT will discuss where there are opportunities to incorporate the plan into other planning mechanisms and who would be responsible for leveraging those opportunities. As described in Section 7.1 Implementation, incorporation into existing planning mechanisms will be done through the process of:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes;
- Ensuring that the related planning process cross-references the mitigation plan, where appropriate, and
- Monitoring community budget meetings for other community program opportunities.

Examples of opportunities to cross reference the mitigation plan in other planning efforts.

- Opportunity to cross Reference the Mitigation Plan into updates of the City's Comprehensive Plan or Capital Improvement Plan.
- Cross reference the MP in the City's Land Use Code when it is updated.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through these other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this mitigation plan.

7.2.5 Continued Public Involvement

Activities related to public involvement during the 2020 update are documented in Chapter 3 and Appendix B.

Continued public involvement is imperative to the overall success of the plan's implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, press releases to local media, and through public hearings. This includes maintaining a digital version of the plan on the City OEM website for public review. In addition, the Story Map created during the 2020 update will be available on the City's website to showcase hazard and risk assessment information and the mitigation action plan. Information on who to contact within the OEM will be posted with the plan. The City of Santa Fe OEM will maintain a file of comments received for reference during the next five-year update. Any revisions to the plan that may occur as a result of a disaster will also be made public and posted on the city website.

The next five-year update process also provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. When the HMPT 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. In reconvening, the HMPT plans to identify a public outreach subcommittee, which will be responsible for coordinating the activities necessary to involve the greater public. Public notice will be posted, and public participation will be invited, at a minimum, through available website postings and press releases to the local media outlets, primarily newspapers. As

part of this effort, at least one public meeting will be held, and public comments will be solicited on the plan update draft.

APPENDIX A: MITIGATION PLANNING TEAM

APPENDIX A: HMPT MEMBERS

Name	Department	Division	Title	Meetings[1] Attended
Kyle Mason	Office of Emergency Management	--	Emergency Management Director	Kick-off; Mtg #2; Mtg#3
David Silver	Office of Emergency Management	--	Emergency Manager (former)	Kick-off; Mtg #2
Noah Berke	Land Use	Current Planning	Planning Manager	Kick-off; Mtg #2
Melissa McDonald	Public Works	Engineering – River, Watershed and Trails Section	River & Watershed Manager	Kick-off; Mtg #3
Javier Martinez	Public Works	Streets & Drainage Maintenance	PE Division Director	Kick-off
Regina Wheeler	Public Works	--	Public Works Director	Mtg #2
Alan Hook	Public Utility	Water	Water Resources Coordinator	Kick-off; Mtg #3
Leroy Griego	Public Utilities	Environmental Services	Commercial Supervisor	Mtg #2
Neal Denton	Public Utilities	Environmental Services	Sustainability Planner	
Shannon Jones	Public Utilities	Wastewater	Waste Water Director	
Eric Lucero	Public Utilities	Environmental Service	Operations Manager	
Gary Varela	Parks and Recreation	Parks	Parks Superintendent	Mtg #2
Chris Ortiz	Parks and Recreation	Parks and Watershed	Parks Superintendent	
Sheila Chavez	Parks and Recreation	Recreation	Administrative Manager	Mtg #2
Kristine Mihelcic	Constituent Services	Constituent and Council Services	Director	Mtg #2
Michelle Gurule	Constituent Services	--	Administrative Services	
Richard DeMella	Community Services	Youth and Family Division	Division Director	Kick-off
Edith Martinez	Community Services	Youth and Family Service	Office Manager	
Celeste Garcia	Human Resources	--	HR Associate	
Marcos Martinez	City Attorney's Office	--	Assistant Attorney	Kick-off; Mtg #2
Erin McSherry	City Attorney's Office	--	City Attorney	
Jessica Sandoval	Economic Development		Project Specialist	
Carolynn Roibal	Finance		Administration Manager	Kick-off; Mtg #2; mtg #3

[1] Those that are not listed as attending a meeting participated in the planning process in other ways such as emails, phone calls and face-to-face meetings with the City Emergency Manager/Project Manager and consultants.

Name	Department	Division	Title	Meetings[1] Attended
Debra Harris-Garmedina	Finance	Accounting	Controller	
Matt Harding	Tourism	Community Convention Center	Lead Specialist	Kick-off; Mtg #2; Mtg #3
Melanie Moore	Tourism	Community Convention Center	Operations Manager	
Phillip Pacheco	ITT	GIS	GIS Project Coordinator	
Leonard Padilla	ITT	GIS	GIS Project Coordinator	
Larry Worstell	ITT	Infrastructure	Infrastructure Manager	Kick-off; Mtg #2;
Jan Snyder	Fire	Administration	Assistant Fire Chief	
Greg Gallegos	Fire	Wildland Fire Preparedness	Wildland Superintendent	Kick-off
Porfirio Chavarria	Fire	Wildfire Preparedness	WUI Specialist	Kick-off
David Webb	Police		Lieutenant	Kick-off
Anthony Tapia	Police		Captain	Mtg #2; Mtg#3
Ben Valdez	Police	Investigations	Operations Deputy Chief	
Robert Vasquez	Police	Operations	Administration Deputy Chief of Police	
Stakeholders				
Martin Vigil	Santa Fe County	Office of Emergency Management	Emergency Manager	Mtg #3
Alicia Storer	Santa Fe County	Office of Emergency Management	Special Projects Administrator	Kick-off; Mtg #2; Mtg #3
Ignacio Dominguez	Santa Fe County	Office of Emergency Management	Emergency Management Coordinator	Kick-off; Mtg #2; Mtg #3
Cody Ulrich	Los Alamos County	Office of Emergency Management	Emergency Management Specialist	Kick-off
Beverley Simpson	Los Alamos County	Office of Emergency Management	Emergency Manager	Kick-off
Sigmund Silber	Santa Fe Pojoaque Soil and Water Conservation District		Elected Supervisor	Kick-off; Mtg #2; Mtg #3
Leo Maestas	San Miguel County/CLV	Office of Emergency Management	Emergency Manager	Kick-off
Marcella Benton	State of New Mexico	Department of Homeland Security and Emergency Management		Kick-off
Sara Gerlitz	State of New Mexico	Department of Homeland Security and Emergency Management	Mitigation Specialist	Kick-off

Name	Department	Division	Title	Meetings[1] Attended
Evelyn D. Ward	Santa Fe Amateur Radio Emergency Service		Emergency Coordinator	Mtg #2; Mtg #3
Kristin Baja	Urban Sustainability Directors Network	Climate Resilience	Programs Director	
Wood Environment and Infrastructure Solutions, Inc. Planning Team				
Jeff Brislawn	Wood		Project Manager	
Scott Field	Wood		Senior Planner	
Amy Carr	Wood		Hazard Mitigation Planner	

APPENDIX B: PLANNING PROCESS DOCUMENTATION

City of Santa Fe Hazard Mitigation Plan Update Kickoff Meeting Agenda

Date: Tuesday, May 7, 2019
9:30-11:30 am MDT

Meeting at: Emergency Operations Center
Mid-town Campus
1600 St Michaels Dr
Santa Fe, NM 87505

Project: City of Santa Fe Hazard Mitigation Plan Update

Subject/Purpose

The purpose of the meeting is to initiate the process for updating the City's Hazard Mitigation Plan (HMP), introduce the Disaster Mitigation Act of 2000, and summarize the hazard mitigation planning process. The HMP is intended to identify hazards, assets at risk, and ways to reduce impacts through long-term sustainable mitigation projects.

Attendees: Santa Fe Emergency Management Coordinating Group and Stakeholders

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1. Introductions
2. Mitigation, Mitigation Planning, and the Disaster Mitigation Act Requirements
3. The Role of the Hazard Mitigation Planning Team (HMPT)
4. Overview of the 2014 City of Santa Fe Hazard Mitigation Plan
5. Objectives and Schedule for HMP Update
6. Review of Identified Hazards
7. Coordinating with Other Agencies, Related Planning Efforts, and Recent Studies
8. Planning for Public Involvement
9. Initial Information Needs
10. Questions and Answers

wood.

SIGN-IN SHEET
CITY OF SANTA FE HAZARD MITIGATION PLAN UPDATE
Kickoff Meeting
Tuesday, May 7, 2019 9:30 AM – 11:30 am
Midtown Campus - Emergency Operations Center
1600 St Michaels Dr. Santa Fe, NM 87505

Name	Agency/Dept	Title	Phone	E-mail
Jeff Brislawn	Wood	Project Mgr	303-XXX-5506	Jeff.brislawn@woodplc.com
Javier Martine	City of Santa Fe	Streets Director	955-2402	jamartinez2@santafenm.gov
Alicia Storer	Santa Fe County OEM	EM Specialist	505-235-17576	agstorer@santafecountynm.gov
Ignacio Dominguez	Santa Fe County OEM	EM Coordinator	505-992-3074	Idominguez@santafecounty
Marcella Benton	DHSEM		505-476-9690	marcella.benton@gmail.com
Sara Gerlitz	DHSEM	Mitigation Spec.	505 660 3808	Sara.gerlitz@state.nm.us
Richard DeMella	COMSEN.	Youth Fam Div Dir	955-6573	rmdemella@SFNM.GOV
Matt Harding	convention center	Lead Specialist	801-376-6295	mdharding@sfnm.gov
GREGG GALLEGOS	FIRE	WILDLAND SUPT.	505-955-3901	ggallegos@ "
DAVID WEBB	SFPD	LIEUTENANT	505-955-5357	dweb66@Santafenm.gov
Sigmund Silber	SFPSWCD	Elected Supervisor	505 473-7666	Sigmund Silber e g.com
Melissa McDonald	Public Works	River + Watershed Coordinator	955-6840	MAMcDonald@santafenm.gov
LARRY WORSTELL	IT	Infrastructure Mgr	955-5580	LFWORSTELL@santafe.gov
Porfirio Chavarria	SFFD	WUI Specialist	955.3119	pchavarria@santafenm.gov
Cody Ulrich	LAC OEM	EM Spec.	5056628290	cody.ulrich@lacnm.us

SIGN-IN SHEET
CITY OF SANTA FE HAZARD MITIGATION PLAN UPDATE
Kickoff Meeting
Tuesday, May 7, 2019 9:30 AM – 11:30 am
Midtown Campus - Emergency Operations Center
1600 St Michaels Dr. Santa Fe, NM 87505

Name	Agency/Dept	Title	Phone	E-mail
Beverley Simpson	Los Alamos	EM	662-8283	beverley.simpsm@lacnm.us
Leo Maestas	SMC/CLV OEM	Emergency Manager	429-6805	lmaestas@co.sanmiguel.nm.us
Carolyn Roibal	Finance	Admin Mgr	955-6531	croibal@santafenm.gov
Noah Berke	Land Use	Planning Manager	955-6647	NCBerke@santafenm.gov
MARCOS MARTINEZ	Legal	Attorney	955-6502	mdmartinez@santafenm.gov
Richard DeMella	CSF	DIV DIR.	955-6573	rmdemella@santafenm.gov
Alan Hook	CSF/WATER DIV	WATER RESOURCES	955-4205	aghook@santafenm.org
Sigmund Silber	Santa Fe Reservoir SWCD	Elected Supervisor	473-7006	sigmundsilber@q.com
GREG GALLEGOS	SF FIRE	WILDLAND DEPT.	955-3901	ggallegos@santafenm.gov
Phillip Pacheco	City of S.F. GIS	GIS Project Coordinator	955-4681	pmpacheco1@santafenm.gov
Leonard Padilla	City of Santa Fe GIS	GIS Project Coordinator	955-6616	lppadilla@santafenm.gov
David Silver	SFOEM	Emergency Mgr	955-6537	dmsilver@santafenm.gov
Kyle Mason	SFOEM	Em. Specialist	955-6704	kcmason@santafenm.gov

City of Santa Fe
Hazard Mitigation Plan 2019 Update

Kick-Off Meeting Summary
9:30 am-11:30 am
May 7, 2019

Emergency Operations Center
Mid-town Campus
1600 St Michaels Dr.
Santa Fe, NM 87505

Introductions and Opening Remarks

Kyle Mason with the City Office of Emergency Management began the meeting with welcoming remarks and introduced Jeff Brislawn, project manager at Wood Environment & Infrastructure Solutions, Inc. (Wood), the consulting firm hired to facilitate the planning process and develop the updated plan. Jeff asked everyone around the room to introduce themselves. Twenty seven (27) persons representing a mix of city departments and stakeholders were present and documented on a sign-in sheet. City department representatives included Planning, Office of Emergency Management, Community Services, Public Utilities, Public Works, Fire, GIS, Legal, Finance, and the Convention Center.

Stakeholders and other interested parties present included:

- New Mexico Department of Homeland Security and Emergency Management
- Santa Fe County Fire Department – Emergency Management
- Los Alamos County Emergency Management
- San Miguel County Emergency Management
- Santa Fe Pojoaque Soil and Water Conservation District

Jeff asked how many had participated in a local hazard mitigation planning process and a few raised their hands. Jeff discussed the agenda items; the key discussion is summarized below and additional details are within the meeting PowerPoint presentation.

Mitigation Planning and the Disaster Mitigation Act Requirements

Jeff presented PowerPoint slides that outlined the planning process and the Disaster Mitigation Act (DMA) of 2000 Requirements. Jeff also mentioned the increase in the number of disaster incidents and the corresponding increase in recovery costs in New Mexico and nationwide in recent years. The upside of these disasters is that more funding is becoming available for mitigation projects. The City of Santa Fe Hazard Mitigation Plan (HMP) will be updated in accordance with the DMA 2000. The planning process involves a 4 Phase approach with 9 steps per FEMA guidance updated in 2013.

An important aspect of the plan update is that it's needed to be eligible for FEMA mitigation grant funding. Jeff emphasized the importance and benefits of hazard mitigation planning and the types of mitigation projects that can be funded if eligibility requirements are met. In New Mexico, these projects have included wildfire mitigation/fuels treatment, flood reduction/drainage improvements, generators and warning systems. He also noted 'climate resilient' activities including groundwater recharge for drought mitigation and green infrastructure for stormwater mitigation.

Role of the Hazard Mitigation Planning Team (HMPT)

The City and interested stakeholders will comprise the Hazard Mitigation Planning Team (HMPT) to provide input into the plan update. The HMPT is largely comprised of the City's Emergency Management Coordinating Group (EMCG). Jeff emphasized that local input will shape the plan to reflect the City's current priorities. Active participation is required for full approval of the plan from FEMA. Participation includes the following:

- Attend meetings and participate in the planning process
- Provide requested information to update the plan
- Review drafts and provide comments
- Identify mitigation projects, provide status on existing actions in the 2014 HMP
- Assist with and participate in the public input process
- Coordinate formal adoption

Stakeholders include other local, state and federal agencies with a stake in hazard mitigation in the City, and may include academic institutions, adjacent jurisdictions, and local business and industry. Stakeholders have various options and levels of participation including:

- Attend HMPT meetings or stay in loop via email list
- Provide data/information
- Partner on mitigation efforts
- Review draft plan

Overview of the 2014 City of Santa Fe Hazard Mitigation Plan

Jeff presented slides with an overview of the 2014 plan, including the overarching goals and a sample of the high priority mitigation actions. Jeff explained that the mitigation strategy contained approximately 60 hazard mitigation actions, which is a lot for a single jurisdictional plan. The update process will be an opportunity to revisit the actions and refine them to make it a realistic and achievable action plan.

Objectives and Schedule for the HIRA Update

The HMP update will be based on existing documents and studies, with the 2014 HMP and other related municipal plans providing the baseline for identified hazards and the groundwork for policies and actions for hazard mitigation.

Aspects of the planning process include:

- Engage the City participants to create a plan that reflects current priorities, development trends, hazards and risks
- Raise awareness and engage the public
- Update hazards and baseline development data to reflect current conditions
- Update the mitigation strategy

The HMP will be updated over the next six months, with at least two more meetings of the Hazard Mitigation Planning Team. Wood will be updating the Hazard Identification and Risk Assessment (HIRA) in the next couple of months, with input from the HMPT. The next meeting will cover the highlights of the risk assessment update and will likely occur in July, with a specific date TBD. Three drafts of the HMP will be created: the first for review by HMPT members, a second for public review and review by NM DHSEM, and a third for FEMA review. The first draft for HMPT review is targeted for October 2019, and the public review and DHSEM review draft is targeted for November. The final plan for FEMA review is targeted for December. The City will need to re-adopt the plan once it has been initially approved by FEMA. Due to the length of FEMA reviews that could be May or June of 2020.

Review of Identified Hazards

Based on hazards from the 2014 City HMP, the list of potential hazards was reviewed. Jeff showed a slide that listed the hazards in the 2014 HMP. Climate change was also included in the 2014 plan and noted with the hazards that could be affected (probability and intensity), where applicable. Jeff also showed a slide with the results of a hazard identification and ranking exercise completed by the EMCG in October 2018. The group discussed the 2014 HMP hazards, 2018 hazard ranking and potential additional hazards and arrived at the following list to be addressed in the HMP update:

Natural Hazards

- Dam Failure (new to plan)
- Drought
- Flood
- Severe Weather
  - Extreme temperatures
  - Hail
  - Lightning
  - Thunderstorms
  - Wind
  - Winter Storms
- Tornado
- Wildfire/Wildland Urban Interface

Possible natural hazards to at least mention but maybe not profile:

- Land subsidence (some areas in county, will look to see if areas in city)
- Debris flow (potential for post-fire debris flows affecting watershed/water supply outside city limits)
- Earthquake (low probability)
- Expansive soil (some areas in county, will look to see if areas in city)
- Volcano (low probability and few mitigation options)

Human Caused Hazards

- Active Shooter
- CBRNE
- Cyber Attack
- Hazardous Materials Release
- Pipeline Explosion
- Public Health Emergency
- Transportation Accident
- Utility Disruption

Jeff noted that the significance level of hazards will vary and instead of a numeric ranking the hazards will be grouped into High, Medium and Low categories. The group noted that the compounding and cascading nature of hazards should be noted in the plan where applicable (e.g. drought leads to wildfire leading to flood and debris flows). Arroyo erosion is an issue which will be included in the flood hazard profile. Dam failure was a noted omission from the 2014 plan and is one of the high significance hazards noted in the Santa Fe County Hazard Mitigation Plan. Space weather was profiled in the 2014 plan but will not be a separate hazard in the 2019 update; since the impacts are largely on utility disruption it will be noted within that hazard's profile.

Human caused hazards are optional in local hazard mitigation plans and will not be reviewed by FEMA. City OEM wants them included in the HMP to provide a basis for all-hazards planning.

Jeff will prepare a revised hazard identification list to share via email and finalize with input from the HMPT after the meeting. Jeff noted that every hazard profiled must have at least two mitigation actions identified per NM DHSEM and FEMA Region VI guidance.

Jeff Brislawn asked the group to review the list of hazards and comment on how they could be enhanced or updated with:

- Historic incidents
- Incident logs
- Public perception
- Scientific studies
- Other plans and reports (e.g., flood and drainage studies, CWPPs, Internet databases)
- Recent disasters

Suggested resources from the HMPT included:

- Cooperative project with state engineers from New Mexico and Colorado related to dam safety and inundation areas.
- USGS has done some debris flow mapping/modeling in the watershed.
- The Nature Conservancy has done a fireshed risk assessment
- An arroyo hazard assessment study has been done

Coordinating with Related Planning Efforts

Jeff asked the group what other studies have been completed or are in process that could inform or be linked (or cross-referenced) with the HMP update. The following were suggested by the HMPT:

- The countywide CWPP is going to be updated in the next year
- City did a 'lite' CWPP update
- City stormwater plan recently updated
- Source Water Protection Plan – 2001 – is going through an update
- Fireshed strategic plan – this is about a year out
- Water conservation and drought management plan – update of plan about a year out
- Santa Fe Metropolitan Planning Organization transportation plan is ramping up

Coordinating with Other Agencies

The group discussed other agencies that should be coordinated with. Those that have a stake or interest in hazard mitigation included:

- The Nature Conservancy
- Fireshed Coalition
- Santa Fe Watershed Organization
- New Mexico State Engineer – Dam Safety
- National Weather Service
- Utility providers: PNM, NM Gas, Comcast, Century Link

Planning for Public Involvement

How to involve the public was discussed. The public can be a source of information on hazards and mitigation ideas. An ArcGIS online 'StoryMap' will be created, with options for the public to provide input via online surveys. Public meetings are scoped to be part of the effort, but Jeff recommend 'piggy backing' on other public forums where possible to ensure an audience. Suggestions included:

- Stormwater outreach to the public and business
- National public preparedness month in September
- Next Gen Water conference – June 9th

Data Collection Needs and Next steps

A "Local Hazard Mitigation Plan Data Collection Guide" handout was provided and discussed. Jeff emphasized that this guide is for City staff participating in the plan update. It contains worksheets that will help focus needed input. **These are due back to Jeff Brislawn by email June 14, 2019**. A Google Share Drive will be set up for the project to share large documents. A GIS needs list was provided to the City to assist with data collection. City OEM will provide the meeting summary, handouts, presentation and sign in sheet by email so that other HMPT members that could not attend today's meeting could get up to speed. Jeff noted that he will be in touch to followup on some of the previously identified data sources and plans.

Adjourn

The meeting adjourned at 11:30 am.

Summary prepared by Jeff Brislawn, Wood

Jeff.brislawn@woodplc.com
303-209-3781
1942 Broadway, Suite 314
Boulder, CO 80302

Subject: Emergency Management Coordinating Group
Location: Emergency Operations Center

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Start: Tue 5/7/2019 9:00 AM
End: Tue 5/7/2019 11:00 AM
Show Time As: Tentative

Recurrence: (none)

Organizer: MASON, KYLE A.

Hello all,

The City of Santa Fe is initiating the process for updating the City's Mitigation Plan. The Emergency Management Coordinating Group (EMCG) will form the basis of our team to develop the updated plan. As a representative on this group, and or a key City department with an stake in hazard mitigation, you are being invited to participate. The planning effort will be assisted by Wood Environment & Infrastructure's professional planning services. Three planning team workshops over the next 6 months are anticipated.

The City's Mitigation Plan is being updated in accordance with the Disaster Mitigation Act of 2000 and the required 5 year update cycle. The purpose of this plan is to reduce or eliminate long-term risk to the people and property of the City from the effects of hazard events. Updating the plan will also ensure the City remains eligible for FEMA mitigation grant funding.

In addition to City government staff, we are inviting other key stakeholders to participate in the plan development process. These stakeholders are those who have significant interests in the City or that have information to support the planning process, to include other local, state, federal, or tribal agencies, as well as representatives from key business, industry, nonprofit organizations, and the public.

You are invited to the first of three planning meetings:

Workshop 1: Kickoff Meeting
Date: Thursday May 7, 2019
Time: 9:00 – 11:00 am
Location: Emergency Operations Center – Mid-town Campus, 1600 St Michaels Dr (See Attached Map)

From: MASON, KYLE A. <kamason@santafenm.gov>
Sent: Friday, May 24, 2019 8:25 AM
Subject: Hazard Mitigation Plan Kickoff Meeting Follow-Up
Attachments: Santa Fe City Data Collection Workbook.docx; Santa Fe_KickOff_Slides Wood 5-7-19.pdf; Santa Fe HMP update Kickoff Meeting Summary5-7-19.pdf

Follow Up Flag: Follow up
Due By: Monday, June 10, 2019 8:00 AM
Flag Status: Flagged

Thanks for your participation in the kickoff meeting for the update of the Hazard Mitigation Plan on May 7. Attached is a summary of the meeting and the slides that were presented by Wood. The Data Collection Guide (to be completed by City of Santa Fe Staff only) handed out at the meeting is also attached as a Word document. **The Guide is intended to help facilitate the collection of the necessary information for the plan update and needs to be returned to Jeff Brislawn by June 14th.**

There were a number of documents and studies identified in the meeting and captured in the summary that could help inform the plan. Please send any information or links to information that may be relevant to Jeff Brislawn (jeff.brislawn@woodplc.com), preferably by June 14.

Kyle Mason
Emergency Management Specialist
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704

City of Santa Fe Mitigation Plan Update
Risk and Goals Meeting Agenda

Date: Tuesday, July 30, 2019
1:00-4:00pm

Meeting at: Emergency Operations Center
Mid-town Campus
1600 St Michaels Dr
Santa Fe, NM 87505

Project: City of Santa Fe Mitigation Plan Update

Subject/Purpose

The purpose of the meeting is to discuss the highlights of the hazard identification and risk assessment update. This will form the basis for the update of the mitigation strategy as we move forward in the planning process. We will also revisit the goals of the hazard mitigation plan to see if they need to be adjusted to meet current needs.

Attendees: Santa Fe Emergency Management Coordinating Group and Stakeholders

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1. Introductions
2. Review of the Planning Process
3. Review of Identified Hazards
4. Vulnerability Assessment Overview by Hazard
5. Capabilities Assessment Update
6. Updating Goals for the Mitigation Plan
7. Update on Planning for Public Involvement
8. Schedule and Next Steps
9. Questions and Answers

wood.

SIGN-IN SHEET

CITY OF SANTA FE HAZARD MITIGATION PLAN UPDATE

Risk Assessment and Goals Meeting

Tuesday, July 30, 2019 1:00 –4:00 pm

Midtown Campus - Emergency Operations Center

1600 St Michaels Dr. Santa Fe, NM 87505

Name	Agency/Dept	Title	Phone	E-mail
Alicia Storer	SFC OEM	Special Projects Administrator	505-235-1756	agstorer@santafecountynm.gov
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David Silver	SFOEM	EM Director	505 955 6532	drsilver@santafenm.gov
[illegible]	P&R	[illegible]	[illegible]	[illegible]
Sigmund Silber	Santa Fe Pojoaque Soil and Water Cons Dist	Elected Supervisor	505 4737006	sigmund silber @ q.com
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Anthony Tapia	SFPD	CAPT.	505-955-5286	matapia@santafenm.gov
Kristin Mihalcik	Const. & Council	Director	699-5714	kmmihalcik@santafenm.gov
Gary Vorell	Parks	Superintendent	231-6164	glvorell@santafenm.gov
Ben Valdez	Santa Fe Police	Deputy Chief	505-955-5040	bpvaldez@santafenm.gov
Noah Berke	Land Use	Planner Manager	955-6647	NLBERKE

SIGN-IN SHEET

CITY OF SANTA FE HAZARD MITIGATION PLAN UPDATE

Risk Assessment and Goals Meeting

Tuesday, July 30, 2019 1:00 –4:00 pm

Midtown Campus - Emergency Operations Center

1600 St Michaels Dr. Santa Fe, NM 87505

Name	Agency/Dept	Title	Phone	E-mail
Marcos Martinez	City Attorney		955-6512	mdmartinez@
Evelyn D Ward	SFARES	Emergency Coordinator	660-2454	rendosno @msn.com
Larry Wong [illegible]	ITT	Larry	955-5580	
Regina Wheeler	Public Works	Director	505 690 4197	rawheeler@santafenm.gov

Summary of the City of Santa Fe
Mitigation Plan Update
Risk Assessment and Goals Meeting

July 30, 2019
1:00 – 4:00pm
Emergency Operations Center - Mid-town Campus
1600 St Michaels Dr
Santa Fe, NM 87505

Introductions and Opening Remarks

Jeff Brislawn of Wood, the consulting firm hired to facilitate the plan update process, began the meeting with welcoming remarks. Nineteen persons were present and documented on a sign in sheet.

Review of the Planning Process

Following introductions a PowerPoint presentation was presented by Jeff Brislawn. Jeff reviewed the planning process being followed and discussed the project status. Following the FEMA 9 step process the effort is presently in Step 5 Conduct a Risk Assessment and will transition to Step 6 Develop a Mitigation Strategy.

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 City of Santa Fe Risk Assessment & Goals Meeting PowerPoint presentation for specific details on each hazard and a handout summarizing hazard significance.

Jeff discussed the asset inventory including buildings, people, critical facilities and natural and historic resources as a baseline for measuring hazard impacts. Critical facilities have been categorized in accordance with a new FEMA Community Lifelines methodology for identifying assets important for community disaster resiliency and recovery. Regarding utilities infrastructure it was suggested to reach out to PNM to get more information on the main power lines coming into the City, and New Mexico Gas Company for gas lines. They might be able to provide information on outages, causes and impacts.

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.

Hazard or Topic	Meeting Discussion and Problem Statements
Dam Incident	• Considerable risk to the downtown area is anticipated due to the location of Nichols and McClure dams in the watershed above town. • Wood did not have inundation layers to assess specific impacts in GIS; OEM should have some mapping done in 2012 that can be provided, and Public Works could do modeling if needed. • The Nichols dam spillway ran for a couple of months this past spring due to heavy snowmelt in the watershed, but no flooding issues were noted. • In addition to risk to life and property damage it was noted that failure of Nichols or McClure would jeopardize the City's water supply
Drought	• Impacts from drought were discussed • The City had turned off irrigation to parks during the 2002 drought • There was discussion around the coincidence of drought with high wildfire activity. This typically is the case, though 2018 was a bad drought but not so bad for wildfire; It was suggested by the HMPC to juxtapose the US Drought Monitor data with large fire events in New Mexico. • The City relies on three sources of water supply - Nichols and McClure reservoirs, wells, and diversions from the San Juan/Chama water allocation (Buckman); despite this diversity past droughts have stretched those available resources. • It was noted that the City has some reclaimed/recycled water capabilities
Flood	• The overall significance should be changed from Medium to High • FEMA flood hazard mapping doesn't capture all risk from stormwater and arroyo flooding • City Land Use has mapping of all arroyos capable of carrying 200 cfs of flow or more • Land Use also noted that they have a layer of flood prone properties • Jeff discussed flood insurance policy numbers, which appear to generally be in line with the count of flood prone properties identified through GIS analysis • It was noted that many homeowners own their homes outright and thus are not required to have flood insurance as a condition of receiving a federally backed loan.

Hazard or Topic	Meeting Discussion and Problem Statements
	• The City can provide more specifics on the impacts of the July 2018 flood including City costs, maps of damage assessment areas. The SBA may have additional damage in formation. Consequences of the flood was silting of roads and culverts, power outages, and many first responders were required to respond to the incident, making them less available for other emergencies.
Severe Weather (Hail, Lightning, Wind, Winter Storms, Thunderstorms, Extreme Temperatures)	• Storms and lighting have periodically caused power loss in the downtown area • Winter storms have sometimes dumped heavy amounts of snow that can temporarily immobilize the City though typically the snow melts fast; a 2006 incident was noted • Despite a lot of flat roofs in the area there was not knowledge of roof collapses due to snow loading. It was noted the 2015 International Building Code standards have been adopted • Hail has sometimes caused issues and in recent years the amount, as opposed to the size, has caused issues. A May 2018 storm dumped about 6" of hail that caused transportation and traffic issues. • Wind damage occasionally occurs and has caused tree damages and car damage in the downtown area; in May (?) of 2019 the City suffered about $250,000 in damage to the Arts Campus
Tornado	• Recent events were discussed. • It was noted that in 2017 an event caused a small amount of damage near or in the City, in the Auga Fria area. • An event was thought to have occurred in 2018 also • It was suggested to check with the local National Weather Service
Wildfire	• Wildfire was discussed as the hazard with the greatest potential for impacts to the City and city water supply • Some public engagement has occurred to educate homeowners of the risk and the benefits of defensible space • It was noted that there are no incentives for defensible space • A representative from the Santa Fe-Pojoaque Soil and Water Conservation District noted that they could help with mitigation projects on private lands
Other natural hazards not profiled	• Landslide, subsidence, volcanoes and earthquake are noted as potential hazards

Hazard or Topic	Meeting Discussion and Problem Statements
	• HAZUS modelling done for the Santa Fe County HMP indicates potential for significant damage in the City; since probability is low the HMPC suggested noting this but not fully profiling it. • A general lack of data on landslide hazards was noted. It was suggested to reach out to State DHSEM and the Streets Department (Cerro Gordo). • Subsidence has caused a few issues; areas noted were in the Plaza area downtown and an incident at Target.
Hazardous Materials	• Incident statistics were discussed; a question was raised about what the 6 fatalities was associated with. Wood will check to see if there are any additional specifics in the database sourced.
Pipeline Explosion	• Not much data available on this; OEM has access to the non- public viewer of the National Pipeline Mapping System and will check, though they may not want specifics put in a public document • It was noted a gas line was hit by construction workings in 2011 or 2012 which resulted in an evacuation of the vicinity. • The city does have CNG facility for vehicles in the vicinity of Meow Wolf.
Utility Disruption	• Communications disruptions have been problematic; a Century Link outage for 20 hours in the spring of 2019 was noted. • It was suggested to reach out to PNM to see if they have statistics on average number and average duration of electrical outages.
Transportation Accidents	• It was noted that large accidents are the concern, as opposed to the common smaller accidents • Potential exists for bus, train, airplane mass casualty incidents
CBRNE	• Chemical, Biological, Radiological, Nuclear, Explosion • The City has many resources in place and regularly train and prepare for these incidents • Personal Protective Equipment resources and communications plans were noted as additional capabilities • No recent incidents were noted, but sometimes Police gets calls about IED incidents; Police may have Explosive Ordinance Disposal call records.

Hazard or Topic	Meeting Discussion and Problem Statements
Active Shooter	• The Police and Fire departments have done a lot of preparedness and training for these incidents • An incident at the Benny Keith High School in Albuquerque in 2018 was noted • The incidents can have longer term ramifications – the Aztec High School building in Farmington was noted as still not usable after the 2017 incident • The definition of active shooter is broad and is intended to include attacks such as vehicle and knife attacks
Cyber	• Cyber threats are increasing • Isolated ransomware attacks have occurred • A trend of attacks on 911 communications facilities was noted • Utilities (PNM) could be targets • SCADA systems that could be targeted include water treatment, wastewater treatment, city wells and the Buckman diversion facility. • A December 2018 combination ransomware and bomb threat nationwide affected 3 locations in Santa Fe and caused a strain on first responders
Pandemic Disease	• The Department of Health has done a lot of preparedness planning • The City has a higher vulnerability due to the influx of tourists from around the country and world
Capabilities	• Jeff discussed capability highlights • Opportunities for enhancement were discussed including: ○ Update of 2019 Land Use Plan is currently in draft and it could be an opportunity to cross-reference the hazard mitigation plan and acknowledge dam failure inundation ○ More cross-referencing of the hazard mitigation plan in other plans was mentioned ○ Implementation of the stormwater management plan is needed, as well as funding for projects ○ Joining the Community Rating System should be looked at as a way to make flood insurance more affordable ○ Continued use of GIS and technology for hazards awareness and warning

Plan Goals Update

The HMPC reviewed the goals and objectives from the previous plan to see if they were still relevant or needed updating, based on a handout that included the state mitigation plan goals and other related plan goals including the Santa Fe County HMP. The 2014 goals were hazard specific and the group would like to have them be broader. In general the group thought the County HMP goals #1-4 could be used, supplemented with the New Mexico HMP goal #7. The City OEM Strategic Plan goals should be reviewed as well. 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 noted that the mitigation action strategy will be revisited moving forward and will be the focus of the next HMPC meeting. Jeff said that the existing mitigation actions from the 2014 plan will need to be reviewed by the HMPC with a status indicated for each action. Jeff provided a worksheet to help facilitate the status reporting prior to the next meeting, which will also be shared by email. Jeff will work with OEM first, then the list will be provided to the rest of the group. There are 60 actions identified; the list should be reviewed and refined to those that are realistic and achievable.

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.

An ArcGIS online 'StoryMap' will be created with highlights of the updated risk assessment, with options for the public to provide input via online surveys. A public meeting will be scheduled around the next HMPC meeting date, with details forthcoming. There could be an opportunity to discuss the HMP update as part of national public preparedness month activities in September.

Plan Timeline/Next steps

The next and final HMPC planning meeting will be scheduled in September. 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 3:50pm.

CITY OF SANTA FE MITIGATION PLAN
2019 UPDATE
Updating the Mitigation Strategy

Mitigation Planning Goals, Objectives, and Actions - Definitions

Goals, objectives, and mitigation actions should be based on the information revealed in the Risk Assessment. Definitions and examples 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 and visitors
- 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 2014 City of Santa Fe Hazard Mitigation Plan are shown on the next page. The 2019 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 Wood (Jeff.brislawn@woodplc.com).

2014 City of Santa Fe Hazard Mitigation Plan

Goals & Objectives

Goal 1: Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure including the watershed due to **wildfires**.

1.1: Reduce the exposure to critical facilities in high or extreme wildfire hazard areas.

1.2: Reduce the exposure of residential structures to wildfires

1.3: Educate the public in defensible space and other preventative measures to minimize wildfire risk

Goal 2: Reduce possibility of damage and loss due to **drought**.

2.1: Educate the population on damage and loss due to drought

2.2: Continue efforts to encourage residents to use water-saving landscaping techniques.

Goal 3: Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to **flooding**.

3.1: Reduce exposure of structures and roads to flooding

3.2: Build and support local capacity to enable the public to prepare for, respond to and recover from disasters

Goal 4: Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to **severe weather**.

4.1: Develop a comprehensive approach to reducing the possibility of damage and loss of function to identified vulnerable buildings and critical facilities, due to the effects of severe weather hazards.

4.2: Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, compliance with current building codes, etc.

Goal 5: Reduce possibility of injury and death due to **severe weather**.

5.1: Increase public awareness of actions to take during all types of severe weather.

5.2: Increase participation in and number of storm watcher programs throughout City.

5.3: Identify critical facilities and buildings that are vulnerable to severe weather events.

Goal 6: Reduce possibility of severe damage, injury and death due to **high wind**.

6.1: Identify critical facilities and buildings that are vulnerable to high winds.

Goal 7: Reduce possibility of injury and death due to **extreme heat**.

7.1: Increase public awareness of actions to take during extreme heat events.

Goal 8: Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to **human-caused hazards**.

8.1: Develop a comprehensive approach to reducing the possibility of injury and loss of life for residents and occupants of existing structures and critical facilities with the highest relative vulnerability to the effects of hazardous material releases from discrete locations.

8.2: Protect the public water system and other critical facilities from contamination from hazardous materials incidents

8.3: Protect the general population and special populations from hazardous materials incidents.

8.4: Improve communications with facilities housing special populations, such as nursing homes, senior centers, and daycare centers.

8.5: Increase awareness of hazards and actions to take during an emergency.

Goal 9: Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to **space weather**.

9.1: Protect the communication systems and other critical facilities from space weather events.

9.2: Increase awareness of the impact of space weather events on the community.

Goal 10: Promote disaster-resistant development.

10.1: Encourage and facilitate the development or revision of comprehensive plans and zoning ordinances to limit development in high hazard areas and improve the ability to identify vulnerable structures.

10.2: Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.

10.3: Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.

Goal 11: Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.

11.1: Provide public education to increase awareness of hazards and opportunities for mitigation.

11.2: Promote partnerships to continue the development of a citywide approach to identifying and implementing mitigation actions.

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 and implementation opportunities. The following are provided for reference purposes.

City of Santa Fe Land Use & Urban Design Plan, 2019 Draft

Goal: Santa Fe intends to maintain a healthy, balanced natural environment.

> **Policy #1: The Santa Fe River & the Living River Initiative –** Support efforts to ensure that the Santa Fe River functions as a natural living system and also continues to serve as an appealing urban habitat.
>
> **Policy #2: Ground Water & Surface Water –** Support comprehensive efforts to conserve and protect both ground water and surface water within the Santa Fe water shed and aquifer basin.
>
> **Policy #7: Urban Forest –** Support the urban forest as an important element of the City's environmental resources and civic space. Increase the tree canopy to reduce the heat island effect and continue to assess and promote appropriate tree species. Require new development to protect and enhance the urban forest.
>
> **Policy #8: Vegetation –** Minimize the direct loss and/or modification of riparian and wildlife habitat, corridors and wetlands within the Santa Fe area.
>
> **Policy #9: Environmentally Sensitive Areas –** Protect, enhance and restore environmental and biological resources, including the Santa Fe River and habitats that are sensitive or declining within the Santa Fe urban area.

Goal: Santa Fe will have a complete, well-connected transportation network.

> **Policy #7: Safety –** Increase the safety of the transportation system for all users.
>
> **Policy #9: Upgrade the Road Network –** Identify and prioritize projects to correct and prevent safety problems and congestion.

Goal: Santa Fe is committed to creating a sustainable, energy-efficient city for future generations.

> **Policy #2: Mitigate and Adapt to the Effects of Climate Change –** Addressing the complex challenges caused by a changing climate, the city will work with others to analyze the impacts of climate change on Santa Fe's environment and develop mitigation and adaptation strategies to reduce and reverse the negative impacts of climate change.
>
> **Policy #7: Storm water –** Capture, infiltrate and utilize storm water on-site and integrate into the design of all projects, including roadways. Coordinate storm water management such as good grading practices, bio-remediation and landscape development and support.

Goal: Santa Fe will have a more diverse economy.

> **Policy #4: Traditional Infrastructure –** Ensure that road, water and wastewater infrastructure are adequate to serve existing and future needs of city businesses. Work with public and private utility providers to ensure that infrastructure needs for telecommunication (including fiber optic), electricity and natural gas are met.

Santa Fe County Hazard Mitigation Plan, 2018

Goal 1: Reduce the number of injuries and fatalities from hazards

Goal 2: Reduce the amount of property damage, both public and private, from hazards

Goal 3: Minimize recovery time for both community function and the natural environment after natural hazard events

Goal 4: Enhance communication, collaboration and integration among county, federal, state, and tribal agencies in regards to hazard mitigation.

New Mexico State Hazard Mitigation Plan, 2018

Goal 1: Reduce the number of injuries due to natural hazards;

Goal 2: Reduce the number of fatalities from natural hazards;

Goal 3: Reduce the amount of property damage, both public and private, from natural hazards;

Goal 4: Reduce the number of necessary evacuations;

Goal 5: Shorten recovery time for both community function and the natural environment after natural hazard events;

Goal 6: Improve communication, collaboration and integration among State, Tribal and Local emergency management agencies;

Goal 7: Increase awareness and understanding of risks and opportunities for mitigation among the citizens and elected officials of New Mexico; and

Goal 8: Mitigate repetitive loss and severe repetitive loss structures in the state to reduce impacts of flooding

City of Santa Fe Mitigation Plan Update
Mitigation Strategy Meeting Agenda

Date: Tuesday, September 17, 2019
9:00am-Noon

Meeting at: Emergency Operations Center
Mid-town Campus
1600 St Michaels Dr
Santa Fe, NM 87505

Project: City of Santa Fe Mitigation Plan Update

Subject/Purpose

The purpose of the meeting is to discuss the update of the mitigation strategy, building on actions identified in the 2014 plan. The meeting will include a group process to identify potential new mitigation actions to include in the updated plan.

Attendees: Santa Fe Emergency Management Coordinating Group and Stakeholders

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1. Introductions
2. Review of the Planning Process
3. Finalizing Updated Goals
4. Review of possible mitigation activities and alternatives
5. Discuss criteria for mitigation action selection and prioritization
6. Review of progress on existing actions in the plan
7. Brainstorming Session: Development of new mitigation actions (group process)
8. Prioritize mitigation actions (group process)
9. Discuss plan implementation and maintenance
10. Discuss next steps
11. Questions and Answers/Adjourn

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SIGN-IN SHEET
CITY OF SANTA FE MITIGATION PLAN UPDATE
Risk Assessment and Goals Meeting
Tuesday, September 17, 2019 9:00am – Noon
Midtown Campus - Emergency Operations Center
1600 St Michaels Dr. Santa Fe, NM 87505

Name	Agency/Dept	Title	Phone	E-mail
Kyle Mason	SFCFD	EM Specialist	505 955 6704	kemason@santafenm.gov
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Martin Vigil	SFC OEM	EM Director	505-670-0207	mavigil@santafecountynm.gov
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Matt Harding	Convention Center	Lead Specialist	801-376-6295	mdharding@santafenm.gov
Evelyn D. Ward	SFARES	Emergency Coordinator	505 660-2454	rendoswe@msn.com
Carolynn Roibal	Finance	Adm Mgr	505 955 6531	clroibal@santafenm.gov
Sigmund Silber	SFPSWCD	supervisor	505 473 7006	sigmundsilber@q.com
Alan Hook	SF WATER DIVISION	WATER RESOURCES COORDINATOR	(505) 955-4203	aghook@santafenm.gov
MARTIN VIGIL	SFCo OEM	OEM Director	505-992-3072	mavigil@santafecountynm.gov
Jeff Brislawn	Wood	Project Mgr	303-704-5506	Jeff.brislawn@woodplc.com

Example Mitigation Actions by FEMA categories with Hazards Identified in the Santa Fe Mitigation Plan Update 2019

Alternative Mitigation Actions	Dam Incident	Floods	HazMat and Pipeline Explosion	Human Hazards: Pandemic Transportation Accident; CBRNE; Cyber, Shooter	Weather Extremes (drought, hail, lightning, wind and tornado, temps)	Wildfire	Severe Winter Storm and Utility Disruption
PLANS and REGULATIONS							
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	■	■	■			■	

Alternative Mitigation Actions	Dam Incident	Floods	HazMat and Pipeline Explosion	Human Hazards: Pandemic Transportation Accident; CBRNE; Cyber, Shooter	Weather Extremes (drought, hail, lightning, wind and tornado, temps)	Wildfire	Severe Winter Storm and Utility Disruption
Surge protectors and lightning protection					■		
Tree Management					■	■	■
Transfer of development rights		■				■	
Utility location			■		■		■
STRUCTURE AND INFRASTRUCTRE PROJECTS							
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		■					
EDUCATION AND AWARENESS							

Alternative Mitigation Actions	Dam Incident	Floods	HazMat and Pipeline Explosion	Human Hazards: Pandemic Transportation Accident; CBRNE; Cyber, Shooter	Weather Extremes (drought, hail, lightning, wind and tornado, temps)	Wildfire	Severe Winter Storm and Utility Disruption
Flood Insurance	■	■					
Hazard information centers	■	■	■	■	■	■	■
Public education and outreach programs	■	■	■	■	■	■	■
Real estate disclosure	■	■	■		■	■	■
Crop Insurance					■		
Lightning detectors in public areas					■		
Cyber hygiene practices				■			
NATURAL SYSTEMS PROTECTION							
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		■	■			■	
EMERGENCY SERVICES							
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	■	■	■	■		■	

City of Santa Fe Mitigation Plan Update 2019
New Mitigation Action Worksheet

Use this to record new potential mitigation projects (1 form per project) identified during the planning process. Provide as much detail as possible and use additional pages as necessary. Complete and return to Jeff Brislawn by **October 8th.**

Mitigation Action/Project Title	
Hazard(s) Mitigated	
Priority (High, Medium, Low)	
Project Description, Issue/Background	
Responsible Office/ Agency and partners	
Timeline for Completion	
Cost Estimate	
Benefits (Avoided Losses)	

Prepared by: _____

Title/Dept: _____

Phone: _____

Email: _____

Please return worksheets by email to:
Jeff Brislawn
jeff.brislawn@woodplc.com
Phone: 303-704-5506

CITY OF SANTA FE MITIGATION PLAN
2019 UPDATE
Updating the Mitigation Strategy

Revised and Updated Goals & Objectives

Goal 1: Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure including the watershed due to hazards.

1.1: Reduce the exposure to critical facilities in high or extreme wildfire hazard areas.

1.2: Reduce the exposure of residential structures to wildfires

1.3: Educate the public in defensible space and other preventative measures to minimize wildfire risk

1.4: Educate the population on damage and loss due to drought

1.5: Continue efforts to encourage residents to use water-saving landscaping techniques.

1.6: Reduce exposure of structures and roads to flooding

1.7: Build and support local capacity to enable the public to prepare for, respond to and recover from disasters

1.8: Identify critical facilities and buildings that are vulnerable to severe weather events including high winds

1.9: Develop a comprehensive approach to reducing the possibility of damage and loss of function to identified vulnerable buildings and critical facilities, due to the effects of severe weather hazards.

1.10: Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, compliance with current building codes, etc.

1.11: Protect the public water system and other critical facilities from contamination from hazardous materials incidents

Goal 2: Reduce possibility of injury and death from hazards

2.1: Increase public awareness of actions to take during all types of severe weather.

2.2: Increase awareness of hazards and actions to take during an emergency.

2.3: Protect communication systems and other critical facilities from hazard events.

2.4: Increase awareness of the impact of hazard events on the community.

2.5: Increase public awareness of actions to take during extreme heat events.

2.6: Protect the general population and special populations from hazardous materials incidents.

2.7: Improve communications with facilities housing special populations, such as nursing homes, senior centers, and daycare centers.

2.9: Develop a comprehensive approach to reducing the possibility of injury and loss of life for residents and occupants of existing structures and critical facilities with the highest relative vulnerability to the effects of hazardous material releases from discrete locations.

Goal 3: Promote disaster-resistant development.

3.1: Encourage and facilitate the development or revision of comprehensive plans and zoning ordinances to limit development in high hazard areas and improve the ability to identify vulnerable structures.

3.2: Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.

3.3: Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.

Goal 4: Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.

4.1: Provide public education to increase awareness of hazards and opportunities for mitigation.

4.2: Increase participation in and number of storm watcher programs throughout City.

4.3: Promote partnerships to continue the development of a citywide approach to identifying and implementing mitigation actions.

Goal 5 (NEW): Increase awareness and understanding of risks and opportunities for mitigation among citizens and elected officials.

Public Meeting Agenda

Date: 16 September 2019
5:00 PM – 7:00 PM

Meeting at: Emergency Operations Center
Mid-town Campus
1600 St Michaels Dr
Santa Fe, NM 87505

Project: City of Santa Fe Mitigation Plan Update

Subject/Purpose

This meeting is for the public to learn more about the City of Santa Fe Mitigation Plan Update, learn about hazards and vulnerabilities, and provide input into the planning process. The primary intent of the meeting is to gather feedback on mitigation strategies to reduce identified hazard vulnerabilities, answer questions, and gather input to share with the Emergency Management Coordinating Group (Planning Committee) for the plan update. The plan identifies hazards, vulnerabilities, assets at risk, and ways to reduce impacts through long-term, sustainable mitigation projects.

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1. Introductions
2. Overview of the Hazard Mitigation Plan Update and Planning Process
3. Online Public Survey
4. Review of Identified Hazards
5. Discuss Mitigation Action Strategies (current and recommended)
6. Schedule and Next Steps
7. Questions and Answers

SIGN-IN SHEET
CITY OF SANTA FE MITIGATION PLAN UPDATE PROJECT
Public Meeting
Monday, September 16, 2019 5:00 PM – 7:00 PM

Name	Citizen or Organization	Community	E-mail (optional)
Kyle Mason	SFDEM	Agfe Fe	kmason@santafenm.gov
Jeff Brislawn	Wood	City Consultant	jeff.brislawn@woodplc.com

COMMENT CARD

City of Santa Fe Mitigation Plan Update: Public Meeting – September 16, 2019

Please leave a comment related to the City's Mitigation Plan update. Please provide your contact info if you would like to receive ongoing updates and information related to the Plan by email, phone, or mail.

Name (optional):

Email (optional):

Phone Number (optional):

Mailing Address (optional):

Comment:

Or fill out the brief Online Survey at:
https://woodplc.surveymonkey.com/r/SanteFeMP

Comment cards must be delivered to the comment box by the end of the meeting.

From: MASON, KYLE A. <kamason@santafenm.gov>
Sent: Tuesday, October 01, 2019 8:44 AM
To: Brislawn, Jeff P
Subject: FW: Hazard Mitigation Plan Survey

This email was sent to all city employees.

Kyle Mason
Interim Emergency Management Director
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704
Please consider the environment before printing this email.

From: CHACON, LILIA A. <lachacon@santafenm.gov>
Sent: Friday, September 27, 2019 8:37 AM
To: All City Employees <everyone@santafenm.gov>
Subject: Hazard Mitigation Plan Survey

The City of Santa Fe is updating its Hazard Mitigation Plan in 2019 per the five year update cycle required of FEMA and the federal Disaster Mitigation Act of 2000.

Please take a moment and complete this survey to help us collect information to better understand the vulnerabilities within the City of Santa Fe as well as solicit input on needs to best mitigate, or reduce, the impacts of hazards before they occur.

The Hazard Mitigation Plan analyzes the City's vulnerabilities to natural and manmade hazards and identifies mitigation actions the City can take to minimize property damage and reduce the loss of life by lessening the impacts of disasters.

https://woodplc.surveymonkey.com/r/SanteFeMP

Regards,

Lilia Chacon
Communications Director
City of Santa Fe
200 Lincoln Ave.
Santa Fe, NM 87501
O: 505-955-6045
C: 505-670-0719
E: lachacon@santafenm.gov

From: MASON, KYLE A. <kamason@santafenm.gov>
Sent: Tuesday, October 08, 2019 7:36 AM
To: Brislawn, Jeff P
Subject: FW: Hazard Mitigation Plan Survey

Kyle Mason
Interim Emergency Management Director
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704
Please consider the environment before printing this email.

From: CHACON, LILIA A. <lachacon@santafenm.gov>
Sent: Thursday, October 3, 2019 2:12 PM
To: All City Employees <everyone@santafenm.gov>
Subject: Hazard Mitigation Plan Survey

There is still time to participate!

The City of Santa Fe is updating its Hazard Mitigation Plan in 2019 per the five year update cycle required of FEMA and the federal Disaster Mitigation Act of 2000.

Please take a moment and complete this survey to help us collect information to better understand the vulnerabilities within the City of Santa Fe as well as solicit input on needs to best mitigate, or reduce, the impacts of hazards before they occur.

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https://woodplc.surveymonkey.com/r/SanteFeMP

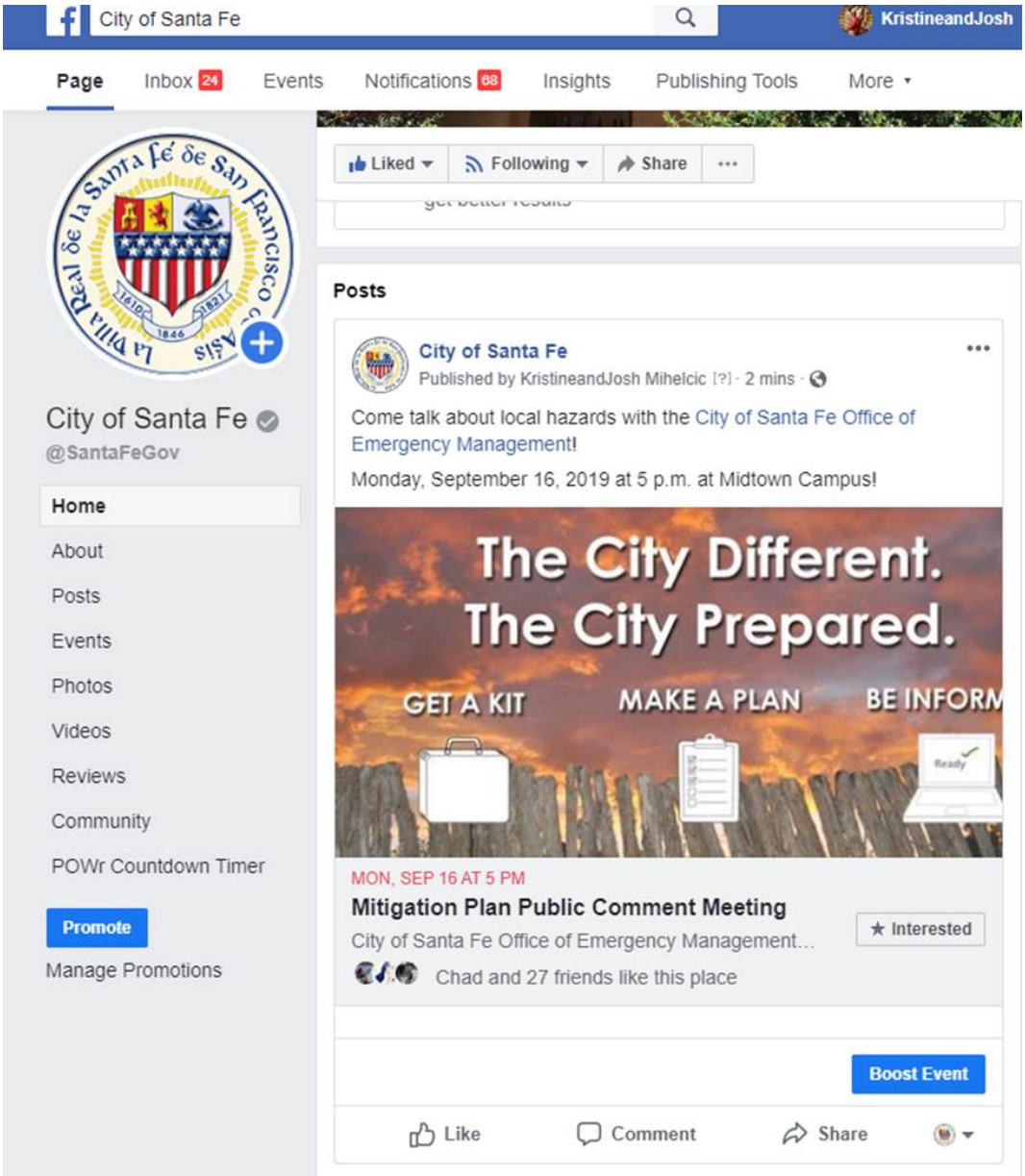
Regards,

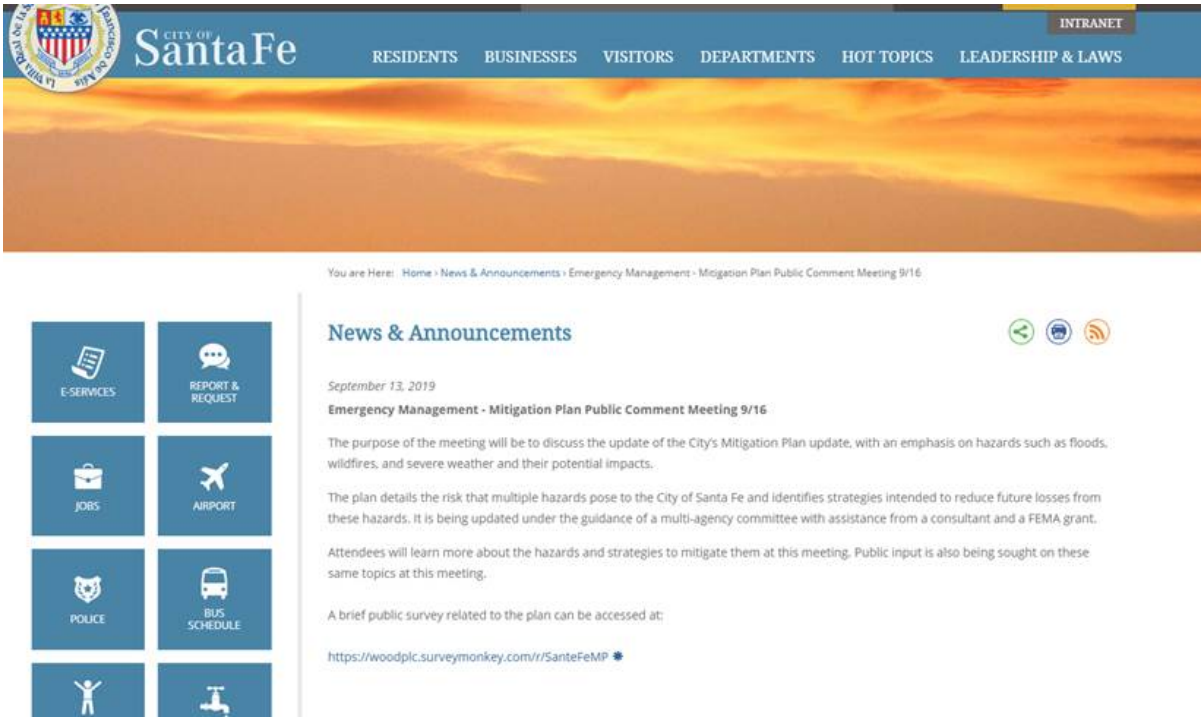
Lilia Chacon
Communications Director
City of Santa Fe
200 Lincoln Ave.
Santa Fe, NM 87501
O: 505-955-6045
C: 505-670-0719
E: lachacon@santafenm.gov

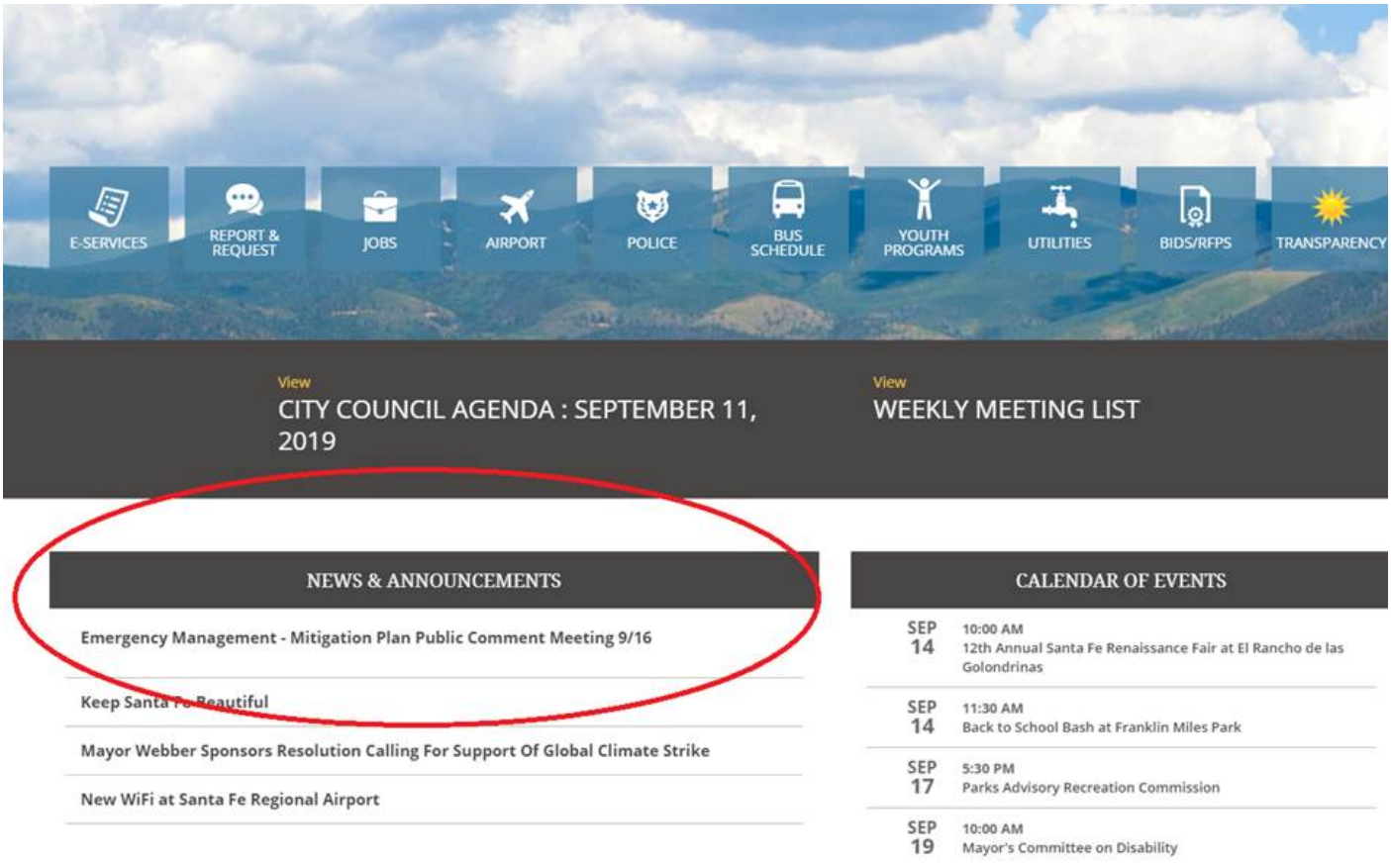
From: MASON, KYLE A. <kamason@santafenm.gov>
Sent: Friday, September 13, 2019 2:35 PM
To: Brislawn, Jeff P
Subject: FW: Screenshots - FB City Page and News and Announcements

Kyle Mason
Emergency Management Specialist
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704
Please consider the environment before printing this email.

From: MIHELCIC, KRISTINE M. <kmmihelcic@santafenm.gov>
Sent: Friday, September 13, 2019 2:33 PM
To: MASON, KYLE A. <kamason@santafenm.gov>
Subject: Screenshots - FB City Page and News and Announcements



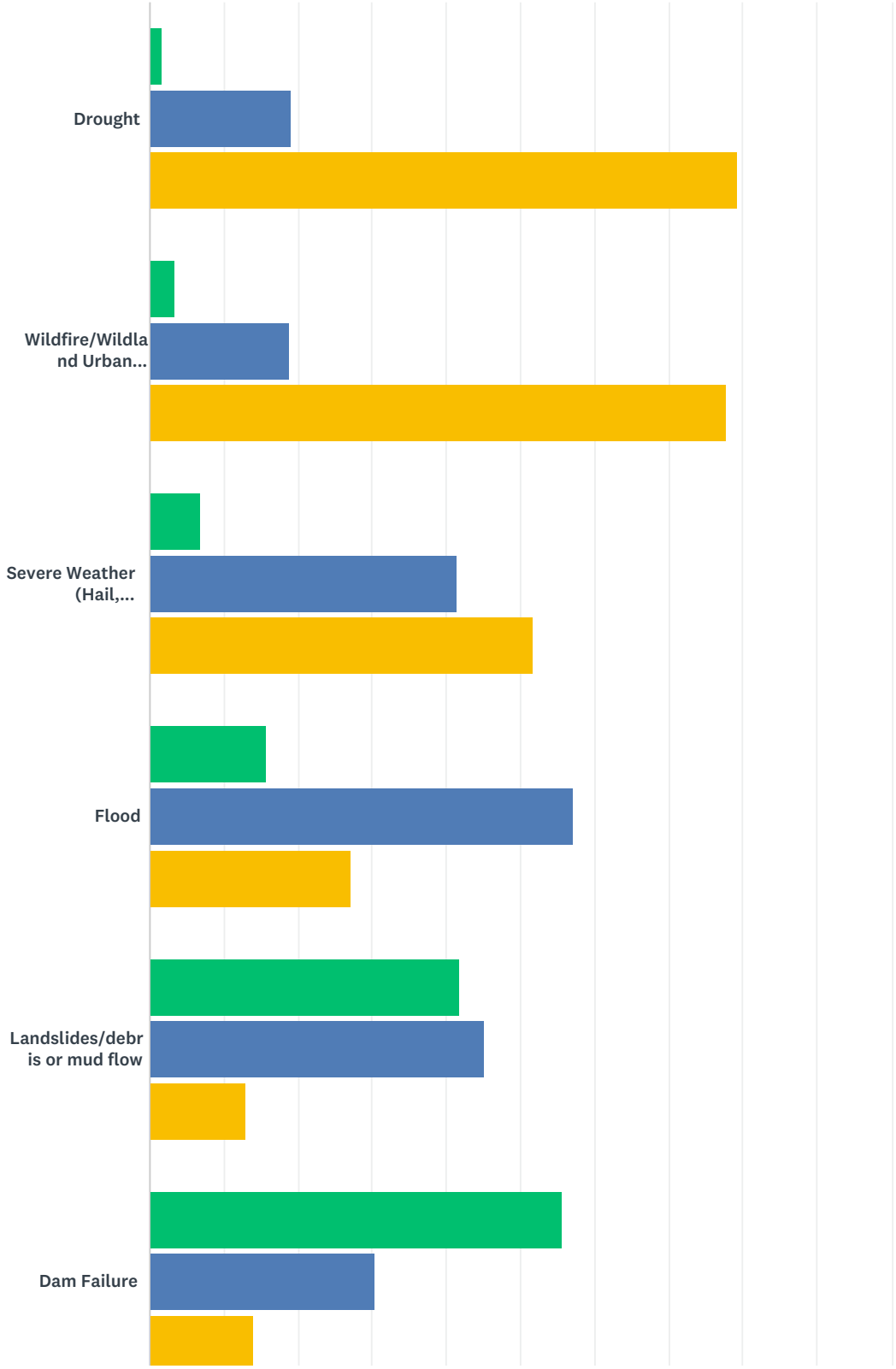


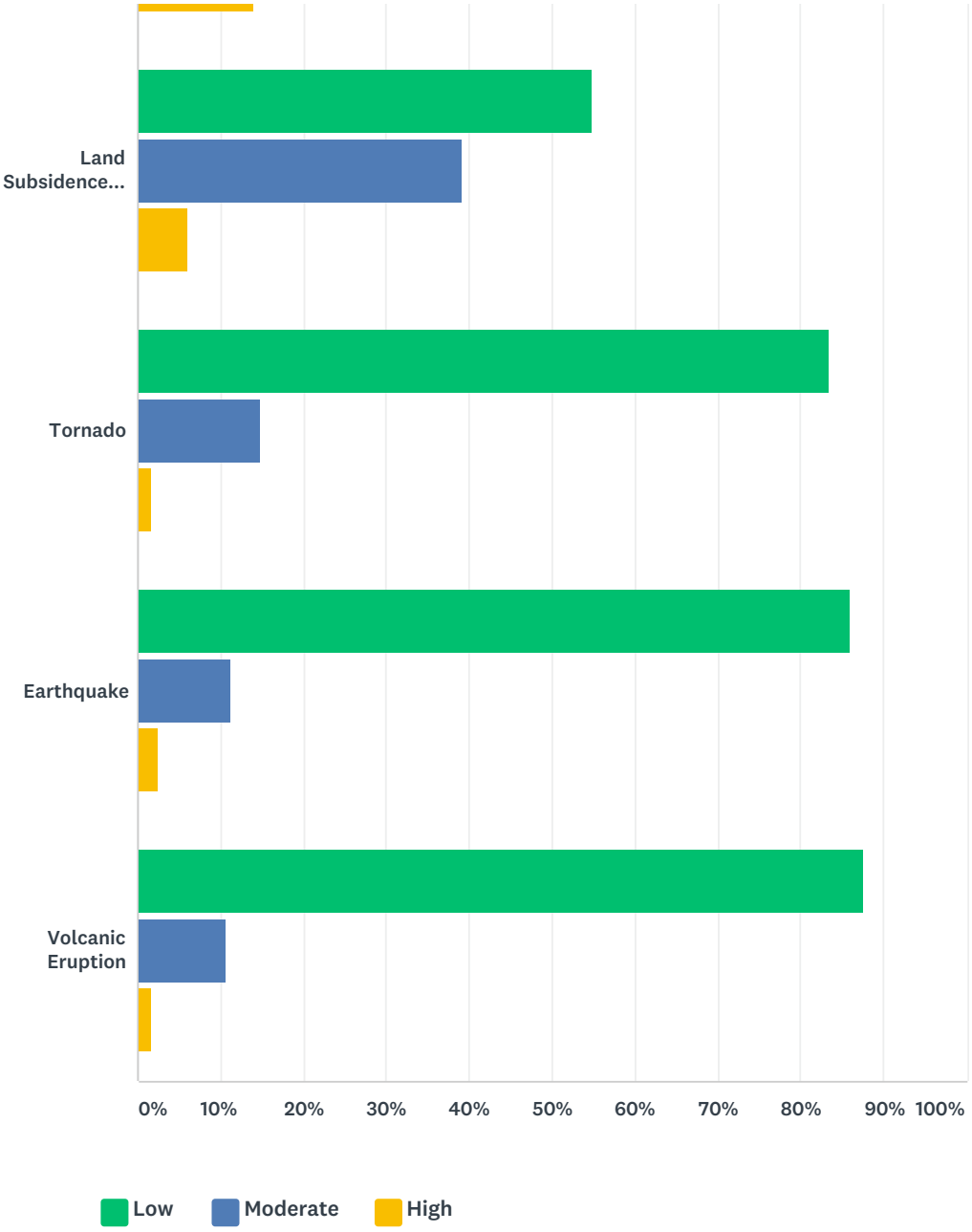


Kristine Mihelcic (Mi-hel-sick)
Constituent and Council Services Director

Q1 The natural hazards addressed in the Mitigation Plan update are listed below. Please indicate the level of significance in the City of Santa Fe that you perceive for each hazard.

Answered: 118 Skipped: 0





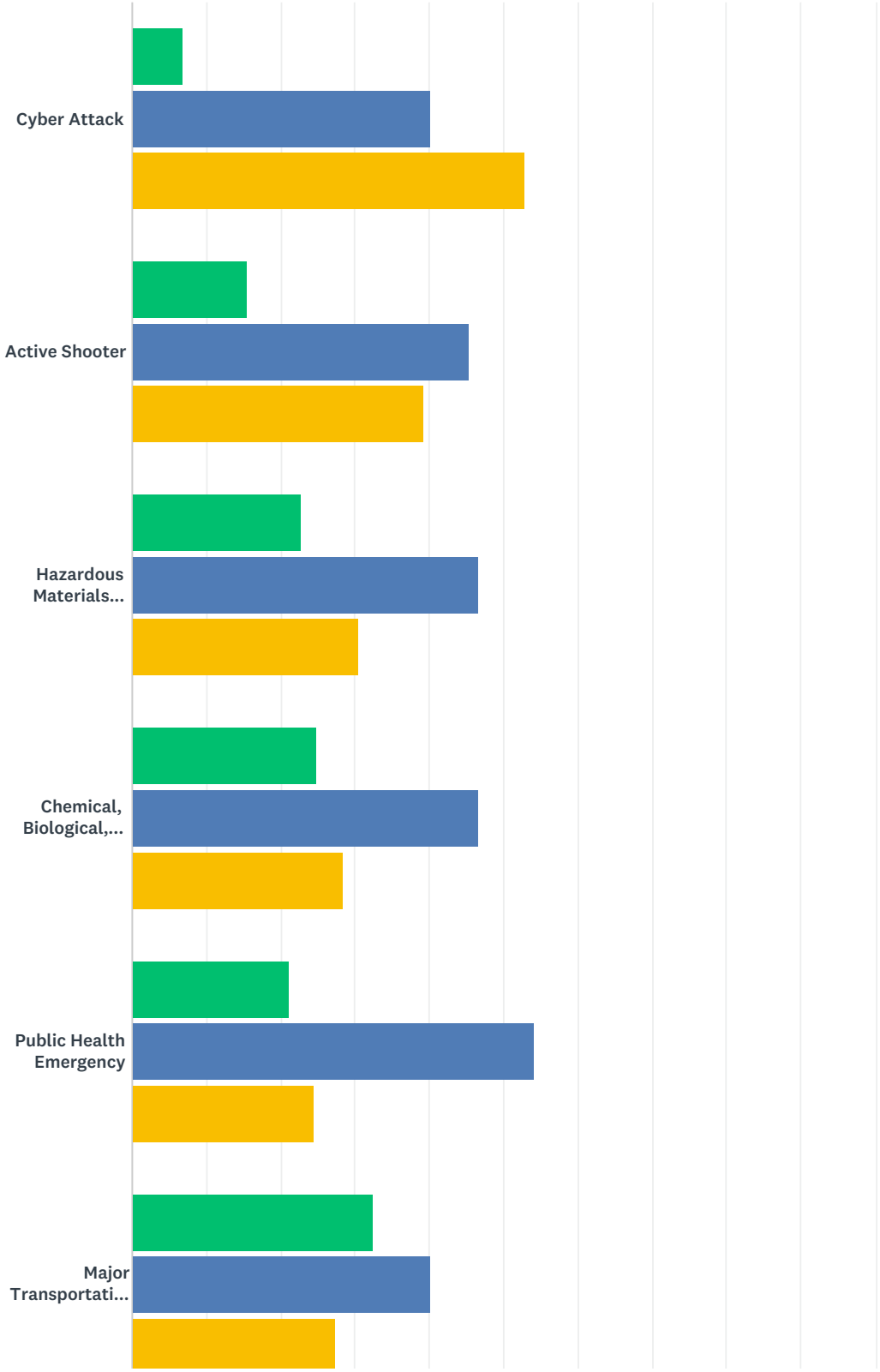
	LOW	MODERATE	HIGH	TOTAL	WEIGHTED AVERAGE
Drought	1.72% 2	18.97% 22	79.31% 92	116	2.78
Wildfire/Wildland Urban Interface	3.42% 4	18.80% 22	77.78% 91	117	2.74
Severe Weather (Hail, Lightning, Wind, Winter Storms, Thunderstorms, Extreme Temperatures)	6.90% 8	41.38% 48	51.72% 60	116	2.45
Flood	15.79% 18	57.02% 65	27.19% 31	114	2.11
Landslides/debris or mud flow	41.74% 48	45.22% 52	13.04% 15	115	1.71
Dam Failure	55.65% 64	30.43% 35	13.91% 16	115	1.58

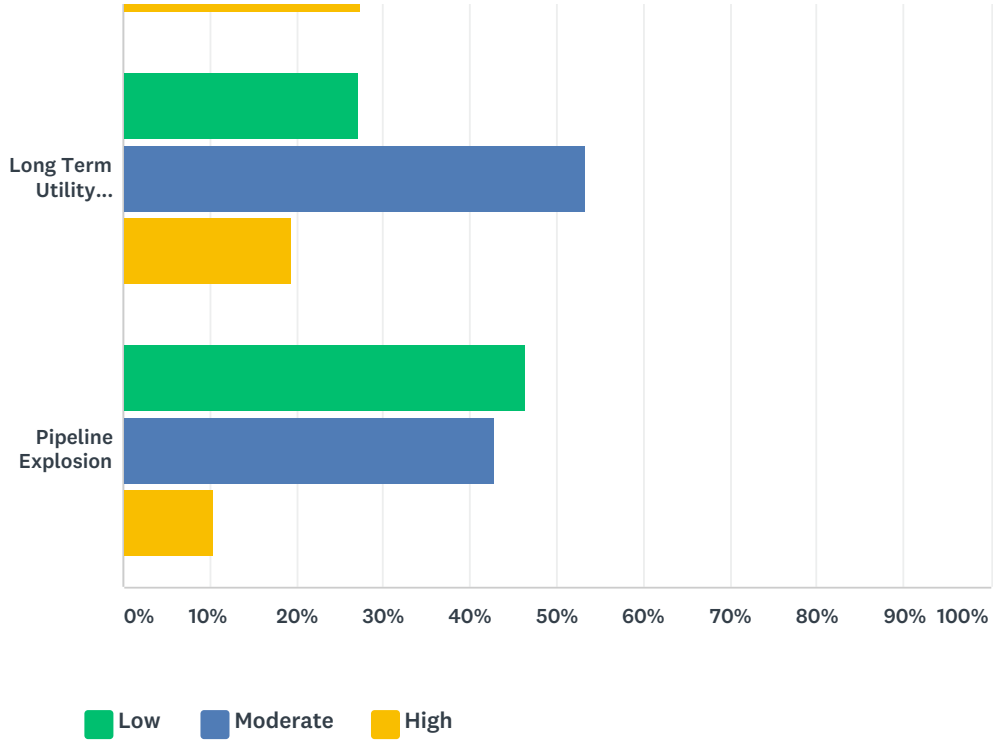
Land Subsidence (settlement or sinkholes)	54.78% 63	39.13% 45	6.09% 7	115	1.51
Tornado	83.48% 96	14.78% 17	1.74% 2	115	1.18
Earthquake	86.09% 99	11.30% 13	2.61% 3	115	1.17
Volcanic Eruption	87.61% 99	10.62% 12	1.77% 2	113	1.14

#	OTHER (PLEASE SPECIFY)	DATE
1	We have had two floods at the La Farge Library. the building is old and in some cases the roof gutter are right over doorways (children's room) west side.	10/4/2019 5:23 PM
2	Heatwave	10/2/2019 4:14 PM
3	Radiation coming from labs	10/1/2019 3:19 PM
4	soil and groundwater contamination as a result of poor storage practices, especially at Los Alamos.	9/28/2019 8:50 PM
5	Mass Shooting Incident, Homeless homicides	9/23/2019 7:02 PM

Q2 The human-caused hazards addressed in the Mitigation Plan update are listed below. Please indicate the level of significance in the City of Santa Fe that you perceive for each hazard.

Answered: 118 Skipped: 0





	LOW	MODERATE	HIGH	TOTAL	WEIGHTED AVERAGE
Cyber Attack	6.84% 8	40.17% 47	52.99% 62	117	2.46
Active Shooter	15.38% 18	45.30% 53	39.32% 46	117	2.24
Hazardous Materials Release (fixed facility or transportation)	22.88% 27	46.61% 55	30.51% 36	118	2.08
Chemical, Biological, Radiological, Nuclear, or Explosive Attack	25.00% 29	46.55% 54	28.45% 33	116	2.03
Public Health Emergency	21.19% 25	54.24% 64	24.58% 29	118	2.03
Major Transportation Accident	32.48% 38	40.17% 47	27.35% 32	117	1.95
Long Term Utility Disruption	27.12% 32	53.39% 63	19.49% 23	118	1.92
Pipeline Explosion	46.49% 53	42.98% 49	10.53% 12	114	1.64

#	OTHER (PLEASE SPECIFY)	DATE
1	Poverty	10/2/2019 4:14 PM
2	water contamination from Los Alamos or leaky underground storage tanks	9/27/2019 10:34 PM
3	Regional Jet crash KSAF	9/27/2019 7:22 PM
4	air pollution, water pollution	9/27/2019 4:38 PM
5	Vehicle-ramming attack on crowds.	9/27/2019 3:35 PM
6	Water and ground contamination, aquifers, rivers and lakes	9/27/2019 2:40 PM
7	Aliens from Venus or Mars	9/27/2019 12:10 AM
8	Short Term Rental disturbance	9/23/2019 7:02 PM

Q3 Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider?

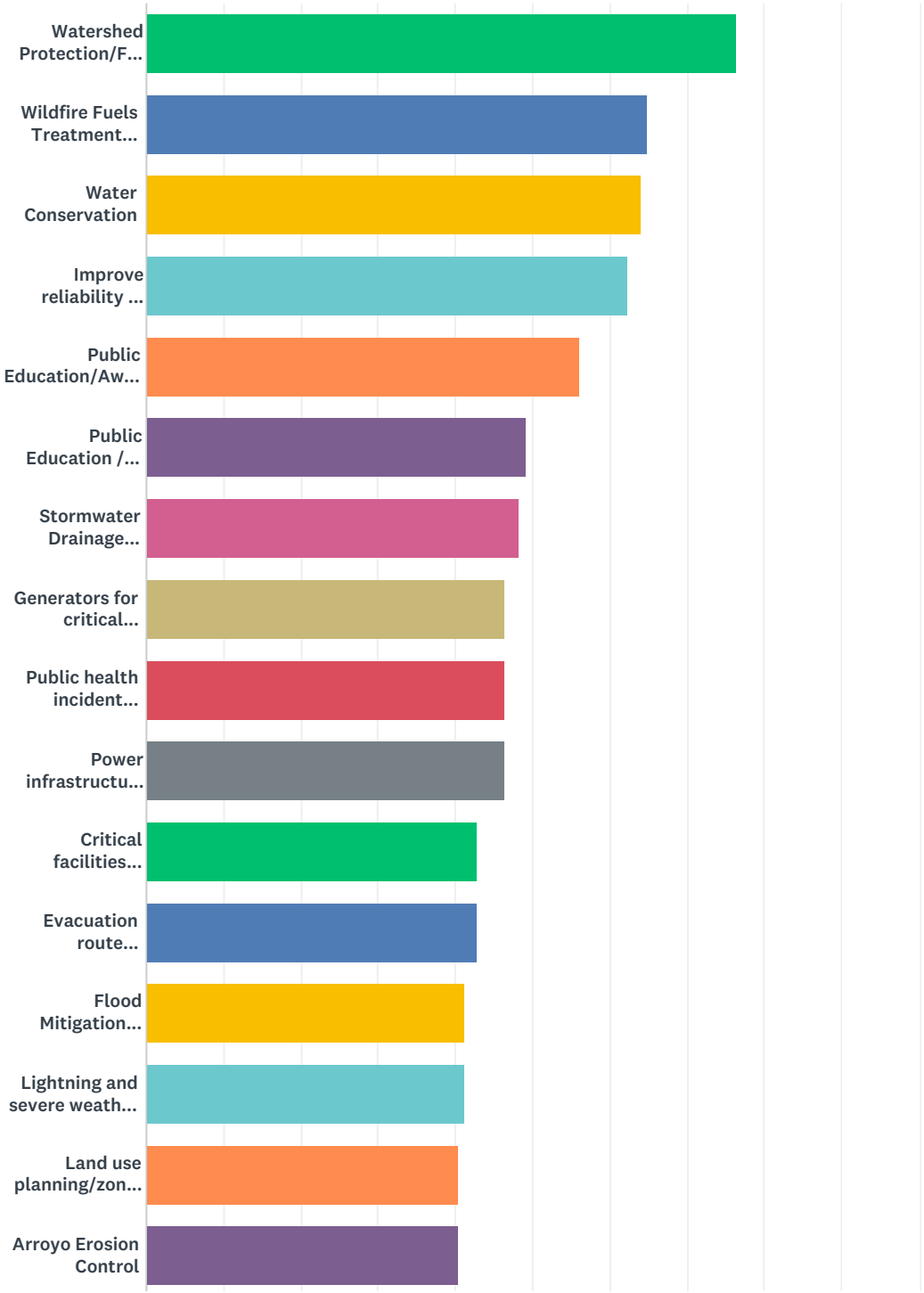
Answered: 61 Skipped: 57

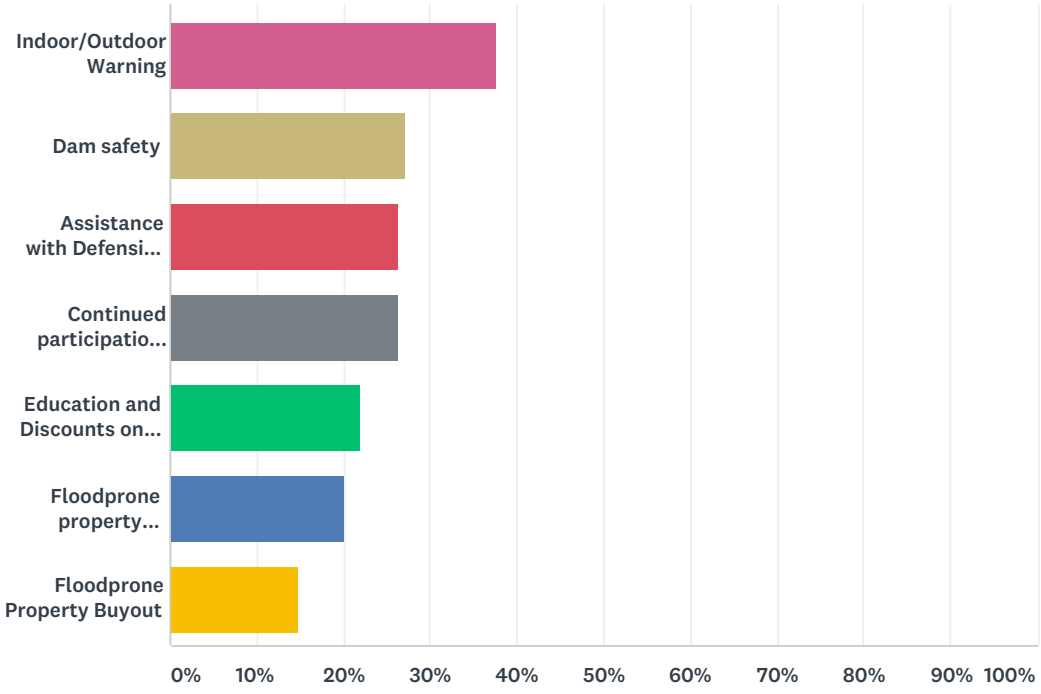
#	RESPONSES	DATE
1	my major concern is about how residents of Canyon and Cerro Gordo Rds can evacuate in case of wildfire. Is there a plan?	10/16/2019 6:31 PM
2	wildfire mitigation	10/14/2019 4:01 AM
3	Wildfire devastation around Upper Canyon and along eastern foothills of Santa Fe	10/11/2019 2:39 AM
4	Traffic congestion on most roads; poor median planning and space	10/4/2019 8:50 PM
5	Old Eberline building on Airport rd next to country club aprts. had a radiation rods pool high levels of radiation	10/4/2019 7:35 PM
6	different landscaping near new Milagro school to lessen the chance of water coming into La Farge staff parking lot east side of building.	10/4/2019 5:24 PM
7	Cerrillos Rd St Francis Intersection	10/3/2019 9:56 PM
8	nope	10/3/2019 8:41 PM
9	Operational permitting inforced	10/3/2019 8:26 PM
10	n/a	10/3/2019 8:23 PM
11	N/A	10/3/2019 8:23 PM
12	no	10/3/2019 8:18 PM
13	Fire escape routes for Windmill Ridge community	10/3/2019 6:07 PM
14	Fire mitagation efforts on city green right of ways. So much brush behind my house on city land.	10/3/2019 4:34 PM
15	Plans to support people in extreme poverty/homeless	10/2/2019 7:20 PM
16	Poverty	10/2/2019 4:14 PM
17	No	10/1/2019 6:54 PM
18	not at this time	10/1/2019 3:35 PM
19	Adress the loitering problem, homless people in need	10/1/2019 3:20 PM
20	not aware of any specific	9/30/2019 2:29 PM
21	Fuel Chemical Transport Trucks, Limited supply of equipment to deal with these types of spills, lack of training for first responders	9/30/2019 1:10 PM
22	Yes	9/29/2019 5:34 PM
23	Managing Wastes Produced by Natural Disasters	9/29/2019 2:41 AM
24	Active shooter, there is no plan for city wide response just pd response. We havent organized faith base organizations as well as st. vincents will quikcly be overwhelemed. David SIlver did a good job in organizing a training event at Capshaw Middle School and St. Vincent's. But since that time we now have the new presbyterian. Our first responsders need to organize howto work with both hospitals.	9/28/2019 9:39 PM
25	The streets are full of human feces and needles. There needs to be a plan to keep things healthy and provide places for people to use public bathrooms.	9/28/2019 8:51 PM
26	No	9/28/2019 6:01 PM
27	How the city will deal with/work to prevent climate change.	9/28/2019 4:36 PM
28	No	9/27/2019 10:46 PM

29	We need to shift to clean energy and shitft our grid to beable to share solar energy efficiently. We need to encourage opening up our roadways for essential transportation only. We need to have a coordinate evacuation plan, which may require busses. We need busses.	9/27/2019 10:39 PM
30	prairie dogs damaging vegitation and landscape	9/27/2019 8:22 PM
31	not at this time	9/27/2019 6:14 PM
32	No	9/27/2019 5:51 PM
33	yes, Market Street station needs a second egress in case of fire	9/27/2019 5:22 PM
34	Emerald Ash Borer being imported in Firewood from Colorado. This will destroy 12% of the urban forest in Santa Fe and increase temps. We need a n Urban Forest Management Plan in place that includes tree planting!	9/27/2019 4:12 PM
35	Wildfire risk in Santa Fe Watershed and surrounding communities	9/27/2019 3:50 PM
36	wildfires/hazardous materials and waste (LANL and otherwise)	9/27/2019 3:44 PM
37	Active Killer./Shooter (guns, edged weapons, IED, and vehicle attacks.) As far as I know there are no drills conducted, or regularly conducted, for City of Santa Fe Employees.	9/27/2019 3:36 PM
38	No	9/27/2019 3:34 PM
39	no	9/27/2019 3:13 PM
40	Flood Issues	9/27/2019 3:11 PM
41	No	9/27/2019 3:11 PM
42	no	9/27/2019 3:08 PM
43	There are specific areas of the city that do not respond well to inclement weather: there is substantial standing water and ice accumulation on Cerrillos and St. Francis with comparatively little rain and snow.	9/27/2019 3:04 PM
44	Climate change is increasing some "natural" risks such as drought, wildfire, flood, and extreme weather.	9/27/2019 3:03 PM
45	No	9/27/2019 3:02 PM
46	n/a	9/27/2019 3:02 PM
47	no	9/27/2019 2:59 PM
48	No	9/27/2019 2:57 PM
49	need to educate residents on the importance of keeping dry trees off propertys	9/27/2019 2:52 PM
50	employee work area safety	9/27/2019 2:51 PM
51	Combined Fire->Damage and loss of water supply at Canyon Rd	9/27/2019 2:49 PM
52	not necessarily	9/27/2019 2:47 PM
53	no	9/27/2019 2:45 PM
54	No.	9/27/2019 2:45 PM
55	Plane Crashes at City of Santa Fe Airport and surrounding City facilities	9/27/2019 2:44 PM
56	no	9/27/2019 2:43 PM
57	No.	9/27/2019 2:43 PM
58	Wildfire	9/27/2019 1:56 AM
59	Trees overhanging in the road on Upper Canyon, Cerro Gordo and Gonzales as well as the entire Eastside. If we have a fire and those branches fall in the road we all get to burn in our cars.	9/27/2019 12:13 AM
60	Extra Terrestrial takeover	9/27/2019 12:11 AM
61	CBRNE/WMD EVENT ON TRIBAL LANDS	9/14/2019 1:02 PM

Q4 Hazard mitigation is defined as actions that can be taken to reduce or eliminate the long-term risk to hazards, prior to a hazard event.The following types of mitigation actions may be considered in the City of Santa Fe. Please indicate the types of mitigation actions that you think should have the highest priority in the City of Santa Fe Hazard Mitigation Plan.

Answered: 114 Skipped: 4





ANSWER CHOICES	RESPONSES	
Watershed Protection/Forest Health Initiatives	76.32%	87
Wildfire Fuels Treatment projects	64.91%	74
Water Conservation	64.04%	73
Improve reliability of communications systems	62.28%	71
Public Education/Awareness	56.14%	64
Public Education / Awareness of hazards	49.12%	56
Stormwater Drainage Improvements	48.25%	55
Generators for critical facilities	46.49%	53
Public health incident preparedness	46.49%	53
Power infrastructure protection	46.49%	53
Critical facilities protection from hazards	42.98%	49
Evacuation route development	42.98%	49
Flood Mitigation including stream restoration	41.23%	47
Lightning and severe weather protection for critical facilities	41.23%	47
Land use planning/zoning with consideration of hazards	40.35%	46
Arroyo Erosion Control	40.35%	46
Indoor/Outdoor Warning	37.72%	43
Dam safety	27.19%	31
Assistance with Defensible Space	26.32%	30
Continued participation in the National Flood Insurance Program	26.32%	30

Education and Discounts on Flood Insurance	21.93%	25
Floodprone property elevation	20.18%	23
Floodprone Property Buyout	14.91%	17
Total Respondents: 114		

Q5 Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural or human-caused hazards:

Answered: 41 Skipped: 77

#	RESPONSES	DATE
1	evacuation rehearsals	10/16/2019 6:33 PM
2	wildfire action preparation plan	10/14/2019 4:03 AM
3	The Santa Fe Fire Department currently has NO plans in place for safe evacuation of Upper Canyon/Cerro Gordo neighborhoods despite multiple attempts by residents to discuss this issue. We understand wildfires are highly dynamic events. However, that the fire department has zero planning in place for safe egress of residents is irresponsible at best. The fire department is 100% aware that narrow roads in that area would immediately become jammed and yet the response to resident concerns has been a collective shrug. As one fire department official said, "Well, you chose to live there." Which is completely unacceptable. I would have thought the local fire officials would have taken notice of the devastation and death in Paradise, California.	10/11/2019 2:43 AM
4	Training Emergency Coordinators of each department.	10/7/2019 3:04 PM
5	Drinking water transportation	10/4/2019 8:53 PM
6	Invest funds in protection already in place like Fire Derpartment Haz-Mat team. Pre-plan target hazard areas	10/4/2019 7:38 PM
7	parking has become a problem during pick up at Milagro School next door to Oliver La Farge library	10/4/2019 5:26 PM
8	Food and supplies stash	10/3/2019 11:20 PM
9	LANL legacy waste Runoff	10/3/2019 8:52 PM
10	N/A	10/3/2019 8:44 PM
11	Enforcement of operational permits	10/3/2019 8:28 PM
12	Poverty reduction	10/2/2019 4:16 PM
13	evacuation plans and shelters communicated to community	10/2/2019 3:40 PM
14	Cyber attacks to our electrical grid pose the greatest threat.	10/1/2019 6:58 PM
15	Work on storm drans prior to rain event to prevent flooding	10/1/2019 3:22 PM
16	unknown	9/30/2019 2:31 PM
17	Training, Most of this training is free via FEMA, Orange hazmat books for first responders. Put together your Incident Command System(ICS) as outlined in the ICS	9/30/2019 1:18 PM
18	Managing Wastes Produced by Natural Disasters	9/29/2019 2:43 AM
19	current police radio's have blank area's specifically near SWAN park. Police Admin acknowledged this but said there was nothing they could do.	9/28/2019 9:42 PM
20	control of runoff from farmland that pollutes rivers with fertilizers.	9/28/2019 8:57 PM
21	Increasing public awareness of safe destinations in the event of fires or other disasters.	9/28/2019 4:40 PM
22	None	9/27/2019 10:47 PM
23	Encourage dryland farming in neighboring areas so as to save groundwater.	9/27/2019 10:40 PM
24	Traffic and DWI enforcement	9/27/2019 7:24 PM
25	Critical facilties should be built to withstand flooding and other hazards and equiped to fully operate for 7 days (with suffient fuel for generators); vulnerable communiites and community members identified and located with neighbor system of checking in on them.	9/27/2019 6:16 PM

26	Ability to set up clean air refuges for those affected by summer wildfires who do not have central air. Our house gets incredibly hot and the only way to cool down in summer is open windows and fans at night. If a wildfire came very close, our house would be unlivable, and I know many in the same situation who worry about this.	9/27/2019 4:45 PM
27	Urban Forest Management to assist with Santa Fe's 2040 Plan is very important.	9/27/2019 4:14 PM
28	Importance of taking resposibility for your preparedness	9/27/2019 3:53 PM
29	All hazards approach to planning. Meaning planning, drills, and training that can be used for multiple disasters/mass casualty incidents.	9/27/2019 3:38 PM
30	na	9/27/2019 3:15 PM
31	enforcement of environmental laws	9/27/2019 3:10 PM
32	unknown	9/27/2019 3:04 PM
33	unknown	9/27/2019 3:01 PM
34	lightning protection, generators and satellite phone for water treatment plants, employee and citizen protection measures for Dam failures.	9/27/2019 2:55 PM
35	Develop a more resilient water supply via reuse	9/27/2019 2:50 PM
36	Consevation plan, sustainability plan, dam safety plan	9/27/2019 2:50 PM
37	Forest fire mitigation.	9/27/2019 2:48 PM
38	N/A	9/27/2019 2:46 PM
39	Forest thinning	9/27/2019 1:57 AM
40	Escape route from the planet to the moons of Jupiter.	9/27/2019 12:13 AM
41	Specialized WMD/CBRNE Training for First Responder's	9/14/2019 1:05 PM

City of Santa Fe
NEWS RELEASE
www.santafenm.gov

FOR IMMEDIATE RELEASE
Contact: Kyle Mason, Emergency Management Director
Email: kamason@santafenm.gov
O: 505-955-6704

CITY OF SANTA FE MITIGATION PLAN UPDATE AVAILABLE FOR PUBLIC REVIEW AND COMMENT

Santa Fe, March 25, 2020--Would you like to learn more about what the City of Santa Fe is doing to minimize the impacts of floods, wildfires, hazardous materials incidents, and other hazards? A draft of the City's updated Mitigation Plan is being made available for public review and comment. The plan assesses risks posed by natural and human-caused hazards, identifies ways to reduce those risks, and allows the City to be eligible for mitigation grants from FEMA. A Hazard Mitigation Planning Team (HMPT) that includes representatives from various City departments and stakeholders updated the plan over the past eleven months with assistance from a consultant. The plan identifies hazard mitigation goals and a variety of mitigation projects with the intent of reducing losses from hazard events before they occur again. The planning team is now soliciting public comment on the plan before it is finalized and submitted for FEMA review and approval.

The comment period will be March 25 - April 11, 2020.

The plan and a comment form can be accessed at the following website: https://www.santafenm.gov/mitigation_plan
Comments on the plan can be left here: https://bit.ly/Santa_Fe_Mit_Plan_Feedback

Highlights of the hazard vulnerability assessment including hazard maps can be accessed at this link, along with a summary of the plan's proposed mitigation actions. The site also allows the public to report concerns about hazards through a map interface.

https://santa-fe-new-mexico-hazard-mitigation-thecitydifferent.hub.arcgis.com/

Hardcopies will also be available for review upon request through: Kyle Mason – kamason@santafenm.gov

For more information, contact Kyle Mason, Emergency Management Director. kamason@santafenm.gov

###

From: MASON, KYLE A. <kamason@santafenm.gov>
Sent: Thursday, April 02, 2020 11:17 AM
To: Brislawn, Jeff P
Subject: FW: Mitigation Plan Public Review Press Release
Attachments: Santa Fe Mitigation Public Review Press Release 3.25.2020 (003).docx

Kyle Mason
Emergency Management Director
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704
Please consider the environment before printing this email.

From: CHACON, LILIA A. <lachacon@santafenm.gov>
Sent: Thursday, April 2, 2020 10:56 AM
To: MASON, KYLE A. <kamason@santafenm.gov>
Cc: MIHELCIC, KRISTINE M. <kmmihelcic@santafenm.gov>
Subject: RE: Mitigation Plan Public Review Press Release

Hi Kyle,
This was sent out to media and councilors on Wed. March 25 at 11:30 a.m. as well as Kristine. Not sure if/where posted.

City of Santa Fe
NEWS RELEASE
www.santafenm.gov

FOR IMMEDIATE RELEASE
Contact: Kyle Mason, Emergency Management Director
Email: kamason@santafenm.gov
O: 505-955-6704

City of Santa Fe Mitigation Plan Update Available for Public Review and Comment

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For more information, contact Kyle Mason, Emergency Management Director. kamason@santafenm.gov
###

From: MASON, KYLE A. <kamason@santafenm.gov>
Sent: Thursday, April 2, 2020 10:44 AM
To: CHACON, LILIA A. <lachacon@santafenm.gov>
Cc: Brislawn, Jeff P <jeff.brislawn@woodplc.com>; MIHELCIC, KRISTINE M. <kmmihelcic@santafenm.gov>
Subject: RE: Mitigation Plan Public Review Press Release

Lilia – did this get posted on the city website? Do you have a link by chance?

Kyle Mason
Emergency Management Director
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704

From: MASON, KYLE A.
Sent: Wednesday, March 25, 2020 10:54 AM
To: CHACON, LILIA A. <lachacon@santafenm.gov>; MIHELCIC, KRISTINE M. <kmmihelcic@santafenm.gov>
Cc: Brislawn, Jeff P <jeff.brislawn@woodplc.com>
Subject: RE: Mitigation Plan Public Review Press Release

This is the final version – sorry. Please let me know when it gets posted online.

Kyle Mason
Emergency Management Director
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov

C: 505-469-7662
O: 505-955-6704

From: MASON, KYLE A.
Sent: Wednesday, March 25, 2020 9:24 AM
To: CHACON, LILIA A. <lachacon@santafenm.gov>; MIHELCIC, KRISTINE M. <kmmihelcic@santafenm.gov>
Cc: 'Brislawn, Jeff P' <jeff.brislawn@woodplc.com>
Subject: RE: Mitigation Plan Public Review Press Release

Looks like I missed the date on the first line. See revised attachment and make any corrections you see fit.

Kyle Mason
Emergency Management Director
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704

From: MASON, KYLE A.
Sent: Wednesday, March 25, 2020 9:23 AM
To: CHACON, LILIA A. <lachacon@santafenm.gov>; MIHELCIC, KRISTINE M. <kmmihelcic@santafenm.gov>
Cc: Brislawn, Jeff P <jeff.brislawn@woodplc.com>
Subject: Mitigation Plan Public Review Press Release

Please distribute far and wide. Send me links or screenshots of the postings as we need to demonstrate public engagement for the planning process.

I will be posting to OEM's social medias if you are able to repost/share.

Kyle Mason
Emergency Management Director
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704

From: MASON, KYLE A. <kamason@santafenm.gov>
Sent: Thursday, April 16, 2020 10:15 AM
To: Brislawn, Jeff P
Subject: FW: AlertSantaFe: Emergency Preparedness Information

Did I forward this onto you?

Kyle Mason
Emergency Management Director
City of Santa Fe Office of Emergency Management
kamason@santafenm.gov
C: 505-469-7662
O: 505-955-6704
Please consider the environment before printing this email.

From: Linda Tanner <ljtanner1@mac.com>
Sent: Thursday, April 2, 2020 3:12 PM
To: MASON, KYLE A. <kamason@santafenm.gov>
Subject: Fwd: AlertSantaFe: Emergency Preparedness Information

Dear Kyle Mason,

I did read and glance at this very fine attached Plan. Given the title, I did expect to see actual mitigation efforts listed that businesses, contractors and homeowners could take. The first one that comes to mind is the great brochure produced by the Santa Fe Fire Dept called Ready, Set, Go! It gives homeowners, contractors and businesses actual things to do to protect structures from fire. I don't see those kinds of practical efforts listed in this attached Plan, which is strange given the mitigation title of the plan.

Second, Santa Fe seems to have a superb Emergency Management Alert System and Amber Alert System recently used for COVID-19. I didn't see these systems highlighted in the attached Plan and I hope you agree they should be. Maybe I missed these.

Third, I think the two earthen dams that could impact downtown Santa Fe if they broke through should warrant a Drill every few years. I think you know that there were three Corona Virus-like Drills under two administrations where the findings were largely ignored. Drills are very powerful tools. Similarly, there should be a Santa Fe Drill if legacy waste and current operations were to burn at LANL. Perhaps Santa Fe already dovetails in to their LANL Drills and if that's the situation, it should be so stated in this attached Plan.

Fourth, I was sad to see the low turnout of some of the meetings on this topic, especially when it was a requirement to attend. Perhaps you can explore remote dial-in participation to these meetings.

Lastly, I would like to see your team address gases in your attached Plan. It's possible that some of the larger swimming pools (e.g. Centennial, Chavez Center) use chlorine gas instead of pellets. When

modeled, a shoulder high sheared off chlorine gas cylinder depending on the prevailing wind and topography could exceed one mile.

Thank you for sharing your Plan.
Kind regards,

Linda Tanner
224 Cibola Dr.
Santa Fe, NM 87501
ljtanner1@mac.com

Begin forwarded message:

From: City of Santa Fe Office of Emergency Management <AlertSantaFe@getrave.com>
Subject: AlertSantaFe: Emergency Preparedness Information
Date: March 25, 2020 at 10:14:00 AM MDT
To: ljtanner1@mac.com
Reply-To: City of Santa Fe Office of Emergency Management <OEM@santafenm.gov>

CITY OF SANTA FE MITIGATION PLAN UPDATE
AVAILABLE FOR PUBLIC REVIEW AND COMMENT

Santa Fe, March 25, 2020--Would you like to learn more about what the City of Santa Fe is doing to minimize the impacts of floods, wildfires, hazardous materials incidents, and other hazards? A draft of the City's updated Mitigation Plan is being made available for public review and comment. The plan assesses risks posed by natural and human-caused hazards, identifies ways to reduce those risks, and allows the City to be eligible for mitigation grants from FEMA. A Hazard Mitigation Planning Team (HMPT) that includes representatives from various City departments and stakeholders updated the plan over the past eleven months with assistance from a consultant. The plan identifies hazard mitigation goals and a variety of mitigation projects with the intent of reducing losses from hazard events before they occur again. The planning team is now soliciting public comment on the plan before it is finalized and submitted for FEMA review and approval.

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For more information, contact Kyle Mason, Emergency Management Director.
kamason@santafenm.gov

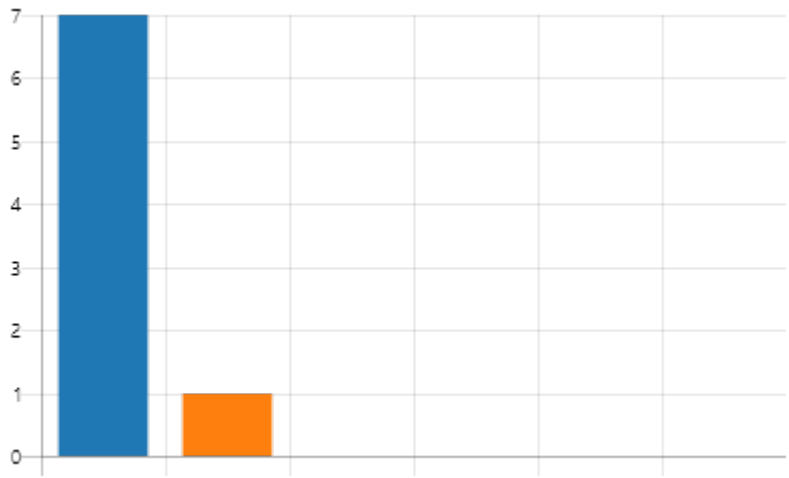
Forms Feedback Survey for City of Santa Fe Draft... - Saved

Feedback Survey for City of Santa Fe Draft Mitigation Plan Update

8	13:16	Active
Responses	Average time to complete	Status

1. Select affiliation (select one):

Member of the Public	7
Private industry	1
Nonprofit	0
Government-Local	0
Government-State	0
Government-Federal	0



2. Please provide comments regarding the Draft Update of the City of Santa Fe Mitigation Plan here:

8
Responses

Latest Responses

"Please do not do prescribed burns or pile burns during pandemics or ot...

"I believe it would be prudent to contract with the same vendor to gener...

"This is David Perez, CEO Of the Santa Fe Group. We are a local business...

Public Feedback Results

ID	Start time	Completion time	Email	Name	Select affiliation (select one):	Please provide comments regarding the Draft Update of the City of Santa Fe Mitigation Plan here:
2	3/25/20 11:42:06	3/25/20 11:42:54	anonymous		Member of the Public	The Dam Failure map is unavailable requiring a password.
3	3/26/20 9:39:06	3/26/20 9:43:43	anonymous		Member of the Public	Keep firearms out of all vegetative areas, especially woods, forests, arroyos, bosques, canyons; no campfires and no fireworks--ever.
4	3/26/20 11:29:22	3/26/20 11:32:50	anonymous		Member of the Public	Very complete although i had a question about early identification. Seemed on first read there was plenty of attention to hazard management / risk assessment but not much about early warning systems and procedures. What's in place there? Do we rely mostly on the State & Fed agencies? How quickly does that translate to alerts?
5	3/26/20 11:33:12	3/26/20 11:52:05	anonymous		Member of the Public	I have browsed through the mitigation plan. I retired from the City in 2007 and served under five different City Managers as their 'troubleshooter.' I worked with the Emergency Preparedness person from the SFFD and we held meetings with key personnel from each department to formulate what kinds of mitigation efforts needed to be addressed. I have the same concerns now that I had then. There is nothing detailed I could see that indicates how you keep the City of Santa Fe functioning from remote centers. As an example: there is a gas explosion or a severe fire restricting access to City Hall or the facilities on Siringo Road. How organized are you that there can be access to the City's IT systems. Can Finance and Payroll still continue to issue paychecks, or PO's? Does HR have the ability to connect with all city employees via their cell phones and does HR have a complete and current list of each employee's emergency contact information. How set up is Finance to be able to issue emergency PO's in large amounts should there ever be a need to procure massive amounts of supplies? I remember so well the big snowstorm we had prior to my retirement and we were not prepared. Employees could not get to work, and we did not have a command central that could be operational immediately. You have thousands of personnel files and should there ever

					be a fire in city hall, you are screwed if they are lost. What kind of plans are in place should IT be affected and the systems go down. Years ago there were backup tapes being run and taken supposedly to a secure place. Today I imagine there are more secure ways of having backups. When Santa Fe was being surrounded by Wildfires, again, before I retired, we spent many meetings trying to figure out our strategy to pay for setting up shelters and purchasing supplies to feed and house residents that could not return to their homes. At that time Finance had some restraints to issuing PO's in short order to stores statewide. And now? I am sure I could come up with more questions to ask, but for now, the above are my comments. Julie Berman
6	3/26/20 15:47:43	3/26/20 15:49:17	anonymous	Member of the Public	Please stop all prescribed burns and pile burns during emergencies
7	3/27/20 11:37:35	3/27/20 11:40:32	anonymous	Private industry	This is David Perez, CEO Of the Santa Fe Group. We are a local business with a global enterprise and third party risk organization called Shared Assessments (www.sharedassessments.org) We would like to offer to help with your risk mitigation program for free as a way to help the city. Please reach out to me at david@santa-fe-group.com
8	3/29/20 9:08:28	3/29/20 10:21:12	anonymous	Member of the Public	I believe it would be prudent to contract with the same vendor to generate a Pandemic Annex to this plan. The sooner the city moves forward with identifying mitigation actions related to pandemic the better prepared it will be when the inevitable mitigation funds become available. The city should identify all mitigation opportunities and needs regardless of whether they currently meet FEMA or State funding eligibility. These actions might include localized strategic stockpiling, protection of critical public facilities, such as perimeter fencing for hospitals, pharmacies and grocery stores, architectural modifications to public spaces to reduce the exposure to disease, policy change associated with cleaning and maintenance, security, hoarding management, resource distribution and supply chains.

					I further believe by acting provocatively the city will avoid public skepticism of the mitigation plan because it does not address pandemic at the level we are currently experiencing. An Annex to the Plan would allow the city to make minor modifications to the existing plan and then thoroughly address the mitigation opportunities that reveal themselves for pandemic, rather than rushing to amend the existing plan. Just my thoughts Brian Williams
9	4/11/20 9:42:12	4/11/20 9:43:21	anonymous	Member of the Public	Please do not do prescribed burns or pile burns during pandemics or other natural disasters.

Survey123 Feedback

Please Enter Date of Your Concern	Hazard Concern	Other Hazards - Hazard Concern	Concern Description	Ideas for Mitigation	Do you wish to have the City contact you regarding this concern?	If Yes, please provide a contact information
3/25/2020 18:00	wildfire		I always have a wildfire concern. I live in the county off 9 mile rd. BUT if you create a map which shows the WUI interface wildfire areas - PLEASE GIVE A KEY TO THE COLOR CODING. I CAN ASSUME RED IS MOST DANGEROUS. yellow? Green? Thanks	We need more Chamisa clearing.		dtverite@comcast.net
3/25/2020 18:00	wildfire		The color-coded map that accompanies the Wildfire risk assessment does not appear to include any definition of what the colors mean, which renders the map useless to lay residents such as myself.		no	
3/25/2020 18:00	dam_failure		The map that would show the properties at risk of inundation requires a ArcGIS Online login, which renders this section useless to the lay property owner such as myself.		no	
3/25/2020 18:00	human_caused_hazards		This otherwise thoughtful plan completely fails to address our current situation in which a sociopathic president, enabled and protected by a small cadre of self-serving officials and extremist	Governmental and religious leaders of integrity must forge and activate common cause networks to	no	

			religious leaders is deliberately endangering the lives and well-being of the nation and the planet.	speak out truthfully and enlist other leaders in the private sector, to include retired military, to break through the cacophony of lies, expose the shameful self-interest of the few, and create a tsunami of public outrage sufficient to bring voters to the polls to evict the criminal enterprise now endangering our future.		

APPENDIX C: ADOPTION RESOLUTION

CITY OF SANTA FE, NEW MEXICO

RESOLUTION NO. 2020-47

INTRODUCED BY:

Councilor Michael J. Garcia

Councilor JoAnne Vigil Coppler

Councilor Renee Villarreal

A RESOLUTION

ADOPTING THE CITY OF SANTA FE MITIGATION PLAN.

WHEREAS, the City of Santa Fe is vulnerable to natural hazards such as flash floods, wildfire, and drought, as well as human-caused hazards that can result in loss of life and property, damage to the environment, economic hardship, and threats to the public's health and safety; and

WHEREAS, a Mitigation Plan for the City of Santa Fe, New Mexico (the "Plan") was developed by City staff with input from members of the public; and

WHEREAS, the Plan recommends mitigation activities that will reduce loss of life and property, damage to the environment, and threats to public health and safety by the natural and human-caused hazards that face the City; and

WHEREAS, the Federal Emergency Management Agency (FEMA) requires adoption of the plan and updating every five years in order to ensure the City's continued eligibility for certain categories of federal hazard mitigation funding.

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BODY OF THE CITY OF SANTA FE that the City of Santa Fe Mitigation Plan, dated April 2020 and attached

hereto as Exhibit A, is hereby adopted as an official plan of the City of Santa Fe.

BE IT FURTHER RESOLVED that the City Manager shall ensure the Santa Fe Emergency Management Director is:

1. Responsible for coordinating hazard mitigation planning and related actions and programs of the City of Santa Fe; and
2. Directed to bring appropriate revisions to the City's mitigation plan to the Governing Body to reflect City issues as soon as possible and thereafter on an annual basis and prepare a report to the Governing Body. The report shall include an assessment of progress made toward meeting the goals and objectives of the Plan and implementing specific actions identified in the Plan. The report shall include targets for the following year, including recommendations for any appropriate revisions to the Plan.

PASSED, APPROVED, and ADOPTED this 9th day of December, 2020.

ATTEST: ALAN WEBBER, MAYOR

YOLANDA Y. VIGIL, CITY CLERK

APPROVED AS TO FORM:

ERIN K. McSHERRY, CITY ATTORNEY

Legislation/2020/Resolutions/2020-47 City Mitigation Plan Adoption