



Appendix H: Community Wildfire Protection Plan



September 2020

FIRE ADAPTED COMMUNITIES



People and communities are prepared to receive, respond to and recover from wildfire.

SAFE, EFFECTIVE WILDFIRE RESPONSE



All jurisdictions coordinate to implement safe, effective, risk-based management decisions.

RESILIENT LANDSCAPES



Landscapes are resilient to fire, insect, and disease disturbances, regardless of jurisdictional boundaries.

SANTA FE COUNTY CWPP

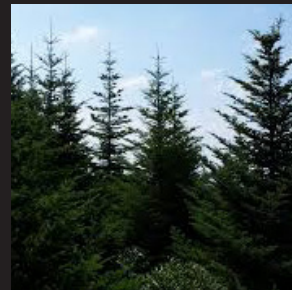
POST-FIRE RECOVERY



Preparing communities for inevitable fire effects, through pre-fire planning for post-fire response.

SWCA ENVIRONMENTAL CONSULTANTS

Santa Fe County Community Wildfire Protection Plan





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EXECUTIVE SUMMARY

This Santa Fe County Community Wildfire Protection Plan (SCCWPP) addresses hazards and risks of wildland fire throughout Santa Fe County (hereafter referred to as the County) and makes recommendations for fuel reduction projects, public outreach and education, structural ignitability reduction, and fire response capabilities. The County comprises a diverse landscape and land ownership but a population with a common concern: the need to prepare for wildfire to reduce the risk of loss of life and property.

While community members are familiar with large fires, as several have occurred in the southwest region in recent years, the County itself has experienced several years with minimal large catastrophic fires. Fire managers believe the danger is increasing, however, and a large fire is likely imminent. This SCCWPP has been developed to assist the County in ensuring that a catastrophic wildfire will be avoided in the future by assessing areas at risk and recommending measures to decrease that risk.

The purpose of the SCCWPP is to assist in protecting human life and reducing property loss due to wildfire throughout the County. The plan is the result of a community-wide wildland fire protection planning process and the compilation of documents, reports, and data developed by a wide array of contributors. This plan was compiled in 2019 and 2020 as an update to the original 2008 CWPP. All versions of the SCCWPP have been developed in response to the federal Healthy Forests Restoration Act (HFRA) of 2003.

The SCCWPP meets the requirements of the HFRA by addressing the following:

1. Having been developed collaboratively by multiple agencies at the state and local levels in consultation with federal agencies and other interested parties.
2. Prioritizing and identifying fuel reduction treatments and recommending the types and methods of treatments to protect at-risk communities and pertinent infrastructure.
3. Suggesting multi-party mitigation, monitoring, and outreach.
4. Recommending measures and action items that residents and communities can take to reduce the ignitability of structures.
5. Soliciting input from the public on the Draft SCCWPP.

A group of multijurisdictional agencies (tribal, federal, state, and local), organizations, and residents joined together as a Core Team to develop this CWPP Update. Many of these Core Team members were part of the original Core Team for the 2008 CWPP. Core Team members have also had many years of experience working in fire management in the County.

The planning process has served to identify many physical hazards throughout the County that could increase the threat of wildfire to communities. During development of the 2008 CWPP, the community members were highly engaged in providing input. Several public meetings were convened to gather comments. By incorporating public and Core Team input into the recommendations, treatments are tailored specifically for the County. The SCCWPP emphasizes the importance of collaboration among multijurisdictional agencies in order to develop fuels mitigation treatment programs to address wildfire hazards. The County has a committed team of career and volunteer firefighters, who work arduously to protect the life and property of citizens, but without homeowners taking on some of the responsibility of reducing fire hazards in and around their own homes, these resources are severely stretched. A combination of homeowner and community awareness, public education, and agency collaboration and treatments are necessary to fully reduce wildfire risk.

A significant amount of fire mitigation work has been completed by the County and other stakeholders since the 2008 SCCWPP was completed. These actions include many cross-boundary hazardous fuels projects that cover various jurisdictions; the completion of defensible space treatments in the wildland urban interface (WUI) to reduce the potential for structural ignitability; hundreds of home hazard assessments, to identify actions homeowners can take to harden their homes and make them more

defensible; expansion of firefighting capability through the procurement of funds to purchase vital firefighting equipment to support the many fire departments throughout the County; and the development of hazard mitigation plans to support emergency management including the safe and effective evacuation of people and animals in the event of a wildfire or other emergencies.

Some of the highest risk areas identified in this SCCWPP are communities located within and adjacent to National Forest land and the WUI. Federal and state agencies have tirelessly treated these areas, including within the Santa Fe Watershed, utilizing an active prescribed fire program and mechanical treatments. Treatments to fuels in these high hazard areas contribute to decreasing the likelihood of wildfire's negative impacts on communities in the County WUI. Continued preventive activities are needed however to further reduce the negative impacts that wildland fire can have on communities and community members living in the WUI.

Communities located in bosque, grassland and shrubland areas of the County also need to prepare for fast paced wildfire spread in these fine fuels. Recommendations for improving wildfire mitigation in these communities may include focusing on actions to reduce the presence of weeds in WUI communities, encouraging residents to mow borders around their property; encouraging residents to harden their homes to potential flame impingement from fast moving grass fires; and, equipping fire departments to respond quickly to these fast-paced wildfire events.

The SCCWPP provides background information, a risk assessment, and recommendations. Unlike the original CWPP and updates, much of this background information is housed in several appendices to the main document to focus the main document on analysis and action items. Chapter 1 provides a general overview of CWPPs and describes actions that have been taken to mitigate wildfire risk since 2008. Chapter 2 presents an overview of the fire environment and specific information about fuel types. Chapter 3 describes the results of the risk assessment and summary of community risk ratings. Chapter 4 provides recommendations with respect to the three primary goals of the National Cohesive Wildfire Strategy: 1) restore and maintain landscapes, 2) create fire-adapted communities, and 3) improve wildfire response. Recommendations outlined under each goal include action plans and monitoring strategies for implementing fuels reduction projects, reducing structural ignitability, improving fire response capabilities, and initiating public outreach and education. Chapter 5 describes monitoring strategies and details regarding implementation of actions. The plan does not require implementation of any of the recommendations, but the message throughout this document is that the greatest fire mitigation could be achieved through the joint actions of individual homeowners and local, state, and federal governments. It is important to stress that this document is an initial step in raising public awareness and treating areas of concern and should serve as a tool in doing so.

The SCCWPP should be treated as a live document to be updated annually or immediately following a significant fire event. The plan should continue to be revised to reflect changes, modifications, or new information. These elements are essential to the success of mitigating wildfire risk throughout Santa Fe County and will be important in maintaining the ideas and priorities of the plan and the communities in the future.

CWPP STORY MAP

This CWPP was developed during the 2020 COVID-19 pandemic. As a result, it was not possible to convene the public to gather input in the planning process. In order to address this, the County developed a story map (online web content) to disseminate information to the public and provide an opportunity for the public to provide input into the plan content. In addition to facilitating information sharing, the story map also provides the County with a platform that can be readily revised to keep the CWPP document current. The CWPP is shared on the Wildland page of the County Fire Department: <https://www.santafecountynm.gov/fire/wildland>.

PREVIOUS CWPP ACCOMPLISHMENTS

The following table outlines the progress that has been made throughout the County since the 2008 CWPP. This table should be revised annually as projects are implemented.

Project	Date	Entity	Serves to
Structural Ignitability Projects			
The County enacted a new WUI code, based on the international WUI code. The code includes requirements for vegetation management around a structure, based on the Ready-Set-Go! Defensible space guidelines. The County revised their WUI delineation for implementation of the WUI code.	2018	Santa Fe County	Provide legal guidelines for new construction and remodels, pertaining to structural requirements and defensible space.
The City of Santa Fe is working toward adoption of a similar WUI code.	2020	City of Santa Fe	Provide legal guidelines for new construction and remodels, pertaining to structural requirements and defensible space.
Several WUI communities have established phone trees for notifications. This is especially encouraged for communities with a large number of vacation properties.	2013	Santa Fe County Fire Dept	Facilitate communication between residents in the event of an emergency.
A pilot project utilizing EQIP funds was launched in La Barbaria in 2013 for a cost-share program in conjunction with Santa Fe-Pojoaque Soil and Water Conservation District (SWCD). Similar efforts have been implemented throughout the Edgewood SWCD and southern portion of the County.	2013	Multiple partners	Provide funding to implement hazardous fuels treatments.
Assessments were carried out to assess access and improve accessibility into the property, as part of the home hazard assessments.	2013	Santa Fe County Fire Dept	Provide direction for homeowners on how to improve emergency access.
The County ran a program to provide rural address markers to all residents.	2013	Santa Fe County Fire Dept	Facilitate fast emergency response.
The County ran a program to educate residents about the importance of home hardening, as part of the home hazard assessments. Ready, Set, Go! literature is provided to all residents who enquire about an assessment.	2013	Santa Fe County Fire Dept	Provide direction for homeowners on home hardening techniques to reduce the wildfire threat from ember cast.

Project	Date	Entity	Serves to
National Association of Counties granted the County Fire Department an Achievement Award for their Wildfire Hazard Assessment and Prevention Program.	2015	New Mexico Association of Counties (NMAC)	Recognize the actions the County has implemented to improve education to residents of the County and mitigate wildfire hazards.
Fire Response Projects			
The Wildland Division was formed, funded from a Collaborative Forest Restoration Program (CFRP) grant and a NMAC grant. A WUI specialist and several other staff members have been hired. The Division has a 5-10 person fire suppression/fuels crew and a seasonal Youth Conservation Corp (YCC) crew.	2008	Santa Fe County Fire Dept	Increase wildfire response capacity
The City of Santa Fe Fire Department has also established a Wildland Division and a permanent and seasonal fire crew.	2008	City of Santa Fe Fire Dept	Increase wildfire response capacity
The County initiated online training for National Wildfire Coordinating Group (NWCG) courses. This online platform is a work in progress and a priority for the County in 2020.	2011	Santa Fe County Fire Dept.	Provide opportunities for volunteer fire fighters to keep current on all NWCG classes and refreshers.
A volunteer firefighter reimbursement program was started in 2009 and improved upon in 2020 by increasing payments for calls and trainings.	2009	Santa Fe County Fire Dept	Support and incentivize volunteerism
The City of Santa Fe has implemented a program partnering with Santa Fe Beautiful, to provide curbside pick-up of slash and green waste.	2019	City of Santa Fe	Support and encourage residents to implement defensible space practices.
The County provides fire refresher training (RT-130) for approximately 260 people each year. Trainings are provided for all entities.	Annually	Santa Fe County Fire Dept	Maintain qualifications for key fire responders.
The County utilize a SimTable for community education and officer training.	2013	Santa Fe County Fire Dept	Enhance fire training through mock incidents.
The County has established Mutual Aid Agreements (MAA) and Joint Powers Agreements (JPA) with state and federal partners to maintain and enhance fire response capacity. The JPA allows for provision of firefighting resources to non-fed agencies.	2013	Santa Fe County Fire Dept	Enhance cross-jurisdictional response.
The County hosts an annual agency cooperater meeting every year	Annually	Santa Fe County Fire Dept	Improve coordination ahead of fire season.
There has been significant equipment replacement countywide, including new Type 6 trucks for several volunteer departments.	Annually	Santa Fe County Fire Dept	Maintain equipment quality and ensure resource needs are being met.

Project	Date	Entity	Serves to
The County has installed a new CAD system within the Regional Emergency Center, which will be tied to vehicle laptop global positioning systems (GPS).	2019	Santa Fe County Fire Dept	Support and enhance emergency response.
The County geographic information system (GIS) mapped all fire hydrants within the County boundary.	2012	Santa Fe County GIS	Support fire response and maintenance of suppression infrastructure.
The Santa Fe County Hazard Mitigation Plan (HMP) was updated in 2018.	2018	Santa Fe County Emergency Management	Provide planning for all hazards within the County.
<p>The Wildland Incident Organizer is a documentation aid for wildland events with sections on:</p> <ul style="list-style-type: none"> • Incident Complexity Analysis • Unit Log • Initial Attack Size-Up • Spot Weather Observations and Forecast • Standards for Flagging • Fire Weather Observation Log • LCES Reminder • Resource Documentation • Radio Frequency List • Risk Management Guide • After Action Review Guide • Incident Objectives • Structural Watch-outs 	2011	Santa Fe County Fire Dept	Provide a rapid reference guide for use during a wildland incident.
Agencies throughout the County have been utilizing decision support tools for wildfire response, including the Wildland Fire Decision Support System (WFDSS)	2010	All agencies	Support decision making and planning and resource allocation during a wildfire event.
Public Education and Outreach Projects			
Ready, Set, Go! Program is being implemented in the County.	2018	Santa Fe County Fire Dept	Provide a consistent messaging for fire prevention activities.

Project	Date	Entity	Serves to
<p>The County has been implementing home hazard assessments since 2009. Assessments consist of windshield assessments, with home assessed briefly and packet material left at door or gate and more detailed requested assessments, where walkaround assessments are completed with homeowner, allowing for questions and answers. Packet materials consist of Firewise information, guides to mitigating property, fire resistant plant guides and basic evacuation preparation guide. The fire department’s focus is on providing Ready, Set, Go! literature, since that is the program that has been adopted countywide.</p>	2009	Santa Fe County Fire Dept	Provide more specific data on home hazards and results in more tailored direction for a homeowner to follow to mitigate hazards around their property.
<p>The County has been implementing larger workshop home assessments, for a group of neighbors on request. A SimTable is utilized for these assessments. The most successful meetings are those with HOAs or communities, or when fire prevention messaging is “piggybacked” on existing events. Larger regional meetings have been attempted but are not as successful. Since 2009, over 75 community educational meetings have been convened in the County.</p>	2009	Santa Fe County Fire Dept	Provide more specific data on home hazards and results in more tailored direction for a homeowner to follow to mitigate hazards around their property.
<p>State forestry produces radio ads, Fire Adapted Communities has begun TV ads, and Santa Fe County Fire Prevention is active on local radio stations. In 2013, a Living with Fire Conference was held at Santa Fe Community College with speakers and attendees from New Mexico, Colorado, and Arizona. Two websites (sfcfire-wildland.com and fireadaptednewmexico.org) distribute timely information, as well as Facebook and Twitter postings.</p>	2013	Santa Fe County Fire Dept	Keep wildfire in the minds of the local residents throughout the year and share new information for mitigating risk.
<p>The Greater Santa Fe Fireshed Coalition was formed in 2016 and is a coalition of public-private partners who convened to address wildfire risk and forest health in the Santa Fe Watershed. http://www.santafefireshed.org/</p>	2016	Santa Fe County Fire Dept	Take a proactive approach to improving the long-term resilience of the forests, watershed, wildlife and communities in the southern Sangre de Cristo Mountains.
<p>The Greater Santa Fe Fireshed Coalition, the Forest Stewards Guild, the City of Santa Fe Fire Department, and the Santa Fe National Forest collaborated to create signage about local fire ecology at Big Tesuque trailhead.</p>	2019	Greater Santa Fe Fireshed Coalition and others	Provide background to visitors about the ecology of the landscape and the importance of fire’s role in the ecosystem.

Project	Date	Entity	Serves to
The Greater Santa Fe Fireshed Coalition hosts “Wildfire Wednesdays” (a webinar) during the COVID-19 pandemic to inform participants about fire mitigation actions and activities as well as local fire ecology.	2020	Greater Santa Fe Fireshed Coalition	Continue public outreach around wildfire topics during the COVID-19 pandemic.
The County have hosted Town Hall style meetings (as called on by the County Commissioners) providing outreach to residents on fire prevention and fire risk.	2008	Santa Fe County Fire Dept	Provide outreach to community members.
During annual fire refreshers, the County fire department provides orientation on the Ready, Set, Go! materials; County firefighters can then outreach to the public whenever possible.	2008	Santa Fe County Fire Dept	Provide a consistent message between fire departments and the public.
The County has utilized the Fireworks Curriculum (developed by the Missoula Fire Lab) in local schools to educate youth in fire prevention and introduction of fire into fire-adapted veg communities. The department is looking at ways to restructure and potentially expand this program.	2008	Santa Fe County Fire Dept	Educate youth on fire science and fire prevention.
The County has and continues to hold emergency preparedness meetings. The County will respond to requests for information and provide Emergency Management personnel to discuss emergency reverse 911 and other emergency management protocols.	2008	Santa Fe County Emergency Management	Prepare residents for evacuation and emergency messaging.
The County has been working to build strong communication networks between departments, and the public. New technologies have been employed, including Smart 911, Santa Fe alert and social media platforms.	2013	All entities	Improve messaging before, during and after a wildfire event.
Fuel Treatments			
The County works with a YCC crew for hazardous fuel treatment projects.	2009	Santa Fe County Fire Dept	Implement and maintain hazardous fuel reduction.

Project	Date	Entity	Serves to
Several landscape-level treatment projects have been implemented utilizing multijurisdictional and cross boundary partnerships (see Figure 4.1). 900 acres have been treated on state lands. Approximately 170,512 acres of U.S. Forest Service (USFS) lands have been treated in the eastern portion of the Santa Fe National Forest. This includes 88,313 acres of completed treatments; 5,087 of ongoing treatments; and 77,112 acres of historical treatments. There are additional planned treatments covering 130,918 acres of USFS lands (NMFWR 2020).	2009	Multiple agencies	Address landscape level forest health and hazardous fuel loading.
Chipper days are scheduled as needed to support community clean-ups; however, the County is moving toward curbside pick-up of waste, using a grapple truck and 40-yard dumpsters.	2013	Santa Fe County Fire Dept	Encourage and support defensible space practices on private land.
The County has been able to mobilize fire fighters using the Resource Mobilization Plan, to give fire fighters necessary fire experience.	2019	Santa Fe County Fire Dept	Provide on-fire training for County fire staff.
The Bureau of Indian Affairs (BIA) developed fuel management plans with each of the Pueblo within the County.	2009	BIA	Address wildfire hazards on Pueblo lands.
The Santa Fe-Pojoaque Soil and Water Conservation District offered a private, tribal, and non-federal public lands grant funding opportunity for landowners.	2019	Santa Fe-Pojoaque Soil and Water Conservation District	Create defensible space around structures within Hyde Park and Tesuque Corridors, as well as other areas around the Fireshed.
The National Fire Protection Association and State Farm offered small grants to fund wildfire risk reduction and preparedness activities on Wildfire Community Preparedness day.	2020	National Fire Protection Association and State Farm	Bring the community together to take action to reduce wildfire risk.
The U.S. Department of Agriculture granted funding to the Greater Santa Fe Fireshed for activities that will mitigate the risk of wildfire, improve forest health, and protect water quality.		U.S. Department of Agriculture	Complete science-based restoration projects collaboratively.
The County works with City Wildland Division crew, YCC crews, New Mexico State Forestry Division's (NMSF's) Inmate Working Crew, Returning Heroes Veterans Crew, Chimayo Conservation Corp, and private contractors. At a minimum, 20 new jobs have been created since 2008 to implement the CWPP (Evans et al. 2015).	2008	All	Increase the capacity to implement fuel mitigation.



The New Mexico Draft Forest Action Plan (EMNRD 2020) states that New Mexico, like other western states, faces urgent issues concerning forests and watersheds, including catastrophic wildfires, epidemic insect outbreaks, and changing climate conditions (New Mexico Department of Energy, Minerals, and Natural Resources [EMNRD] 2020). As wildfire severity increases, communities need a plan to help prepare for, reduce the risk of, and adapt to wildland fire events. Community Wildfire Protection Plans (CWPPs) help accomplish these goals. A CWPP provides recommendations that are intended to reduce, but not eliminate, the extreme severity or risk of wildland fire.

In 2008, Santa Fe County (the County) completed its first CWPP. This CWPP received a partial update in 2015. The development of the County CWPP has included meaningful collaboration among many local stakeholders including local, state, and federal officials, as well as other interested parties such as non-governmental stakeholders and private citizens. Much of the information brought forward from 2008 and 2015 is still current and reflects the concerns and issues that have been expressed by the public over recent years.

This document, hereinafter known as the “2020 Update of the Santa Fe County CWPP” (SCCWPP) reviews, verifies, and/or identifies potential new priority areas where mitigation measures are needed to protect from wildfire the irreplaceable life, property, and critical infrastructure in the County. This 2020 CWPP reviews and presents potential treatments for mitigation of wildfire-related risks in the priority areas but does not attempt to mandate the type and priority for treatment projects that will be carried out by the land management agencies and private landowners. With the responsibility for implementing wildfire mitigation treatments being totally at the discretion of the landowner, the 2020 SCCWPP will only identify potential treatments and a suggested priority for these projects.

PURPOSE

It is the intent of this 2020 SCCWPP to provide a countywide scale of wildfire risk and protection needs and then bring together all of the responsible wildfire management and suppression entities in the County to address the identified needs and to support these entities in planning and implementing the necessary mitigation measures.

This CWPP update process involves looking at past fires and treatment accomplishments using the knowledge and expertise of the professional fire managers who work for the various agencies and governing entities in the County. This update process identifies the current local wildfire risks and needs that occur in the County, supporting this with relevant science and literature from the southwest region.

NAVIGATION

The plan provides background information, a risk assessment, and recommendations to reduce or mitigate wildfire risk to communities. The CWPP is designed to be used by the residents of the County, as well as stakeholders tasked with forest, fire, and emergency management. Some information is therefore highly technical in order to provide sufficient detail to aid in project implementation. During this CWPP update, the plan has been supplemented with online content compiled into a project story map. The story map serves as a synopsis to the larger plan and is designed to make the information in this plan more accessible to the reader as it allows the public and stakeholders to interface with the various map products that have been developed through this planning process. The story map and CWPP will be readily updated as conditions change throughout the County. The story map can be accessed via the County Fire Department, Wildland webpage.¹

This CWPP is organized into several chapters with more detailed information compiled into appendixes. Chapter 1 provides an overview of CWPPs and describes the need for a plan; Chapter 2 gives an overview of the fire environment and introduces the reader to fire history information and well as fire response; Chapter 3 describes the methodology for the risk assessment and the results in detail; Chapter 4 outlines the mitigation strategies that could be implemented to reduce wildfire risk under the umbrella of the National Cohesive Strategy, including action plans that outline priorities and recommendations for reducing fuels, initiating public education and outreach, reducing structural ignitability, and improving fire response capabilities; and Chapter 5 provides suggested approaches to monitoring actions. The SCCWPP does not require implementation of any of the recommendations; however, these recommendations may be used as guidelines for the implementation process if funding opportunities become available. The recommendations for fuels reduction projects are general in nature; site-specific planning that addresses location, access, land ownership, topography, soils, and fuels would need to be employed upon implementation. Also, it is important to note that the recommendations are specific to wildland urban interface (WUI) areas and are expected to reduce the loss of life and property.

In developing the SCCWPP, a large amount of background information on the County is compiled and analyzed, including location and land use data, climate and weather data, baseline vegetation data, historic conditions, population, and demographics, CWPP planning process, fire regime and baseline conditions, fire policy, and other supporting background information. This information is presented in Appendix A, Community and CWPP Background.

Additional appendices to this CWPP include maps in Appendix B; the Core Team contact list in Appendix C; community descriptions and hazard ratings in Appendix D; the National Fire Protection Association (NFPA) Wildfire Fire Risk and Hazard Severity Form 1144 in Appendix E; funding opportunities in Appendix F; a homeowner's guide in Appendix G; and Community Outreach in Appendix H.

ALIGNMENT WITH THE NATIONAL COHESIVE STRATEGY

As part of the 2020 update to the CWPP, the 2008 plan has been aligned with the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy) and its Phase III Western Regional Action Plan by adhering to the nation-wide goal *“To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.”* (National Strategy 2014:3).

The primary, national goals identified as necessary to achieving the vision are:

Restore and maintain landscapes: Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.

¹ CWPP Story Map- <https://www.santafecountynm.gov/fire/wildland>

Fire-adapted communities: Human populations and infrastructure can withstand a wildfire without loss of life and property.

Wildfire response: All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

For more information on the Cohesive Strategy, please visit: <https://www.forestsandrangelands.gov/strategy/documents/strategy/CSPPhaseIIINationalStrategyApr2014.pdf>

Alignment with these Cohesive Strategy goals is described in more detail in Chapter 4, Mitigation Strategies.

In addition to aligning with the Cohesive Strategy, the CWPP Update also incorporates information on post-fire recovery, the significant hazards of a post-fire environment, and the risk that post-fire effects pose to communities (Figure 1.1).



Figure 1.1. CWPP Update incorporating the three primary goals of the Cohesive Strategy and post-fire recovery and serving as holistic plan for fire prevention and resilience.

ALIGNMENT WITH STATE PLANS AND AGREEMENTS

The New Mexico Forest Action Plan (FAP) (EMNRD 2020) is still in draft form at the time of writing, however, this CWPP aligns with many of the goals and strategies laid out in that plan, as described in Chapter 4. Future updates to the CWPP should continue to align with the FAP.

The recent passing of House Bill 266- the Forest and Watershed Restoration Act (FAWRA)- emphasized the need for restoration throughout the state, and allocates funds through EMNRD for the purpose of restoring forests and watersheds (See Appendix F for more information).²

In 2019, EMNRD and the USFS signed a shared stewardship agreement to commit to collaborative forest management and set landscape scale priorities for targeted treatments that manage risks and increase benefits in areas where they will have the greatest impact across broad landscapes. The shared stewardship agreement includes a commitment to implement the Cohesive Strategy. As part of the agreement, EMNRD and the USFS will use their respective authorities to conduct government-to-government consultation directly with the tribes and pueblos throughout the state to encourage shared stewardship strategies.

CORE TEAM

In 2008, representatives from various government agencies—along with members of fire departments and local communities—formed a Core Team and participated in decision-making activities that led to the development of the original Santa Fe County CWPP. Some of the members of the original Core Team were joined by new stakeholders and convened to provide input on this 2020 CWPP update. Stakeholder involvement is critical in producing a meaningful document that included all collaborators' diverse perspectives. The Core Team drives the planning process in its decision making, data sharing, experience, and communication with community members who are not on the Core Team. The project was kicked-off on October 31, 2019; the Core Team met for the first time on January 9, 2020, and convened again on March 4, 2020. Due to the Covid-19 pandemic throughout the spring of 2020, all other Core Team communications were limited to email and conference calls.

The Core Team List is provided in Appendix C.

PROJECT AREA

The project area includes all of Santa Fe County as delineated by its geographic and political boundaries. The project boundary encompasses several municipalities. The largest municipal area is the county seat of Santa Fe (Figure 1.2).

LAND OWNERSHIP

Santa Fe County has varied land ownership, including large areas of U.S. Forest Service (USFS) Santa Fe National Forest, USFS Wilderness Areas, Bureau of Land Management (BLM), National Park Service (NPS), tribal, state, and private land (Figure 1.3). Tribal lands include San Ildefonso Pueblo, Pojoaque Pueblo, Nambe Pueblo, and Tesuque Pueblo.

² <http://www.emnrd.state.nm.us/SFD/FAWRA.html>

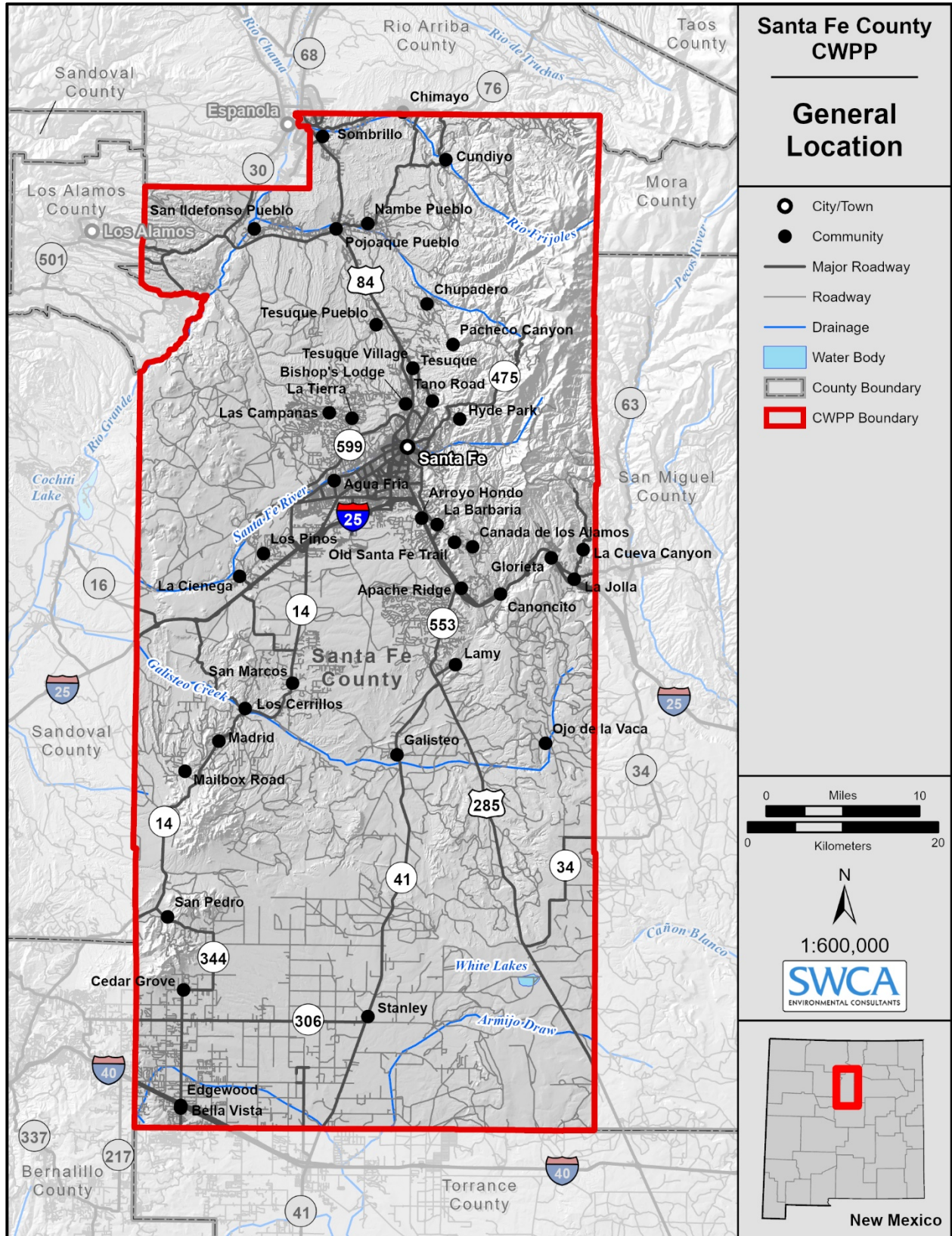


Figure 1.2. Santa Fe County CWPP general location.

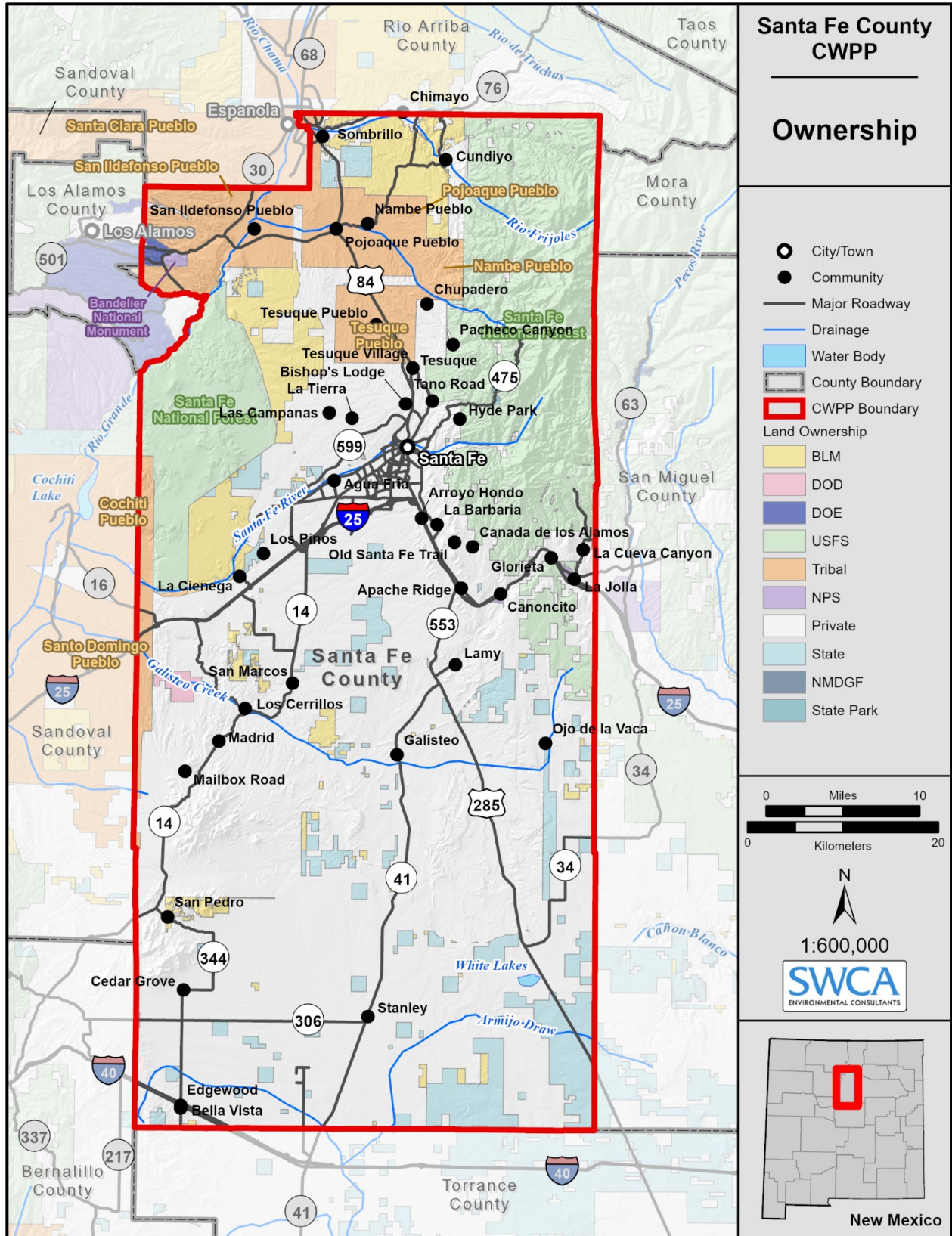


Figure 1.3. Santa Fe County land ownership.

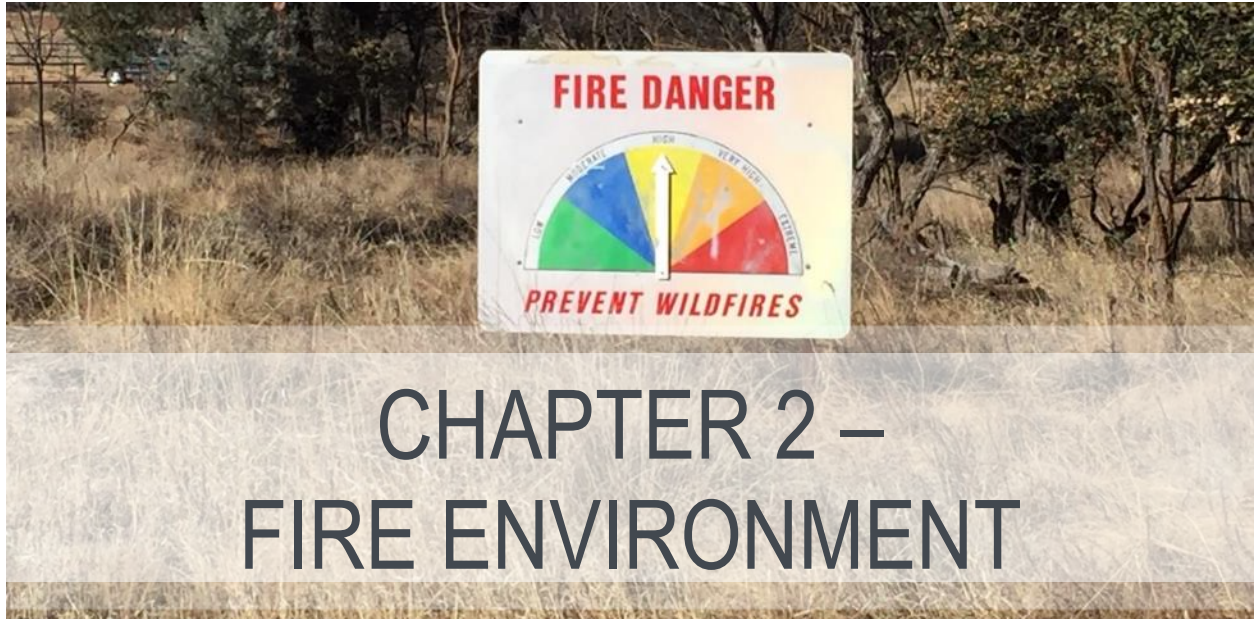
PUBLIC INVOLVEMENT

A key element in the CWPP process is the meaningful discussions it generates among community members regarding their priorities for local fire protection and forest management (Society for American Foresters [SAF] 2004). Due to the COVID-19 pandemic, traditional CWPP public meetings and gatherings were not possible. In order to accommodate engagement with the public, while adhering to restrictions on public gatherings, the County developed a CWPP story map (online content) to provide opportunities for information sharing and gathering.³ In addition, the draft was made available for public review from August 7 through September 6, and the story map and draft were announced through several different media outlets including newspapers, radio, social media, and online blogs (Appendix H).

Between July 25, 2020, and August 25, 2020, several social media and news sites published information about the CWPP story map and draft Plan. Additionally, the Santa Fe Reporter published an article during the week of September 21, 2020. Next Door, Facebook, and Twitter accounts were all used by New Mexico Fire Information, New Mexico State Forestry, the Southwest Fire Consortium, and more to distribute information to the public about the Plan update and the public comment period. In addition, the Richard Eeds show featured an interview with two Core Team members on August 20, 2020. More information on the details of these online resources (including URLs) can be found in Appendix H. Appendix H also includes a brief summary of the story map including representative photographs of the information available to the public.

During subsequent updates to this plan, the County will employ more traditional methods of engagement to ensure the community are able to continue to provide substantive input into the document. Recommendations for future community engagement and outreach are provided in Table 4.4.

³ CWPP Story Map- <https://www.santafecountynm.gov/fire/wildland>



CHAPTER 2 – FIRE ENVIRONMENT

WILDLAND URBAN INTERFACE

A WUI is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior [USDI] and U.S. Department of Agriculture [USDA] 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation.

The WUI creates an environment in which fire can move readily between structural and vegetative fuels, increasing the potential for wildland fire ignitions and the corresponding potential loss of life and property. Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI throughout the country as a whole, which is having a significant influence on wildland fire management practices. Combined with the collective effects of aggressive suppression policies, resource management practices, land use patterns, climate change, and insect and disease infestations, the expansion of the WUI into areas with high fire risk has created an urgent need to modify fire management practices and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens and Ruth 2005). Mitigation techniques for fuels and fire management can be strategically planned and implemented in WUI areas; for example, with the development of defensible space around homes and structures (Figures 2.1 and 2.2).



Figure 2.1. Example of the WUI in Santa Fe County.



Figure 2.2. Example of the WUI in Santa Fe County.

A CWPP offers the opportunity for collaboration of land managers to establish a definition and a boundary for the local WUI; to better understand the unique resources, fuels, topography, and climatic and structural characteristics of the area; and to prioritize and plan fuels treatments to mitigate for fire risks. At least 50% of all funds appropriated for projects under the Healthy Forests Restoration Act (HFRA) must be used within the WUI area.

On December 12th, 2018 the County Board of Commissioners adopted the International WUI Code.⁴ The Ordinance (2018-8) is cited as the Santa Fe County Fire Code and referred to as the Fire Code.

The Fire Code is effective within the unincorporated boundaries of the County, including private land or land owned by the United States. The Fire Code adopts the International Fire Code, 2015 edition, as well as Appendix Chapters B and D (IFC), as published by the International Code Council.⁵ The Fire Prevention Division of the Santa Fe County Fire Department is responsible for the implementation, administration and enforcement of the provisions of the Fire Code. The Fire Code applies to new construction only and includes provisions including but not limited to fire protection water supply, access road width and locations of above-ground propane tanks.

During the promulgation process for the Fire Code, the County revised the original CWPP WUI delineation. The classification the County used in delineating the WUI areas was based on an analysis of fuels, similar to a hazard assessment. The Core Team determined that this new WUI delineation should be integrated into this CWPP Update (Figure 2.3).

⁴ Ordinance No. 2018-8: https://www.santafecountynm.gov/documents/ordinances/Ordinance_2018-8.pdf

⁵ 2015 International Wildland Urban Interface Code: <https://codes.iccsafe.org/content/IWUIC2015/toc>

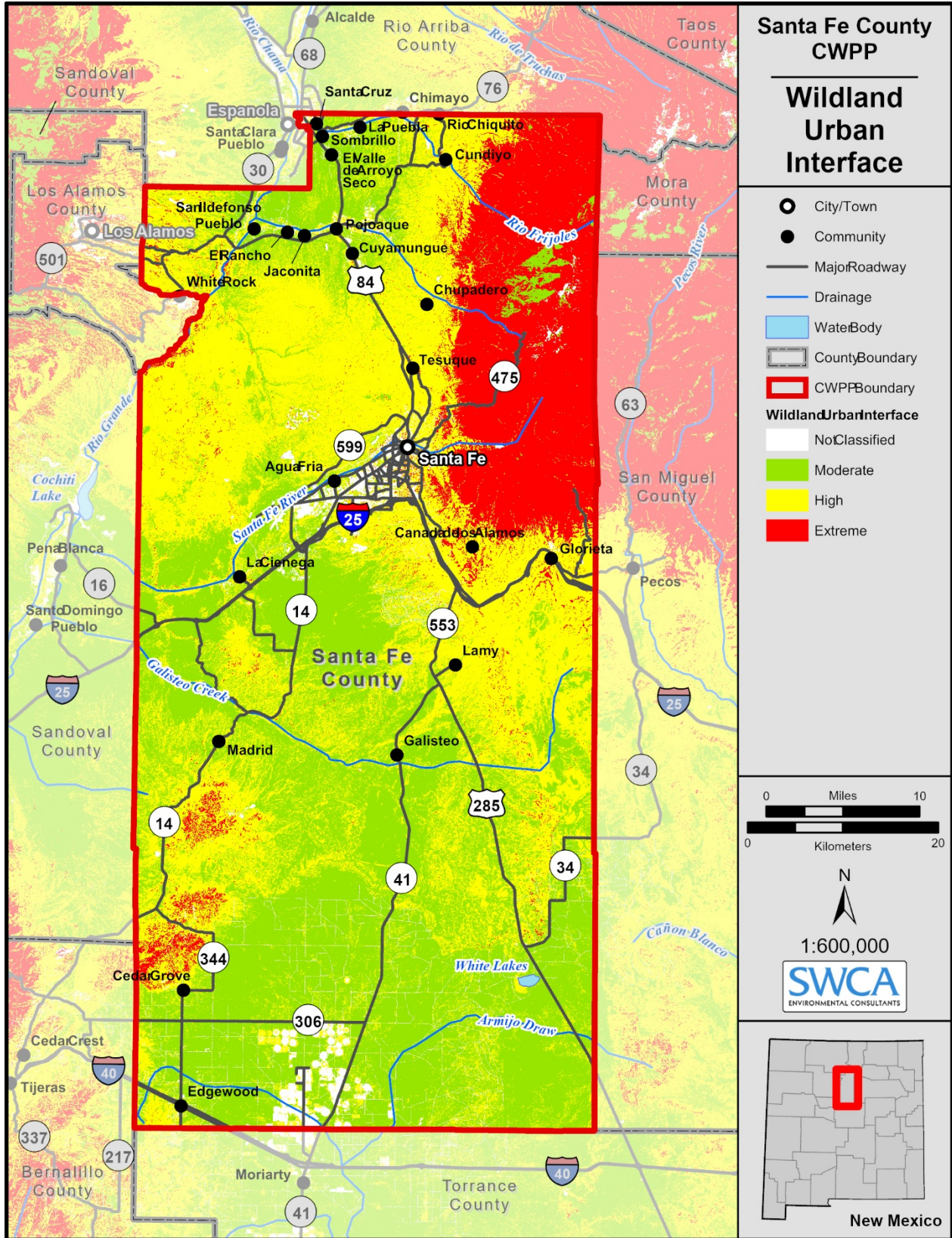


Figure 2.3. WUI delineation for Santa Fe County.

FIRE HISTORY

Recent Fire Occurrence

Historic wildfire activity and information regarding fire regime are described in detail in Appendix A.

Fire history data encompassing the period from 1960 to 1996 suggests a pattern of increased numbers of fires starting in 1996 (Figure 2.4), with a decline in fire frequency over the last decade. This data set may reflect an increase in fire reporting from the mid-1990s, or a change in suppression tactics away from immediate suppression of fires; because these data anomalies are unknown, the period from 1996 to 2018 is the focus of the discussion below.

During the more active fire period from 1996-2018, human ignitions are historically the most common cause of fires within the County (Figure 2.5); however, lightning is widespread throughout monsoon season and could contribute to fire starts from June through August (Figure 2.6). Most fires are detected early and suppressed before they gain acreage (Figure 2.7); however, given the right conditions, some fires may grow large and become difficult to suppress. During the development of the CWPP update, the County experienced the Medio Fire, a 4,010-acre fire on the Espanola Ranger District. The fire was a result of a lightning ignition on August 17, 2020 and demonstrates the potential for large fire growth. Adjacent counties with similar fuels and topographic conditions have also experienced large fires.

Most fires in the County have occurred along roadways and close to more populated areas. The Santa Fe National Forest and the Greater Santa Fe Fireshed have in contrast received very low numbers of fires over the last century (Forest Stewards Guild n.d). Figure 2.8 shows the fire history across the County since 1914.

A concern of residents in the WUI is the number of human ignitions, particularly with the development and improvement of roads, residences, and recreational opportunities in wildland areas. Human-caused fires account for approximately 84% of the wildfires recorded for the County since 1996. Although the majority of fires take place during the summer months, human-caused ignitions increase the potential for wildfires throughout the year.

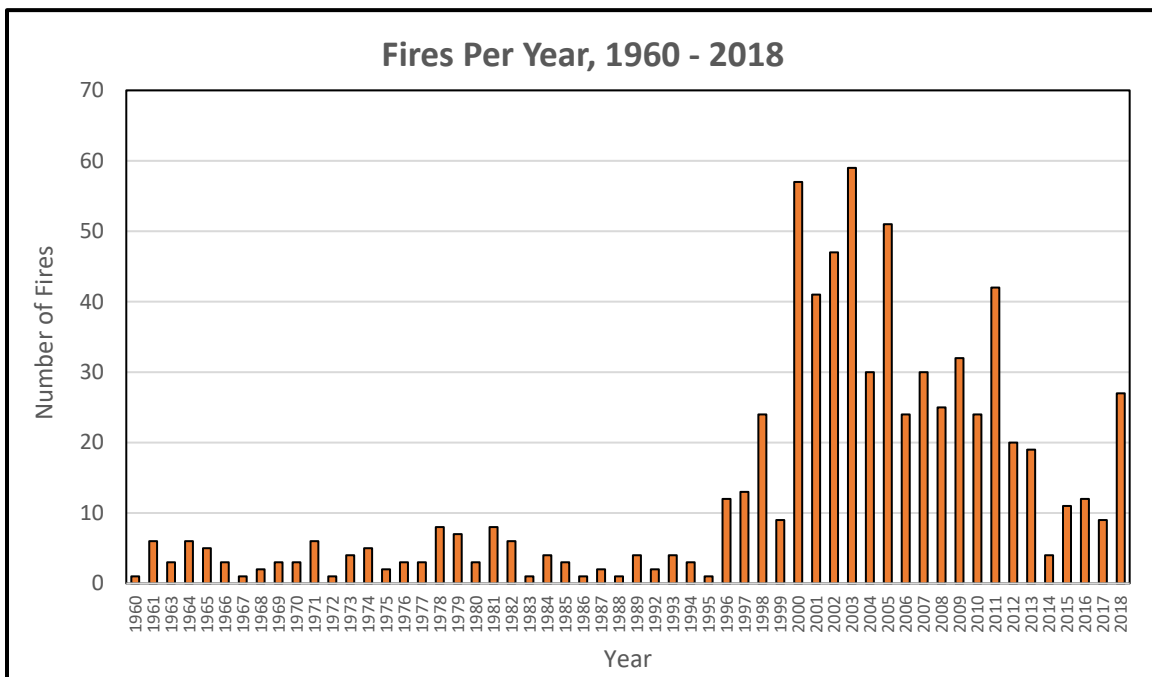


Figure 2.4. Annual wildfire frequency in Santa Fe County from 1960 to 2018, based on available data.

Source: USFS/NMSF.

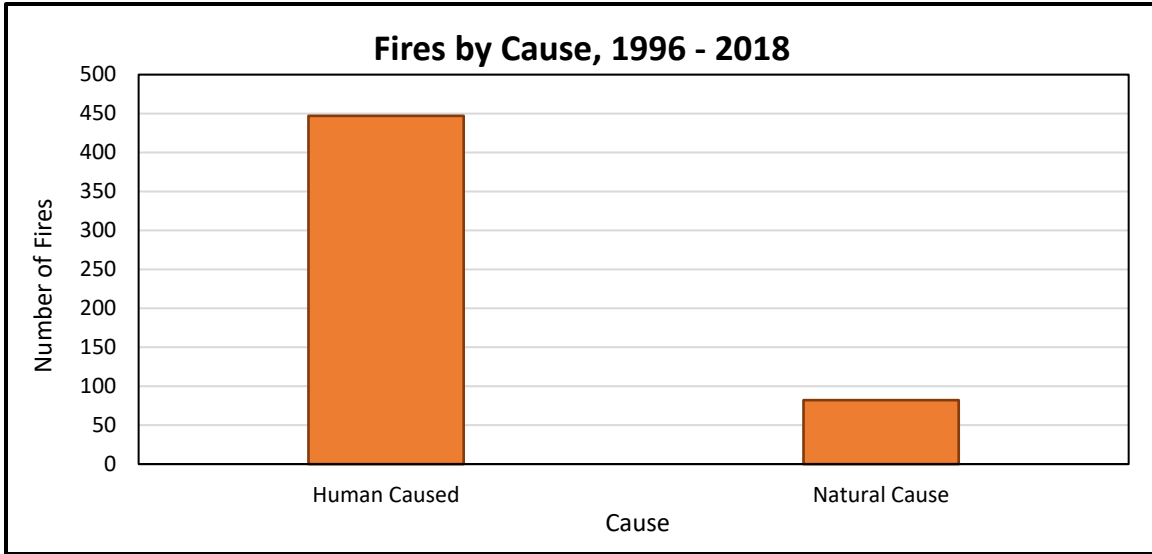


Figure 2.5. Fire causes for Santa Fe County from 1996 to 2018.

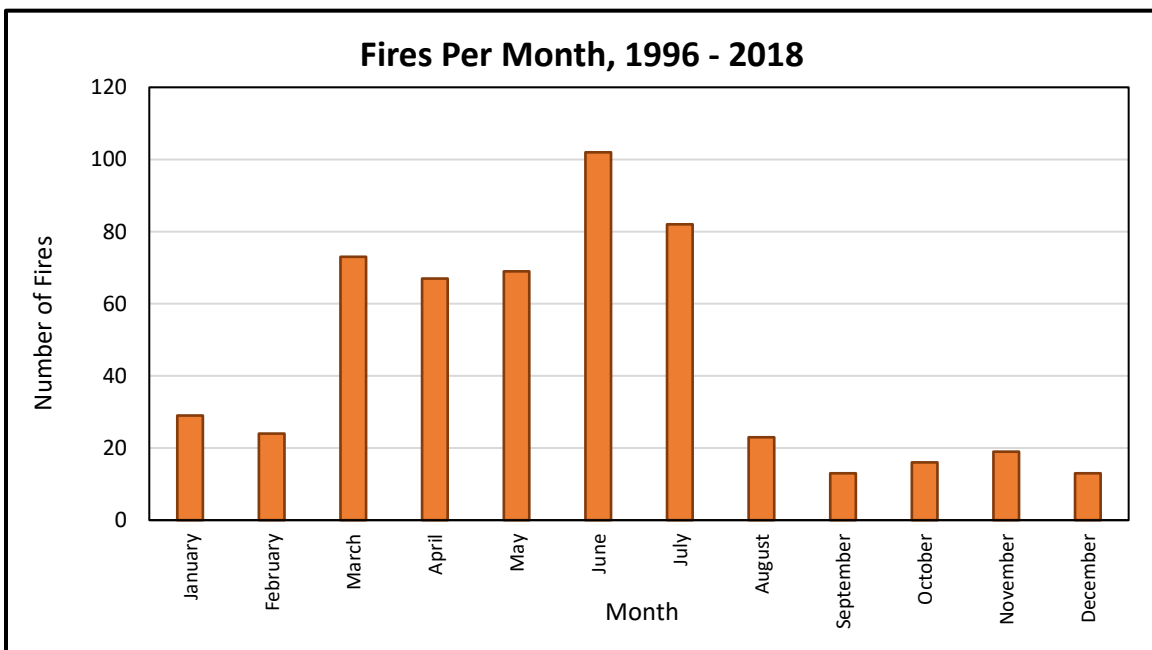


Figure 2.6. Monthly fire frequency in Santa Fe County based on data from 1996 to 2018.

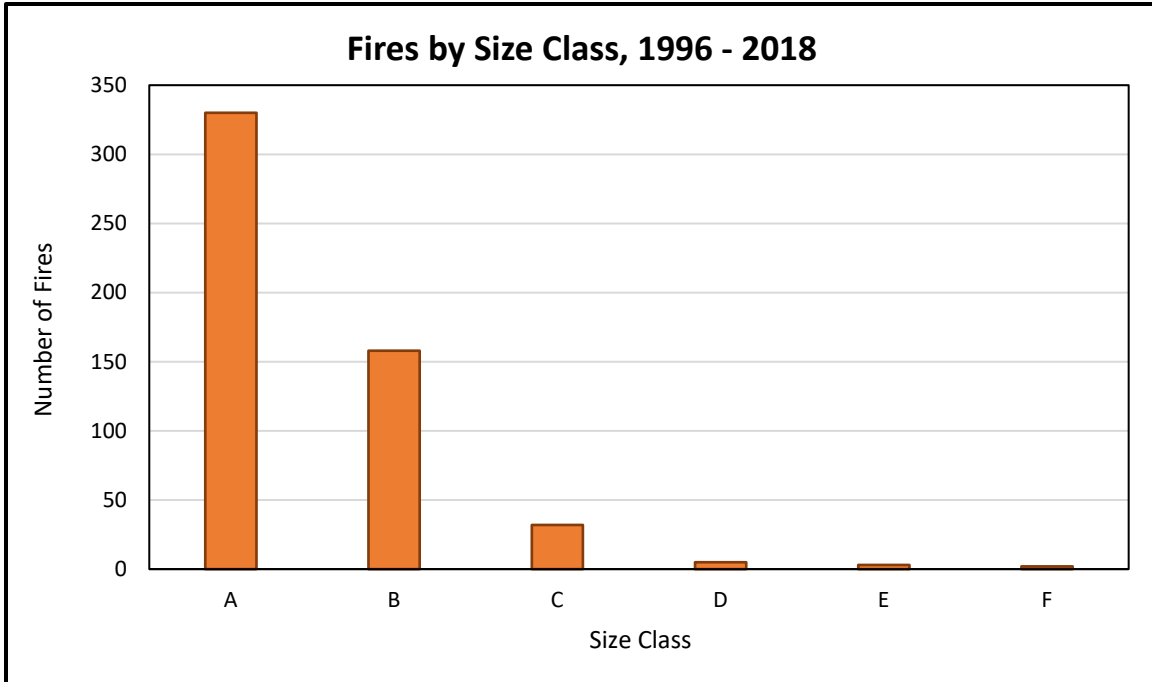


Figure 2.7. Fire size statistics for Santa Fe County based on fire history data from 1996 to 2018.

Size Class: A = 0.25 acre or less; B = greater than 0.25 to 10 acres; C = 10 to 100 acres; D = 100 to 300 acres; E = 300 to 1,000 acres; F = 1,000+ acres.

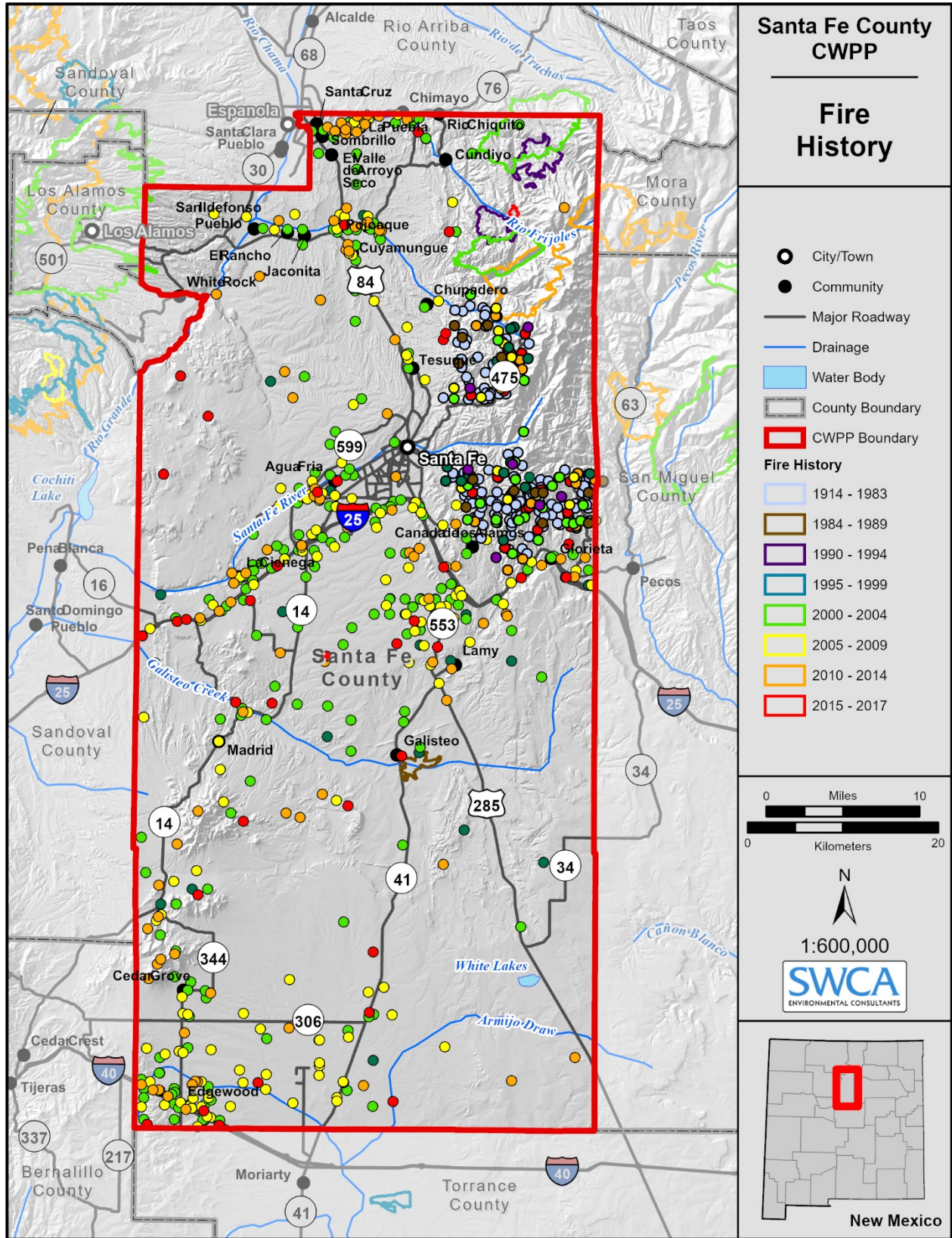


Figure 2.8. Fire history for Santa Fe County from 1914 to 2017.

Future Challenges

The long periods of drought that have been observed throughout the Southwest, in combination with altered forest management practices and fire exclusion policies over the last century, have resulted in frequent landscape-level, high-severity fires that are beyond the range of natural variability (Allen et al. 2002; Covington and Moore 1994). In the past few years, fires have grown to record sizes and are burning earlier, longer, hotter, and more intensely than they have in the past (Loehman et al. 2018; Westerling et al. 2006; Westerling 2016). According to the National Interagency Fire Center (NIFC), occurrence of catastrophic wildfires has greatly increased over the last 20 years. Westerling et al. (2006) claim that a study of large (>1,000 acres) wildfires throughout the western United States for the period 1970 to 2003 saw a pronounced increase in frequency of fire since the mid-1980s (1987–2003 fires were four times more frequent than the 1970–1986 average). The length of the fire season was also observed to increase by 78 days, comparing 1970–1986 to 1987–2003. An update to Westerling et al.'s 2006 work found that the frequency of large wildfires has continued to increase with each decade since 1970 (Westerling 2016). Within just the last 10 years, a record number of acreages have burned, and numbers are continually getting larger (NIFC 2019). In 2019, 50,477 fires were reported nationwide, burning 4.7 million acres (NIFC 2020). With increased fires comes increased suppression costs; 2018 beat all previous records, with federal firefighting costs hitting \$3,143,256,000. In New Mexico, 79,887 acres were burned by wildfire in 2019.

Periodic drought and intense rainfall patterns projected for the Southwest are expected to result in significantly diminished stream flow and drier surface conditions (Seager et al. 2008), shifting the regional climate further toward aridity. These changes in relative humidity are blamed for many of the wildfire conditions observed today, as increased drying over much of the Southwest has led to an increase in days with high fire danger (Abatzoglu and Williams, 2016; Prein et al. 2016). In the forests of the Southwest, total area burned, and percent burned at high severity have continued to increase over the past three decades (Mueller et al. 2020). Since ca. 2000, there has been a notable increase in annual area burned at high severity and a greater percent of fires are burning at high severity (Mueller et al. 2020).

Drought conditions coupled with warmer temperatures, also called global-change-type droughts, increase water stress on vegetation (Breshears et al. 2005) and decrease forest resilience to wildfire and other disturbance events. Advanced computer models are now making national-scale simulations of ecosystems, providing predictions of how fire regimes will change in the twenty-first century (Neilson 2004). Western grasslands are predicted to undergo increased woody expansion of piñon-juniper associated with increased precipitation during typical wet seasons. Summer months are predicted to be hotter and longer contributing to increased fire risk (Neilson 2004). The periodic drought and intense rainfall patterns that Gutzler (2013) and others (Alexander et al. 2006; Gutzler and Robbins 2011; Hurd and Coonrod 2008) project for the region are expected to result in significantly diminished stream flow and drier surface conditions (Seager et al. 2008), shifting the Southwest climate further toward aridity. Under these greater climatic extremes, fire behavior is expected to become more erratic, with larger flame lengths, increased torching and crowning, and more rapid runs and blowups associated with extremely dry conditions (Brown et al. 2004). In a study examining multiple climatic scenarios on Southwestern ecosystem structure, Loehman et al. (2018) found that their hot-arid climate scenario catalyzed fundamental, long-term forest ecosystem shifts including reduced biomass and altered forest structure. Extreme hot-arid climatic conditions can push forest ecosystems over a tipping point, or threshold at which even small changes could reorganize ecosystem processes (Loehman et al. 2018). Dry forests already at the edge of their climatic tolerance are most likely to convert to non-forest systems (Stevens-Rumann et al. 2018, Millar and Stephenson 2015). In Loehman et al.'s (2018) study, shrubland ecosystems were identified as a stable alternative to forest systems. These findings are in agreement with observed shifts from ponderosa pine forests to pinyon-juniper woodlands as a result of global-change style drought conditions. These predicted and observed shifts will radically affect land management goals and strategies on Southwestern landscapes. Current strategies can't prevent this ecosystem reorganization (Loehman et al. 2018). Rather, novel approaches must be utilized to manage for desired ecosystem conditions.

Although fire suppression is still aggressively practiced, fire management techniques are continually adapting and improving, especially in light of changing climate. Management of fire for resource objectives is an option for land managers in the County. Due to scattered human developments (homes, ranches, and farms) and values (residential and commercial structures, historic and natural values) throughout the WUI, suppression in WUI areas will always have to be a priority. However, combining prescribed fire and managing wildland fire for resource objectives with effective fuels management and restoration techniques have been proven to help re-establish natural fire regimes and reduce the potential for catastrophic wildfires on public lands associated with heightened risk due to a warming climate. The use of prescribed fire on private land is a decision to be made by the landowner, and it is acknowledged that given the prevailing drought such a management technique may not always be feasible in the County.

FIRE RESPONSE CAPABILITIES

Planning and Decision Support

As wildfires have continued to grow in size and severity over the last decade, this has led to fire managers needing to institute more robust pre-fire planning as well as adapt and improve decision-making tools in order to reduce risk to fire responders and the public and assess impacts on ecological processes.

A primary decision tool utilized by fire managers across all agencies is the Wildland Fire Decision Support System (WFDSS), a system that assists fire managers and analysts in making strategic and tactical decisions for fire incidents (WFDSS 2015).⁶ WFDSS combines desktop applications for fire modeling into one web-based system. It provides a risk-informed decision process and documentation system for all wildland fires and it also introduces economic principles into the fire decision process in order to improve efficiencies which also ensuring safe and effective wildfire response.

One intent of WFDSS is to ensure that when fire response decisions are made, they fall in line with agency land and resource management plans. Agencies have recently been moving away from the traditional written fire management plans and instead are developing spatial fire management plans that can be housed within WFDSS (WFDSS 2015). The Santa Fe National Forest for example will have all management requirements and strategic objectives for fire management, contained within WFDSS, so that in the event of a fire, incident managers are considering this information when making decisions and developing strategic direction for the wildfire incident (WFDSS 2015).

Another tool employed by fire managers in pre-fire planning is the potential operational delineation (POD). PODs combine fire modeling with expertise from local fire practitioners and managers to identify potential locations where fire suppression could be effective (Caggiano et al. 2020; Harden 2020). This concept was tested in northern New Mexico during the 2019 fire season on seven New Mexico fires, including land in the Santa Fe National Forest. This pilot project demonstrated the effectiveness of PODs for decision support. It is anticipated that these processes will continue to be used in future fire planning across jurisdictions.

Fire Resources

The availability of resources is dictated by the state and federal wildland fire season. From approximately April 15 through July 15, resources are plentiful around the region. This time period is considered the Southwest fire season, so multiple crews, engines, helicopters, and air tankers are available. However, from July 15 to October 31, firefighting focus often changes to other regions such as to the Northwest and California. During this period, the time frame to obtain resources is extended, sometimes taking up to 48 hours. During the winter months, obtaining resources is difficult as many firefighters are employed seasonally from April through October. Given the changing fire regimes, wildfires now occur throughout the entire year, extending beyond the state and federal designated wildland fire season. Resources are limited for fires that occur outside of this time frame.

⁶ WFDSS: https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml

Santa Fe County Fire Department

Volunteer and career firefighters at the County and community level have similar capabilities throughout the entire year, while state and federal responders are affected by fire season. In spite of the continuous level of capabilities, ebbs and flows occur within the volunteer service. Recruiting and retaining volunteers is challenging due to people's lifestyles and the training requirements one must follow to be a volunteer firefighter. Although several volunteer firefighters are present in the County, not all are available to respond to every fire. The County Wildland Division has taken steps to have a fire crew all year round for county response.

Santa Fe National Forest

The Santa Fe National Forest provides fire response on USFS land in the County. Fire management and suppression protocols are directed by the Forest Plan.

On USFS land, the USFS has the responsibility for initial attack (initial response). The USFS maintains Mutual Aid Agreements (MAA) with the New Mexico State Forestry Division (NMSF), the County, and the NPS. Under the MAA, agency personnel may respond to incidents outside their agency boundaries.

The management of wildfire ignitions for multiple resource objectives (managing naturally burning fires in forests as a tool for helping to restore forest health and mitigating the escalating costs of fire suppression) is practiced on federal land but depends upon a thorough assessment of risk to values at risk in the WUI. Depending on the location and nature of a wildfire, USFS policies outline appropriate management responses to guide district personnel in the application of specific suppression techniques. All large wildfire response would be based upon assessment using WFDSS.

In wilderness areas, the Santa Fe National Forest supervisor must approve the use of helicopters, portable pumps, and chainsaws, as well as the construction of helispots. The Southwestern Regional Forester must approve the use of motorized vehicles and bulldozer line construction. Fire strategies call for:

- restoring fire to the ecosystem;
- using prescribed fire to reduce hazards;
- managing wildland fires so that air quality issues are compatible with local, state, and federal laws; and
- minimizing suppression impacts to wilderness as well as impacts to the surrounding area.

The USFS has the following resources available for fire suppression throughout the County:

- Santa Fe Supervisors Office
 - 3 – Type 3 Incident Command
 - 2 – Operations Section Chiefs
 - 3 – Task Force Leaders
 - Santa Fe Hotshots
- Espanola Ranger District
 - 2 – Type 3 ICs/Division Supervisors
 - 1 – Type 4 Engine
 - 1 – Type 6 Engine
- Pecos/Las Vegas Ranger District
 - 2 – Type 3 ICs/Division Supervisors
 - 1 – Type 3 Engine
 - 1 – Type 6 Engine

New Mexico State Forestry Resources

The Bernalillo District of NMSF has primary responsibility for non-federal, non-municipal, non-tribal, and non-pueblo lands within the SCCWPP area. In the event of a wildfire on state land, local fire departments or other resources may be used for initial attack under the New Mexico Joint Powers Agreements.⁷

Bureau of Land Management

The BLM operates a State Fire and Aviation Management office in Santa Fe and four District Fire Programs located in Albuquerque, Farmington, Roswell (Pecos District) and Las Cruces Districts. The County falls within the management area of the Farmington District, Taos Field Office. The local field office has initial attack responsibility and provides mutual aid assistance for wildland fire activities on BLM-administered public land. Through the Joint Powers Agreements, the BLM also maintains initial fire attack response responsibilities for designated state and private lands. Fire suppression resources are stationed in Taos covering the County and other areas of BLM responsibility. Additional resources can be drawn from other parts of the district or other districts as needed.

Each field office or district office in New Mexico has a Resource Management Plan, which provides management direction for all BLM resources. FMPs are supplements to the Resource Management Plans and are more detailed, site-specific plans. FMPs establish fire and fuels objectives and implementation strategies, and they serve as a reference for on-the-ground decisions in fire and fuels management. Each field office or district office has an approved FMP. These plans are periodically reviewed and updated as needed.

The single overriding priority in BLM fire management is to protect human life, of both the public and firefighters. In addition, agency policies aim to protect human communities, their infrastructure, and the natural resources on which they depend. Other property and improvements will be protected. Where possible on BLM land, wildland fire is allowed to function as an essential ecological process and agent of natural change in fire-dependent ecosystems. Management actions also focus on the improvement or maintenance of ecosystem health and wildlife habitat and the protection of high-value cultural, historical, and paleontological resources.

Bureau of Indian Affairs

The Southwest BIA operates in the State of New Mexico and southern Colorado. BIA Fire and Aviation Management operate in Ohkay Owingeh but oversee four tribes located within Santa Fe County. The four tribes are Pueblo of Tesuque, Pueblo of Pojoaque, Pueblo of Nambe, and the Pueblo of Idllefonso. Northern Pueblos Agency has initial attack responsibility and provides mutual aid assistance for wildland fire activities on the Santa Fe Zone. Through the Joint Powers Agreements, the Northern Pueblos Agency also maintains initial attack fire response responsibilities for designated state and private lands. Fire suppression resources are stationed in Ohkay Owingeh covering three Counties and other areas of BIA responsibility. Additional resources can be drawn from other Fire Cooperative Tribes as needed.

Each BIA Agency in New Mexico and Colorado has a Forest Management Plan, which provides management direction for all BIA natural resources. Fire Management Plans (FMP) are supplements to the Forest Management Plans and are more detailed and site-specific plans for each tribe. FMPs establish fire and fuels objectives and implementation strategies, and they serve as a reference for on-the-ground decisions in fire and fuels management. Each agency has an approved FMP. These plans are annually reviewed and updated as needed.

The single overriding priority in BIA fire management is to protect human life, of both the public and firefighters. In addition, agency policies aim to protect tribal trust communities, their infrastructure, and the natural resources on which they depend upon. Other property and improvements will be protected. Where possible on BIA trust lands, wildland fire is allowed to function as an essential ecological process and agent of natural change in fire-dependent ecosystems. Management actions also focus on the

⁷ Joint Powers Agreement: https://gacc.nifc.gov/swcc/dc/nmadc/management_admin/incident_business/documents/New%20Mexico%20JPA.pdf

improvement or maintenance of ecosystem health and wildlife habitat and the protection of high-value cultural, historical, and religious resources.

Northern Pueblos Agency has the following resources available for fire suppression throughout the County:

- 2 – Type 3 Incident Commanders/Division Group Supervisors
- 2 – Type 4 Incident Commanders
- 1 – Task Force Leaders
- 6 – Type 5 Incident Commanders
- 6 – Engine Bosses
- 3 – Type 6 Engines (E-2561, E-2562, E-2563)

Pueblo Tesuque (Fire Cooperative)

- 2 – Type 5 Incident Commanders
- 1 – Engine Boss
- 1 – Type 6 Engine (E-1860)

Santa Clara Pueblo (Fire Cooperative/Fire Compact)

- 2 – Type 5 Incident Commanders
- 1 – Engine Boss
- 1 – Type 6 Engine

MUTUAL AID

The wildland fire community is well known for its development of mutual aid agreements at the federal, state, and local levels. Such automatic aid agreements allow for closest forces to respond to an incident as quickly as possible regardless of jurisdiction. Such agreements may also describe how reimbursement will be conducted; state resources responding to wildfires on federal land may have their associated costs reimbursed by the responsible federal agency, and the reverse is true for federal resources suppressing a wildfire on state land.

EVACUATION RESOURCES

As part of emergency management protocols, Santa Fe County has adopted the Ready, Set, Go! protocols for community evacuation.⁸

Road Systems

Much of Santa Fe County is accessible via surfaced roads and highways; however, some communities are accessed only via unsurfaced roads (Figure 2.9), which are often narrow and windy with many dead-end roads (Figure 2.10). These routes may prove hazardous during emergency evacuation, especially where they are adjacent to forested land with vegetation close to or overhanging the road. Fuel treatment may be needed along some roads where vegetation is overhanging and could prevent safe evacuation of residents or safe access by emergency responders. Some rural roads and driveways may also have narrow bridges with weight limits (see Figure 2.10) that may impact access with large emergency apparatus.

⁸ Ready-Set-Go and Santa Fe County Evacuation: https://www.santafecountynm.gov/fire/emergency_management_division/evacuation_planning_guide



Figure 2.9. Example of unsurfaced road.



Figure 2.10. Example of unsurfaced roads.

Horses, Livestock, and Animals

Many rural homes also have horses and other large animals and livestock, and pets are common in homes throughout the County. In the event of a wildfire, it is important that residents and fire responders have a plan for evacuation of pets and livestock. Evacuation planning often neglects to describe how animals will be evacuated and where they will be taken. The loading of horses, for example, during a fire and smoke situation, and transport of stock vehicles down narrow roads under stressful situations, can be very difficult. Public education could emphasize the need to practice loading horses quickly, for example.

There is also a need to pre-identify where animals can be taken, such as county fairgrounds, for large animal shelter. Similarly, locations where small animals such as dogs and cats picked up in the fire area should also be pre-identified, as well as the lead agencies, such as humane societies, coordinating this work.

A plan for livestock evacuation and shelter has been identified as a need in the County.

WATER AVAILABILITY AND SUPPLY

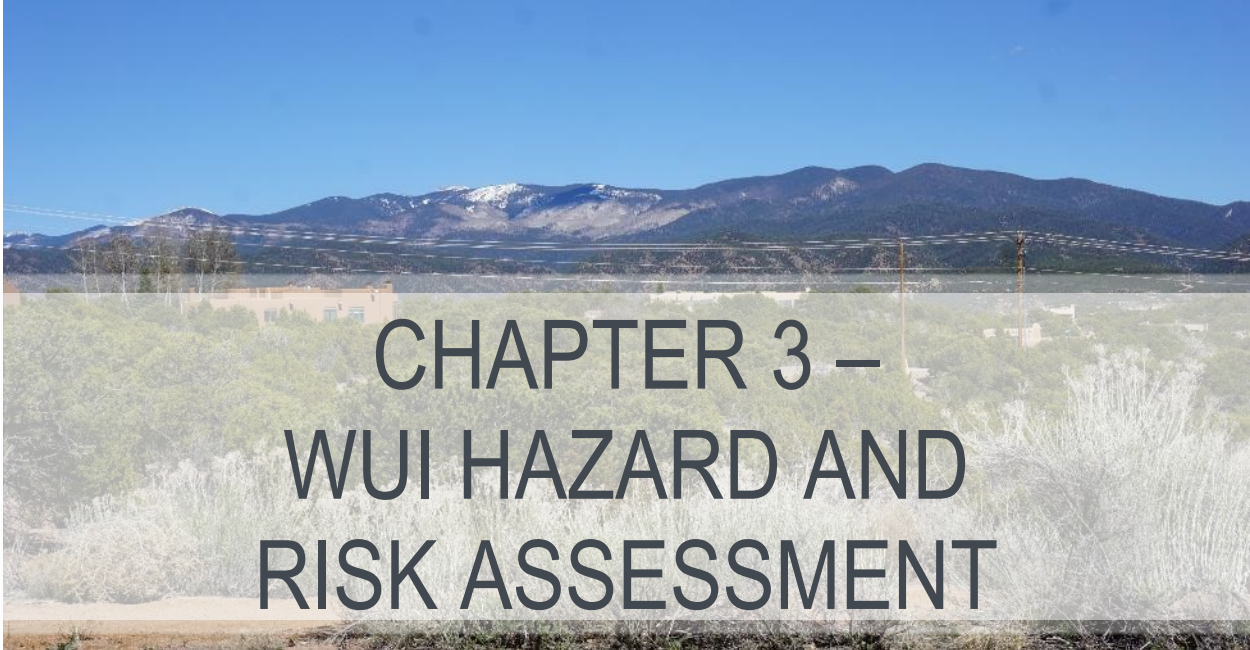
Water supply is variable around the County and may be provided by hydrants, wells, cisterns, and ponds. Many rural and unincorporated communities lack water for fire suppression. There have been upgrades at fire stations implemented in some communities, including installation of aboveground and belowground water tanks. Additional water storage is still needed in many areas.

Ponds and rivers could also provide alternative sources for suppression, and many stations have the capability and equipment to draft, but suitable drafting sources are not always known.

Limited water supply can impact International Standards Organization (ISO) ratings for fire departments, so improvements to water infrastructure have been identified as a priority for this CWPP update. The hydrant location dataset for the County is incomplete, and therefore, mapping is identified as a needed project in this CWPP update.

PUBLIC EDUCATION AND OUTREACH PROGRAMS

Public education and outreach programs are a common factor in virtually every agency and organization involved with the wildfire issue. Detailed information on these programs is provided in Appendix A.



PURPOSE

The purpose of developing the risk assessment model described here is to create a unique tool for evaluating the risk of wildland fires to communities within the WUI areas of Santa Fe County. Although many definitions exist for hazard and risk, for the purpose of this document these definitions follow those used by the firefighting community:

Hazard is a fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition and resistance to control.

Risk is defined as the chance of a fire starting as determined by the presence and activity of causative agents (National Wildfire Coordinating Group [NWCG] 1998).

The hazard and risk assessment is twofold and combines a geographic information system (GIS) model of hazard based on fire behavior and fuels modeling technology (Composite Risk/Hazard Assessment) and a Core Team generated assessment of on-the-ground community hazards and values at risk.

From these assessments, land use managers, fire officials, planners, and others can begin to prepare strategies and methods for reducing the threat of wildfire, as well as work with community members to educate them about methods for reducing the damaging consequences of fire. The fuels reduction treatments can be implemented on both private and public land, so community members have the opportunity to actively apply the treatments on their properties, as well as recommend treatments on public land that they use or care about.

The Santa Fe County Hazard Mitigation Plan (HMP) (Santa Fe County 2018) lists wildfire hazard as a highly likely hazard, with extensive spatial extent, with a critical magnitude/severity and high overall significance.

FIRE BEHAVIOR MODEL

OVERVIEW

The wildland fire environment consists of three factors that influence the spread of wildfire: fuels, topography, and weather. Understanding how these factors interact to produce a range of fire behavior is fundamental to determining treatment strategies and priorities in the WUI. In the wildland environment, vegetation is synonymous with fuels. When sufficient fuels for continued combustion are present, the level of risk for those residing in the WUI is heightened. Fire spreads in three ways: 1) surface fire spread—the flaming front remains on the ground surface (in grasses, shrubs, small trees, etc.) and resistance to control is comparatively low; 2) crown fire—the surface fire “ladders” up into the upper levels of the forest canopy and spreads through the tops (or crowns) independent of or along with the surface fire, and when sustained is often beyond the capabilities of suppression resources; and 3) spotting—embers are lifted and carried with the wind ahead of the main fire and ignite in receptive fuels; if embers are plentiful and/or long range (>0.5 mile), resistance to control can be very high. Crown fire and spotting activity has been a concern for fire managers particularly under extreme weather conditions. In areas where homes are situated close to timber fuels and/or denser shrubs and trees, potential spotting from woody fuels to adjacent fuels should always be acknowledged.

Treating fuels in the WUI can lessen the risk of intense or extreme fire behavior (Martinson and Omi 2013; Safford et al. 2009). Studies and observations of fires burning in areas where fuel treatments have occurred have shown that the fire either remains on or drops to the surface, thus avoiding destructive crown fire, as long as activity fuels are treated or removed (Graham et al 2004; Pollet and Omi 2002; Prichard et al. 2010; Safford et al. 2012; Waltz et al. 2014). Fuel mitigation efforts therefore should be focused specifically where these critical conditions could develop in or near communities at risk (CARs).

For this plan, an assessment of fire behavior has been carried out using well-established fire behavior models: FARSITE, FlamMap, BehavePlus, and FireFamily Plus housed within the Interagency Fuel Treatment Decision Support System (IFTDSS), as well as ArcGIS Desktop Spatial Analyst tools. Data used in the Composite Risk/Hazard Assessment is largely obtained from LANDFIRE.

Information regarding the modeling approach and components is included in Appendix A.

COMPOSITE RISK/HAZARD ASSESSMENT

The Composite Risk/Hazard Assessment modeling approach utilizes a Weighted Sum Model, which “stacks” geographically aligned datasets and evaluates an output value derived from each cell value of the overlaid dataset in combination with the weighted assessment. In a Weighted Sum Model, the weighted values of each pixel from each parameter dataset are added together so that the resulting dataset contains pixels with summed values of all the parameters. This method ensures that the model resolution is maintained in the results and thus provides finer detail and range of values for denoting fire risk. Figure 3.1 illustrates the individual datasets and the relative weights assigned within the modeling framework.

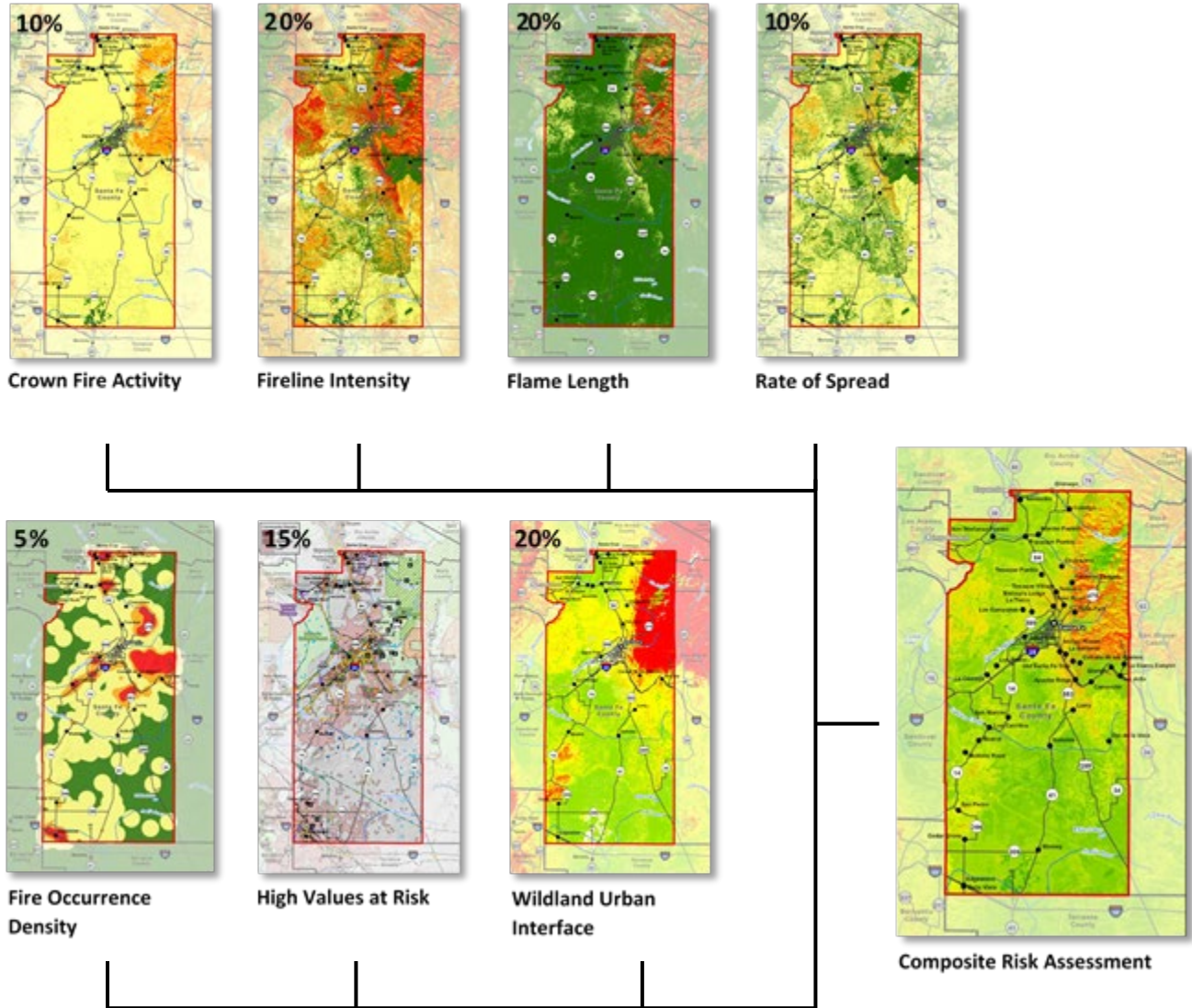


Figure 3.1. Composite risk/hazard overlay process.

Figure 3.2 is the risk assessment for the planning area; it combines all the fire behavior parameters described above. The risk assessment classifies the planning area into low, moderate, and high-risk categories.

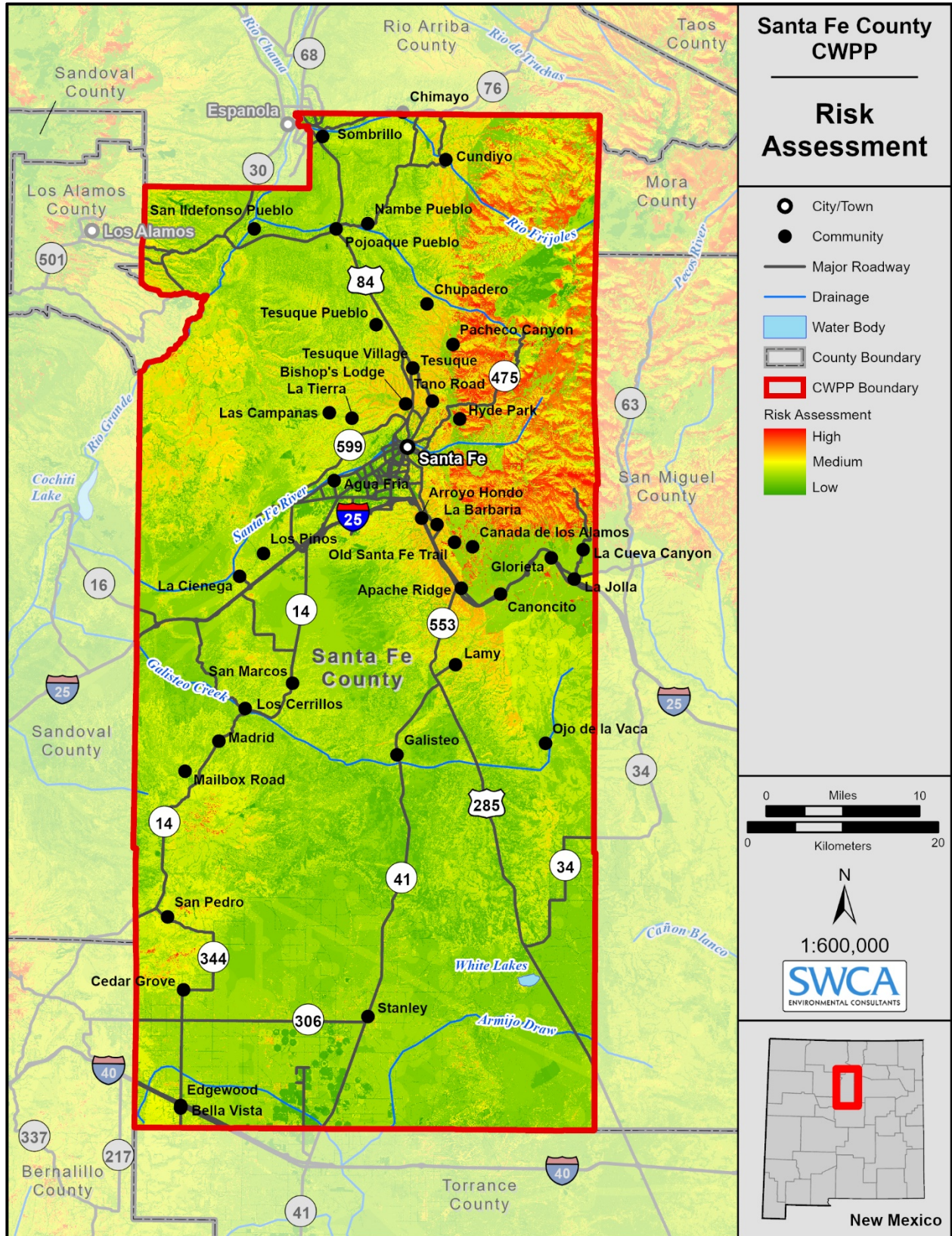


Figure 3.2. Composite risk/hazard assessment.

COMMUNITY HAZARD ASSESSMENTS

The 2008 CWPP developed descriptions of risk and hazard for each community. As part of the update, the Core Team revisited these descriptions and identified several areas within Santa Fe County that may have experienced a change in risk rating. In order to properly assess the hazards in and around these communities, several field days were implemented to carry out community assessments.

The assessment was conducted in Spring 2020 using the NFPA Wildland Fire Risk and Hazard Severity Form 1144 (Appendix E). This form is based on the NFPA Standard for Reducing Structure Ignition Hazards from Wildland Fire 2013 Edition. The NFPA standard focuses on individual structure hazards and requires a spatial approach to assessing and mitigating wildfire hazards around existing structures. It also includes ignition-resistant requirements for new construction and is used by planners and developers in areas that are threatened by wildfire and is commonly applied in the development of Firewise Communities (for more information, see www.firewise.org).

Each area was rated based on conditions within the community and immediately surrounding structures, including access, adjacent vegetation (fuels), defensible space, adjacent topography, roof and building characteristics, available fire protection, and placement of utilities. Where a range of conditions was less easily parsed out, a range of values was assigned on a single assessment form. Each score was given a corresponding adjective rating of low, moderate or high. An example of the assessment form used in this plan is in Appendix E. The purpose of the community WUI assessment and subsequent hazard ratings is to identify fire hazard and risks and prioritize areas requiring mitigation and more detailed planning. These assessments should not be seen as tactical pre-suppression or triage plans. The community assessment helps to drive the recommendations for mitigation of structural ignitability, community preparedness, and public education. The assessment also helps to prioritize areas for fuels treatment based on the hazard rating. The NFPA ratings serve as the CAR ratings required by the New Mexico Fire Planning Task Force.

The CAR hazard ratings from the community assessment and the GIS hazard/risk assessment are provided in Table 3.1. This table also includes a summary of the positive and negative attributes of a community as they relate to wildfire risk. Full CAR descriptions are provided in Appendix D.

Table 3.1. Communities at Risk List with Assessment Summary

Fire District	Community	CAR Rating (based on NFPA 1144)	Positive	Negative
Pojoaque	Sombrillo and Cuartelez	70 Medium	<ul style="list-style-type: none"> • ~1 mile to nearest fire station • Flat terrain • Bosque fuels • Hydrants in community 	<ul style="list-style-type: none"> • Narrow driveways, many unmarked • Relatively high density of homes • Many values at risk
Chimayo	Chimayo (NOTE- roads north of 76 are Rio Arriba County jurisdiction)	69 Medium	<ul style="list-style-type: none"> • ~1 mile to nearest fire station • Bosque fuels • Sparse fuels adjacent to community 	<ul style="list-style-type: none"> • Some rolling topography • Narrow driveways, many unmarked • Many values at risk • Limited hydrants
	Cundiyo	62 Medium	<ul style="list-style-type: none"> • Hydrants in community • Small population • Structure separation • Agricultural lands providing buffer to wildlands 	<ul style="list-style-type: none"> • Some rolling topography • Narrow roads through community • Narrow driveways, many unmarked
Tesuque	Tesuque Village	69 Medium	<ul style="list-style-type: none"> • Flat terrain • Good access • Bosque fuels 	<ul style="list-style-type: none"> • Dense vegetation around roads and driveways • Limited hydrants in town • Many values at risk • Relatively high population
	Chupadero	70 Medium	<ul style="list-style-type: none"> • Good access along main road • Small population • Structure separation • Close to fire station 	<ul style="list-style-type: none"> • Some continuous fuels • Limited hydrants along main road • Narrow driveways with limited turnaround
	Pacheco Canyon	95 High	<ul style="list-style-type: none"> • Sparse population • Access good from main road • Low density of values at risk 	<ul style="list-style-type: none"> • Rugged terrain • Continuous fuels • Some narrow driveways, some with locked access
	Tano Road	96 High	<ul style="list-style-type: none"> • Access good from main road • Structure separation • Relatively close to fire station 	<ul style="list-style-type: none"> • Steep grades and topographic features • Some narrow and steep driveways, some with locked access • Limited water availability • Some continuous fuels

Fire District	Community	CAR Rating (based on NFPA 1144)	Positive	Negative
Santa Fe City	Hyde Park	103 High	<ul style="list-style-type: none"> Hydrants in community Close to fire station Good road conditions 	<ul style="list-style-type: none"> Steep grades Gated driveways may restrict access High population density
	Bishops Lodge	96 High	<ul style="list-style-type: none"> Some hydrants Close to fire station Good road conditions 	<ul style="list-style-type: none"> Heavy fuels Steep grades Heavy density of values at risk
Agua Fria	La Tierra	68 Medium	<ul style="list-style-type: none"> Close to fire station Some hydrants Lower population density Structure separation Light fuels 	<ul style="list-style-type: none"> Water availability limited in some areas Rolling topography
	Las Campanas	38 Low	<ul style="list-style-type: none"> Hydrants in community Wide paved driveways Good access Close to fire station 	<ul style="list-style-type: none"> Complicated road network Relatively high population density Heavy density of values at risk
La Cienega	La Cienega	70 Medium	<ul style="list-style-type: none"> Hydrants in community Close to fire station Good access from main roads Sparse vegetation in vicinity of community 	<ul style="list-style-type: none"> Some driveways are narrow and unmarked Some dense vegetation around homes Bridges may impede travel
	Los Pinos	70 Medium	<ul style="list-style-type: none"> Hydrants in community Close to fire station Good access from main roads Sparse vegetation in vicinity of community 	<ul style="list-style-type: none"> Some driveways are narrow and unmarked Some dense vegetation around homes Bridges may impede travel

Fire District	Community	CAR Rating (based on NFPA 1144)	Positive	Negative
Glorieta Pass	Glorieta (including Glorieta Estates and Glorieta Mesa)	95 High	<ul style="list-style-type: none"> • Some hydrants in community • Close to fire station • Good access from main roads 	<ul style="list-style-type: none"> • Steep grades in vicinity • Continuous fuel loads adjacent to WUI • Heavy density of values at risk • Narrow driveways • Limited signage • Unsurfaced roads around Glorieta Mesa and Glorieta Estates
	La Cueva Canyon	112 High	<ul style="list-style-type: none"> • Good access from main roads • Low population density • Evidence of defensible space actions • Cohesive community with history of collaboratively implementing fire-adapted community concepts 	<ul style="list-style-type: none"> • Steep grades and topographic concerns • Narrow, unsurfaced and windy roads • Unmarked driveways • 5 miles from fire station • Limited water availability
	La Jolla	92 High	<ul style="list-style-type: none"> • Close to fire station • Good access from main roads • Low population density 	<ul style="list-style-type: none"> • Limited water availability • Poor defensible space • Continuous fuel loads adjacent to WUI
Hondo	Ojo de la Vaca	99 High	<ul style="list-style-type: none"> • Good access from main road • Sparse vegetation adjacent to community • Low population density 	<ul style="list-style-type: none"> • Heavy fuels around homes • Topographic concerns • Limited water availability • Over 4 miles to fire station
	Apache Ridge	114 High	<ul style="list-style-type: none"> • Close to fire station • Good access from main road • Structure separation • Low population density 	<ul style="list-style-type: none"> • Steep grades • Narrow side roads with poor surface conditions • Limited water availability • Dense vegetation around homes
	La Barbaria	110 High	<ul style="list-style-type: none"> • Close to fire station • Structure separation • Lower population density 	<ul style="list-style-type: none"> • Steep grades • Narrow driveways with limited turnaround • Limited water availability • Complicated road networks
	Canada de los Alamos	96 High	<ul style="list-style-type: none"> • Low population density • Structure separation 	<ul style="list-style-type: none"> • Limited water availability • Over 4 miles to fire station • Steep grades • Narrow driveways, many unmarked

Fire District	Community	CAR Rating (based on NFPA 1144)	Positive	Negative
	Canoncito	90 High	<ul style="list-style-type: none"> • Good access from main roads • Low population density • Sparse vegetation in community 	<ul style="list-style-type: none"> • Narrow driveways • Steep grades • Topographic concerns • Limited water availability • Denser vegetation adjacent to WUI
	Old Santa Fe Trail	93 High	<ul style="list-style-type: none"> • Close to fire station • Some hydrants • Good access from main roads 	<ul style="list-style-type: none"> • Steep grades • Complicated road networks • Heavy fuels near homes • Heavy density of values at risk
	Arroyo Hondo	63 Medium	<ul style="list-style-type: none"> • Sparse vegetation • Good access from main roads • Flat terrain 	<ul style="list-style-type: none"> • Heavy population density • Heavy density of values at risk • Limited hydrants
El Dorado	Lamy	75 High	<ul style="list-style-type: none"> • Some hydrants in community • Good access from main roads • Sparse vegetation 	<ul style="list-style-type: none"> • Heavy density of values at risk • Over 5 miles to nearest fire station • Driveways are narrow and some are unmarked.
Turquoise Trail	San Marcos and Turquoise Trail	72 High	<ul style="list-style-type: none"> • Sparse vegetation • Good access from main roads • Low population density 	<ul style="list-style-type: none"> • 5 miles from fire station • Poorly marked driveways • Historic and cultural values at risk • Limited water availability
Galisteo	Galisteo	74 High	<ul style="list-style-type: none"> • Close to fire station • Good access from main roads • Sparse vegetation 	<ul style="list-style-type: none"> • Narrow and unmarked driveways • Compact and dense community structure, poor separation of structures. • High density of values at risk
	Los Cerrillos	74 High	<ul style="list-style-type: none"> • Close to fire station • Good access from main roads • Sparse vegetation 	<ul style="list-style-type: none"> • Narrow and unmarked driveways • Compact and dense community structure, poor separation of structures. • High density of values at risk

Fire District	Community	CAR Rating (based on NFPA 1144)	Positive	Negative
Madrid	Madrid	78 High	<ul style="list-style-type: none"> • Close to fire station • Good access from main roads • Sparse fuels 	<ul style="list-style-type: none"> • Narrow driveways • Poor road conditions • Limited water availability • Heavy density of values at risk • Compact and dense community, poor structure separation
	Mail Box Road	94 High	<ul style="list-style-type: none"> • Low population density • Sparse fuels • Good access from main roads 	<ul style="list-style-type: none"> • Steep grades • Narrow driveways, many unmarked • Limited turnarounds • Poor road conditions • Limited water availability • 5 miles to fire station
Edgewood	San Pedro	100 High	<ul style="list-style-type: none"> • Close to fire station • Good access from main roads • Low population density 	<ul style="list-style-type: none"> • Some poor road conditions • Narrow driveways, some unmarked • Limited water availability • Some heavy fuels adjacent to WUI
	Cedar Grove	100 High	<ul style="list-style-type: none"> • Close to fire station • Low population density • Structure separation 	<ul style="list-style-type: none"> • Limited water availability • Some steep grades • Some steep and narrow driveways • Some heavy fuels adjacent to WUI
	Bella Vista	78 High	<ul style="list-style-type: none"> • Hydrants in community • Close to fire station • Good access from main roads 	<ul style="list-style-type: none"> • Some heavy fuels adjacent to WUI • Some narrow driveways • Relatively high population density
	Thunder Mountain	83 High	<ul style="list-style-type: none"> • Some hydrants in community • Close to fire station • Close to fire station • Good access from main roads 	<ul style="list-style-type: none"> • Dense vegetation close to homes • Steep grades • Homes mid-slope
Nambe Pueblo		51 Moderate	<ul style="list-style-type: none"> • Good access • Sparse vegetation surrounding community 	<ul style="list-style-type: none"> • 4.5 miles from a fire station • Limited water availability • High density of cultural values at risk
Tesuque Pueblo		44 Moderate	<ul style="list-style-type: none"> • Close to fire station • Sparse vegetation surrounding community 	<ul style="list-style-type: none"> • Limited water availability • High density of cultural values at risk • Some steep slopes

Fire District	Community	CAR Rating (based on NFPA 1144)	Positive	Negative
San Ildefonso Pueblo		53 Moderate	<ul style="list-style-type: none"> • Sparse vegetation surrounding community 	<ul style="list-style-type: none"> • 7.4 miles from a fire station • Very limited water availability • Some access concerns
Pojoaque Pueblo		44 Moderate	<ul style="list-style-type: none"> • Good highway access • Sparse vegetation surrounding community • Close to fire station • Hydrants in community 	<ul style="list-style-type: none"> • High density of cultural values at risk • Some moderate slopes • Limited separation of structures in some areas

COMMUNITY VALUES AT RISK

Earlier compilation of the critical infrastructure in the planning area, coupled with the community assessments, public outreach, and Core Team input, has helped in the development of a list of community values at risk (CVARs) from wildland fire. These data are also supplemented with Highly Valued Resources and Assets (HVRA) data, which is a data set that is being gathered nationwide and available through IFTDSS. In addition to critical infrastructure, CVARs can include natural, social, and cultural resources. The public is encouraged to provide additional CVARs during the public outreach period, via the story map survey link. Based on feedback provided, this section and the associated mapping will be revised.

In addition to critical infrastructure, CVARs can also include natural, social, and cultural resources (see Maps 8 and 9 in Appendix B). It is important to note that although an identification of CVARs can inform treatment recommendations, a number of factors must be considered in order to fully prioritize areas for treatment; these factors include appropriateness of treatment, land ownership constraints, locations of ongoing projects, available resources, and other physical, social, or ecological barriers to treatment.

The scope of this CWPP does not allow determination of the absolute natural, socioeconomic, and cultural values that could be impacted by wildfire in the planning area. In terms of socioeconomic values, the impact due to wildfire would cross many scales and sectors of the economy and call upon resources locally, regionally, and nationally.

NATURAL CVARS

The CWPP planning area has a variety of natural resources of particular concern to land managers, such as rare habitats and listed plant and wildlife species. Public outreach throughout the County over the last decade or so, has emphasized the importance of natural/ecological values to the general public. Examples of natural values identified by the public and the Core Team include the following:

- Public land
- Hunting areas
- Trail systems
- Agricultural land
- Viewsheds
- Wildlife habitat and game species
- Watersheds and water quality (Figure 3.3)



Figure 3.3. Example of a natural CVAR, a stream.

SOCIOECONOMIC CVARS

Social values include population, recreation, infrastructure, agriculture, and the built environment. Much of the built environment in the planning area falls within the WUI zones. Examples include the following:

- Tourism
- Schools
- Fire departments (Figure 3.4)
- Highways
- Churches
- Care homes, senior housing, day care, and other group homes
- Water storage
- Recreation sites



Figure 3.4. Turquoise Trail volunteer fire department.

CULTURAL CVARS

Many historical landmarks are scattered throughout Santa Fe County. Particular CVARs that have been identified by the Core Team and the public in the CWPP planning area are the following:

- Pueblos
- Archeological resources
- Churches (Figure 3.5)
- Barns
- Historic houses
- Agricultural infrastructure



Figure 3.5. Example of a cultural CVAR, a church.

EXPOSURE ANALYSIS

In order to assess the vulnerability of CVARs to wildfire, an exposure analysis was completed, which is an assessment of wildfire hazard—likelihood and intensity—where HVRA are located (IFTDSS 2020; Scott et al. 2013).⁹ The analysis was applied to the following national HVRA data sets: communities, infrastructure, wildlife, surface water, and recreation (IFTDSS 2020). Figure 3.6 is a composite map representing the combined exposure hazards to these values. The results of the exposure analysis can be applied to determine treatment location priorities relative to values and their exposure to fire (IFTDSS 2020).

⁹ IFTDSS- Exposure Analysis: https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/30-tasks/qwra_ea/exposureanalysis/overview.htm

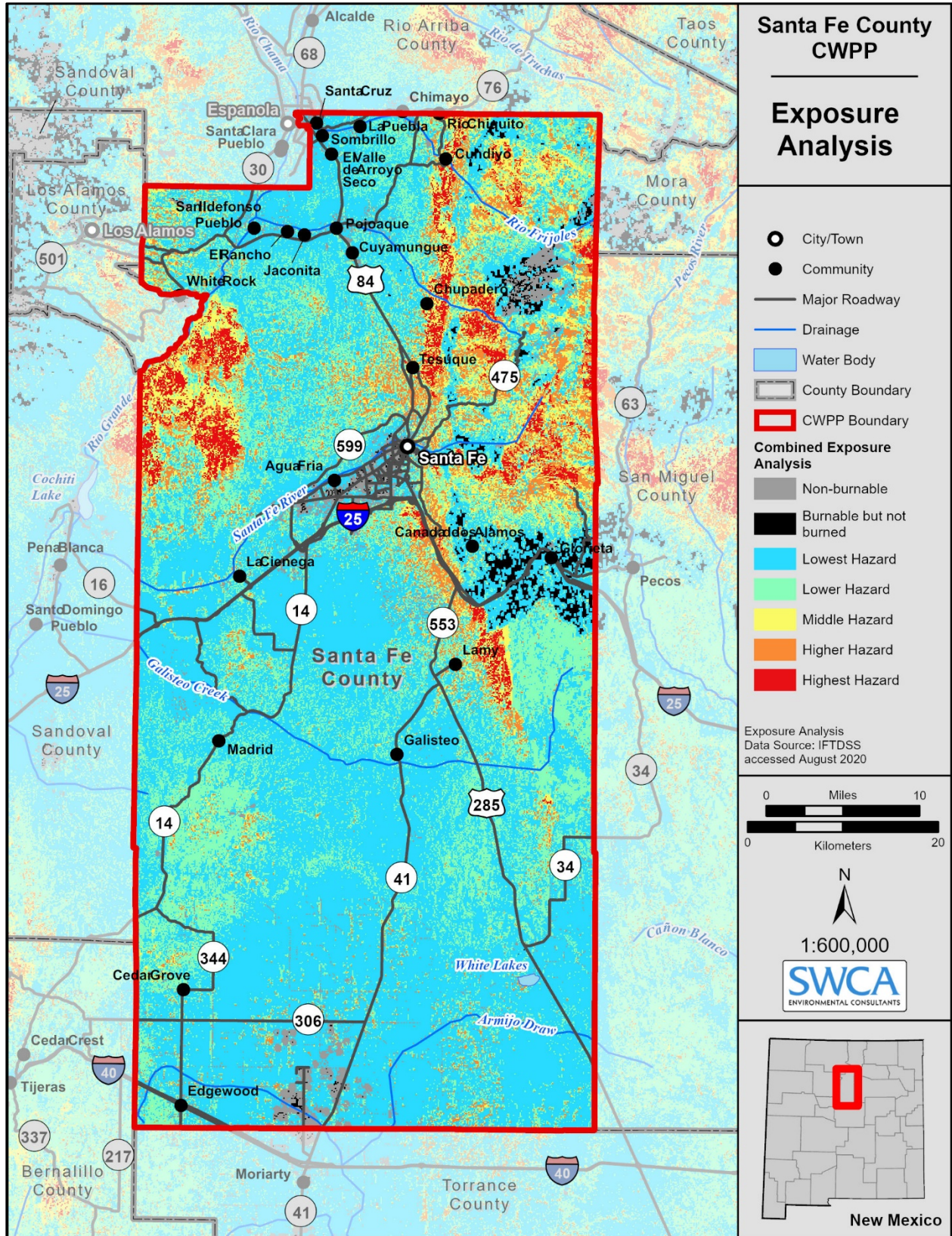


Figure 3.6. Exposure analysis map showing hazards to highly valued resources and assets (communities, infrastructure, wildlife, recreation, and surface water).



CHAPTER 4 – MITIGATION STRATEGIES

As part of the 2020 CWPP update, this plan has been aligned with the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy) and its Phase III Western Regional Action Plan by adhering to the nation-wide goal *“To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.”* (National Strategy 2014:3).

In order to do this, the CWPP recommendations have been structured around the three main goals of the Cohesive Strategy: restoring and maintaining landscapes, fire-adapted communities, and wildfire response.

This chapter provides guidance for implementing recommendations under each Cohesive Strategy goal. Many of these community-specific recommendations can be implemented at the homeowner or community level. Projects requiring large-scale support can be prioritized based on the Community Hazard/Risk Assessments and Composite Risk Assessment.

Recommendation matrixes are used throughout this chapter to serve as an action plan for implementation. Recommendations have been aligned with the strategies in the Draft NM State Forest Action Plan (EMNRD 2020) wherever possible.

COHESIVE STRATEGY GOAL 1: RESTORE AND MAINTAIN LANDSCAPES

Goal 1 of the Cohesive Strategy and the Western Regional Action Plan is Restore and Maintain Landscapes: Landscapes across all jurisdictions are resilient to fire and other disturbances in accordance with management objectives.

“Sustaining landscape resiliency and the role of wildland fire as a critical ecological process requires a mix of actions that are consistent with management objectives. The West will use all available methods and tools for active management of the landscape to consider and conserve a diversity of ecological, social, and economic values. The West will coordinate with all partners and seek continued stakeholder engagement in developing market-based, flexible and proactive solutions that can take advantage of economies of scale. All aspects of wildland fire will be used to restore and maintain resilient landscapes. Emphasis will be placed on protecting the middle lands near communities.” (Western Regional Action Plan 2013:14).

In this CWPP, recommendations to restore and maintain landscapes focus on vegetation management and hazardous fuel reduction.

RECOMMENDATIONS FOR HAZARDOUS FUEL REDUCTION

Fuels management of public and private land in the WUI is key to the survival of homes during a wildfire event, as well as the means to meet the criteria of Goal 1. Research in New Mexico has shown how fuel treatments in the WUI can change fire behavior to support suppression activities and protect homes (Evans et al. 2015). The importance of fuels management is reflected in policy at the federal level, with the HFRA requiring that federal land management agencies spend at least 50% of their fuels reduction funds on projects in the WUI. One of the major goals of the County HMP is to expand hazardous fuel mitigation activities (Santa Fe County 2018).

Fuels should be modified with a strategic approach across Santa Fe County to reduce the threat that high-intensity wildfires pose to lives, property, and other values. Pursuant to these objectives, recommendations have been developed in the context of existing and planned fuels management projects. This section provides information on fuel treatment methodologies that can be applied to protect structures (defensible space), then near community boundaries (fuel breaks, cleanup of adjacent open spaces), and finally in the wildlands beyond community boundaries (larger-scale forest health and restoration treatments).

While not necessarily at odds with one another, the emphasis of each of these treatment types is different. Proximate to structures, the recommendations focus on reducing fire intensity consistent with Firewise and International Fire Code standards. Further into open space areas, treatments will tend to emphasize forest health and increasing resiliency to catastrophic wildfire and other disturbances. Cooperators in fuels management should include federal, state, and local agencies as well as interested members of the public. Federal land management plans focus on these more landscape level treatments, so the CWPP incorporates most federal land management by reference to those land management planning documents. The CWPP focuses primarily on projects within or adjacent to WUI areas.

Table 4.1 summarizes the types of treatments recommended throughout the planning area. The majority of the treatments are focused on higher risk areas, as defined by the Composite Risk/Hazard Assessment and Core Team input. Many of these treatment recommendations are general across the communities because similar conditions and concerns were raised by fire responders for all communities that border wildland areas. Table 4.1 also addresses the requirement for an action plan and assessment strategy by providing monitoring guidelines and a timeline for implementation. This timeline is obviously dependent on available funding and resources, as well as National Environmental Policy Act (NEPA) protocols for any treatments pursued on public land.

The treatment list is by no means exhaustive and should be considered purely a sample of required projects for the future management of the planning area. Many projects may be eligible for grant funds available from federal and/or state sources. A key source of funding for implementing hazardous fuel reduction are funds available through Western Regional Action Plan, which is the reason this CWPP tiers to those goals. For an additional list of funding sources, please refer to Appendix F.

Each land management agency has a different set of policies governing the planning and implementation of fuels reduction projects. A thorough assessment of current fuel loading is an important prerequisite for any fuels prescription, and all treatment recommendations should be based on the best possible science. When possible, simultaneously planning for the management of multiple resources while reducing fuels will ensure that the land remains viable for multiple uses in the long term. The effectiveness of any fuels reduction treatment depends on the degree of maintenance and monitoring that is employed. Monitoring will also ensure that objectives are being met in a cost-effective manner.

Fire management cannot be a one-size-fits-all endeavor; this plan is designed to be flexible. Treatment approaches and methods will be site-specific and should be adapted to best meet the needs of the landowner and the resources available. Moreover, each treatment recommendation should address protection of CVARs, particularly the protection of threatened and endangered species.

Table 4.1. Fuel Treatment Recommendations

Project Description	Location	Land Ownership	Method and Goal	Timeline	Resources/Funding	Priority
Expand multi-agency collaboration to link fuel mitigation activities and adopt a more holistic view of forest management (Aligns with Draft NM Forest Action Plan Strategy 1 and Sub-Strategies 1.1 and 1.2) ¹⁰	All communities where appropriate. High-risk communities to be prioritized.	All ownership and partners, including Greater Santa Fe Fireshed Coalition, Forest Stewards Guild, The Nature Conservancy, Rio Grande Water Fund, City of Santa Fe, New Mexico Forestry Division, USFS, BLM.	<ul style="list-style-type: none"> Protect forests, watersheds, and water quality by moderating catastrophic fire behavior. Communicate early and often with local residents, and engage communities in the planning process. Identified as a goal in the 2018 HMP. Possibility of leveraging hazard funding for implementation (see page 5.36 in the 2018 HMP). Utilize Greater Santa Fe Fireshed Coalition to provide detailed action plans and strategy for landscape treatment on all jurisdictions. Continue current initiatives to increase collaboration across boundaries. Integrate with fuels strategies on public lands. Align with agency land and resource management plans. Work from existing and planned treatment data (Figure 4.1) and the risk assessment, to develop conceptual treatment plans that are highest priority for treatment. Appoint a chair and a representative responsible for seeking grant opportunities. 	Meetings in conjunction with Greater Santa Fe Fireshed Coalition.	<ul style="list-style-type: none"> National Fire Plan Rural Fire Assistance FEMA Hazard Mitigation Grant funding FEMA Pre-disaster Mitigation funding USFS Hazard Fuels grants Utilize the latest relevant scientific literature to support approach, including information generated by the various southwest forest restoration institutes. USFS Title II FAWRA funding- see Appendix F. 	High

¹⁰ New Mexico Forest Action Plan: http://www.emnrd.state.nm.us/SFD/documents/NMFAP_DraftforReview4.22.2020.pdf

Project Description	Location	Land Ownership	Method and Goal	Timeline	Resources/Funding	Priority
Expand hazardous fuel mitigation activities utilizing various options and methods as appropriate	All communities where appropriate. High-risk communities to be prioritized.	All ownership	<ul style="list-style-type: none"> Encourage cooperation by private landowners to expand treatments onto private land. Build upon existing monitoring efforts on USFS land and expand monitoring to all jurisdictions (including private land) in order to contribute to adaptive management. Consider the impacts that treatments may have on altering the fuel complex (e.g., introducing more flashy fine fuels). Consider the use of citizen science programs to engage Santa Fe County citizens, schools, and/or interested citizens in monitoring forest treatments. 	2022	<ul style="list-style-type: none"> National Fire Plan Rural Fire Assistance FEMA Hazard Mitigation Grant funding FEMA Pre-disaster Mitigation funding USFS Hazard Fuels grants Work with existing collaborative groups to engage the public, i.e., the Greater Santa Fe Fireshed Coalition. 	High

Project Description	Location	Land Ownership	Method and Goal	Timeline	Resources/Funding	Priority
			<ul style="list-style-type: none"> Utilize optimization models (e.g., IFTDSS) to determine fuel treatment scenarios that would provide optimal fire behavior moderation while protecting watersheds and community values. Identify regular maintenance schedules for upcoming treatments and identify areas that were previously treated and would now require maintenance activities. Develop robust monitoring strategies and communicate findings to the public, practitioners, and research community. 		<ul style="list-style-type: none"> Utilize the latest relevant scientific literature to support approach, including information generated by the various southwest forest restoration institutes. 	
<p>Roadside thinning along access roads and evacuation routes with scheduled maintenance to improve sustainability</p>	<p>All communities where appropriate. High-risk communities to be prioritized.</p>	<p>Private, New Mexico Department of Transportation and USFS land</p>	<ul style="list-style-type: none"> Reduce fuel loading along roadways in order to mitigate potential ignitions from the highway and provide safe clearance to facilitate evacuation and emergency access. Mechanical treatment: tree removal, mowing. Herbicide treatment to remove weeds, as needed or appropriate. Design maintenance schedule depending upon vegetation type. Goal is to maintain clearance during fire season. 	<p>Implement and maintain annually or as outlined in maintenance schedule.</p>	<ul style="list-style-type: none"> National Fire Plan Rural Fire Assistance FEMA Hazard Mitigation Grant funding FEMA Pre-disaster Mitigation funding USFS Hazard Fuels grants 	<p>High</p>

Project Description	Location	Land Ownership	Method and Goal	Timeline	Resources/Funding	Priority
Maintain utility line right-of-way (ROW) (Aligns with Draft NM State Forest Action Plan Strategy 4: Utility Rights of Way)	PNM (Public Service Company of NM) ROW	PNM	<ul style="list-style-type: none"> Utility line ROWs need more regular maintenance to ensure clearance with heavy fuels, especially across forested property. PNM to increase maintenance cycles. Develop a utility specific fire plan to identify inspection, vegetation and maintenance standards and protocols to reduce potential utility ignitions and harden the electric grid. 	Implement and maintain annually or as outlined in maintenance schedule.	<ul style="list-style-type: none"> PNM Utility clearance standards and protocols. 	High
Develop pre-fire plans for post-fire response (Aligns with Draft NM State Forest Action Plan Sub-Strategy 2.1.3)	Countywide, focusing on areas at highest risk first.	County, municipal, tribal governments; utility providers; water providers	<ul style="list-style-type: none"> Review the Post-Fire Response and Rehabilitation section (Chapter 4) for post-fire planning and actions. Develop and/or familiarize yourself with Burned Area Emergency Rehabilitation (BAER) protocols. Establish guidelines for county, municipal, utility providers, water providers that details the steps required in the event of a fire, to better prepare for post-fire response. Establish relationships with agencies responsible for post-fire response, before the fire. 	2021	<ul style="list-style-type: none"> FEMA County Hazard Mitigation Emergency Managers https://afterwildfirenm.org/ 	High
Equipment purchase for riparian fuel break maintenance	BIA NPA	Tribal	<ul style="list-style-type: none"> Purchase a skid steer with masticating head for removal and maintenance of fuel brakes within the riparian areas of all 4 tribes within Santa Fe County. Majority of fire activity occur within the riparian fuels. 	2021	<ul style="list-style-type: none"> National Fire Plan Rural Fire Assistance 	High

Project Description	Location	Land Ownership	Method and Goal	Timeline	Resources/Funding	Priority
Focus on mitigation measures within areas of high exposure potential (Figure 3.6) (Aligns with Draft NM State Forest Action Plan Sub-Strategy 2.1.2)	Priority areas of interest (Figure 4.1)	All ownership	<ul style="list-style-type: none"> Assess hazard mitigation opportunities to protect values at risk within areas of highest exposure potential. Consider a full tool kit of mitigation measures. 	2021	<ul style="list-style-type: none"> National Fire Plan Rural Fire Assistance FEMA Hazard Mitigation Grant funding FEMA Pre-disaster Mitigation funding USFS Hazard Fuels grants Work with existing collaborative groups to engage the public, i.e., the Greater Santa Fe Fireshed Coalition. Utilize the latest relevant scientific literature to support approach, including information generated by the various southwest forest restoration institutes 	High

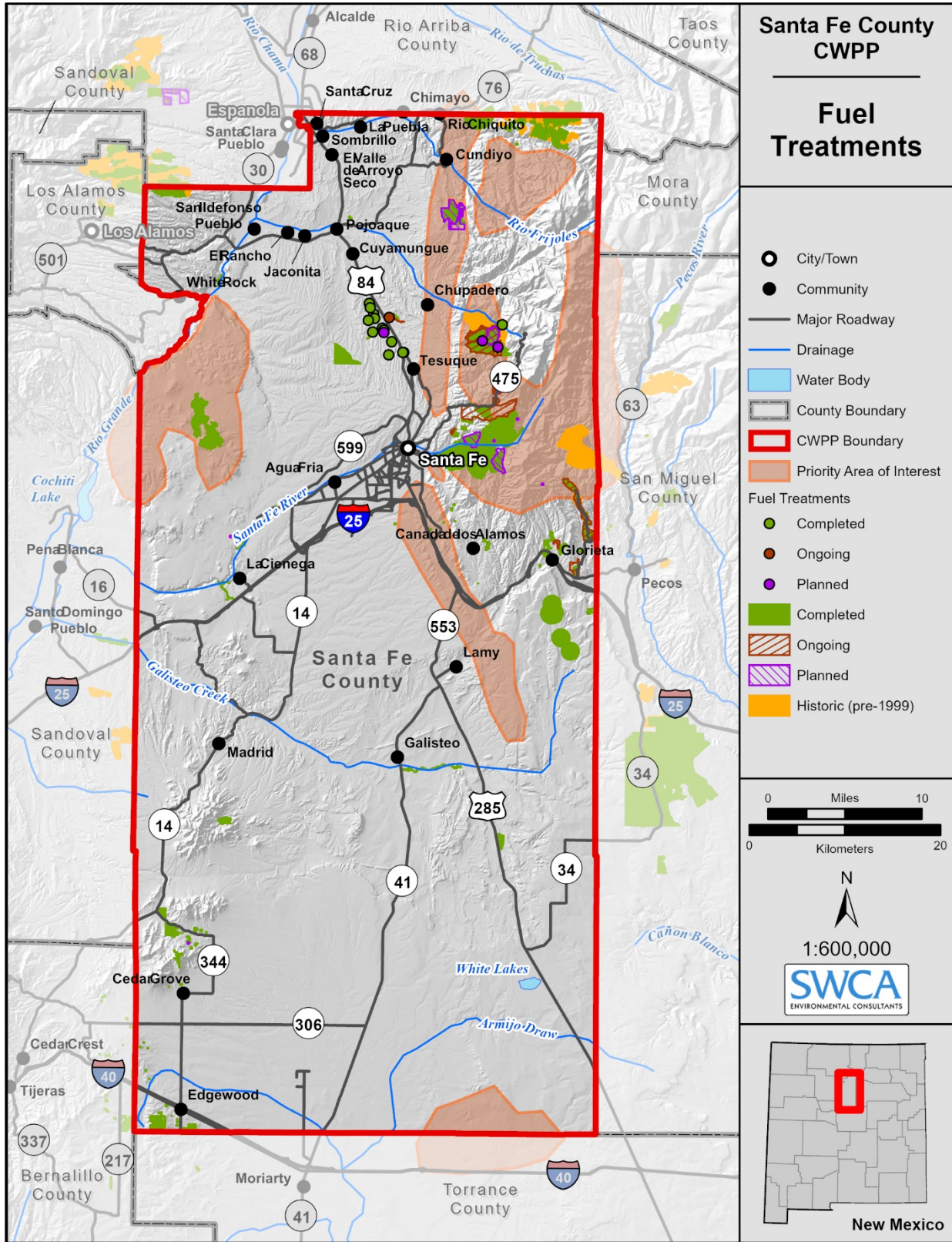


Figure 4.1. Existing and planned fuel treatments across all jurisdictions.

Priority Areas of Interest delineate areas with dense concentrations of values at risk with high potential exposure to wildfire.

Fuels Treatment Scales

Defensible Space

Defensible space is perhaps the fastest, most cost-effective, and most efficacious means of reducing the risk of loss of life and property. Although fire agencies can be valuable in providing guidance and assistance, creating defensible space is the responsibility of the individual homeowner (Figure 4.2).

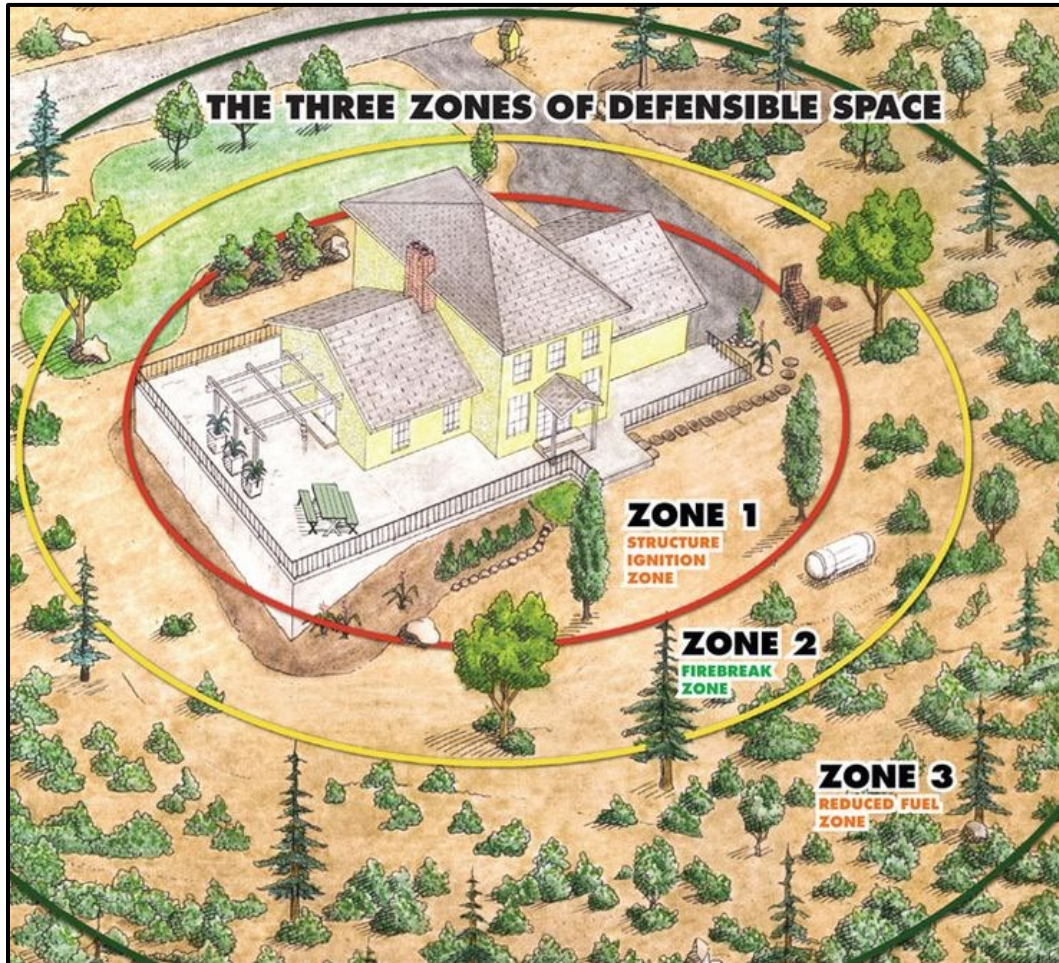


Figure 4.2. Defensible space providing clearance between a structure and adjacent woodland or forest fuels.

Source: Firewise.org.

Effective defensible space consists of creating an essentially fire-free zone adjacent to the home, a treated secondary zone that is thinned and cleaned of surface fuels, and (if the parcel is large enough) a transitional third zone that is basically a managed forest area. These components work together in a proven and predictable manner. Zone 1 keeps fire from burning directly to the home; Zone 2 reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember production; and Zone 3 does the same at a broader scale, keeping the fire intensity lower by maintaining a more natural, historic condition (Figures 4.2 and 4.3).

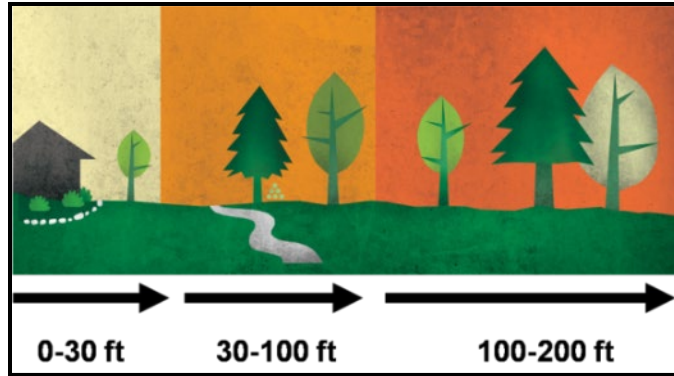


Figure 4.3. Defensible space zones.

Source: www.firewise.org.

It should be emphasized that defensible space is just that—an area that allows firefighters to work effectively and with some degree of safety to defend structures. While defensible space may increase a home’s chance of surviving a fire on its own, a structure’s survival is not guaranteed, with or without firefighter protection. Nevertheless, when these principles are consistently applied across a neighborhood, everybody benefits.

Specific recommendations should be based on the hazards adjacent to a structure such as slope steepness and fuel type. The County has a program established for carrying out home hazard assessments and therefore homeowners are encouraged to contact the County fire department to schedule an assessment on their home to provide specific actions they can take for wildfire mitigation. Firewise guidelines and the Homeowners Guide (Appendix G) are excellent resources, but creating defensible space does not have to be an overwhelming process. Assisting neighbors may be essential in many cases. Homeowners should consider assisting the elderly, sharing ladders for gutter cleaning, and assisting neighbors with large thinning needs. Homeowner actions have been found to also motivate neighbors to act, increasing the scope of the wildfire mitigation across a community (Evans et al. 2015). Adopting a phased approach can make the process more manageable and encourage maintenance (Table 4.2).

Table 4.2. Example of a Phased Approach to Mitigating Home Ignitability

Year	Project	Actions
1	Basic yard cleanup (annual)	<ul style="list-style-type: none"> Dispose of clutter in the yard and under porches. Remove dead branches from yard. Mow and rake. Clean off roofs and gutters. Remove combustible vegetation near structures. Coordinate disposal as a neighborhood or community. Post 4-inch reflective address numbers visible from road.
2	Understory thinning near structures	<ul style="list-style-type: none"> Repeat basic yard cleanup. Limb trees up to 6–10 feet. Trim branches back 15 feet from chimneys. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.

Year	Project	Actions
3	Understory thinning on private property along roads and drainages	Limb trees up to 6–10 feet. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.
4	Overstory treatments on private property	Evaluate the need to thin mature or diseased trees. Prioritize and coordinate tree removal within neighborhoods to increase cost effectiveness.
5	Restart defensible space treatment cycle	Continue the annual basic yard cleanup. Evaluate need to revisit past efforts or catch those that were bypassed.

Fuel Breaks and Open Space Cleanup

The next location priority for fuels treatments should be where the community meets the wildland. This may be the outer margins of a town or an area adjacent to occluded open spaces such as a park. Fuel breaks (also known as shaded fuel breaks) are strips of land where fuel (for example living trees and brush, and dead branches, leaves or downed logs) has been modified or reduced to limit the fires ability to spread rapidly. Fuel breaks should not be confused with firebreaks, which are areas where vegetation and organic matter is removed down to mineral soil. Shaded fuel breaks may be created to provide options for suppression resources or to provide opportunities to introduce prescribed fire. In many cases, shaded fuel breaks may be created by thinning along roads. This provides access for mitigation resources and firefighters, as well as enhancing the safety of evacuation routes.

Larger-scale Treatments

Farther away from WUI communities, the emphasis of treatments often becomes broader. While reducing the buildup of hazardous fuels remains important, other objectives are often included, such as forest health and resiliency to catastrophic wildfire and climate change considerations. Wildfires frequently burn across jurisdictional boundaries, sometimes on landscape scales. As such, these larger treatments need to be coordinated on a strategic level. This requires coordination between projects and jurisdictions, as is currently occurring.

Land managers have carried out numerous forest restoration projects across Santa Fe County and the Sangre de Cristo Mountains and have ongoing projects planned on public land that are designed to reduce hazardous fuels to protect communities and resources, while restoring fire-adapted communities. Figure 4.1 shows existing fuel treatments that have been completed or planned across the County. This information is derived from the NM Vegetation Treatment Mapping project developed by the New Mexico Forest and Watershed Restoration Institute.¹¹ The reader is referred to agency websites and the Federal Register for the latest information on planned or ongoing actions on federal land within the County.¹² Figure 4.1. also includes areas delineated as priority areas of interest. These are areas of high concentrations of HVRA that coincide with high potential exposure to wildfire, based on exposure analysis (Figure 3.6). These are areas where land managers should consider employing mitigation measures to protect these CVARs.

Public support for landscape projects can often be mixed because some individuals or communities do not perceive the treatments to be effective (Evans et al. 2015). Building public trust is therefore important, and this includes ensuring that federal agencies engage the community early and often in the planning process and that science is used to support fuel treatment planning and management decisions.

¹¹ NMFWR Vegetation Treatment Mapper- <https://nmfwri.org/gis-projects/nm-vegetation-treatment-mapping>

¹² Federal Register: <https://www.federalregister.gov/>

Fuel Treatment Methods

Since specifics of the treatments are not provided in detail in Table 4.1, different fuels reduction methods are outlined in the following narrative.

Several treatment methods are commonly used, including manual treatments, mechanized treatments, and prescribed fire (Table 4.3). This brief synopsis of treatment options is provided for general knowledge; specific projects will require further planning. The appropriate treatment method and cost will vary depending on factors such as the following:

- Diameter of materials
- Proximity to structures
- Acreage of project
- Fuel costs
- Steepness of slope
- Area accessibility
- Density of fuels
- Project objectives

It is imperative that long-term monitoring and maintenance of all treatments is implemented. Post-treatment rehabilitation such as seeding with native plants and erosion control may be necessary.

Table 4.3. Summary of Fuels Treatment Methods

Treatment	Comments
Machine mowing	Appropriate for large, flat, grassy areas on relatively flat terrain.
Prescribed fire	Can be very cost effective. Ecologically beneficial. Can be used as training opportunities for firefighters. May require manual or mechanical pretreatment. Carries risk of escape, which may be unacceptable in some WUI areas. Unreliable scheduling due to weather and smoke management constraints.
Brush mastication	Brush species tend to re-sprout vigorously after mechanical treatment. Frequent maintenance of treatments are typically necessary. Mastication tends to be less expensive than manual (chainsaw) treatment and eliminates disposal issues.
Timber mastication	Materials up to 10 inches in diameter and slopes up to 30% can be treated. Eliminates disposal issues. Environmental impact of residue being left on site is still being studied.
Manual treatment with chipping or pile burning	Requires chipping, hauling, pile burning of slash in cases where lop and scatter is inappropriate. Pile burning must comply with smoke management policy.
Feller buncher	Mechanical treatment on slopes more than 30% or of materials more than 10 inches in diameter may require a feller buncher rather than a masticator. Costs tend to be considerably higher than masticator.

Manual Treatment

Manual treatment refers to crew-implemented cutting with chainsaws. Although it can be more expensive than mechanized treatment, crews can access many areas that are too steep or otherwise inaccessible with machines. Treatments can often be implemented with more precision than prescribed fire or mechanized methods allow. Merchantable materials and firewood can be removed while non-merchantable materials are often lopped and scattered, chipped, or piled and burned on site. Care should

be exercised to not increase the fire hazard by failing to remove or treat discarded material in a site-appropriate manner.

Strategic timing and placement of fuels treatments is critical for effective fuels management practices and should be prescribed based on the conditions of each particular treatment area. Some examples of this would be to place fuel breaks in areas where the fuels are heavier and in the path of prevailing winds and to mow grasses just before they cure and become flammable. Also, burning during the hotter end of the prescription is important since hotter fires are typically more effective at reducing heavy fuels and shrub growth. In areas where the vegetation is sparse and not continuous, fuels treatments may not be necessary to create a defensible area where firefighters can work. In this situation, where the amount of fuel to carry a fire is minimal, it is best to leave the site in its current condition to avoid the introduction of exotic species.

Mechanized Treatments

Mechanized treatments include mowing, mastication (ground-up timber into small pieces), and whole tree felling. These treatments allow for more precision than prescribed fire and are often more cost-effective than manual treatment.

Mowing, including ATV and tractor-pulled mower decks, can effectively reduce grass fuels adjacent to structures and along highway rights-of-way and fence lines. For heavier fuels, several different masticating machines can be used, including drum- or blade-type masticating heads mounted on machines and ranging in size from a small skid-steer to large front-end loaders. Some masticators can grind standing timber up to 10 inches in diameter. Other masticators are more effective for use in brush or surface fuels. Mowing and mastication do not actually reduce the amount of on-site biomass but alter the fuel arrangement to a less combustible profile.

In existing fuel break areas maintenance is crucial especially in areas of encroaching shrubs or trees. In extreme risk areas more intensive fuels treatments may be necessary to keep the fire on the ground surface and reduce flame lengths. Within the fuel break, shrubs should be removed, and the branches of trees should be pruned from the ground surface to a height of 4 to 8 feet, depending on the height of the fuel below the canopy, and thinned with a spacing of at least two to three times the height of the trees to avoid movement of an active fire into the canopy.

Mechanical shears mounted on feller bunchers are used for whole tree removal. The stems are typically hauled off-site for utilization while the limbs are discarded. The discarded material may be masticated, chipped, or burned in order to reduce the wildfire hazard and to speed the recycling of nutrients.

Prescribed Burning

Prescribed burning is also a useful tool to reduce the threat of extreme fire behavior by removing excessive standing plant material, litter, and woody debris while limiting the encroachment of shrubby vegetation (Figure 4.4). Where possible, prescribed fire could occur on public lands since fire is ecologically beneficial to this fire-adapted vegetation community and wildlife habitat. Land managers are already cooperating to implement prescribed burning in Santa Fe County.

All prescribed fire operations will be conducted in accordance with federal and state laws and regulations. Public safety would be the primary consideration in the design of any prescribed burn plan so as to not negatively impact the WUI. The areas to be burned would occur within fuel breaks or appropriate fire lines (USFS 2015). Agency use of prescribed fire on public lands would be carried out within the confines of the agency's fire management planning documents and would require individual prescribed burn plans that are developed for specific burn units and consider smoke management concerns and sensitive receptors within the WUI. Smoke monitors could be placed in areas where smoke concerns have been raised in the past.



Figure 4.4. Photographs showing two treatment plots on the Santa Fe National Forest, pre- and post-prescribed fire.

Following any type of fuels reduction treatment, post-treatment monitoring should continue to ensure that management actions continue to be effective throughout the fire season. The vegetation within this ecosystem can change rapidly in response to drought or moisture from year to year and during the course of the season, so fuels treatments should be adjusted accordingly.

Several re-entries may be needed to meet full resource management objectives, so a solid maintenance plan is needed to ensure success.

Impacts of Prescribed Fire on Communities

Managing smoke from prescribed fires is an important part of planning for prescribed burning. The New Mexico Environment Department, Air Quality Bureau has smoke management guidelines to protect the health and welfare of New Mexicans from the impacts of smoke (New Mexico Environment Department 2005). Smoke from burning vegetation produces air pollutants that are regulated by both the U.S Environmental Protection Agency (EPA) and the state of New Mexico.¹³ Fire managers must obtain a permit from the Air Quality Bureau to start a prescribed burn and can only do so during optimal conditions for smoke management. During a burn, lighting patterns can be altered to change how smoke is generated. Generally, the impacts of smoke from prescribed burning are far less than those from wildfire events. Prescribed burns aid in reducing the potential smoke impacts of high-intensity, extensive wildfires.¹⁴

Prescribed fires can have impacts on air quality that may impact local communities. Impacts on a regional scale are typically only acute when many acres are burned on the same day, which is rare in this region. Local problems are occasionally acute due to the large quantities of smoke that can be produced in a given area during a short period of time. Residents with respiratory problems may be impacted during these burning periods since smoke consists of small particles of ash, partly consumed fuel, and liquid droplets that are considered air pollutants. Other combustion products include invisible gases such as carbon monoxide, carbon dioxide, hydrocarbons, and small quantities of nitrogen oxides. Oxides of nitrogen are usually produced at temperatures only reached in piled or windrowed slash or in very intense wildfires that are uncommon in the region. In general, prescribed fires produce inconsequential amounts of these gases.

Effects of smoke can be managed by burning on days when smoke will blow away from smoke-sensitive areas. Precautions are taken when burning near populated areas, highways, airports, and other smoke-sensitive areas. Any smoke impact downwind is considered before lighting a fire. Smoke management is a significant component of all prescribed burn plans. Other mitigating actions include alerting the public of upcoming burning activities, including the purpose, best conditions for ensuring good smoke dispersal, duration, size, and location of projects. Local radio, newspapers, social media, and TV can provide broad coverage for alerts. Land management agencies in the project area consistently work with concerned citizens regarding smoke management and attempt to provide solutions such as the placement of smoke monitors at sensitive sites.

Thinning and Prescribed Fire Combined

Combining thinning and prescribed fire can be the most effective treatment (Graham et al. 2004). In forests where fire exclusion or disease has created a buildup of hazardous fuels, prescribed fire cannot be safely applied, and pre-burn thinning is required. The subsequent use of fire can further reduce residual fuels and reintroduce this ecologically imperative process.

Management of Non-native Plants

The USDA maintains a list of noxious weeds rated from A to C based on the current degree of infestation of the species and the potential for eradication (USDA 2010). Fuel treatment approaches should always

¹³ https://www.env.nm.gov/wp-content/uploads/sites/2/2018/03/SMP_Guidance_052505.pdf

¹⁴ <http://www.santafefreshed.org/smoke>

consider the potential for introduction or proliferation of invasive non-native species as a result of management actions.

Fuel Breaks

Fire behavior in the CWPP planning area has been modeled using FlamMap. This assessment provides estimates of flame length and rate of spread; the information should be used by land managers when prescribing treatments. Land managers are cautioned, however, that fuel breaks will not always stop a fire under extreme fire behavior or strong winds; these should only be seen as a mitigating measure and not a fail-safe method for fire containment. Furthermore, fuel break utility is contingent upon regular maintenance, as regrowth in a fuel break can quickly reduce its effectiveness and vegetation in this ecosystem is known to quickly re-sprout and reestablish. Maintenance of existing breaks could be more cost efficient than installation of new features.

It is not possible to provide a standard treatment prescription for the entire landscape because fuel break dimensions should be based on the local fuel conditions and prevailing weather patterns. For example, in some areas, clearing an area too wide could open the landscape to strong winds that could generate more intense fire behavior and/or create wind throw.

Because of the dominant wind patterns in Santa Fe County (i.e., out of the west-southwest), fuel breaks are recommended on the west sides of communities.

Strategic placement of fuel breaks is critical to prevent fire from moving from wildland fuels into adjacent neighborhoods. For effective management of most fuels, fuel breaks should be prescribed based on the conditions in each treatment area. Some examples of this would be to place fuel breaks in areas where fuels are heavier or in areas with easy access for fire crews. In areas where the vegetation is discontinuous, fuel treatments may not be necessary. In this situation it is best to leave the site in its current condition to avoid the introduction of more flammable, exotic species which may respond readily following disturbance.

Well-managed fuels reduction projects often result in ecological benefits to wildlife and watershed health. Simultaneously, planning and resource management efforts should occur when possible while reducing fuels to ensure that the land remains viable for multiple uses in the long term. The effectiveness of any fuels reduction treatment will increase over time with a maintenance and monitoring plan. Monitoring will also ensure that objectives are being met in a cost-effective manner.

COHESIVE STRATEGY GOAL 2: FIRE-ADAPTED COMMUNITIES

Goal 2 of the Cohesive Strategy/Western Regional Action Plan is: Fire-Adapted Communities:

Human populations and infrastructure can withstand a wildfire without loss of life and property. The basic premise of this goal is:

“Preventing or minimizing the loss of life and property due to wildfire requires a combination of thorough pre-fire planning and action, followed by prudent and immediate response during a wildfire event. Post-fire activities can also speed community recovery efforts and help limit the long-term effects and costs of wildfire. CWPPs should identify high-risk areas and actions residents can take to reduce their risk. Fuels treatments in and near communities can provide buffer zones to protect structures, important community values and evacuation routes. Collaboration, self-sufficiency, acceptance of the risks and consequences of actions (or non-action), assisting those who need assistance (such as the elderly), and encouraging cultural and behavioral changes regarding fire and fire protection are important concepts. Attention will be paid to values to be protected in the middle ground (lands between the community and the forest) including watersheds, viewsheds, utility and transportation corridors, cultural and historic values, etc.” (Western Regional Action Plan 2013:15).

In this CWPP update, recommendations for fire-adapted communities include public education and outreach actions and actions to reduce structural ignitability.

RECOMMENDATIONS FOR PUBLIC EDUCATION AND OUTREACH

Just as environmental hazards need to be mitigated to reduce the risk of fire loss, so do the human hazards. Lack of knowledge, lack of positive actions, and negative actions all contribute to increased risk of loss in the WUI.

Most Santa Fe County residents understand the risk that wildfire poses to their communities. The community is incredibly well informed in wildfire science and already engaged in mitigation (Figure 4.5). It is important to continually engage the community as a partner in order to expand wildfire mitigation options across land ownership (McCaffrey 2004; Winter and Fried 2000; McCaffrey and Olsen 2012, McCaffrey, 2020). Table 4.4 lists recommendations for improving public education and outreach.

Three communities in the County are already Firewise certified: Monte Sereno Neighborhood, Rancho Viejo Community, and Tesuque Valley.¹⁵ Some residents would still benefit from greater exposure to the Firewise Communities concept,¹⁶ fire-adapted communities,¹⁷ and Ready, Set, Go! programs.¹⁸ Firewise programs have been found to motivate residents to carry out defensible space and other actions within their community, empower residents to take control of addressing wildfire risk, improve community cohesion through collective actions, and encourage coordination of outside agencies (Evan et al. 2019). Continuing enthusiasm over long periods is difficult however, particularly if a community “spark plug” or active coordinator leaves or steps down. Glorieta Estates used to be an active Firewise community, but activity has waned (Evans et al. 2015). Measures to improve sustainability of mitigation actions are included in Table 4.4.

The County and City of Santa Fe provide home hazard assessments to residents, and these assessments can provide tailored actions that residents can make to address wildfire hazards around their homes (Evans et al. 2015). Greater participation in these programs could improve local understanding of wildfire and, in turn, improve protection and preparedness.

Other methods to improve public education could include increasing awareness about fire department response and fire department resource needs; providing workshops at demonstration sites showing Firewise Communities landscaping techniques or fuels treatment projects; organizing community cleanups to remove green waste; publicizing availability of government funds for thinning and prescribed burning on private lands; and, most importantly, improving communication between homeowners and local land management agencies to improve and build trust, particularly since the implementation of fuel treatments and better maintenance of existing treatments needs to occur in the interface between public and private lands.

The Greater Santa Fe Fireshed Coalition carries out many public outreach activities throughout the County (Figure 4.6) and is a great resource for information and contacts regarding wildfire mitigation and wildfire prevention within the County and City of Santa Fe.¹⁹

¹⁵ State Listings of Certified Firewise Communities: <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/Firewise-USA-Resources/Firewise-USA-sites/State-listing-of-participants>

¹⁶ Firewise Communities—A Model of Local Initiative and Cooperation: www.firewise.org

¹⁷ Fire Adapted Communities Coalition: <https://fireadapted.org/>

¹⁸ Ready, Set, Go!: https://www.wildlandfirersg.org/s/?language=en_US

¹⁹ Greater Santa Fe Fireshed Coalition- contacts: <http://www.santafefireshed.org/santafecitycounty>



Figure 4.5. Wildfire Community Preparedness Day activities attended by the City of Santa Fe Fire Department (photo credit: P. Chavarria).



Figure 4.6. The Greater Santa Fe Fireshed Coalition frequently outreaches to the Santa Fe community (photo credit: P. Chavarria).

Table 4.4 lists public education and outreach projects recommended for implementation in the County.

Table 4.4. Public Outreach and Education Recommendations

Project	Description	Presented By	Target Date	Resources Needed	Serves to...	Priority
Accurately represent fire response capability	Transparency and facts needed regarding capacity to respond to a large fire. The resources have not yet been tested. Pre-planning and mock incidents need to be used to test and report back to the public.	County Fire Department and other agencies	2022	<ul style="list-style-type: none"> Agency planning Mock incidents Dispatch Media blasts Community outreach meetings 	Provide an accurate assessment of fire response capacity	High
Identify vulnerable populations	The County needs to better document vulnerable populations (elderly, disabled, low income) who may need additional help to mitigate home hazards. Seek grant opportunities to support assistance for vulnerable populations.	Santa Fe County, municipalities, HOAs, community leaders	2021	<ul style="list-style-type: none"> County staff Community liaison Community leaders to champion projects for vulnerable populations 	Address a need to assist vulnerable populations.	High
Home assessments and resident surveys	Continue further home hazard assessments in conjunction with the City of Santa Fe and the Wildfire Research Center. Assessments would be windshield assessments with data and surveys sent to homeowners. The surveys could be used to inform groups (e.g., the Fireshed Coalition) about public perceptions of risk, as well as priority areas in which to focus efforts.	County, City of Santa Fe, Wildfire Research Center	Summer 2020	<ul style="list-style-type: none"> 2 or 3 staff members for assessments City is investing in this effort 	Contribute to ongoing data collection on hazards in the County. Open up a line of dialogue between a fire department and the resident regarding actions that can take to reduce wildfire risk. Educates homeowners on real actions that could mitigate their wildfire hazard and risk.	High

Project	Description	Presented By	Target Date	Resources Needed	Serves to...	Priority
	Consider reassessments of homes (using the same protocols and hazard forms) previously surveyed to determine obstacles to mitigation and record successes.					
Face-to-face public engagement opportunities	<p>The County is looking for opportunities to sample a broad selection of the public through piggybacking on events that draw all segments of the society.</p> <p>The County should ensure that all interactions result in follow up engagement, by gathering contact information for residents interested in action.</p> <p>Events in high-risk areas should be targeted first.</p>	County Fire Department	Year round	<ul style="list-style-type: none"> Funding to support purchase of materials Venue fees 	Engage a broad cross-section of the population instead of attracting only those residents who are already engaged in fire prevention and risk reduction activities. Social science has shown that face-to-face engagement is the most effective way to generate action.	High
Increase scope of outreach opportunities	<p>The County would like to hire a communications officer.</p> <p>The Communications officer should pursue continuous and repeat interactions with residents to generate greater mitigation actions.</p>	County Fire Department	Ongoing	<ul style="list-style-type: none"> Salary for communications officer 	Improve capacity for public outreach to residents.	High
Priority ignition concerns	Use education and outreach to address priority concerns regarding ignition (e.g., exploding targets).	Public agencies, County, Sheriff's Department	2022	<ul style="list-style-type: none"> Media blasts Enforcement 	Reduce unnecessary ignition through unlawful or irresponsible behaviors.	Medium

Project	Description	Presented By	Target Date	Resources Needed	Serves to...	Priority
Improve agency coordination of outreach	Agency coordinated meeting- consistent message. Could raise cross-boundary issues during this meeting. Model on Jemez Mountains annual event.	All agencies	2022	<ul style="list-style-type: none"> Internal agency support for initiatives Meeting materials Media support 	Provide a consistent message regarding wildfire activity, fire prevention goals, actions for homeowners. Reduce redundancy. Improve efficiency. Reduce potential confusion or messaging fatigue.	Medium
Expand partnerships with insurance brokers	Engaging insurance agents in dialogue. The County residents have been advised to adhere to the Ready, Set, Go! program. Provide incentives for mitigation actions	County, insurance brokerages	2022	<ul style="list-style-type: none"> Potential committee Resources from insurance companies Outreach and education 	Align insurance company requirements with County codes and ordinances Possibly increase value of homes that have wildfire mitigation completed.	Medium
Improve sustainability of mitigation actions by residents	In order to encourage engagement in mitigation actions and sustain engagement, entities should: <ul style="list-style-type: none"> - Provide recognition of service - Provide incentives for residents to take action - Assist and facilitate actions by providing services for treating and removing slash - Identify barriers to engagement and address (Reams 2005) - Track progress and identify areas requiring support 	All agencies	2022	<ul style="list-style-type: none"> Project tracking Online tools to share recognition Meeting materials Media support 	Increase sustainability for mitigation actions and combat fatigue amongst residents and communities.	High

RECOMMENDATIONS FOR REDUCING STRUCTURAL IGNITABILITY

Table 4.5 provides a list of community-based recommendations to reduce structural ignitability that should be implemented throughout the SCCWPP planning area. Reduction of structural ignitability depends largely on public education that provides homeowners the information they need to take responsibility for protecting their own properties. A list of action items that individual homeowners can follow can be found below. Carrying out fuels reduction treatments on public land may only be effective in reducing fire risk to some communities; however, if homeowners have failed to provide mitigation efforts on their own land, the risk of home ignition remains high and firefighter lives are put at risk when they carry out structural defense.

Preparing for wildland fire by creating defensible space around the home is an effective strategy for reducing structural ignitability. Studies have shown that burning vegetation beyond 120 feet of a structure is unlikely to ignite that property through radiant heat (Cohen and Butler 1996), but fire brands that travel independently of the flaming front have been known to destroy houses that had not been impacted by direct flame impingement. Hardening the home to ignition from embers, including maintaining vent coverings and other openings are also strongly advised as measures to protect a home from structural ignitability. Education about managing the landscape around a structure, such as removing weeds and debris within a 30-foot radius and keeping the roof and gutters of a home clean, are two maintenance measures proven to limit combustible materials that could provide an ember bed and ignite the structure. Educating people about the benefits of proper maintenance of their property that includes pruning and trimming trees and shrubs and, where warranted, the removal of trees and other vegetation, and using Firewise Communities landscaping methods on their property is also essential for successful household protection.

It is important to note that no two properties are the same. Homeowners and communities are encouraged to research which treatments would have the most effect for their properties. Owners of properties on steep slopes, for example, should be aware that when constructing defensible space, they must factor in slope and topography, which would require extensions to the conventional 30-foot recommendations. More detailed information on reducing structural ignitability can also be found in Appendix G (Homeowner's Guide).

Some structural ignitability hazards are related to homes being in disrepair, vacant or abandoned lots, and minimal yard maintenance. In order to influence change in homeowner behavior, county ordinances may be needed.

Table 4.5. Recommendations for Reducing Structural Ignitability

Project	Private Land/Homeowners	Programs Available	Description	Resources/Funding	Timeline	Priority
Need greater enforcement of the new International WUI code (Fire Code)	County	Fire Prevention Division	The Fire code applies only to new construction and requires that structures meet the parameters of the Code in order to secure building permits. Following permitting there is no current enforcement of those code parameters. The County would like to explore options for increasing resources to support greater Fire Code enforcement, including annual inspections to ensure that emergency access is maintained.	<ul style="list-style-type: none"> Fire Prevention and Safety Grants 	2022	Low
Increase defensible space actions	Private land. Highest risk areas a priority.	Work with Soil and Water Conservation Districts and NMSF to find funding sources for residents	<ul style="list-style-type: none"> Initiate and expand defensible space cost-sharing programs like those that have been developed in La Barbaria, Glorieta and the Edgewood Soil and Water Conservation District. Increase enforcement of defensible space codes and ordinances. Provide tax incentives for defensible space actions. Work with insurance companies to determine the potential to provide incentives for defensible space associated with reduced insurance premiums. City and County to coordinate green waste pick-up. Expand existing program. 	<ul style="list-style-type: none"> Water Trust Board funding Environmental Quality Incentives Program (EQIP) funding 	2021	High
Implement spring community yard cleanup days focused on neighborly service and supporting vulnerable populations	<p>All residents would be encouraged to participate in each community.</p> <p>Effort to be focused on vulnerable members of the population.</p> <p>Additional focus on seasonal residents.</p>	County/City chipper program	<ul style="list-style-type: none"> A community-led day of yard cleanup with fire mitigation in mind would encourage large numbers within the community to carry out mitigation measures and implement defensible space. Residents would assist elderly, disabled, or vulnerable neighbors. 	<ul style="list-style-type: none"> Santa Fe County Municipalities Churches/youth/ community service groups 	Spring 2021	High

Project	Private Land/Homeowners	Programs Available	Description	Resources/Funding	Timeline	Priority
			<ul style="list-style-type: none"> Provide chipper and/or other green waste disposal pick-up opportunities to residents. 			
Firewise/Ready Set Go! Workshops	Private land, HOAs	County home assessments	<ul style="list-style-type: none"> Identified as a goal in the 2018 HMP. Possibility of leveraging hazard funding for implementation (see page 5.37 in the 2018 HMP). Offer hands-on workshops to highlight individual home vulnerabilities and how-to techniques to reduce ignitability of common structural elements. Examples include installing metal flashing between house and fence or deck and installing wire mesh over eaves, vents, and under decks. Home assessments conducted in a neighborhood often include groups of neighbors participating with the assessor to learn from each other's homes. Homeowners get a better understanding of home hardening by viewing a home other than their own and seem to feel more comfortable asking questions as a group. Home assessments in this manner are being encouraged. These types of group assessments have been conducted in the Agua Fria, Vereda Mesita, La Cueva, and Cougar Ridge neighborhoods. Can be requested by an HOA. Utilize a train-the-trainer model. Develop a team of trained citizens that could perform hazard assessments within their community. Seek funding to pay volunteer fire departments (VFDs) to assist with the train-the-trainer concept or consider hiring a contractor to provide training. 	<ul style="list-style-type: none"> www.firewise.org, www.nfpa.org, www.wildlandfirersg.org https://www.fema.gov/hazard-mitigation-grant-program Ready, Set, Go! grants Fire Prevention and Safety grants SAFER grants Agency budgets 	2021	High

Project	Private Land/Homeowners	Programs Available	Description	Resources/Funding	Timeline	Priority
			<ul style="list-style-type: none"> Currently implemented as part of the Ambassador Program, in conjunction with the City of Santa Fe. Expand this program to reach more residents. Ready, Set, Go! literature is provided to the homeowners during assessments. Continue this practice. 			
Mitigate hazards associated with seasonal properties	Seasonal property owners, HOAs	Ready, Set, Go!	<ul style="list-style-type: none"> Stay active in preparing for wildland fire when absent. Plan to have someone maintain property when absent. Speak with neighbors to develop an action plan in the event of a fire. Establish phone trees. 	<ul style="list-style-type: none"> Water Trust Board funding EQIP funding Ready, Set, Go! grants 	2022	High
Provide printed list of mitigation measures to homeowners with different scales of actions.	All residents would be encouraged to participate. Specific effort to be focused on seasonal residents.	Fire departments Firewise communities Academic and peer-reviewed literature	<p>Utilize Ready, Set, Go! literature where possible.</p> <p>Utilize list of action items broken down by cost (see below):</p> <ul style="list-style-type: none"> <u>Low or no cost</u> – ensure house numbers are easily viewed from the street. <u>Medium cost</u> – annual clearance and thinning of trees and shrubs along driveways to facilitate safe access by emergency vehicles. 	<ul style="list-style-type: none"> Ready, Set, Go! grants Fire Prevention and Safety grants SAFER grants 	Fall 2021	Moderate

Action Items for Homeowners to Reduce Structural Ignitability

Low or No Cost Investment (<\$50)

Regularly check fire extinguishers and have a 100-foot hose available to wet perimeter.

Maintain defensible space for 30 feet around home. Work with neighbors to provide adequate fuels mitigation in the event of overlapping property boundaries.

Make every effort to keep lawn mowed and green during fire season.

Screen vents with non-combustible meshing with mesh opening not to exceed nominal ¼-inch size.

Ensure that house numbers are easily viewed from the street.

Keep wooden fence perimeters free of dry leaves and combustible materials. If possible, non-combustible material should link the house and the fence.

Keep gutters free of vegetative litter. Gutters can act as collecting points for fire brands and ashes.

Store combustible materials (firewood, propane tanks, grills) away from the house; in shed, if available.

Clear out materials from under decks and/or stacked against the structure. Stack firewood at least 30 feet from the home, if possible.

Reduce your workload by considering local weather patterns. Because prevailing winds in the area are often from the west-southwest, consider mitigating hazards on the west corner of your property first, then work around to cover the entire area.

Seal up any gaps in roofing material and enclose gaps that could allow fire brands to enter under the roof tiles or shingles.

Remove flammable materials from around propane tanks.

Minimal Investment (<\$250)

When landscaping in the home ignition zone (HIZ) (approximately 30 feet around the property), select non-combustible plants, lawn furniture, and landscaping material. Combustible plant material like junipers and ornamental conifers should be pruned and kept away from siding. If possible, trees should be planted in islands and no closer than 10 feet to the house. Tree crowns should have a spacing of at least 18 feet when within the HIZ. Vegetation at the greatest distance from the structure and closest to wildland fuels should be carefully trimmed and pruned to reduce ladder fuels, and density should be reduced with approximately 6-foot spacing between trees crowns.

Box in eaves, attic ventilation, and crawl spaces with non-combustible material.

Work on mitigating hazards on adjoining structures. Sheds, garages, barns, etc., can act as ignition points to your home.

Enclose open space underneath permanently located manufactured homes using non-combustible skirting.

Clear and thin vegetation along driveways and access roads so they can act as a safe evacuation route and allow emergency responders to access the home.

Purchase or use a National Oceanic and Atmospheric Administration weather alert radio to hear fire weather announcements.

Moderate to High Investment (>\$250)

Construct a non-combustible wall or barrier between your property and wildland fuels. This could be particularly effective at mitigating the effect of radiant heat and fire spread where 30 feet of defensible space is not available around the structure.

Construct or retrofit overhanging projections with heavy timber that is less combustible.

Replace exterior windows and skylights with tempered glass or multilayered glazed panels.

Invest in updating your roof to non-combustible construction. Look for materials that have been treated and given a fire-resistant roof classification of Class A. Wood materials are highly combustible unless they have gone through a pressure-impregnation fire-retardant process.

Construct a gravel turnaround in your driveway to improve access and mobilization of fire responders.

Treat construction materials with fire-retardant chemicals.

Install a roof irrigation system.

Replace wood or vinyl siding with nonflammable materials.

Relocate propane tanks underground.

COHESIVE STRATEGY GOAL 3: WILDFIRE RESPONSE

Goal 3 of the Cohesive Strategy/Western Regional Action Plan is Wildfire Response: All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions:

“A balanced wildfire response requires integrated pre-fire planning with effective, efficient, and coordinated emergency response. Pre-fire planning helps tailor responses to wildfires across jurisdictions and landscape units that have different uses and management objectives. Improved prediction and understanding of weather, burning conditions, and various contingencies during wildfire events can improve firefighting effectiveness, thereby reducing losses and minimizing risks to firefighter and public health and safety. Wildfire response capability will consider the responsibilities identified in the Federal Response Framework. Local fire districts and municipalities with statutory responsibility for wildland fire response are not fully represented throughout the existing wildland fire governance structure, particularly at the NWCG, NMAC, and GACC levels.” (Western Regional Action Plan 2013:15).

This section provides recommended actions that jurisdictions could undertake to improve wildfire response.

RECOMMENDATIONS FOR IMPROVING FIRE RESPONSE CAPABILITIES

Educating the public so they can reduce its dependence on fire departments is essential because these resources are often stretched thin due to limited personnel.

Table 4.6 provides recommendations for improving firefighting capabilities. Many of these recommendations are general in nature.

Table 4.6. Fire Response Capability Recommendations

Project	Fire Department	Description	Timeline	Contact/Funding	Priority
Improve the public warning system to improve wildfire response and possible evacuation measures	County Fire Department	<ul style="list-style-type: none"> Identified as a goal in the 2018 HMP. Possibility of leveraging hazard funding for implementation (see page 5.38 in 2018 HMP). Investigate and procure ignition detection technology to increase response rates to wildland fire ignitions. There exist low-cost and high-impact, available technologies that address WUI Detection and Tracking gaps (e.g., Descartes Lab Platform, WIFIRE, Dunami, IRWIN, Hawkeye, ATAK, Tanka, CAWFE, LANCE) (FEMA 2019). Seek public alert and warning technologies to deliver more targeted and effective message across the whole County, particularly to vulnerable populations. Possible solutions include CodeRed, Rumblr, SAVE, Hootsuite) (FEMA 2019). Improve use of key public and private social media platforms to deliver emergency messaging during a WUI incident. Possible solutions include Nextdoor, Dunami, LexisNexis, Facebook and Twitter. Pre-fire planning and mock incidents to determine capacity and identify communication problems and hurdles to public warnings. Possible solutions: agency mock incidents, fire modeling tools—IFTDSS, WFDSS, SimTable. 	2021	<ul style="list-style-type: none"> Technology solutions are identified in a 2019 FEMA report on WUI incidents.²⁰ FEMA grants Companies that develop fire detection systems include: Wildland Detection Systems http://www.wildlandsystems.com/ Fire Alert MK1 http://vigilys.com/technology/firealert/ 	High

²⁰ https://www.dhs.gov/sites/default/files/publications/wui_fire_report_of_findings_july_24_2019v2_508.pdf

Project	Fire Department	Description	Timeline	Contact/Funding	Priority
Integrate the HMP and CWPP to allow leveraging of hazard funds to implement projects that will mitigate wildfire risk	Santa Fe County Fire Department	<ul style="list-style-type: none"> • Work to bring the CWPP and HMP revisions into alignment. • Integrate the two plans or build consistent project recommendations across each planning process. 	2023	<ul style="list-style-type: none"> • FEMA hazard mitigation plan funding. • NM Association of Counties funding. 	High
Pre-fire planning (Aligns with Draft NM State Forest Action Plan Strategies 2.1.3 and 2.2.1)	All agencies	<ul style="list-style-type: none"> • Develop WUI pre-plans and accompanying evacuation plans for high risk communities. • Implement mock evacuations on communities identified as high risk. • Develop protocols to address weaknesses. • Helps to develop a consistent model and messaging across agencies. 	2022	<ul style="list-style-type: none"> • FEMA, Department of Homeland Security (DHS) grants • NMFD • Resource Mobilization Plan 	High
Improve communications regarding wildland fire smoke	All agencies	<ul style="list-style-type: none"> • Improve education and outreach regarding smoke to increase tolerance for prescribed fire smoke outside of wildfire season. • Identify vulnerable citizens and build registry. • Communicate prescribed fire plans directly to vulnerable populations. 	2022	<ul style="list-style-type: none"> • New Mexico Environment Department, Air Quality Bureau • Greater Santa Fe Fireshed Coalition 	Moderate
Identify and plan for mass shelter/care operations	County, Office of Emergency Management in conjunction with municipalities and tribes Red Cross, New Mexico Department of Homeland Security and Emergency Management	<ul style="list-style-type: none"> • Identified as a goal in the 2018 HMP. Possibility of leveraging hazard funding for implementation (see page 5.41 in 2018 HMP). • Identify mass-care facilities in the event of a mass-evacuation. • Develop a County community emergency response team (CERT) program and stockpile of Meals, Ready to Eat (MRE). • The casinos are a possible resource, but pre-planning is needed to ensure bandwidth. 	2022	<ul style="list-style-type: none"> • FEMA, DHS 	Moderate

Project	Fire Department	Description	Timeline	Contact/Funding	Priority
Develop a livestock evacuation plan and shelter plan	County in conjunction with municipalities and tribes,	<ul style="list-style-type: none"> A livestock evacuation and shelter plan is needed. Previously, the rodeo grounds have been incorrectly identified as a venue. 	2022	<ul style="list-style-type: none"> Santa Fe County Extension Office New Mexico Livestock Board Santa Fe Horse Coalition 	Moderate
Increase volunteer fire department (VFD) recruitment (diversify age classes)	All fire departments	<ul style="list-style-type: none"> Target fire education at schools to encourage younger generations to become interested in firefighting. Carry out recruitment drives through open house and mailings. Provide training incentives for VFD firefighters. 	Annually	<ul style="list-style-type: none"> Schools All fire departments Fire Prevention and Safety grants SAFER grants 	High
Increase funds for VFDs	All fire departments	<ul style="list-style-type: none"> Maintain contact with NMSF and regularly seek grant money. Implement regular evaluations of resource needs for each VFD and make available to public to raise awareness of shortages. Maintain updated list of fire callouts and provide to NMSF/USFS/BLM. Use local media to inform public of fire resources situation. Work with the local newspaper editor to have a year-round column that documents fire department activities. Apply for rural fire assistance program grants. Improve ISO ratings. 	Monthly review of grant opportunities	<ul style="list-style-type: none"> volfire@santafecountynm.gov State and County FEMA Assistance to Firefighters Grant Program, Fire Prevention and Safety grants Rural fire assistance grants SAFER grants VFD assistance 	High
Map and test hydrants and dry hydrant systems. Improve visibility of existing hydrants.	All fire departments	<ul style="list-style-type: none"> Locate existing dry hydrants and map locations. Test functionality. Provide to fire departments and/or install new dry hydrants in areas with minimal water supply for suppression. This data could be added to dispatch computer data to facilitate fire response. Add hydrant markers to reduce obscurity by vegetation. 	Spring 2021	<ul style="list-style-type: none"> NRCS Environmental Quality Incentives Program (EQIP) USFS NMSF 	High

Project	Fire Department	Description	Timeline	Contact/Funding	Priority
Improve water supply	All departments and agencies	<ul style="list-style-type: none"> Funding is needed to procure and install water storage tanks at fire departments throughout the County. Strategic positioning of water storage tanks may alleviate shortage in some areas. ISO rating can be improved through improved water supply infrastructure. 	Fall 2021	<ul style="list-style-type: none"> Fire Prevention and Safety grants SAFER grants 	High
Identify vulnerable populations	Santa Fe County, municipalities, HOAs, community leaders	<ul style="list-style-type: none"> The County, in cooperation with emergency management agencies, would establish a registry of vulnerable populations (elderly, disabled, low income) who may need additional help during a wildfire event. Develop pre-planning and outreach to these populations so that there is a plan in place in the event an individual needs to assistance for evacuation. Incorporate data into spatial mapping 	2021	<ul style="list-style-type: none"> County staff Community liaison Community leaders to champion projects for vulnerable populations FEMA, DHS funding 	Moderate
Increase the number of “red-carded” individuals in the fire departments (Aligns with Draft NM State Forest Action Plan Sub-Strategy 2.3.4)	All fire departments	<ul style="list-style-type: none"> Offer NWCG Basic Wildland Firefighting and Fire Behavior, S-130/S-190 classes to VFDs every fall with an option to attend on weekends. Incentives may be needed to encourage attendance. NMSF could provide training. Work with federal agencies to develop evening and weekend courses for volunteers. Pursue online training programs and have trainees work with an in-house trained mentor to complete training. Facilitate annual refresher participation by having in-house refreshers available or convene agencies to have a countywide refresher. 	Annually, or following recruitment drives	<ul style="list-style-type: none"> NMSF County USFS Fire Prevention and Safety grants SAFER grants BLM program to help train local VFDs 	High

Project	Fire Department	Description	Timeline	Contact/Funding	Priority
		<ul style="list-style-type: none"> • Santa Fe County and the Santa Fe National Forest should work together to develop and then sign a blanket agreement to utilize VFDs on prescribed fires to increase wildland fire experience and ultimately increase capacity for response to wildfires. • Utilize the NMSF Resource Mobilization Plan, which provides a pool of qualified wildland fire resources within the structural fire service of New Mexico so they may be mobilized to assist in the suppression of wildfires and WUI fire incidents. Through this program, VFDs can be reimbursed for wildfire assignments. 			
Reduce wildfire occurrences to reduce flood and debris flow potential	All agencies, Burned Area Emergency Rehabilitation (BAER) teams	<ul style="list-style-type: none"> • Identified as a goal in the 2018 HMP. Possibility of leveraging hazard funding for implementation (see page 5.40 in 2018 HMP). • Develop post fire preparedness plans for high risk areas. (see Table 5.1) • Review the Post-Fire Response and Rehabilitation section below for post-fire planning and actions. • Develop response protocols in conjunction with emergency managers, FEMA, and DHS. 	2021	<ul style="list-style-type: none"> • FEMA • County Hazard Mitigation • Emergency Managers • Edgewood Soil and Water Conservation District (Water Trust Board and Non-Federal Lands Grant funding available) • https://afterwildfirenm.org/ 	High
Utilize spatial fire management tools to support pre-fire planning Potential operational delineations (PODs) (Aligns with Draft NM State Forest Action Plan Sub-Strategy 2.3.1)	All departments and agency land managers	<ul style="list-style-type: none"> • PODs are being increasingly used for developing pre-fire plans for wildfire response. Entities throughout the County should continue to explore options to collaboratively develop PODs across jurisdictions. 	2021	<ul style="list-style-type: none"> • BLM and USFS are already exploring the use of PODs. Information on a pilot project in New Mexico in 2019 is available here: https://forestry.usu.edu/news/utah-forest-newsletter/PODs_NM.pdf 	High

Project	Fire Department	Description	Timeline	Contact/Funding	Priority
Engine Purchase	BIA	<ul style="list-style-type: none"> Purchase a new Type 6 engine to be located in Santa Clara Pueblo. 	2021	<ul style="list-style-type: none"> Fire Prevention and Safety Grants SAFER Grants 	High
Improve Storage	Water BIA	<ul style="list-style-type: none"> Purchase 4, 5,000-gallon Portable Tanks; Fold-a-Tank (1 in Tesuque, 1 in Santa Clara, 2 at Northern Pueblos Agency). Improve water storage capabilities for wildfire suppression on tribal lands 	2021	<ul style="list-style-type: none"> Fire Prevention and Safety Grants SAFER Grants 	High
Utilize spatial communication tools to support emergency response	County	<ul style="list-style-type: none"> There are many GIS solutions that could be applied to emergency response. ESRI ArcGIS Solutions for Emergency Management are a suite of free (with an ESRI license), supported, and customizable applications, maps, workflows, and data management tools centered around preparedness, response, recovery, and mitigation. These solutions can help agencies prepare for and respond to emergencies in their communities with a cohesive, accessible, and adaptive GIS system. They also provide a platform that enables coordination across jurisdictions. While many agencies have developed their own tools and systems, these “in-house” efforts can be costly to build and maintain and can restrict information flow between departments as well as the public. Whether using ESRI products or other systems, it is important to recognize the value of—and invest in—comprehensive GIS systems for emergency response that solve communication problems; reduce training, infrastructure, and maintenance costs; and can adapt and grow to changing needs. 	5 years	<ul style="list-style-type: none"> All agencies 	Moderate

POST-FIRE RESPONSE AND REHABILITATION

Federal, state, and local post-fire response is often overlooked during the wildfire planning process. While neighboring counties have experienced high-severity, extensive wildfire, Santa Fe County has been fortunate to avoid catastrophic wildfire thus far. The 2011 Las Conchas fire in neighboring Los Alamos County burned more than 156,000 acres and highlighted the numerous complexities of post-fire response. Following the fire, heavy rains resulted in widespread floods carrying trees, boulders, and soil through canyons, ultimately damaging communities and critical infrastructure. Water utilities serving Albuquerque were forced to pump from shrinking groundwater reserves to avoid the sediment- and debris-filled Rio Grande. In Santa Fe, with The Nature Conservancy and USFS, the city has established a water fund for restoration efforts in forest areas that source the city's water. The project will require millions of dollars for forest thinning and watershed rehabilitation projects carried out over the next 20 years (National Geographic 2011).

Ongoing research indicates that a moderate- to high-severity wildfire followed by a rainfall event in the upper Santa Fe watershed could result in a debris flow filling 39% of McClure Reservoir with sediment. McClure Reservoir provides an average of 40% of Santa Fe's annual water use.²¹ Creating a plan that outlines steps for agencies, municipalities, and the county to follow will streamline post-fire recovery efforts and reduce the inherent stress to the community.

There are many facets to post-fire recovery, including but not limited to:

- Ensuring public health and safety—prompt removal of downed and hazard trees, addressing watershed damage, and mitigating potential flooding.
- Rebuilding communities and assessing economic needs—securing the financial resources necessary for communities to rebuild homes, business, and infrastructure.
- Restoring the damaged landscape—restoration of watersheds, soil stabilization, and tree planting.
- Reducing fire risk in the future—identifying hazard areas and implementing mitigation.

Recovery of the vegetated landscape is often more straightforward than recovery of the human environment. Assessments of the burned landscape are often well-coordinated through the use of interagency crews who are mobilized immediately after a fire to assess the post-fire environment and make recommendations for rehabilitation efforts.

For the community impacted by fire, however, there is often very little planning at the local level to guide their return after the fire. Residents impacted by the fire need assistance making insurance claims; finding temporary accommodation for themselves, pets, and livestock; rebuilding or repairing damaged property; removing debris and burned trees; stabilizing the land for construction; mitigating potential flood damage; repairing infrastructure; reconnecting to utilities; and mitigating impacts to health. Oftentimes, physical impacts can be mitigated over time, but emotional impacts of the loss and change to surroundings are long-lasting and require support and compassion from the community.

AFTER THE FIRE

Returning Home

First and foremost, follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Do not attempt to return to your home until fire personnel have deemed it safe to do so.

Even if the fire did not damage your house, do not expect to return to normal routines immediately. Expect that utility infrastructure may have been damaged and repairs may be necessary. When you return to your home, check for hazards, such as gas or water leaks and electrical shorts. Turn off

²¹ https://static1.squarespace.com/static/57b62cb1ebbd1a48387a40ef/t/5c7454f27817f77ef6beaa7f/1551127809168/postfire_impacts_highres.pdf

damaged utilities if you did not do so previously. Request that the fire department or utility companies turn the utilities back on once the area is secured. Similarly, water supply systems may have been damaged; do not drink from the tap until you have been advised that it is safe to do so. Finally, keep a “fire watch”; look for smoke or sparks in houses and other buildings.

Note any changes of address with the U.S. Postal Service, banks, utilities, credit card companies, and newspapers. If you do stay elsewhere, try to locate any legal documents, medications, valuables, etc. before relocating (NMSF 2020).

If your home is safe to enter, vacuum all surfaces, clean any airflow filters, and remove soot and smoke from walls if possible. Clean all mattresses and kitchenware. Any perishables exposed to heat should not be consumed (City of Phoenix Fire Department 2009). For additional safety information, see afterwildfirenm.org/immediate-safety.

Insurance Claims

Your insurance agent is the best source of information for submitting a claim. The insurance claim process will be much easier if you photographed your home and valuables before the fire and have kept the photographs in a safe place. Most of the expenses incurred during the time you are forced to live elsewhere may be reimbursed, so be sure to keep all receipts. Do not start any repairs without the approval of your claims adjuster. If you are a renter, you may also contact your property owner or management company (City of Phoenix Fire Department 2009). If you are not insured, contact the American Red Cross (NMSF 2020).

Community Safety: Post-Fire Floods and Debris Flows

There are numerous natural hazards after a wildfire. Perhaps most dangerous are potential flash floods and landslides following rainfall in a burned area upstream from a community. Wildfires increase risk of flooding because burned soil is unable to absorb rainfall and it becomes hydrophobic. Even small rainfall can cause a flash flood, transporting debris and damaging homes and other structures. Listen and look for emergency updates, weather reports, and flash flood warnings. Develop an evacuation plan with your family and stay away from waterways, storm channels, and arroyos (NMSF 2020). Checklists to prepare for flooding are available at <https://www.afterwildfirenm.org/flood-information/before-the-flood-checklists>.

Mobilizing Your Community

When your community is safe and capable of monitoring potential storms, coordination for recovery efforts can begin. Depending on community size, one person or a team of post-fire coordinators can be appointed to work directly with agencies or teams helping with wildfire response. It is important that this person have demonstrated management and computer skills, community knowledge, and experience with federal and state agencies. The post-fire coordinator(s) can delegate any identified recovery tasks or needs to volunteers; however, it may be helpful to specifically appoint a volunteer coordinator. Responsibilities of a volunteer coordinator include creating a volunteer database, recruitment, management, and coordination of community volunteers (NMSF 2020).

The recovery coordinator should become familiar with representatives from local, state, and government agencies that will be helping with coordination or funding of post-fire recovery. The following are resources may be helpful for the post-fire and volunteer coordinators (Coalition for the Upper South Platte [CUSP] 2016):

- The New Mexico Department of Homeland Security and Management
- The Federal Emergency Management Agency (FEMA)
- The American Red Cross
- NMSF
- Continuing Authorities Program & Emergency Flood Protection: U.S. Army Corps of Engineers

- Emergency Watershed Protection (EWP): Natural Resources Conservation Service (NRCS)
- Food Assistance and Farm Service Agency: USDA
- Forest Restoration Assistance: NMSF
- Conservation Districts
- USFS
- NRCS, including Earth Team
- Disaster Distress Helpline

Any large wildfire will also involve an Incident Command System (ICS), an appropriately sized team assigned to aid in post-fire recovery. Learn more at <https://www.nps.gov/articles/wildland-fire-incident-command-system-levels.htm>.

The following should be considered when assessing community needs (NMSF 2020):

- Are there paid staff that will be dedicated to helping with recovery?
- Who is familiar with the ICS? Who has technical skills to help with post-fire treatments? Which community members will be able to write grants and apply for assistance? Who has accounting skills? Management skills?
- How much money will the community need? How can you acquire it?
- How will the community address immediate needs such as shelter, food, and health care? Counseling and mental health?

Communication

After a team is assembled and immediate tasks are identified, find the best way to spread information in your community. You may distribute flyers, set up a voicemail box, work to find pets or livestock that have been displaced, develop a mailing list for property owners, hold regular public meetings, etc. It is important that a long-term communications plan is developed (CUSP 2016). Communication ideas include (NMSF 2020):

- Newspaper communications with emergency information (and phone numbers for emergency services) on flooding, landslides, and debris flows.
- Published information about ongoing flood and landslide mitigation projects.
- Information about safe flooding responses: stay out of the car and off the roads, escape to dry land as soon as possible, do not attempt to cross flowing water.
- Remind residents to listen to weather reports and remain aware of rainfall. Be alert for changes in water flow and stay away from areas prone to landslides and flooding.
- Information on volunteer needs and planned repair projects.

Post-Fire Rehabilitation and Resources

Post-fire land rehabilitation is critical to protect your community from flooding, erosion, and debris flows. Your community response coordinator can identify a team of federal, state, and local agencies to assess impacts and prioritize areas for treatment (NMSF 2020). It is important that this treatment team include experts such as foresters, engineers, and hydrologists (CUSP 2016).

Burned Area Emergency Rehabilitation (BAER) teams are interdisciplinary teams of professionals who work to mitigate the effects of post-fire flooding and erosion if a fire has occurred on **federal** land. The NRCS Emergency Watershed Protection (EWP) program provides technical and financial services for watershed repair on **public (state and local) and private land**. The goal is reduced flood risk via funding and expert advice for land treatments. The EWP program can provide up to 75% of funds;

remaining funds can be paid with in-kind volunteer labor (CUSP 2016). This funding is used by the State Emergency Rehabilitation Team (SERT) to develop specific recovery and treatment plans.

Examples of potential treatments include (NMSF 2020):

- Hillside stabilization (ex: placing bundles of straw parallel to the slope to slow erosion)
- Hazard tree cutting
- Felling trees perpendicular to the slope contour to reduce runoff
- Mulching areas seeded with native vegetation
- Stream enhancements and construction of catchments to control erosion, runoff, and debris flows
- Fencing cattle and people out of unstable, steep slopes
- Planting or seeding native species to limit spread of invasive species.

A comparison of potential hillside, channel, and road treatments is available at <https://www.afterwildfirenm.org/post-fire-treatments/which-treatment-do-i-use>.

The effectiveness of various treatments is described at https://www.fws.gov/fire/downloads/ES_BAR/Post-Fire_Hillslope_Treatment_Synthesis.pdf.

Specific Treatment Details

Hillslope Treatments

Cover Applications:

- Dry mulch provides immediate ground cover with mulch to reduce erosion and downstream flow.
- Wet mulch (hydromulch) provides immediate cover to hold moisture and seeds on slopes using a combination of organic fibers, glue, suspension agents, and seeds (most effective on inaccessible slopes).
- Slash spreading provides ground cover to reduce erosion by felling trees in burned areas.
- Seeding reduces soil erosion over time with an application of native seed mixtures (most successful in combination with mulching). Breaking up and loosening topsoil to break down the hydrophobic layer on top of the soil is also effective.

Erosion Barrier Applications:

- Erosion control mat: organic mats staked on the soil surface to provide stability for vegetation establishment.
- Log erosion barrier: trees felled perpendicular to the hillslope to slow runoff.
- Fiber rolls (wattles): rolls placed perpendicular to the hillslope to reduce surface flows and reduce erosion.
- Silt fencing: permeable fabric fencing installed parallel to the slope contour to trap sediment as water flows down the hillslope.

Channel Treatments

- Check dam: small dams built to trap and store sediment in stream channels.
- In-channel tree felling: felling trees in a staggered pattern in a channel to trap debris and sediment.
- Grade stabilizer: structures made of natural materials placed in ephemeral channels for stabilization.

- Stream bank armoring: reinforcing streambanks with natural materials to reduce bank cutting during stream flow.
- Channel deflector: an engineered structure to direct flow away from unstable banks or nearby roads.
- Debris basin: constructed to store large amounts of sediment moving in a stream channel.

Road and Trail Treatments

- Outsloping and rolling dips (water bars) alter the road shape or template to disperse water and reduce erosion.
- Overflow structures protect the road by controlling runoff and diverting stream flow to constructed channels.
- Low water stream crossing: culverts replaced by natural fords to prevent stream diversion and keep water in the natural channel.
- Culvert modification: upgrading culvert size to prevent road damage.
- Debris rack and deflectors: structure placed in a stream channel to collect debris before reaching a culvert.
- Riser pipes filter out debris and allow the passage of water in stream channels.
- Catchment-basin cleanout: using machinery to clean debris and sediment out of stream channels and catchment basins.
- Trail stabilization: constructing water bars and spillways to provide drainage away from the trail surface.

These treatments and descriptions are further detailed at <https://afterwildfirenm.org/post-fire-treatments/treatment-descriptions>.

For more information about how to install and build treatments, see the Wildfire Restoration Handbook at https://www.rmfi.org/sites/default/files/hero-content-files/Fire-Restoration-HandbookDraft_2015_2.compressed_0.pdf.

Timber Salvage

Many private landowners may decide to harvest trees killed in the fire, a decision that can be highly controversial. Any remaining trees post-fire can be instrumental for soil and wildlife habitat recovery. Furthermore, burned soils are especially susceptible to soil compaction and erosion. Therefore, timber salvage must be performed by professionals. Several programs assist landowners with timber salvage, including the NRCS Environmental Quality Incentives Program (EQIP) (CUSP 2016).

Invasive Species Management and Native Revegetation

Wildfire provides opportunity for many invasive species to dominate the landscape because many of these species thrive on recently burned landscapes. It is imperative that landowners prevent invasive establishment by eradicating weeds early, planting native species, and limiting invasive seed dispersal (CUSP 2016).

Planting native seeds is an economical way to restore a disturbed landscape. Vegetation provides protection against erosion and stabilizes exposed soils. In order to be successful, seeds must be planted during the proper time of year and using correct techniques. Use a native seed mixture with a diversity of species and consider the species' ability to compete with invasive species. Before planting, the seedbed must be prepared with topsoil and by raking to break up the hydrophobic soil layer. If you choose to transplant or plant native species, consider whether the landscape has made a sufficient recovery to ensure the safety of the individuals (CUSP 2016).

Long-Term Community Recovery

On non-federal land, recovery efforts are the responsibility of local governments and private landowners. Challenges associated with long-term recovery include homes that were severely damaged or were saved but are located in high-severity burn areas. Furthermore, homes saved but located on unstable slopes or in areas in danger of flooding or landslides present a more complicated challenge.

Economically, essential businesses that were burned or were otherwise forced to close pose a challenge to communities of all sizes. Given these complications, rebuilding and recovery efforts can last for years, with invasive species control and ecosystem restoration lasting even longer (CUSP 2016). It is critical that a long-term plan is in place and there is sufficient funding and support for all necessary ecosystem and community recovery.^{22,23}

²² <http://www.afterwildfirem.org/>

²³ <https://nmfireinfo.com/information/after-a-wildfire/>



CHAPTER 5 – MONITORING AND EVALUATION STRATEGY

Developing an action plan and an assessment strategy that identifies roles and responsibilities, funding needs, and timetables for completing highest-priority projects is an important step in organizing the implementation of the SCCWPP. Table 4.1 in the previous section identifies tentative timelines and monitoring protocols for fuels reduction treatments, the details of which are outlined below.

All stakeholders and signatories to this CWPP desire worthwhile outcomes. We also know that risk reduction work on the ground, for the most part, is often not attainable in a few months—or even years. The amount of money and effort invested in implementing a plan such as this requires that there be a means to describe, quantitatively or qualitatively, if the goals and objectives expressed in this plan are being accomplished according to expectations.

This section will present a suite of recommended CWPP monitoring strategies intended to help track progress, evaluate work accomplished, and assist planners in adaptive management.

The strategies outlined in this section consider several variables:

- Do the priorities identified for treatment reflect the goals stated in the plan? Monitoring protocols can help address this question.
- Can there be ecological consequences associated with fuels work? We may be concerned about soil movement and/or invasive species encroachment post-treatment. Relatively cost-effective monitoring may help clarify changes.
- Vegetation will grow back. Thus, fuel break maintenance and fuels modification in both the home ignition zone and at the landscape scale require periodic assessment. Monitoring these changes can help decision-makers identify appropriate treatment intervals.

As the CWPP evolves over time, there may be a need to track changes in policy, requirements, stakeholder changes, and levels of preparedness. These can be significant for any future revisions and/or addendums to the CWPP.

Table 5.1 identifies recommended monitoring strategies, both quantifiable and non-quantifiable, for assessing the progress of the CWPP and increase sustainability. It must be emphasized that these strategies are 1) not exhaustive and 2) dependent on available funds and personnel to implement them.

There are many resources for designing and implementing community based, multi-party monitoring that could support and further inform a monitoring program for the CWPP (Egan 2013; NPS 2003).^{24,25,26} Multiparty monitoring involves a diverse group consisting of community members, community-based groups, regional and national interest groups, and public agencies. This approach increases understanding of the effects of restoration efforts and trust among restoration partners. Multiparty monitoring may be more time-consuming due to the collaborative nature of the work; therefore, a clear and concise monitoring plan must be developed.

Table 5.1. Recommended Monitoring Strategies

Strategy	Task/Tool	Lead	Remarks
Project tracking system	On-line web app to track hazardous fuels projects spatially, integrating wildfire risk layer to show progress towards wildfire hazard and risk reduction. Web app would include attribute tables that outline project details	County	Interactive tool will be easily updated and identify areas that require additional efforts.
Photographic record (documents pre- and post-fuels reduction work, evacuation routes, workshops, classes, field trips, changes in open space, treatment type, etc.)	Establish field global positioning system (GPS) location; photo points of cardinal directions; keep photos protected in archival location	Core Team member	Relatively low cost; repeatable over time; used for programs and tracking objectives
Number of acres treated (by fuel type, treatment method)	GPS/GIS/fire behavior prediction system	Core Team member	Evaluating costs, potential fire behavior
Number of home ignition zones/defensible space treated to reduce structural ignitability	GPS	Homeowner	Structure protection
Number of residents/citizens participating in any CWPP projects and events	Meetings, media interviews, articles	Core Team member	Evaluate culture change objective
Number of homeowner contacts (brochures, flyers, posters, etc.)	Visits, phone	Agency representative	Evaluate objective
Number of jobs created	Contracts and grants	Core Team member	Evaluate local job growth
Education outreach: number, kinds of involvement	Workshops, classes, field trips, signage	Core Team member	Evaluate objectives
Emergency management: changes in agency response capacity	<i>Collaboration</i>	Agency representative	Evaluate mutual aid
Codes and policy changes affecting CWPP	Qualitative	Core Team	CWPP changes
Number of stakeholders	Added or dropped	Core Team	CWPP changes
Wildfire acres burned, human injuries/fatalities, infrastructure loss, environmental damage, suppression and rehabilitation costs	Wildfire records	Core Team	Compare with 5- or 10-year average

²⁴ https://nrmfwri.org/restoration-information/cfrp/restoration-papers/restoration-papers-resources/wp5_-draft_2.pdf/view

²⁵ <https://cdm17192.contentdm.oclc.org/digital/collection/p17192coll1/id/609/rec/6>

²⁶ https://nrmfwri.org/restoration-information/cfrp/cfrp-resources/CFRP_MonitoringShortGuide.pdf

An often overlooked but critical component of fuel treatment is monitoring. It is important to evaluate whether fuel treatments have accomplished their defined objectives and whether any unexpected outcomes have occurred. In addition to monitoring mechanical treatments, it is important to carry out comprehensive monitoring of burned areas to establish the success of fuels reduction treatments on fire behavior, as well as monitoring for ecological impacts, repercussions of burning on wildlife, and effects on soil chemistry and physics. Adaptive management is a term that refers to adjusting future management based on the effects of past management. Monitoring is required to gather the information necessary to inform future management decisions. Economic and legal questions may also be addressed through monitoring. In addition, monitoring activities can provide valuable educational opportunities for students.

The monitoring of each fuel's reduction project would be site-specific, and decisions regarding the timeline for monitoring and the type of monitoring to be used would be determined by project. Monitoring and reporting contribute to the long-term evaluation of changes in ecosystems, as well as the knowledge base about how natural resource management decisions affect both the environment and the people who live in it.

The most important part of choosing a monitoring program is selecting a method appropriate to the people, place, and available time. Several levels of monitoring activities meet different objectives, have different levels of time intensity, and are appropriate for different groups of people. They include the following:

Minimum—Level 1: Pre- and Post-project Photographs

Appropriate for many individual homeowners who conduct fuels reduction projects on their properties.

Moderate—Level 2: Multiple Permanent Photo Points

Permanent photo locations are established using rebar or wood posts, global positioning system (GPS)-recorded locations, and photographs taken on a regular basis. Ideally, this process would continue over several years. This approach might be appropriate for more enthusiastic homeowners or for agencies conducting small-scale, general treatments.

High—Level 3: Basic Vegetation Plots

A series of plots can allow monitors to evaluate vegetation characteristics such as species composition, percentage of cover, and frequency. Monitors then can record site characteristics such as slope, aspect, and elevation. Parameters would be assessed pre- and post-treatment. The monitoring agency should establish plot protocols based on the types of vegetation present and the level of detail needed to analyze the management objectives.

Intense—Level 4: Basic Vegetation Plus Dead and Downed Fuels Inventory

The protocol for this level would include the vegetation plots described above but would add more details regarding fuel loading. Crown height or canopy closure might be included for live fuels. Dead and downed fuels could be assessed using other methods, such as Brown's transects (Brown 1974), an appropriate photo series (Ottmar et al. 2000), or fire monitoring (Fire Effects Monitoring and Inventory System [FIREMON]) plots. Identify Timeline for Updating the CWPP

The HFRA allows for maximum flexibility in the CWPP planning process, permitting the Core Team to determine the time frame for updating the CWPP; it is suggested that a formal revision be made on the fifth anniversary of signing and every 5 years following. The Core Team members are encouraged to meet on an annual basis to review the project list, discuss project successes, and strategize regarding project implementation funding. If possible, the CWPP revision should coincide with the revision of the County HMP. A goal of the 2018 HMP is to maintain and implement the CWPP, including project recommendations.

IMPLEMENTATION

The SCCWPP makes recommendations for prioritized fuels reduction projects and measures to reduce structural ignitability and carry out public education and outreach. Implementation of fuels reduction projects need to be tailored to the specific project and will be unique to the location depending on available resources and regulations. On-the-ground implementation of the recommendations in the SCCWPP planning area will require development of an action plan and assessment strategy for completing each project. This step will identify the roles and responsibilities of the people and agencies involved, as well as funding needs and timetables for completing the highest-priority projects (SAF 2004). Information pertaining to funding is provided in Appendix F.

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SWCA

APPENDIX A:

Community and CWPP Background Information

SWCA

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OVERVIEW OF COMMUNITY WILDFIRE PROTECTION PLANS

FEDERAL DIRECTION

In response to a landmark fire season in 2000, the National Fire Plan (NFP) was established to develop a collaborative approach among various governmental agencies to actively respond to severe wildland fires and ensure sufficient firefighting capacity for the future. The NFP was followed by a report in 2001 entitled *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-year Comprehensive Strategy*, which was updated in 2002 to include an implementation plan. This plan was updated once more in 2006, with a similar focus on using a collaborative framework for restoring fire-adapted ecosystems, reducing hazardous fuels, mitigating risks to communities, providing economic benefits, and improving fire prevention and suppression strategies. The 2006 implementation plan also emphasizes information sharing and monitoring of accomplishments and forest conditions, a long-term commitment to maintaining the essential resources for implementation, a landscape-level vision for restoration of fire-adapted ecosystems, the importance of using fire as a management tool, and continued improvements to collaboration efforts (Forests and Rangelands 2006). Progress reports and lessons learned reports for community fire prevention are provided annually.

In 2003, the U.S. Congress recognized widespread declining forest health by passing the Healthy Forests Restoration Act (HFRA), and President Bush signed the act into law (Public Law 108–148, 2003). The HFRA was revised in 2009 to address changes to funding and provide a renewed focus on wildfire mitigation (H.R. 4233 - Healthy Forest Restoration Amendments Act of 2009). The HFRA expedites the development and implementation of hazardous fuels reduction projects on federal land and emphasizes the need for federal agencies to work collaboratively with communities. A key component of the HFRA is the development of Community Wildlife Protection Plans (CWPPs), which facilitates the collaboration between federal agencies and communities in order to develop hazardous fuels reduction projects and place priority on treatment areas identified by communities in a CWPP. A CWPP also allows communities to establish their own definition of the WUI, which is used to delineate priority areas for treatment. In addition, priority is placed upon municipal watersheds, critical wildlife habitat, and areas impacted by wind throw, insects, and disease. Communities with an established CWPP are given priority for funding of hazardous fuels reduction projects carried out in accordance with the HFRA.

In 2014, the final stage of the development of a national cohesive strategy for wildfire was developed: *The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy* (Forests and Rangelands 2014). The national strategy takes a holistic approach to the future of wildfire management:

To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.

In order to achieve this vision, the national strategy goals are:

- **Restore and maintain landscapes:** Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.
- **Fire-adapted communities:** Human populations and infrastructure can withstand a wildfire without loss of life and property.
- **Wildfire response:** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions. (Forests and Rangelands 2014:3)

STATE DIRECTION

The 2020 New Mexico State Forest Action Plan (in draft format at time of writing) recognizes that New Mexico faces continued and urgent threats from catastrophic wildfire.²⁷ The State Forest Action Plan

²⁷ NM State Forest Action Plan (2020): http://www.emnrd.state.nm.us/SFD/documents/NMFAP_DraftforReview4.22.2020.pdf

includes a resource assessment to identify threats to resources, including wildfire, post-wildfire flooding, erosion and debris flow, disease and insects, climate changes, development and fragmentation, and use and forest management activities. The Plan then provides strategies to protect these resources over the next decade. There are several strategies and sub-strategies outlined in the Draft Plan; those specific to wildfire include:

- **Restore Forests and Watersheds:** addresses the legacy of fire exclusion and excessive fuels.
- **Fire Management:** addresses wildfire response on state and private land; supports regional, state, and national wildfire response for all jurisdictions; and restores the ecological role of fire to foster resilient landscapes and watershed health.

The recent passing of H.B. 266, the Forest and Watershed Restoration Act (2019) provides support for landscape resilience throughout the State, by allocating state funds to the EMNRD for the purpose of forest and watershed restoration. EMNRA has been tasked with determining which proposed projects will be funded, in coordination with a newly established Advisory Board (EMNRD 2020).

Like the 2014 national strategy, the NFP, the State Forest Action Plan, 10-year comprehensive strategy, and Federal Emergency Management Agency (FEMA) Disaster Mitigation Act of 2000, all mandate community-based planning efforts with full stakeholder participation, coordination, project identification, prioritization, funding review, and multiagency cooperation. In compliance with Title 1 of the HFRA, a CWPP must be mutually agreed upon by the local government, local fire departments, and the state agency responsible for forest management (New Mexico State Forestry Division [NMSF]). As outlined in HFRA, this CWPP is developed in consultation with interested parties and the federal agencies managing land surrounding the at-risk communities.

GOAL OF A COMMUNITY WILDFIRE PROTECTION PLAN

The goal of a CWPP is to enable local communities to improve their wildfire-mitigation capacity, while working with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural- and human-caused risk of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the HFRA, are:

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 communities at risk (CARs) and their essential infrastructures (SAF 2004).

Treatments of Structural Ignitability: A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).

PLANNING PROCESS

The SAF, in collaboration with the National Association of Counties and the National Association of State Foresters, developed a guide entitled *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) to provide communities with a clear process in developing a CWPP. The guide outlines eight steps for developing a CWPP and has been followed in preparing the SCCWPP:

Step One: Convene Decision-makers. Form a Core Team made up of representatives from the appropriate local governments, local fire authorities, and state agencies responsible for forest management.

Step Two: Involve Federal Agencies. Identify and engage local federal representatives and contact and involve other land management agencies as appropriate.

Step Three: Engage Interested Parties. Contact and encourage active involvement in plan development from a broad range of interested organizations and stakeholders.

Step Four: Establish a Community Base Map. Work with partners to establish a base map(s) defining the community's WUI and showing inhabited areas at risk, wildland areas that contain critical human infrastructure, and wildland areas at risk for large-scale fire disturbance.

Step Five: Develop a Community Risk Assessment. Work with partners to develop a community risk assessment that considers fuel hazards; risk of wildfire occurrence; homes, businesses, and essential infrastructure at risk; other community values at risk (CVARs); and local preparedness capability. Rate the level of risk for each factor and incorporate this information into the base map as appropriate.

Step Six: Establish Community Priorities and Recommendations. Use the base map and community risk assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for treating fuels, reducing structural ignitability and other issues of interest, such as improving fire response capability. Clearly indicate whether priority projects are directly related to the protection of communities and essential infrastructure or to reducing wildfire risks to other community values.

Step Seven: Develop an Action Plan and Assessment Strategy. Consider developing a detailed implementation strategy to accompany the CWPP as well as a monitoring plan that will ensure its long-term success.

Step Eight: Finalize Community Wildfire Protection Plan. Finalize the CWPP and communicate the results to community and key partners.

LOCATION AND GEOGRAPHY

Santa Fe County is 1,910 square miles and is bordered by seven New Mexico counties: Rio Arriba to the north, Sandoval and Los Alamos to the west, Bernalillo at the southwest corner, Torrance to the south, and San Miguel and Mora to the east. Santa Fe County is between the Rio Grande to the west in Sandoval County and the Pecos River to the east in San Miguel County. The main transportation corridors include Interstate 25, which bisects the County at the city of Santa Fe, and Interstate 40, which runs east–west along the southern portion of the County. Other local transportation corridors include U.S. Route 285/84, which runs north–south through the southeast corner of the project area; New Mexico State Routes 14 and 41, which run north–south at the southwest and southern portions of the project area; and New Mexico State Routes 4, 502, 30, 74, 76, 399, and 68 in the northern section of the project area. Access to other County lands consists of narrow, winding roads, including maintained two-lane roads, some one-lane gravel roads, several four-wheel drive dirt roads, and multiple dead-end roads (Santa Fe County 2006).

Santa Fe County is primarily composed of privately owned land. Other landowners include the USFS, New Mexico State Land Office, BLM, Department of Energy (DOE), U.S. Department of Defense, and National Park Service (NPS), as well as private entities. The USFS manages the Santa Fe Watershed portion within the CWPP project area (Table A.1).

Table A.1. Breakdown of Land Ownership in Santa Fe County

Land Ownership	Square Miles	Percentage of the County
Private	1,141	59.73%
U.S. Forest Service	384	20.09%
Tribal Land	145	7.59%
State	119	6.22%
Bureau of Land Management	109	5.72%
Department of Energy	6	0.32%
Department of Defense	4	0.23%
National Park Service	2	0.10%

Santa Fe County contains two mountain ranges. The Ortiz Mountains are located in the southwest corner of the County, bordering the intersection of Sandoval and Bernalillo Counties. The Sangre de Cristo Mountains, Spanish for "the blood of Christ," are the southernmost subrange of the Rocky Mountains, and extend into the northeastern portion of New Mexico and into Santa Fe County. The highest peak in this range within Santa Fe County is Santa Fe Baldy, standing at 12,622 feet and located in the Pecos Wilderness (Sangres 2007). The Pecos Wilderness is within the Santa Fe National Forest, comprising 1.6 million acres (USFS 2007). The topography of Santa Fe County is discussed further below.



Figure A.1. Typical landscape in Santa Fe County, showing mountains, a valley, and pinyon-juniper vegetation.

TOPOGRAPHY

The SCCWPP project area rises from the point at which Interstate 25 crosses from Sandoval County in the west (at 5,436 feet) to the summit of Santa Fe Baldy to the northeast. The Sangre de Cristo

Mountains were formed 27 million years ago when major fault lines running through the range pushed the bedrock skyward (Sangres 2007). Despite the dramatic elevations of Santa Fe County, the majority of the land area is relatively flat. The southern portion of the County exhibits only small hills and large spans of high desert plains (Santa Fe County 2006).

Although much of the County is relatively flat, the topography varies greatly throughout the CWPP project area. The percent of slope is an important factor in determining the types of treatments that should be implemented.

POPULATION

The following information is drawn primarily from U.S. census data (U.S. Census Bureau 2020). In 2019, the population estimate of Santa Fe County was 150,358 persons, an increase of 4.2% over the 2010 census numbers of 144,170. Between 2014 and 2018, there were 61,972 housing units in the County. The County has a population density of 75.5 people per square mile. The majority of the population live within the city limits of Santa Fe, with estimates in 2018 of 84,612 residents.

RECREATION

Outdoor recreation is extremely popular in the County, with the Santa Fe National Forest, Bandelier National Monument, city and state parks, and cultural attractions throughout the County, attracting thousands of visitors. Hunting and camping are popular on public land (Figure A.2).

During peak seasons and large events, a significant number of people can congregate in a relatively small space, which constitutes a large population to evacuate.



Figure A.2. Runners on the new Santa Fe Trail during an event.

Source: <https://www.usafa.af.mil/News/News-Display/Article/1413087/usafa-to-close-portion-of-santa-fe-trail-intermittently/>

PUBLIC LAND MANAGEMENT

SANTA FE NATIONAL FOREST

The Santa Fe National Forest covers 1,558,452 acres, with elevations ranging from 5,300 feet to 13,103 feet at the summit of Trunchas Peak, located within the Pecos Wilderness. The Forest comprises land in Santa Fe County, as well as Rio Arriba, San Miguel, Sandoval, Mora, and Los Alamos Counties. The Forest is broken into five Ranger Districts; portions of the Espanola and Pecos/Las Vegas Ranger Districts fall within the County boundary.

The Santa Fe National Forest Land and Resource Management Plan (Forest Plan) is the guiding policy document for forest and fire management on the forest. The Forest is currently revising their Forest Plan, with a decision document expected following completion of this CWPP. During update to this 2020 CWPP, the Core Team should review and revise recommendations, based on the final Forest Plan and Decision Document.

The Santa Fe National Forest works closely with neighboring entities to develop cross-boundary landscape projects focused on landscape resiliency and forest health (Figure A.3).



Figure A.3. The Santa Fe National Forest has an active prescribed burning program.

Source: NM Fire Info.

STATE LAND

The New Mexico State Forestry Division (NMSF) has statutory responsibilities for cooperation with federal, state, and local agencies in the development of systems and methods for the prevention, control, suppression, and use of prescribed fires on rural land and within rural communities on all non-federal and non-municipal lands in the state (New Mexico Statutes Annotated 1978, Section 68-2-8). As a result, the NMSF is involved in the CWPP planning process. The New Mexico Fire Planning Task Force (NM-FPTF) was created in 2003 by the New Mexico legislature to identify the WUI areas (CARs) in the state that were most vulnerable to wildland fire danger. The task force updates its CARs list annually, reviews completed CWPPs, and approves CWPPs that are compliant with the HFRA.

CLIMATE AND WEATHER PATTERNS

Differences in topographical characteristics throughout the state of New Mexico and Santa Fe County contribute to the divergent climatic regimes within the planning area. The state generally has a mild, arid to semiarid, continental climate characterized by abundant sunshine, light total precipitation, low relative humidity, and relatively large annual and diurnal temperature ranges. Across the state, the annual average number of hours of sunshine ranges from nearly 3,700 hours in the southwestern portions of the state to 2,800 hours in the north-central portions (New Mexico Climate Center [NMCC] 2008).

July is generally the warmest month of the year in New Mexico, with average monthly maximum temperatures ranging from 90 degrees Fahrenheit (°F) at lower elevations to 75°F to 80°F at higher elevations. January is the coldest month, with average daytime temperatures ranging from 43°F to 47°F. Mean annual temperatures do not vary significantly across Santa Fe County, and from lower to higher elevations, mean annual temperatures only range from approximately 49°F to 51°F. Within the County, maximum mean annual temperatures range from 64.9°F in the city of Santa Fe to 67.6°F in Turquoise. Minimum annual temperatures range from 33.7°F in Stanley to 36.0°F in Santa Fe (Table A.2) (Western Regional Climate Center [WRCC] 2020). Within the entire state, the freeze-free season ranges from more than 200 days in the southern valleys to fewer than 80 days in the northern mountains, where some high mountain valleys have freezes in the summer months (NMCC 2008).

Table A.2. Mean Annual Temperature and Precipitation by Station in Santa Fe County

Station	Elevation (feet)	Mean Annual Temperature (°F)			Annual Precipitation (inches)			Period of Record
		Max	Min	Mean Annual	Max	Min	Mean Snowfall	
Glorieta	7,520	Insufficient Data	Insufficient Data	15.78	22.86	8.73	31.1	1915–2010
Santa Fe	6,720	64.9	36.0	13.81	20.09	7.23	21.0	1972–2016
Golden	6,700	Insufficient Data	Insufficient Data	13.79	23.44	4.07	23.7	1901–2016
Stanley	6,380	65.8	33.7	12.08	22.43	4.65	18.7	1909–2016
Turquoise	6,200	67.6	35.1	15.5	22.21	4.54	22.90	1981–2010

Source: WRCC (2020)

Throughout the entire state of New Mexico, average annual precipitation ranges from less than 10 inches over much of the southern desert and the Rio Grande and San Juan valleys to greater than 20 inches in the higher elevations (Thornton et al. 2012). The mean annual precipitation within the County is typically light and ranges from as low as 12.08 inches in Stanley to 15.78 inches in Glorieta. The maximum annual rainfall within the planning area has been recorded as high as 23.44 inches in 1986 in Golden. Golden also had the lowest minimum average annual precipitation at 4.07 inches in 1956 (see Table A.2) (WRCC 2008). 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 (Figures A.4 and A.5) (NMCC 2008). These seasonal rains generally take place as frequent and brief intense thunderstorms. The moisture associated with these storms originates in the Gulf of Mexico. These storms also generate intense lightning activity, which may result in multiple fire ignitions from one storm across a fire management district.

Winter is the driest season in New Mexico, when precipitation is primarily a result of frontal activity associated with Pacific Ocean storms that move across the country from west to east. Much of this precipitation falls as snow in mountain areas. Wind speeds across New Mexico are usually moderate. However, relatively strong and unpredictable winds can accompany frontal activity during the late winter and spring. Wind direction is typically from the southwest (NMCC 2008).

Overall climate regimes in the state typically consist of cyclical drought/wet year patterns that are driven by El Niño-Southern Oscillation. Landscape-scale drought and above-average precipitation have historically occurred at irregular intervals in the past as documented by tree-ring and other data with varying degrees of intensity (Swetnam and Betancourt 1998). Severe and prolonged droughts on record have occurred once every century on average (Gray et al. 2003).

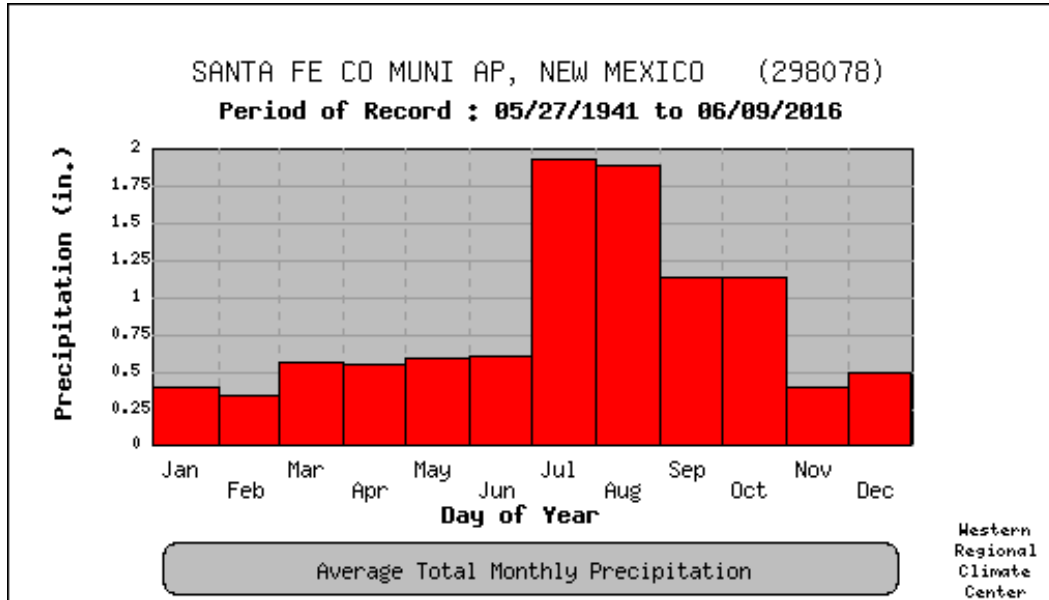


Figure A.4. Monthly average total precipitation for the City of Santa Fe for the period of record (1941–2016).

Source: WRCC (2020)

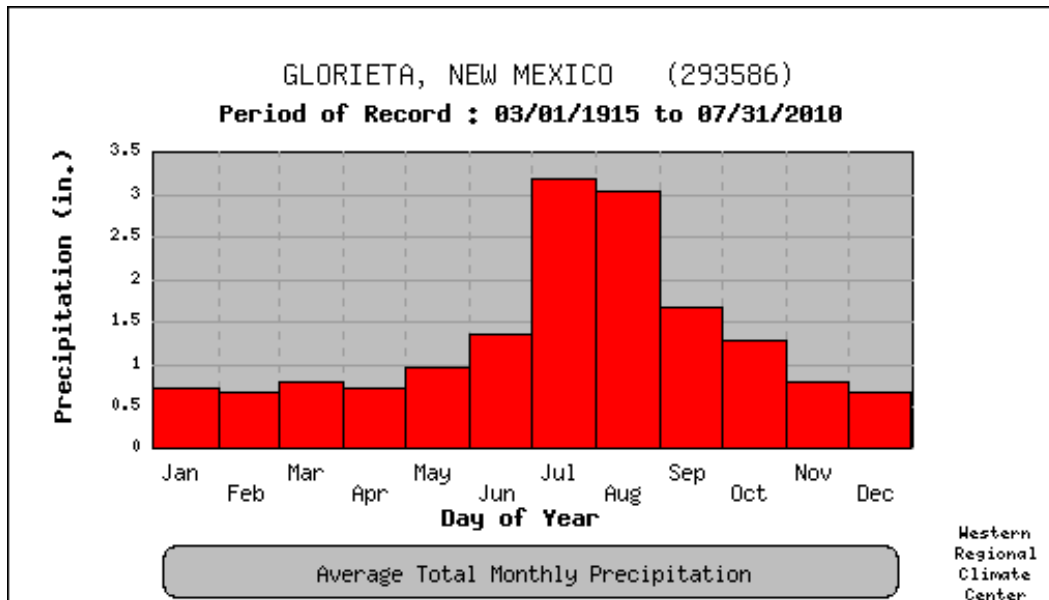


Figure A.5. Monthly average total precipitation for Glorieta for the period of record (1915–2016).

Source: WRCC (2020)

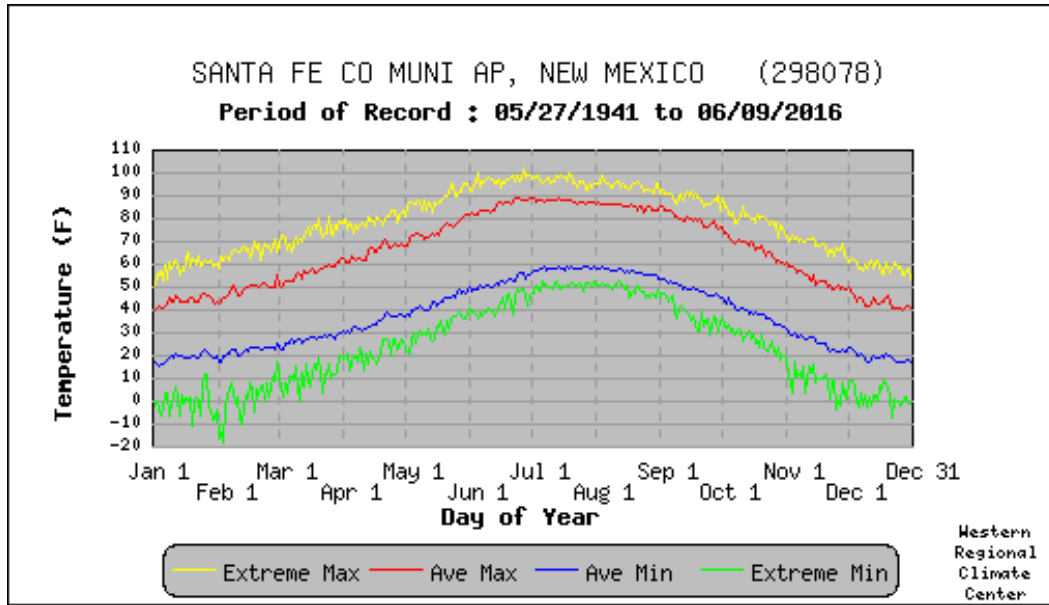


Figure A.6. Daily temperature averages and extremes for the City of Santa Fe for the period of record (1941–2016).

Source: WRCC (2020)

VEGETATION AND LAND COVER

Vegetation zones within Santa Fe County are primarily a function of elevation, slope, aspect, substrate, and associated climatic regimes. Since a broad range in elevation and topography exists across the County, characteristics in vegetative communities are quite variable from site to site (Figure A.7).

Dominant vegetation types within the County are described based on a large spatial scale and represent the overall community structure that will play a general role in fire occurrence and behavior. Although the vegetation types are outlined and described for the entire County in this plan, site-specific evaluations of the vegetative composition and structure in each area of focus should be taken into consideration when planning fuels treatments.

The major vegetation types in Santa Fe County are listed in Table A.3 and are described below the table in more detail using the NatureServe United States Ecological Systems categories (NatureServe 2007). Other types of land cover (e.g., agricultural and developed) also exist in a very small percentage of the County and are not described in more detail as they do not play a significant role in fire behavior.

Table A.3. Major Vegetation Types within Santa Fe County

Existing Vegetation Type	Acres	Percent
<i>Overall Grassland Communities</i>	671,907	48%
Western Great Plains Shortgrass Prairie	292,290	21%
Inter-mountain Basins Semi-desert Grassland	152,450	11%
Southern Rocky Mountain Juniper Woodland and Savanna	145,263	10%
Western Great Plains Foothill and Piedmont Grassland	23,292	2%
Inter-mountain Basins Montane Sagebrush Steppe	23,070	2%
Inter-mountain Basins Semi-desert Shrub-steppe	21,731	1%

Existing Vegetation Type	Acres	Percent
Other Miscellaneous Grassland Types	13,811	1%
<i>Overall Forested Communities</i>	<i>625,845</i>	<i>46%</i>
Southern Rocky Mountain Piñon-juniper Woodland	409,101	29%
Southern Rocky Mountain Ponderosa Pine Woodland	102,485	8%
Rocky Mountain Dry-mesic and Mesic Montane Mixed Conifer Forest and Woodland	94,045	7%
Rocky Mountain Aspen Forest and Woodland	10,324	1%
Other Miscellaneous Forested Types	9,890	1%
<i>Riparian Woodlands and Wetlands</i>	<i>21,952</i>	<i>2%</i>
<i>Other Types</i>	<i>25,892</i>	<i>4%</i>

Source: NatureServe (2007)

GRASSLAND COMMUNITIES

Most of the vegetation in Santa Fe County consists primarily of grassland and evergreen forest communities. Grasslands within the County are composed almost entirely of shortgrass prairie, but also include areas of sagebrush steppe or juniper savanna type ecosystems. Graminoid species that are typical within grassland communities throughout the County include blue grama (*Bouteloua gracilis*) as the dominant graminoid mixed with a variety of different species that vary from site to site. Other associated graminoid species may include threeawn (*Aristida* spp.), needle and thread (*Hesperostipa comata*), prairie Junegrass (*Koeleria macrantha*), western wheatgrass (*Pascopyrum smithii*), James’s galleta (*Pleuraphis jamesii*), dropseed (*Sporobolus* spp.), muhly (*Muhlenbergia* spp.), Indian ricegrass (*Achnatherum hymenoides*), fescue (*Festuca* spp.), and bluegrass (*Poa* spp.).

In some grasslands where shrubs or dwarf-shrubs are present, sand sagebrush (*Artemisia filifolia*), big sagebrush (*A. tridentata*), prairie sagewort (*A. frigida*), fourwing saltbush (*Atriplex canescens*), spreading buckwheat (*Eriogonum effusum*), broom snakeweed (*Gutierrezia sarothrae*), winterfat (*Krascheninnikovia lanata*), and pricklypear (*Opuntia* spp.) may be present. Juniper savannas are best represented just below the lower elevational range of ponderosa pine (*Pinus ponderosa*) forests and contain widely spaced, mature, juniper trees (*Juniperus scopulorum* or *J. monosperma*) and occasionally piñon pine (*P. edulis*).

FORESTED COMMUNITIES

The most common forested community consists of piñon-juniper woodlands. This ecological system occurs on dry mountains and plateaus of north-central New Mexico and is represented in the elevational region between ponderosa pine and grassland communities. Piñon pine and/or oneseed juniper (*J. monosperma*) dominate the tree canopy; however, Rocky Mountain juniper (*J. scopulorum*) may co-dominate or replace oneseed juniper in higher elevations. Understory layers are variable and may be dominated by shrubs or graminoids, or may be absent. Associated understory species may include blue grama, James’s galleta, Arizona fescue (*F. arizonica*), Bigelow sage (*A. bigelovii*), mountain mahogany (*Cercocarpus montanus*), and Gambel oak (*Quercus gambelii*).

Ponderosa pine forests exist in mountainous areas on all slopes and aspects within the County above an elevation of approximately 9,000 feet where the transition from piñon-juniper woodlands to ponderosa pine communities typically takes place. Ponderosa pine is the predominant conifer in these forests; however, Douglas-fir (*Pseudotsuga menziesii*), piñon pine, and Rocky Mountain juniper may also be present in the sub-canopy. The understory of this community is usually shrubby and includes species such as big sagebrush, mountain mahogany, wild rose (*Rosa* spp.), Gambel oak, and snowberry

(*Symphoricarpos* sp.). Common graminoids are similar to those of other communities in the County including needle and thread, fescue, muhly, and grama species.

Mixed-conifer forests also exist in the more mesic, higher elevations of the County above ponderosa pine and consist primarily of Douglas-fir, white fir (*Abies concolor*), and Engelmann spruce (*Picea engelmannii*); however, ponderosa pine may also be present in some areas. Associated understory species may include kinnikinnick (*Arctostaphylos uva-ursi*), creeping barberry (*Mahonia repens*), Oregon boxleaf (*Paxistima myrsinites*), snowberry, fivepetal cliffbush (*Jamesia americana*), Gambel oak, and Rocky Mountain maple (*Acer glabrum*). Herbaceous species include sedge species (*Carex* spp.), muhly grass, Arizona fescue, strawberry (*Fragaria* sp.), and meadow rue (*Thalictrum* sp.).

A small amount of aspen (*Populus tremuloides*) woodlands exist in the County but are not well represented. These deciduous forests are dominated by aspen but may have some shade-tolerant coniferous species such as white fir and spruce developing in the understory in older stands. The understory may consist of shrub and herbaceous layers or may only have a simple herbaceous layer. Understory species may consist of snowberry, serviceberry (*Amelanchier* spp.), kinnikinnick, and thimbleberry (*Rubus parviflorus*). This community type is typically created and maintained by stand-replacing disturbances, including fire.

RIPARIAN WOODLAND COMMUNITIES

Riparian woodlands exist in the County along the flood zones of river corridors and surrounding lakes. This vegetation type exists in a very small percentage of the County and consists primarily of cottonwood (*Populus* spp.), willow (*Salix* spp.), and a variety of other riparian species.

OTHER TYPES

Other types of land cover include a very small percentage of shrub communities, sparsely vegetated or barren areas, altered or disturbed areas, agricultural land, and developed areas.

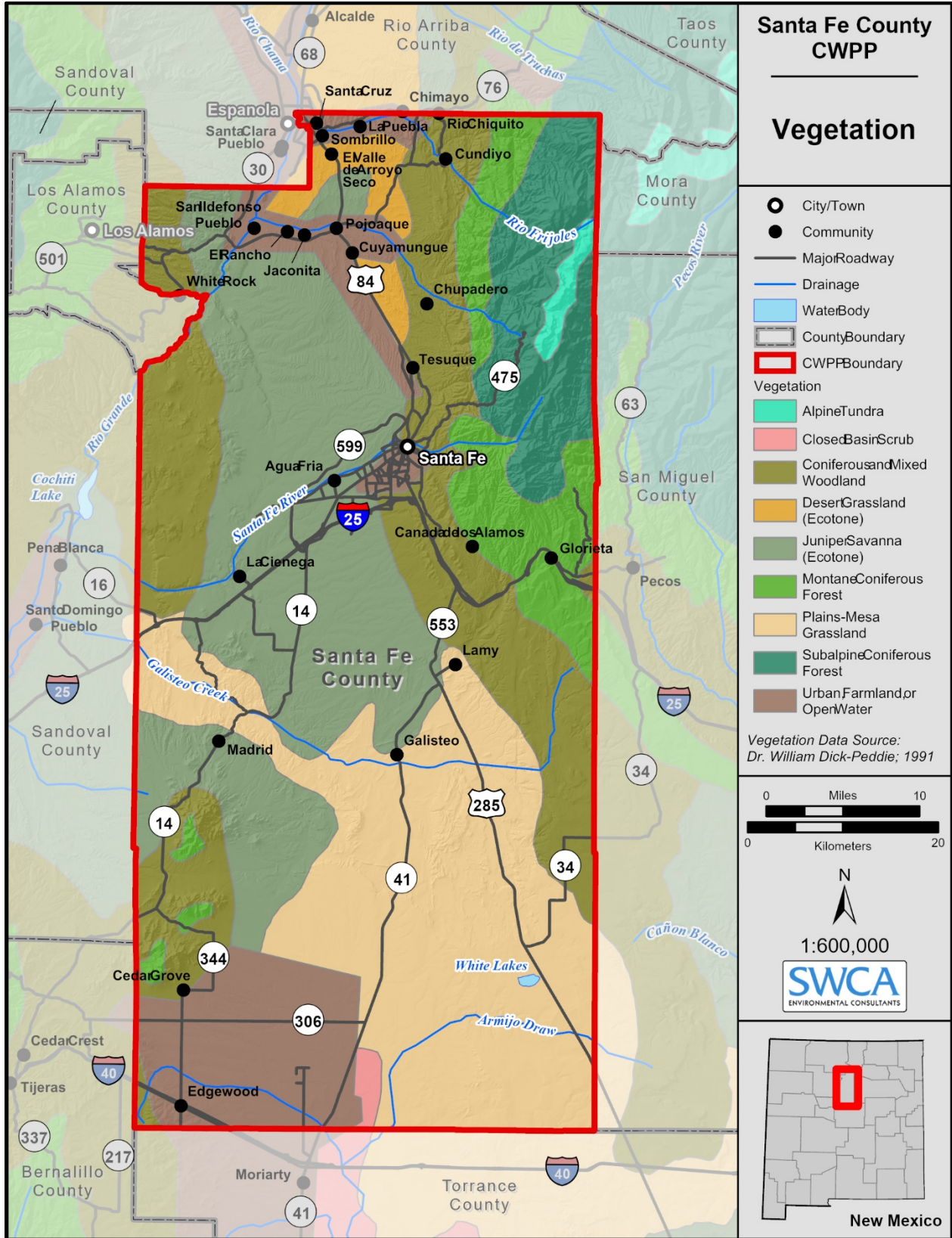


Figure A.7. Santa Fe County existing vegetation cover.

FOREST HEALTH CONSIDERATIONS

Insects

Native insect epidemics within plant communities are usually part of a natural disturbance cycle similar to wildfire. They are often cyclic in nature and are usually followed by the natural succession of vegetation over time. Of primary interest are those that attack tree species because of the implications for fire management.

Present-day insect epidemics in forests are more extensive than they have been in the past (Kurz et al. 2008). This may be a result of drought-related stress and/or faster completion of insect life cycles due to warmer climate regimes. Stands of trees that have been killed by insects have varying degrees of associated fire danger depending on the time lapse following an insect attack and structure of the dead fuels that remain. However, forests with a large degree of mortality following an insect attack may have the potential to experience extremely high fire danger, especially if a large degree of needle cover remains in the canopy.

Insects that have infested or have the potential to infect the forests within and around the SCCWPP planning area are discussed below.

For the past two decades, Southwest forests and woodlands have been subjected to increased drought, insect infestation, and disease, which have resulted in a decline in forest health (Clifford et al. 2008; Shaw 2008). Mortality from drought and bark beetle infestation of ponderosa pine, piñon-juniper, and other forest and woodland species throughout the Southwest region increased dramatically between 2000 and 2003 (Zausen et al. 2005). Piñon pine was especially affected, with over 1.9 million acres (774,771 hectares) of piñon across New Mexico and Arizona showing evidence of bark beetle attack by 2003. Some areas experienced greater than 90% piñon mortality (Gaylord et al. 2013), while juniper mortality was significantly lower. Piñon mortality was largely a result of the piñon ips bark beetle (*Ips confusus*), which generally attacks water-stressed or recently dead trees (Raffa et al. 2008; Rogers 1995). A plethora of recent research has focused on the effects that restoration treatments have on the species resistance/susceptibility to bark beetles in ponderosa pine forests (Gaylord 2014).

Bark Beetles (*Ips* Beetles) (*Ips* spp. and *Dendroctonus* spp.). Ips beetles, also called engraver beetles, are native insects to North American forests. They attack ponderosa and piñon pines as well as other conifers and are responsible for piñon die-off in the region over the last several years. *Dendroctonus* beetles attack medium to large ponderosa pines, blue spruce (*Picea pungens*), Engelmann spruce, and Douglas-fir. Each of these species creates egg galleries, which are distinct to that species in form and shape, which eventually girdle the infected tree. The natural defense of a healthy, rigorous tree is to *pitch out*, or excrete sap into the beetle entrance holes, covering it with sap and killing the invader. Trees are most likely to be successful at this strategy when they are not stressed by competition as a result of high tree density or drought. Once a tree has been colonized, it cannot be stopped.

Twig Beetle (*Pityophthorus* spp.). Twig beetles frequently attack piñon pines, as well as other conifers and occasionally spruce. High populations of this poorly understood native beetle develop in drought-stressed and otherwise injured trees. Breeding is restricted to twigs and small branches. Fading branches throughout the crown and tan sawdust around the attack site can identify trees attacked by the twig beetle. Hand pruning and vigorous watering can sometimes control attacks.

Piñon Needle Scale (*Scale*) (*Matsucoccus acalyptus*). Scale is a native insect that has the appearance of small, black, bean-shaped spots on the piñon pine needles during outbreaks. Scale feeds on the sap of piñon pine needles, damaging cells and leading to decreased vigor, needle drop and dieback, and increased susceptibility to other insects or disease. Sometimes small trees are killed by repeated attacks, and larger trees are weakened to such an extent that they fall victim to attack by bark beetles. Repeated, heavy scale infestations leave trees with only a few needles alive at the tips of the branches. Destroying the eggs before they hatch can greatly reduce potential damage.

Piñon Spindle Gall Midge (Midge) (*Pinyonia edulicola*). Midges produce a spindle-shaped swelling from the needle base that is about 0.5 inch long. This insect is a common parasitic insect that rarely causes serious damage. Control is usually not necessary.

Piñon Needle Miners (Needle Miners) (*Coleotechnites edulicola*, *C. ponderosae*). Needle miners are locally common on piñon and ponderosa pines. The various species resemble one another in appearance and damage but have different life cycles. Damage first becomes evident as foliage browns. Closer examination reveals hollowed-out needles. Early needle drop, reduced growth, and tree mortality can result from needle miner infestation. Trees normally recover from needle miner damage without suffering serious injury, but the current drought may alter this.

Roundheaded and Flatheaded Wood Borers (Family *Cerambycidae* and Family *Buprestidae*). Roundheaded and flatheaded wood borers attack recently cut, dead, or dying trees and often create complex tunnel systems. Roundheaded borers are the most destructive and tunnel deep into the wood. Freshly cut logs in the woods or firewood stored at a home are common infestation sources. These borers are most prominent after a wildfire. They may also spread into vigas in homes.

Juniper Borers (*Callidium* spp.). Several juniper borers aggressively attack drought-stressed junipers throughout their range. Damage can be extensive before symptoms are apparent. Usually a large portion of the tree or the entire tree dies before the insects' exit holes are noticed. Larvae bore beneath the bark, making galleries and tunneling deep into the wood to complete their life cycle over the course of the winter.

Tiger Moth (*Halisidota argentata*). Tiger moth caterpillars are one of the most common defoliators throughout the West. The species typically selects only a few host trees within an area, and the impacts are thus generally limited. Tiger moth caterpillars defoliate host trees, and while the appearance may seem severe, the damage is generally nonlethal. Host species for tiger moth caterpillars include Douglas-fir, true fir, spruce, and pine, all of which exist in the higher plateau and mountain range elevations surrounding the planning area.

Diseases

Diseases of trees, such as parasitic plants, fungi, and bacteria, can also affect forests in the SCCWPP planning area. These diseases impact forest systems by degrading the productivity and health of the forest. Some of the more common forest diseases that are found in the County are described below. Trees that are killed by disease have the similar potential to increase fire hazards.

Mistletoe (*Arceuthobium* spp., *Phoradendron* spp.). Both dwarf and true mistletoe are common in the project area. Mistletoes are parasitic plants that gradually degrade tree vigor and may eventually kill their hosts over a long period of time following further infestation. Essential water and nutrients within the host are used by the mistletoe, thus depriving the host of needed food. Dwarf mistletoe is found on juniper, piñon pine, ponderosa pines, and firs. It is host-specific (i.e., the species that infects piñon does not infect other trees). True mistletoe is common on junipers in the Southwest. Both types of mistletoe spread from tree to tree and are difficult to control. Dwarf mistletoe spreads its seed by shooting berries; true mistletoe seeds are spread by birds. In residential areas, pruning can sometimes be effective on smaller trees. Heavy infestations in large trees can be controlled only by cutting down the trees and removing them to stop the spread of the mistletoe to other trees nearby.

Fir Broom Rust (*Melampsorella caryophyllacearum*). Fir broom rust is a species of fungus that has a broom appearance in the tree canopy. Fir broom rust is primarily a forest problem on white firs at higher elevations. A species also infects Engelmann spruce, but it is less common. These infections cause growth loss, top kill, and eventually tree mortality. Both species require alternate hosts to complete their life cycle. No chemical or biological control exists for fir broom rusts.

Needle Cast (*Elytroderma deformans*). Needle cast affects piñon and ponderosa pines. This disease can be damaging because it invades twigs and needles and persists for several years. Symptoms appear in the spring when the year-old needles turn brown 6 to 12 mm from the needle base.

White Pine Blister Rust (*Cronartium ribicola*). White pine blister rust is a non-native disease caused by a fungus that first arrived in America in the early twentieth century from Asia and Europe. The complex life history of the fungus ultimately results in a lethal infestation of the host tree. The branch and stem canker that result from infestation can result in top kill, branch die-back, and eventually tree mortality.

WILDLIFE

Vegetation management treatments are commonly applied throughout the County to benefit habitat for general wildlife species or game habitat. Most native wildlife species found in the region evolved with a frequent fire regime.

Threatened and Endangered Species

The County is home to several threatened and endangered species, including 11 birds, one mollusk and three mammals.²⁸ Treatments on federal land would be subject to the National Environmental Policy Act (NEPA) and associated analysis of impacts to these species. Treatments in areas that may impact threatened and endangered species would require application of certain mitigation measures to prevent degradation to habitat.

ROADS AND TRANSPORTATION

There are several transport routes throughout the County that connect communities within the WUI. Interstate 25 passes from Albuquerque through Santa Fe and southeast to Glorieta. Highway 14 connects the East Mountains communities to Santa Fe, through Madrid. Route 285 connects the southeast corner of the County and bridges between Interstate 40 and Interstate 25. Route 84 connects the communities and Pueblos in the northwest portion of the County to Santa Fe and surrounding areas.

In addition to the surfaced highways, numerous smaller roads, and forest roads traverse the County, with variable road conditions. Some steep grades and gravel road surfaces may impede travel in the event of a wildfire evacuation or emergency response (Figure A.8).

²⁸ https://bison-m.org/ReportPDFs/rptSpecies_153130218.pdf



Figure A.8. Photograph showing the steep grade and unsurfaced road surface of a WUI community

FIRE HISTORY

Prior to European settlement, Native Americans used fire as a tool to open land for agriculture, hunting, or travel; to drive game for hunting; to promote desirable post-fire herbaceous vegetation; or to manage the land for habitat protection and resource use (Scurlock 1998). As a result, human-caused fires are considered one component of the historical fire regime in the Southwest.

Research has indicated that these burning activities were focused around areas that were inhabited and took place primarily in localized regions during certain time periods across the Southwest; however, the specific influence that Native Americans had on historical fire regimes remains uncertain (Kaye and Swetnam 1999).

PAST FIRE MANAGEMENT POLICIES AND LAND MANAGEMENT ACTIONS

Several factors have combined over the last 120 years to change forest structure, understory and overstory composition, fuel biomass conditions, and historical fire regimes (Cram et al. 2006). Increased settlement, logging practices, and heavy grazing (Baker and Shinneman 2004; Savage and Swetnam 1990) have all been identified as contributing factors (Cram et al. 2006; Kaye and Swetnam 1999). Some species of non-native vegetation were also introduced during that time period and eventually invaded many native landscapes across the West, subsequently altering natural fire-disturbance processes.

Beginning in the early 1900s, the policy for handling wildland fire leaned heavily toward suppression. Over the years, other agencies, such as the BLM, the Bureau of Indian Affairs, and the NPS, have followed the lead of the USFS and adopted fire suppression as the proper means for protecting the nation from wildfire. As a result, many areas now have excessive fuel buildups, dense and continuous vegetative cover, and tree and shrub encroachment into open grasslands.

FIRE REGIMES

In order to classify, prioritize, and plan for fuels treatments across a fire management region, methods have been developed to stratify the landscape based on physiographic and ecological characteristics.

Fire Regime Classifications

A natural, or historical, fire regime is a general classification describing the role fire would play throughout a landscape in the absence of modern human intervention but includes the influence of burning by Native American groups (Agee 1993; Brown 1995; Hann et al. 2008).

Fire regime (FR) classes are based on the average number of years between fires (also known as fire frequency or fire return interval) combined with the severity (i.e., the amount of vegetation replacement) of the fire and its effect on the dominant overstory vegetation (Hann et al. 2008).

The five FR classes are:

- FR I: Frequency of 0 to 35 years and low (mostly surface fires) to mixed severity (less than 75% of the dominant overstory vegetation is replaced).
- FR II: Frequency of 0 to 35 years and high severity (more than 75% of the dominant overstory vegetation is replaced).
- FR III: Frequency of 35 to 200+ years and mixed severity (less than 75% of the dominant overstory vegetation is replaced).
- FR IV: Frequency of 35 to 200+ years and high severity (more than 75% of the dominant overstory vegetation is replaced).
- FR V: Frequency of 200+ years and high severity (more than 75% of the dominant overstory vegetation is replaced).

Fires are characterized by their intensity, the frequency with which they occur, the season in which they occur, their spatial pattern or extent, and their type. Combined, these attributes describe the fire regime. Fire regimes in the western United States have changed dramatically within the past several decades. Historically, frequent, low-intensity surface fires have burned throughout many areas within Santa Fe County, creating a mosaic of different stages of vegetative structure across the landscape. For the most part, these fires have helped to preserve an open vegetative community structure by consuming fuels on the ground surface, which has maintained open meadows and cleared the forest understory of encroaching vegetation.

However, large areas of the Sangre de Cristos that adjoin Santa Fe County have not burned in more than 100 years. This departure from historical, low-intensity fire regimes has caused recent wildland fires to burn much more intensely and unpredictably in many areas of northern New Mexico. It is important to address here the common misconception that all southwestern forests have historically exhibited low intensity frequent surface fire regimes. This is not always the case, as many of the higher elevation (8,500 feet and above) spruce-fir as well as mid-elevation mixed-conifer forests would have naturally experienced infrequent stand replacing fires as part of their natural regeneration cycle, so for these forest types, restoration to more open stands is not always appropriate. At lower elevations, plants and animals are adapted to historical frequent, low-severity fire regimes and are therefore not resilient to the high-severity, extensive wildfires burning today (Keane et al. 2002). Human influences on fire regimes have therefore been greatest at these low-elevation sites. An additional factor contributing to the natural disturbance regime in southwestern forests are outbreaks of bark beetle (*Ips*, *Dendroctonus*, and *Scolytus* spp.), which have locally killed significant numbers of spruce, fir, Douglas-fir, and pine trees throughout the planning area. The effect of bark beetle infestation is particularly evident within Santa Fe County in the area west of Glorieta Pass. Currently, many needles have dropped to the ground and have left only skeletons of trees where fire is less likely to be carried through the canopy due to the absence of light and flashy aerial fuels. In areas where the canopy is still maintaining dead needles, the risk of fire being carried through the canopy is much greater and should be mitigated appropriately.

FUELS AND TOPOGRAPHY WITHIN THE WUI IN SANTA FE COUNTY

The southern half of the County is predominantly composed of grassland fuels, transitioning into shrubsteppe- or shrubland-dominated fuels to the north. Forested communities exist primarily in the higher elevations of the Sangre de Cristo Mountains in the northeastern portion of the County. Grassland communities are primarily characterized by shortgrass prairie, which is relatively sparse and usually occurs on flat to rolling topography at lower elevations. Grasslands may occur as pure herbaceous stands, as a shrubsteppe community, or as a juniper savanna.

Grasslands

Grassland fires have the potential to move quickly under dry, windy, and steep conditions and can easily spread at a surprisingly rapid rate, often reaching over 300 feet per minute. Many authors have suggested that the historical fire-return intervals (FRIs) for grasslands throughout the seventeenth to early nineteenth centuries are thought to have been every 5 to 10 years (Leopold 1924; Swetnam et al. 1992). Fire-suppression policies may have contributed to declining fire frequency in this cover type, but other interacting factors may have contributed as well. About the time of the Civil War, intensive livestock grazing is thought to have been responsible for a decline in grassland fires (Touchan et al. 1996; West 1984). Heavy grazing reduced the fuels available to propagate fire spread and also reduced competition with herbaceous plants, tipping the balance in favor of the woody species. Woodland encroachment, increased tree density, and altered fire behavior characterize many former grasslands of the Southwest. Once woody plants become dominant, their long lifespans and their ability to extract both shallow and deep soil moisture can maintain a woodland condition indefinitely (Burgess 1995). Frequent fire plays a significant role in grassland nutrient cycling and successional processes, and long-term exclusion may produce irreversible changes in ecosystem structure and function (McPherson 1995).

Piñon-juniper Woodlands

One of most common vegetative communities in the County is piñon-juniper woodland. These woodlands are some of the most poorly understood ecosystems in terms of fire regimes, but recent research suggests that fire may have been a less-common and less-important disturbance agent in piñon-juniper woodlands compared with adjacent ponderosa pine and grassland ecosystems. In a recent review of piñon-juniper disturbance regimes, Romme et al. (2007) has subdivided the piñon-juniper cover type into three subtypes: areas of potential woodland expansion and contraction, piñon-juniper savannas, and persistent woodlands. These categories are helpful in separating the broad piñon-juniper cover type into distinct communities, which are subject to different climatic, topographic, and disturbance conditions.

Areas of potential expansion and contraction are those zones wherein the boundaries of the piñon-juniper ecotones have shifted. As mentioned previously, many grasslands in the Southwest have been colonized by trees as a result of a complex interplay of environmental factors. The issue of woodland encroachment into grasslands goes hand in hand with the assessment of historical conditions of the woodlands. These shifting boundaries have been widely documented (e.g., Gottfried 2004) but the historical condition of the ecosystem may be relative to the time scale of evaluation. Betancourt (1987) has suggested that the changing distribution patterns seen in the last century may be part of larger trends that have occurred over millennia and not the result of land use changes. Overall, it is believed that greater landscape heterogeneity existed previously in many of these areas that are now uniformly covered with relatively young trees (Romme et al. 2007).

Piñon-juniper savannas are found on lower elevation sites with deep soils where most precipitation comes during the summer monsoon season. Juniper savanna, the most common savanna in New Mexico, consists of widely scattered trees in a grass matrix (Dick-Peddie 1993). Similar to grasslands, the range of savannas has decreased as tree density has increased, but the mechanisms for tree expansion are complex as is the subject of current research. Significant scientific debate currently exists over the natural FRI for savannas, but most experts agree that fire was more frequent in savannas than in persistent woodlands.

Persistent woodlands, characteristic of rugged upland sites with shallow, coarse soils tend to have older and denser trees. Herbaceous vegetation within this community is typically sparse, even in the absence of heavy livestock grazing. Research from persistent woodlands provides strong evidence to support the theory that the natural fire regime of piñon-juniper woodlands was dominated by infrequent but high-severity fires and that FRIs may have been on the order of 400 years (Baker and Shinneman 2004; Romme et al. 2007). These findings are in stark contrast to previous estimates of piñon-juniper FRIs of 30 to 40 years (Schmidt et al. 2002; Smith 2000). The short FRI estimates are mostly inferred from FRIs of adjacent ponderosa pine ecosystems due to the scarcity of fire-scarred trees in these ecosystems.

In contrast to ponderosa pine, piñon pines and junipers produce relatively small volumes of litter. Understory fuels, either living or dead, must be sufficiently contiguous to carry a low-intensity surface fire. In the absence of fine surface fuels, fires that spread beyond individual trees are most likely wind-driven and spread from crown to crown (Romme et al. 2007). Fire extent is greatest in higher-density woodlands and is limited by both fuels and topography in sparse, low-productivity stands on rocky terrain. Most scientists agree that fire has been more common in savannas and areas of expansion and contraction than in persistent woodlands, but debate remains on the exact range of fire frequency. Overall, frequent, low-intensity surface fires are not the predominant fire regime in piñon-juniper woodlands. Therefore, fire exclusion may not have altered forest structure as dramatically in this forest type. The degree of departure from historical conditions and the causes of any observed changes remain uncertain; therefore, restoration treatments in woodlands should be approached with caution (Romme et al. 2007)

Ponderosa Pine Forests

In general, studies have found that pre-1900 Mean Fire Intervals (MFIs)—the arithmetic average of all fire frequencies for a specific study site—ranged from 4 to 25 years across the Jemez Mountains and that fire frequencies and areas burned were the greatest in mid-elevation ponderosa pine forests (Allen 2001, Fulé et al. 2003 Grissino-Mayer et al. 2004; Swetnam and Dieterich 1985; Veblen et al. 2000). Ponderosa pine stands, which exist in the higher, steeper elevations within the County, are fire-adapted ecosystems that are maintained by frequent, low-intensity fires. Throughout the Southwest, extensive fire history studies have documented historic fire frequencies in ponderosa pine using tree-ring data (Allen et al. 2002; Richardson 1998). Large variation in the spatial and temporal scales of fires in ponderosa pine was common and was usually based on forcing factors, such as seasonality, regional climate, elevation, aspect, and other site conditions (Brown et al. 2001). The effects of fire exclusion on forest structure are thought to be more profound in forests that previously sustained frequent, low-intensity surface fires (Westerling et al. 2006), and it is likely that fire exclusion was a primary cause of departure from historical conditions in ponderosa pine forests. Historically, frequent fire would have consumed fuels on the ground surface and culled young trees to maintain an uneven age distribution and mosaic pattern throughout the forest (Allen et al. 2002). Frequent fire disturbance maintained an open, park-like forest structure with canopy openings and an abundant herbaceous and shrubby understory (Biswell 1973; Cooper 1960; Covington and Moore 1994; Weaver 1947). In contrast to this historic structure, modern ponderosa stands are often overly dense with an understory of younger trees, increasing the likelihood for a fire to be lifted into the canopy. In areas where canopy spacing is less than 20 feet, there is increased crown fire hazard and potential for long-range spotting, especially in the presence of wind and steep slopes.

Mixed-Conifer/Spruce-Fir Forests

Often forest patches affected by low and high severity fire are closely juxtaposed in a transition zone made up of a forest type known as mixed conifer (Fulé et al. 2003). Fire histories in mixed conifer forests vary with forest composition, landscape characteristics, and human intervention, but tend to exhibit mixed severity fire regimes with both low-intensity surface fires and patchy crown fires (Touchan et al. 1996). Mixed-severity fire regimes are the most complex fire regimes in the western United States (Agee 1998) because of their extreme variability (Agee 2004). A mixed-severity fire regime exists where the typical fire, or combination of fires over time, results in a complex mix of patches of different severity, including unburned, low-severity, moderate-severity and high-severity patches (Agee 2004).

Ponderosa pine was once co-dominant in many mixed-conifer forests with relatively open stand structures, but fire suppression has allowed the development of dense sapling understories, with

regeneration dominated by the more fire-sensitive Douglas-fir, white fir, and Engelmann spruce. Forest stand inventory data from Arizona and New Mexico show an 81% increase in the area of mixed-conifer forests between 1962 and 1986 (Johnson 1994). Herbaceous understories have been reduced by denser canopies and needle litter, and nutrient cycles have been disrupted. Heavy surface fuels and a vertically continuous ladder of dead branches have developed, resulting in increased risks of crown fires (Touchan et al. 1996).

Spruce-fir forests that occur at higher elevations in the County exhibit high densities (782–1382 trees/acre), high basal areas (28–39 square meters per hectare [m^2/ha]), continuous canopy cover (52%–61%), and increased woody debris (28–39 m^2/ha). These forest characteristics naturally support high-intensity and severe stand replacing fires (Fulé et al. 2003) and an infrequent fire regime. Approximately 80% or more of the aboveground vegetation is either consumed or dies as a result of such fire.

Riparian Communities

In some local ecosystems a more frequent fire regime has occurred as a result of changes in vegetation composition and structure. Fire-adapted invasive species, such as saltcedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*), have invaded many Southwestern riparian corridors, increasing both fuel volume and continuity. These species also sprout readily after fire. Although native cottonwoods and willows will also regenerate after fire, they typically have limited survival of resprouting individuals. Studies have found that the density of saltcedar foliage is higher at burned sites than unburned sites within riparian areas (Smith et al. 2006). Native riparian vegetation is not adapted to fire to the extent and severity it is currently experiencing. Fires within this ecological zone are typically of a smaller scale (e.g., single-tree fires with minimum surface spread). Once saltcedar has been established at a location, it increases the likelihood that the riparian area will burn and, as a result, alter the natural disturbance regime further. These altered fire regimes, rather than the natural hydrologic system, are now influencing the composition and structure of riparian ecosystems in the Southwest (Ellis 2001), as well as causing a threat to communities situated in or adjacent to the riparian zone.

FIRE MANAGEMENT POLICY

The primary responsibility for WUI fire prevention and protection lies with property owners and state and local governments. Property owners must comply with existing state statutes and local regulations. These primary responsibilities should be carried out in partnership with the federal government and private sector areas. The current Federal Fire Policy states that protection priorities are 1) life, 2) property, and 3) natural resources. These priorities often limit flexibility in the decision-making process, especially when a wildland fire occurs within the WUI.

LAWS, ORDINANCES, STANDARDS, AND CODES FOR WILDFIRE PREVENTION

In 2018 the County established a County Fire Code. The Code adopted and modified the 2015 edition of the International Wildland-Urban Interface Code; regulates fireworks and excessive fire alarms; requires fire inspections; provides for fire protection system plan reviews; regulates gates obstructing access to properties; provides for issuance of permits and collection of fees; and repeals several previous Santa Fe County Ordinance related to fire prevention.²⁹

The Fire Code provisions are implemented, administered, and enforced by the Fire Prevention Division of the Santa Fe County Fire Department, under direction of the County Fire Marshall.

²⁹ https://www.santafecountynm.gov/documents/ordinances/Ordinance_2018-8.pdf

FIRE PLANNING

There are a number of existing documents relating to fire management in Santa Fe County. This CWPP is meant to supplement and not replace any other existing plans. See Chapter 2 for information on agency fire management planning and the growing use of spatial fire planning and decision support tools.

EMERGENCY MANAGEMENT PLANNING

Santa Fe County updated their County Hazard Mitigation Plan (HMP) in 2018. This CWPP dovetails with the wildfire section of the HMP by incorporating wildfire hazard mitigations identified in that plan. In the future, the County should consider revising both plans in unison.

LAND MANAGEMENT STRATEGIES

In 2014, New Mexico launched a Watershed Restoration Initiative with a \$6.2 million appropriation for severance tax dollars to treat priority watersheds on public land. Restoration projects under the initiative are planned and implemented with collaboration between the New Mexico State Forestry Division and partnering organizations, including state, federal, tribal and private partners (New Mexico Energy, Minerals, and Natural Resources Department [EMNRD] 2016). In 2018, EMNRD reported that \$13.3 million dollars in state funding for watershed restoration has been spent on public land in New Mexico as a result of the initiative (EMNRD 2018).

The Forestry Division's Forest and Watershed Health Office has been concentrating on three work areas related to forest and watershed health: 1) Supporting collaborations that expand the State's capacity to get more work done on the ground; 2) implementing the National Cohesive Strategy in New Mexico; and 3) using science, policy and legislation to facilitate the Forestry Division mission.

Forest managers in the region are addressing land management objectives through the use of prescribed fire, mechanical and manual treatments to promote more resilient forest lands. Private, state, and federal lands are interspersed creating a matrix of land ownership, which is often a hurdle to implementation of landscape level treatments. By working with private landowners, forest managers are enhancing landscape-scale efforts to create more resilient forest communities.

PUBLIC EDUCATION AND OUTREACH PROGRAMS

Public education and outreach programs are a common factor in virtually every agency and organization involved with the wildfire issue.

Local and State Programs

Santa Fe County

The County and VFDs have held community outreach events and community workdays throughout the County to raise awareness of fire prevention. The County utilizes Firewise and Ready, Set, Go! literature to support these education efforts.

Greater Santa Fe Fireshed Coalition

The Greater Santa Fe Fireshed Coalition works to identify and implement projects to increase community wildfire resilience using a collaborative approach. Collaborators work on large-scale projects to minimize wildfire risk to the water supply, critical infrastructure, and cultural resources in the fireshed. The Coalition recommends preparing for wildfire diligently and remaining alert year-round. Following simple precautions could save homes and lives from fire. The Coalition's suggestions include the following:³⁰

³⁰ <https://www.santafefireshed.org/getready>

- Becoming familiar with the Ready, Set, Go! Wildfire Action Plan (see *National Programs*).
- Watching the City of Santa Fe Fire Department's story map: [Story Map](#)
- Conducting a [Home Hazard Assessment](#)
- Reviewing the City of Santa Fe [Fire Prevention Booklet](#)
- Signing up for the Santa Fe emergency communications: [E911 Alert Santa Fe](#)

More broadly, the Coalition recommends preparing for any emergency by taking the following actions³¹:

- Creating an evacuation bag with a 3-day supply of personal items
- Reviewing the following resources:
 - The Department of Homeland Security's [Ready.gov](#)
 - [Emergency Planning Tips Flyer](#)
 - [Go Kits and Emergency Planning Presentation](#)
 - [The Ready Santa Fe](#) application

If you are interested in becoming a Fireshed ambassador, [click here](#).

New Mexico State Forestry Division

The State Forestry Division employs several fire prevention programs to educate residents and visitors. According to the EMNRD 2018 Annual Report, the Forestry Division has helped facilitate various educational programs including Ready, Set, Go!, Fire Adapted Community concept, and Firewise USA. In 2018, a total of 25 communities throughout the state remain dedicated to the Firewise program. Numerous other communities are in the process of applying (EMNRD 2018). There are currently three communities in Santa Fe County that are certified Firewise.

Additional wildfire prevention efforts include the Living with Fire Guide for the Homeowner, New Mexico. This publication has been updated for 2018 incorporating the Fire Adapted Community concept in partnership with the University of Nevada Extension, Bureau of Land Management, USFS, Department of Homeland Security, Bureau of Indian Affairs, and NPS (EMNRD 2018).

Bureau of Land Management

The BLM New Mexico conducts fire prevention and education programs and coordinates interagency fire messaging throughout the state and within the Southwest Geographic Area. This includes broad and targeted public messaging via social media, traditional media, and interagency prevention and mitigation publications with cooperators such as the recent revisions of Ready, Set, Go and NM Living with Fire. This also includes the funding and maintenance of the primary interagency fire information site in the state, NMFireInfo.com. Through a partnership with the New Mexico Counties, the BLM funds the Wildfire Risk Reduction Grant Program that includes awards for education and outreach, CWPPs and fuels reduction projects to local government, tribes and non-profit entities. In addition, BLM provides support to the Fire Adapted New Mexico Learning Network and has provided support to the Greater Santa Fe Fireshed Coalition through grants. Also, in the County, BLM regularly engages in STEM events and other outreach opportunities. Informational tools and regulatory signing are posted in popular recreation locations of the County to prevent wildfires.

³¹ <https://www.santafefireshed.org/emergency>

National Programs

Ready, Set, Go!

The Ready, Set, Go! Program, which is managed by the International Association of Fire Chiefs, was launched in 2011 at the WUI conference. The program seeks to develop and improve the dialogue between fire departments and residents, providing teaching for residents who live in high-risk wildfire areas—and the WUI—on how to best prepare themselves and their properties against fire threats (Ready, Set, Go! 2016). The County utilizes the Ready, Set, Go Program for their public outreach with a focus on making communities “fire adapted”. Specific Ready, Set, Go information has been developed for the County.^{32 33}

The tenets of Ready, Set, Go! as included on the website (<http://www.wildlandfirersg.org>) are:

Ready – Take personal responsibility and prepare long before the threat of a wildland fire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe place. Plan escape routes and ensure all those residing within the home know the plan of action.

Set – Pack your emergency items. Stay aware of the latest news and information on the fire from local media, your local fire department, and public safety.

Go – Follow your personal wildland fire action plan. Doing so will not only support your safety but will allow firefighters to best maneuver resources to combat the fire.

Parameters for developing defensible space around a home are described in the County Ready, Set, Go Guide and are illustrated in Figure A.9. Three zones for defensible space actions are described. These include:

Zone 1 This zone, which consists of an area of 0 to 30 feet around the structure, features the most intense modification and treatment. This distance is measured from the outside edge of the home’s eaves and any attached structures, such as decks. Do not plant directly beneath windows or next to foundation vents. Frequently prune and maintain plants in this zone to ensure vigorous growth and a low growth habit. Remove dead branches, stems, and leaves. Do not store firewood or other combustible materials in this area. Enclose or screen decks with metal screening. Extend gravel coverage under the decks. Do not use areas under decks for storage. Prune low-lying branches (ladder fuels that would allow a surface fire to climb into the tree) and any branches that interfere with the roof or are within 10 feet of the chimney. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or 1/3 the height, whichever is the least).

Zone 2 This zone features fuel reduction efforts and serves as a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space should extend at least 100 feet from the structure. Remove stressed, diseased, dead, or dying trees and shrubs. Thin and prune the remaining larger trees and shrubs. Be sure to extend thinning along either side of your driveway all the way to your main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing home site safety and the aesthetics of the property. Keep grass and wildflowers under 8 inches in height. Regularly remove leaf and needle debris from the yard.

Zone 3 This area extends from the edge of your defensible space to your property boundaries. The healthiest forest is one that has multiple ages, sizes, and species of trees where adequate growing room is maintained over time, so maintain a distance of at least 10 feet between the tops of trees. Remove ladder fuels, creating a separation between low-level vegetation and tree branches to keep fire

³² Santa Fe County Ready, Set, Go: <https://www.santafecountynm.gov/media/files/SantaFeRSGGuide2017.pdf>

³³ Ready, Set, Go, Santa Fe Fireshed- You Tube: <https://www.youtube.com/watch?v=JFxoKa72bA>

from climbing up trees. A greater number of wildlife trees can remain in Zone 3, but regularly remove dead trees and shrubs. Ensure trees in this area do not pose a threat to power lines or access roads.

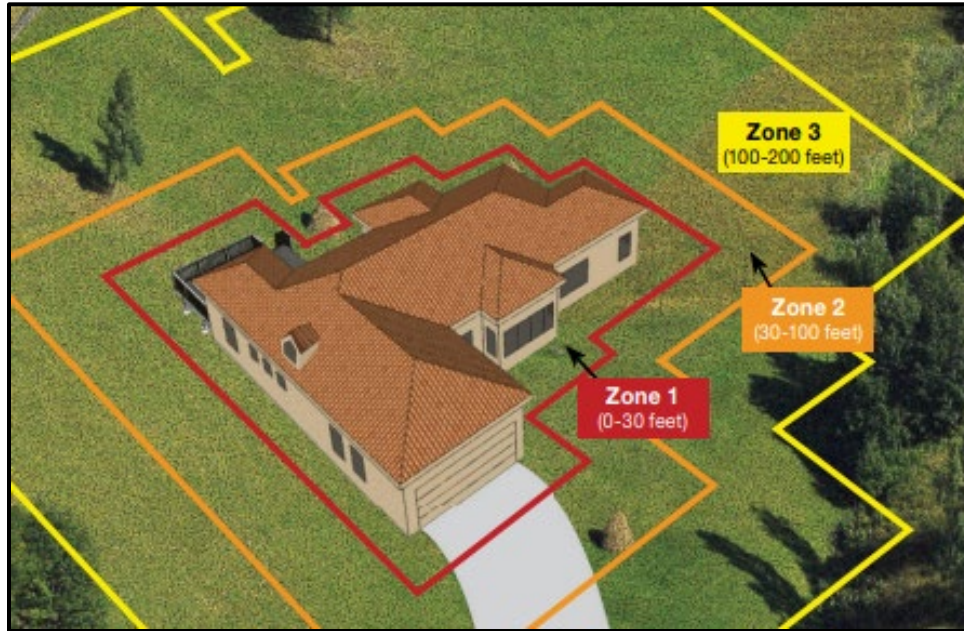


Figure A.9. Defensible Space Zones.

Source: Santa Fe County Ready, Set, Go Guide (2017).

National Fire Protection Association

The NFPA is a global non-profit organization devoted to eliminating death, injury, property, and economic loss due to fire, electrical, and related hazards. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world.

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme. The NFPA's Firewise Communities program (www.firewise.org) encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks.

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research division conducts investigations of fire incidents and produces a wide range of annual reports and special studies on all aspects of the nation's fire problem.

U.S. Fire Administration's WUI Toolkit

The U.S. Fire Administration (USFA) is an entity of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) that aids in the preparation for and response to fire. Their WUI toolkit consists of a list of websites and other information regarding risk assessment, public outreach, and community training. Find the toolkit here: https://www.usfa.fema.gov/wui_toolkit/wui_training.html.

RISK ASSESSMENT COMPONENTS

FIRE BEHAVIOR MODELS

LANDFIRE

LANDFIRE is a national remote sensing project that provides land managers a data source for all inputs needed for FARSITE, FlamMap, and other fire behavior models. The database is managed by the USFS and the USDI and is widely used throughout the United States for land management planning. More information can be obtained from <http://www.landfire.gov>.

FARSITE

FARSITE is a computer model based on Rothermel's spread equations (Rothermel 1983); the model also incorporates crown fire models. FARSITE uses spatial data on fuels, canopy cover, crown bulk density, canopy base height, canopy height, aspect, slope, elevation, wind, and weather to model fire behavior across a landscape. FARSITE is a spatial and temporal fire behavior model. FARSITE is used to generate fuel moisture and landscape files as inputs for FlamMap. Information on fire behavior models can be obtained from <http://www.fire.org>.

FlamMap

Like FARSITE, FlamMap uses a spatial component for its inputs but only provides fire behavior predictions for a single set of weather inputs. In essence, FlamMap gives fire behavior predictions across a landscape for a snapshot of time; however, FlamMap does not predict fire spread across the landscape. FlamMap has been used for the SCCWPP to predict fire behavior across the landscape under extreme (97% worst case) weather scenarios. For this CWPP assessment, the model was run within the Interagency Fuel Treatment Decision Support System (IFTDSS) modeling platform.

FIRE BEHAVIOR MODEL INPUTS

Fuels

The fuels in the planning area are classified using Scott and Burgan's (2005) Standard Fire Behavior Fuel Model classification system. This classification system is based on the Rothermel surface fire spread equations, and each vegetation and litter type is broken down into 40 fuel models.

The general classification of fuels is by fire-carrying fuel type (Scott and Burgan 2005):

(NB) Non-burnable	(TU) Timber-Understory
(GR) Grass	(TL) Timber Litter
(GS) Grass-Shrub	(SB) Slash-Blowdown
(SH) Shrub	

Table A.4 provides a description of each fuel type.

Map 1 in Appendix B illustrates the fuels classification throughout the planning area.

Table A.4. Fuel Model Classification for SCCWPP Planning Area

1. Nearly pure grass and/or forb type (Grass)	
i.	GR1: Grass is short, patchy, and possibly heavily grazed. Spread rate is moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load (0.40 ton/acre).
ii.	GR2: Moderately coarse continuous grass, average depth about 1 foot. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load (1.10 tons/acre).
iii.	GR3: Very coarse grass, average depth 2 feet. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet).
iv.	GR4: Moderately coarse continuous grass, average depth 2 feet. Spread rate very high (50–150 chains/hour); flame length high (8–12 feet).
2. Mixture of grass and shrub, up to about 50% shrub cover (Grass-Shrub)	
i.	GS1: Shrubs are about 1 foot high, low grass load. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load (1.35 tons/acre).
ii.	GS2: Shrubs are 1–3 feet high, moderate grass load. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load (2.1 tons/acre).
3. Shrubs cover at least 50% of the site; grass sparse to non-existent (Shrub)	
i.	SH1: Low fuel load, depth about 1 foot, some grass fuels present. Spread rate very low (0–2 chains/hour); flame length very low (0–1 feet).
ii.	SH2: Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuels present. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load (5.2 tons/acre).
iii.	SH5: Heavy shrub load. Fuel bed depth 4–6 feet. Spread rate very high (50–150 chains/hour), flame length very high (12–25 feet).
iv.	SH7: Very heavy shrub load, possibly with pine overstory. Fuel bed depth 4–6 feet. Spread rate high (20–50 chains/hour); flame length very high (12–25 feet).
4. Grass or shrubs mixed with litter from forest canopy (Timber-Understory)	
i.	TU1: Fuel bed is low load of grass and/or shrub with litter. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load (1.3 tons/acre).
ii.	TU5: Fuel bed high load conifer with shrub understory. Spread rate moderate (5–20 chains/hour); flame length moderate (4–8 feet).
5. Dead and downed woody fuel (litter) beneath a forest canopy (Timber Litter)	
i.	TL1: Low to moderate load, fuels 1–2 inches deep. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot).
ii.	TL2: Low load, compact. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot).
iii.	TL3: Moderate load. Spread rate very slow (0–2 chains/hour); flame length low (1–4 foot); fine fuel load (0.5 ton/acre).
iv.	TL4: Moderate load. Spread rate very slow (0–2 chains/hour); flame length low (1–4 foot).
v.	TL5: High load conifer litter. Spread rate slow (2–5 chains/hour); flame length low (1–4 foot).
vi.	TL6: Moderate load. Spread rate moderate (5–20 chains/hour); flame length low (1–4 foot).
vii.	TL7: Heavy load. Spread rate low (2–5 chains/hour); flame length low (1–4 feet).
viii.	TL8: Long needle litter; long needle fuel. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet).
6. Insufficient wildland fuel to carry wildland fire under any condition (Non-burnable)	
i.	NB1: Urban or suburban development; insufficient wildland fuel to carry wildland fire.
ii.	NB3: Agricultural field, maintained in non-burnable condition.
iii.	NB8: Open water.

Notes: Based on Scott and Burgan's (2005) 40 Fuel Model System.

Topography

Topography is important in determining fire behavior. Steepness of slope, aspect (direction the slope faces), elevation, and landscape features can all affect fuels, local weather (by channeling winds and affecting local temperatures), and rate of spread of wildfire. There are some steep slopes in Santa Fe County that would influence fire behavior and spread.

Weather

Of the three fire behavior components, weather is the most likely to fluctuate. Accurately predicting fire weather remains a challenge for forecasters. As winds and rising temperatures dry fuels in the spring and summer, conditions can deteriorate rapidly, creating an environment that is susceptible to wildland fire. Fine fuels (grass and leaf litter) can cure rapidly, making them highly flammable in as little as 1 hour following light precipitation. Low live fuel moistures of shrubs and trees can significantly contribute to fire behavior in the form of crowning and torching. With a high wind, grass fires can spread rapidly, engulfing communities, often with limited warning for evacuation. The creation of defensible space is of vital importance in protecting communities from this type of fire. For instance, a carefully constructed fuel break placed in an appropriate location could protect homes or possibly an entire community from fire. This type of defensible space can also provide safer conditions for firefighters, improving their ability to suppress fire and protect life and property.

One of the critical inputs for FlamMap is fuel moisture files. For this purpose, weather data have been obtained from FAMWEB (NWCG 2012), a fire weather database maintained by the NWCG. A remote automated weather station was selected (Burro Mountain 292504), and data were downloaded from the website.

Using an additional fire program (FireFamily Plus) with the remote automated weather station data, weather files that included prevailing wind direction (Table A.5, Figure A.10) and 20-foot wind speed were created. Fuel moisture files were then developed for downed (1-hour, 10-hour, and 100-hour) and live herbaceous and live woody fuels. These files represent weather inputs in FlamMap; 95 to 100 percentile weather is used to predict the most extreme scenarios for fire behavior.

Table A.5. Weather Parameters Used in the Fire Behavior Model

Parameter	Low	Moderate	High	Extreme
Percentile range	0–15	16–85	86–94	95–100
1-hour fuel moisture	8.26	3.49	1.56	0.99
10-hour fuel moisture	9.40	4.01	1.99	1.45
100-hour fuel moisture	13.96	6.10	3.69	3.28
Herbaceous fuel moisture	47.88	19.62	20.25	25.15
Woody fuel moisture	114.08	60.91	60.00	60.00
1,000-hour fuel moisture	14.52	6.73	5.53	4.96
20-foot wind speed	8.10	13.27	12.60	11.67

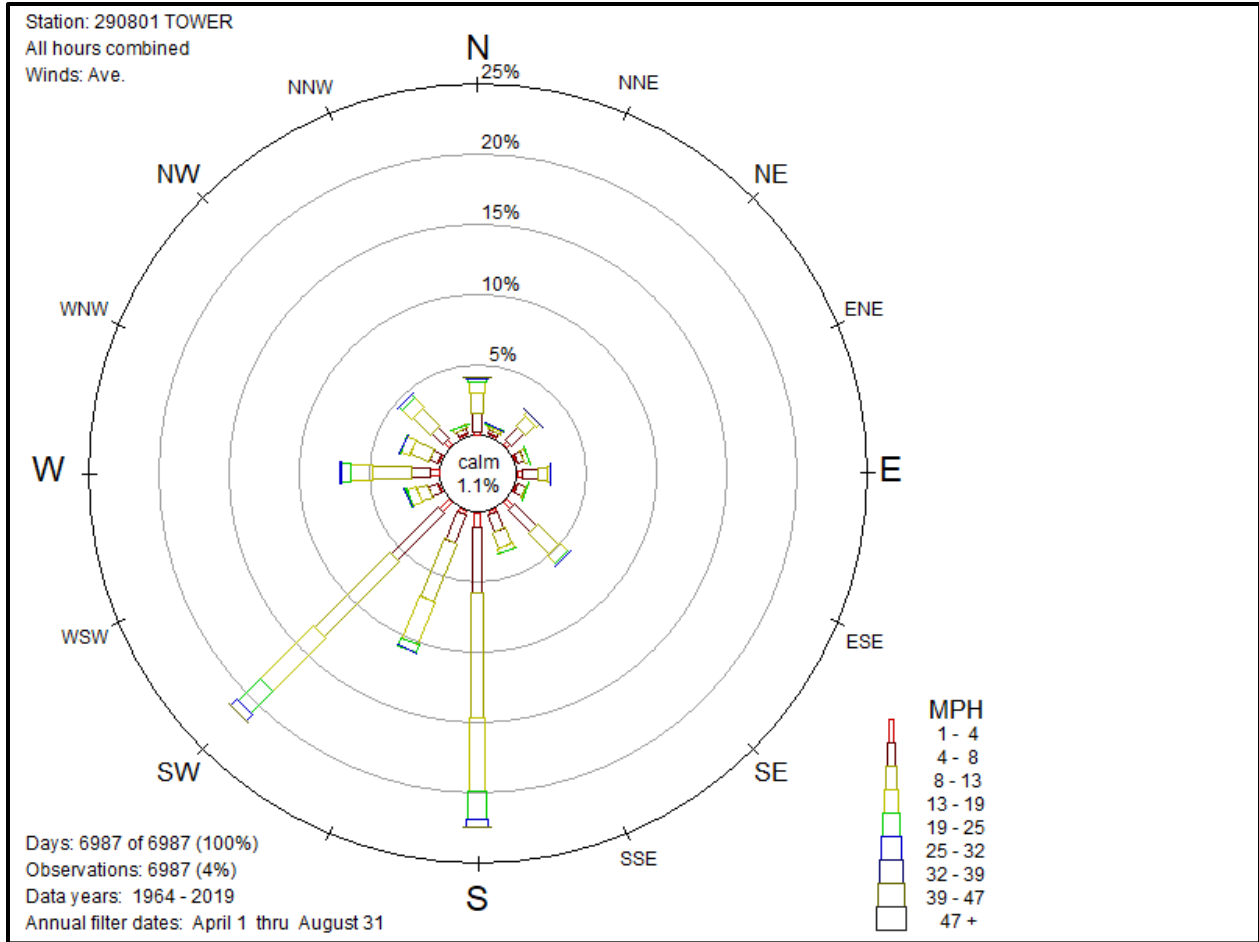


Figure A.10. Wind Rose used in the fire behavior modelling in FlamMap.

FIRE BEHAVIOR MODEL OUTPUTS

The following is a discussion of the fire behavior outputs from FlamMap.

Flame Length

Map 2 in Appendix B illustrates the flame length classifications for the planning area. Flame lengths are determined by fuels, weather, and topography. Flame length is a particularly important component of the risk assessment because it relates to potential crown fire (particularly important in timber areas) and suppression tactics. Direct attack by hand lines is usually limited to flame lengths less than 4 feet. In excess of 4 feet, indirect suppression is the dominant tactic. Suppression using engines and heavy equipment will move from direct to indirect with flame lengths in excess of 8 feet.

Flame lengths across the planning area range from 0 to more than 11 feet. The highest flame lengths are associated with the timber fuels found in the higher elevations in the north east corner of the County.

Fireline Intensity

Map 3 in Appendix B illustrates the predicted fireline intensity throughout the planning area. Fireline intensity describes the rate of energy released by the flaming front and is measured in British thermal units per foot, per second (Btu/ft/sec). This is a good measure of intensity and is used for planning suppression activities. The expected fireline intensity throughout the planning area is similar in pattern to predicted flame length, as fireline intensity is a function of flame length. The pattern for fireline intensity is

similar to flame length in that intensities range from low (less than 100 Btu/ft/sec) through moderate (100–500 Btu/ft/sec) high and extreme intensity (greater than 500 Btu/ft/sec), which tend to be associated with areas dominated by tall shrub and timber fuel loads.

Rate of Spread

Map 4 in Appendix B illustrates the rate of spread classifications for the planning area. The rates of spread in the project area range from 0 to 5 chains/hour up to 50 chains/hour. Low rates of spread are associated with timber dominated areas, while moderate and high rates of spread are associated with grass and shrub fuels. Agricultural areas are modelled with low rate of spread; however, these fuel types can also pose a severe hazard during certain times of the year (prior to harvest or following harvest when residual materials remain) and are often areas of ignition through human activity such as agricultural burning practices.

Crown Fire Potential

Map 5 in Appendix B illustrates the range of crown fire activity from surface fire (in grass-dominated areas) to passive and active crown fire (in timber dominated fuels).

Fire Occurrence/Density of Starts

Map 6 in Appendix B illustrates the fire occurrence density for the planning area. Fire occurrence density has been determined by performing a density analysis on fire start locations with ArcGIS Desktop Spatial Analyst. These locations have been provided by the USFS, NMSF, and fire departments in Santa Fe County, and when combined the points show the location of fire starts within the planning area from 1970 to 2020. The density analysis has been performed as a kernel density, using a 2,500-meter search radius. The density of previous fire starts is used to determine the risk of ignition of a fire. Map 6 in Appendix B reveals a cluster pattern of fires in the northeast corner of the County, associated with forested areas and USFS land. Some fire occurrence clusters at intersections and along highways.

The fire occurrence maps are used to provide information on areas where human-ignited fires are prevalent and hence could be more prone to fire in the future and where there are a higher density of lightning ignitions due to topographic conditions and receptive forest fuels.

Composite Hazard Assessment Model

All data used in the risk assessment have been processed using ESRI ArcGIS Desktop and the ESRI Spatial Analyst Extension. Information on these programs can be found at <http://www.esri.com>. Data have been gathered from all relevant agencies, and the most current data have been used.

All fire parameter datasets have been converted to a raster format (a common GIS data format comprising a grid of cells or pixels, with each pixel containing a single value). The cell size for the data is 30 × 30 meters (98 × 98 feet). Each of the original cell values have been reclassified with a new value between 1 and 4, based on the significance of the data (1 = lowest, 4 = highest). Prior to running the models on the reclassified datasets, each of the input parameters have been weighted; that is, they are assigned a percentage value reflecting that parameter's importance in the model. The parameters were then placed into a Weighted Sum Model, which "stacks" each geographically aligned dataset and evaluates an output value derived from each cell value of the overlaid dataset in combination with the weighted assessment. In a Weighted Sum Model, the weighted values of each pixel from each parameter dataset are added together so that the resulting dataset contains pixels with summed values of all the parameters. This method ensures that the model resolution is maintained in the results and thus provides finer detail and range of values for denoting fire risk.

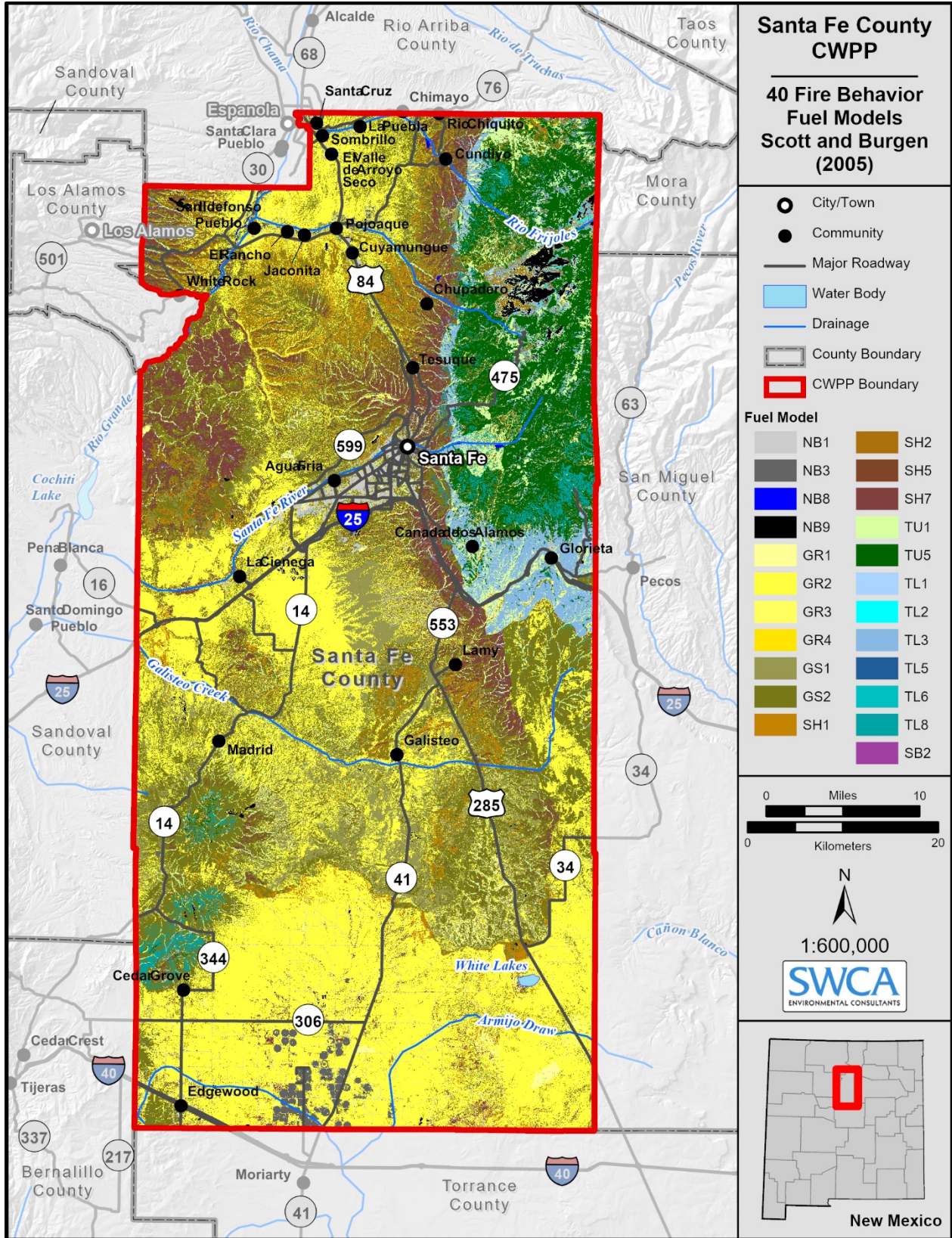
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SWCA

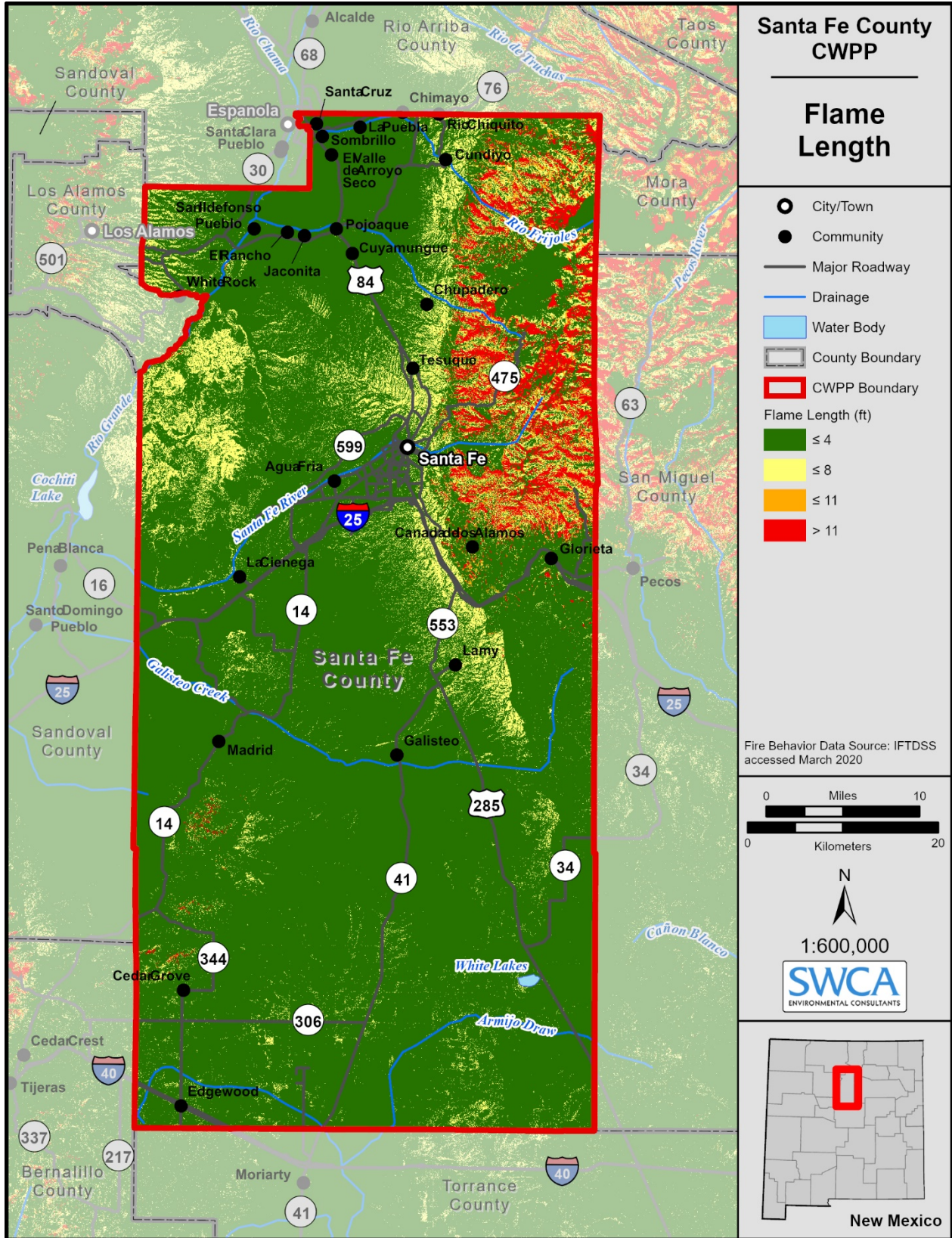
APPENDIX B:

Maps

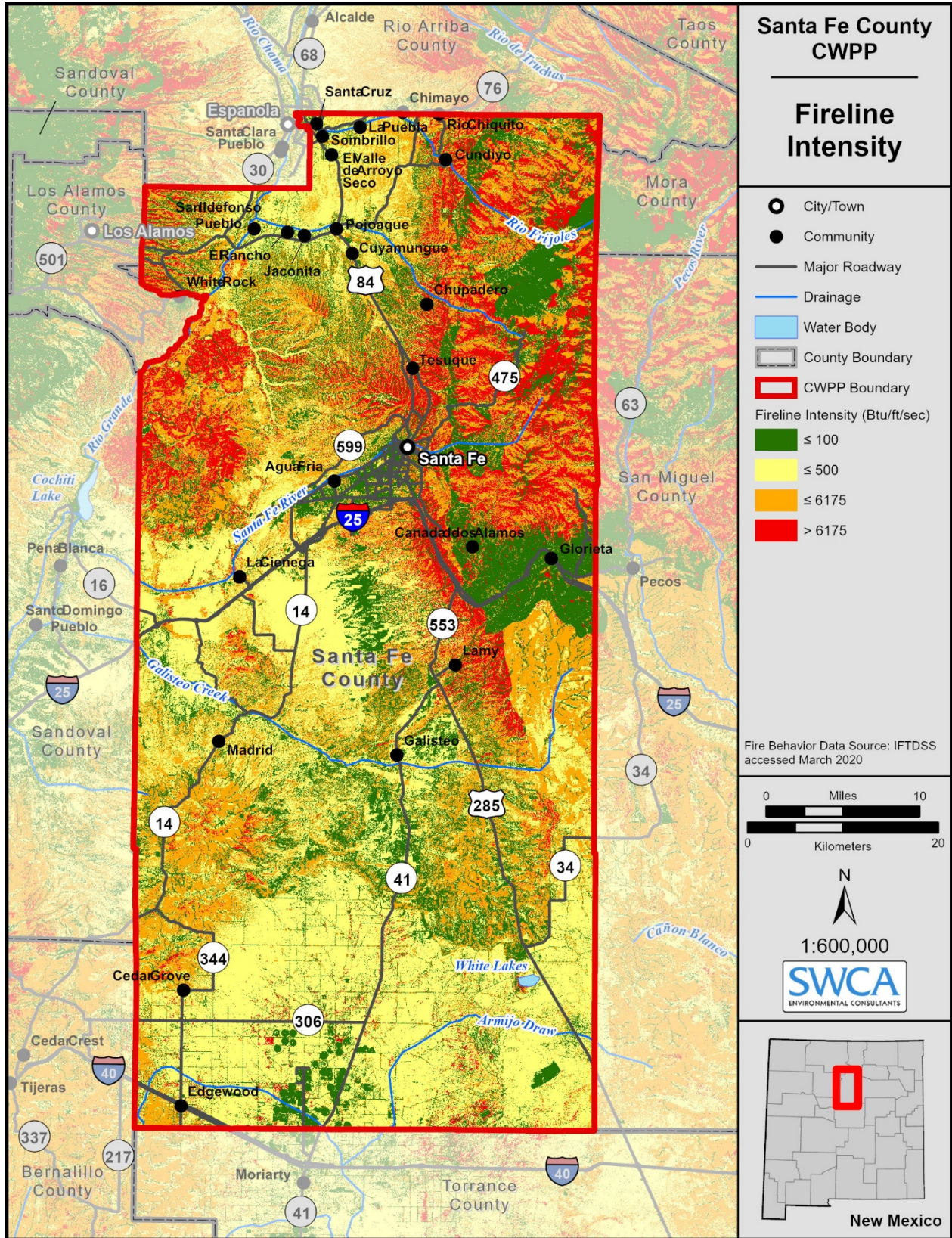
SWCA



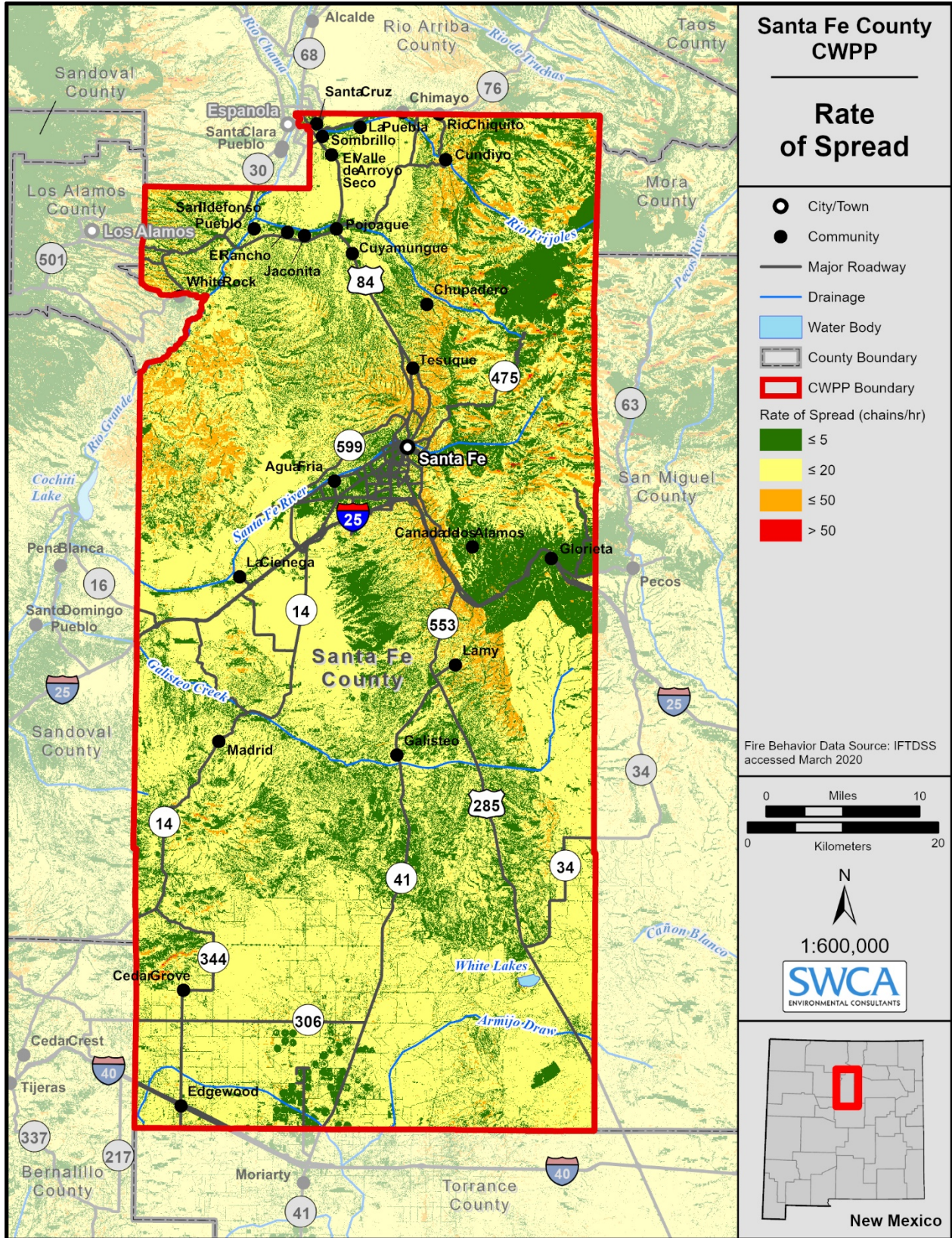
Map 1. Scott and Burgan 40 Fire Behavior Fuel Models.



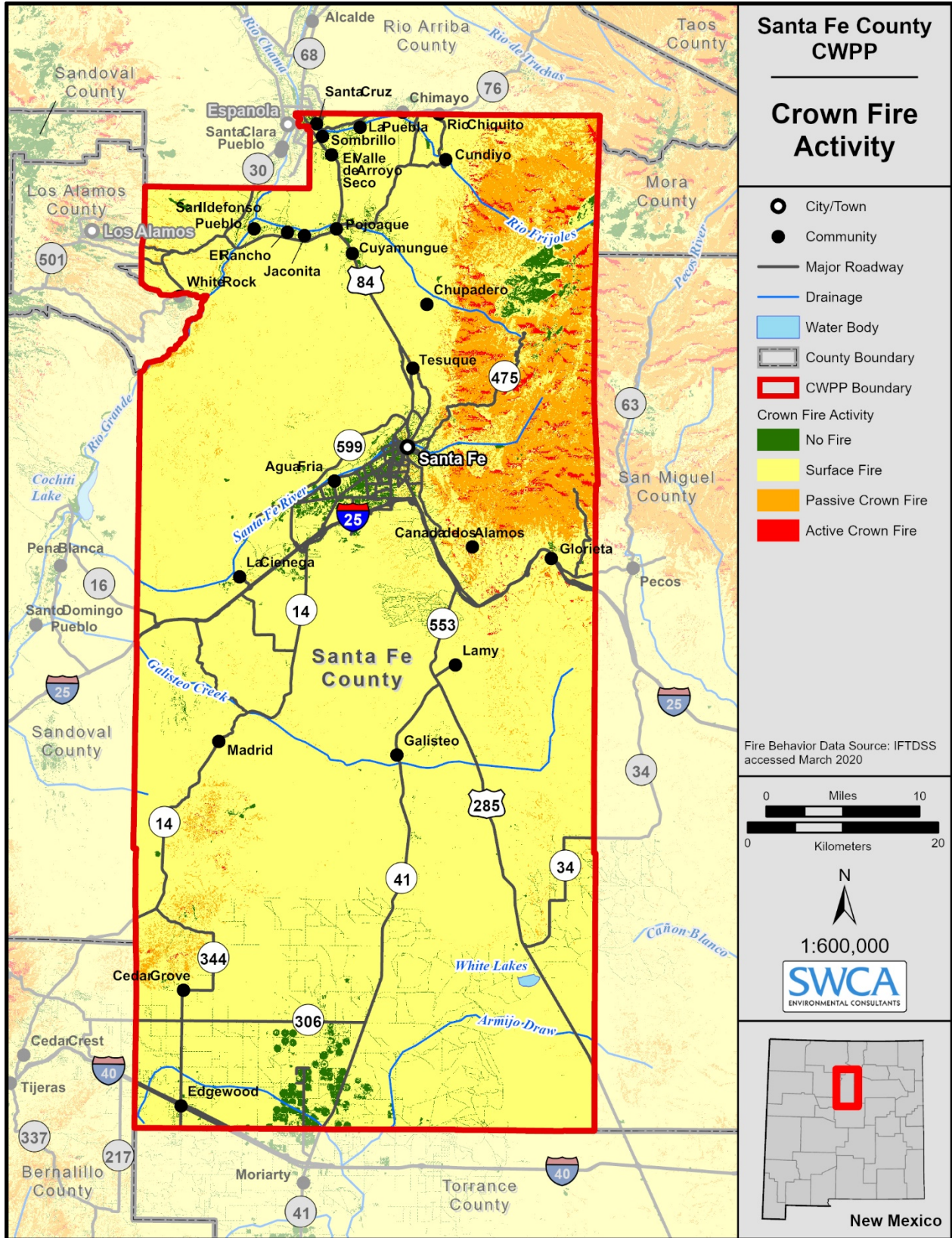
Map 2. Risk assessment inputs: flame length.



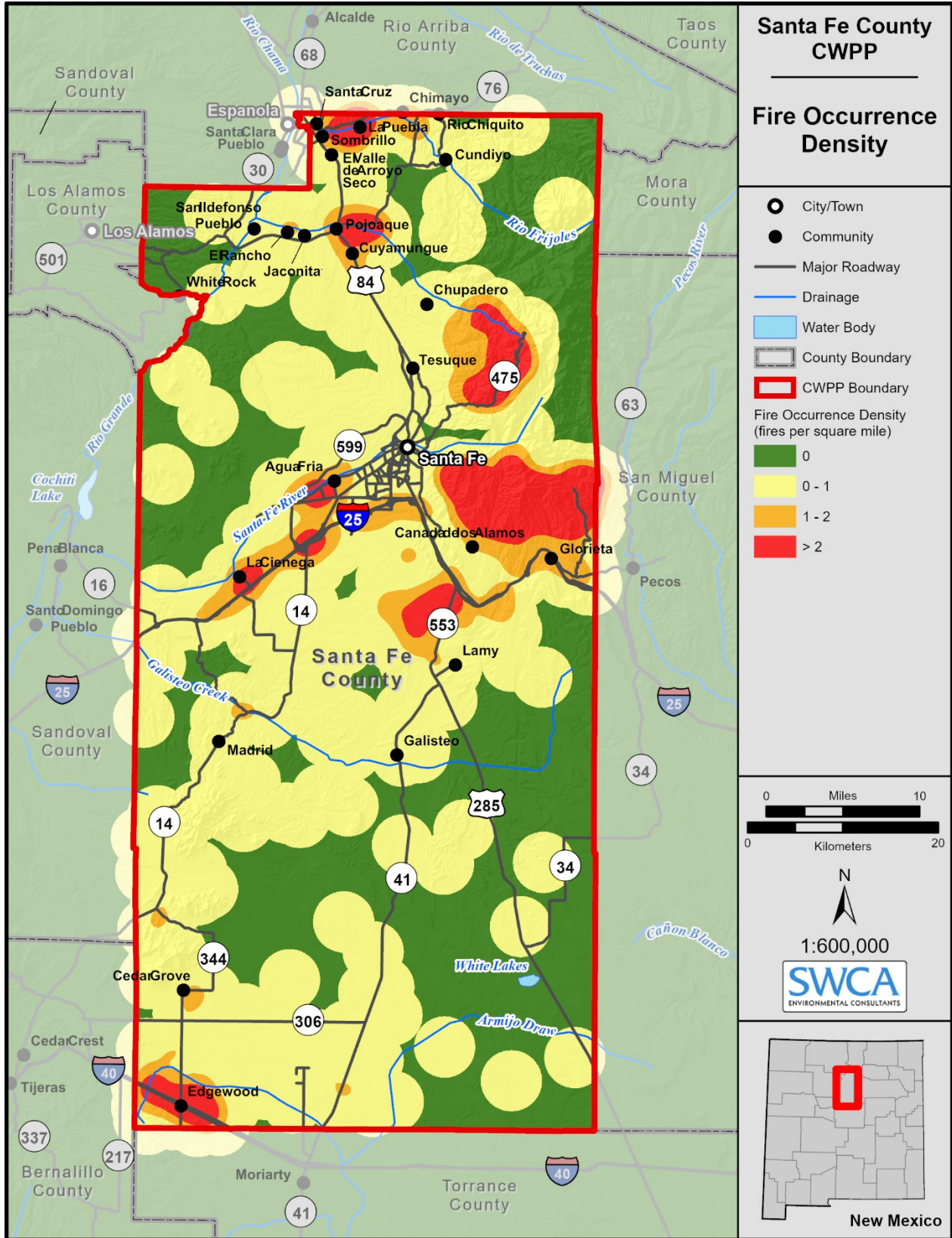
Map 3. Risk assessment inputs: fireline intensity.



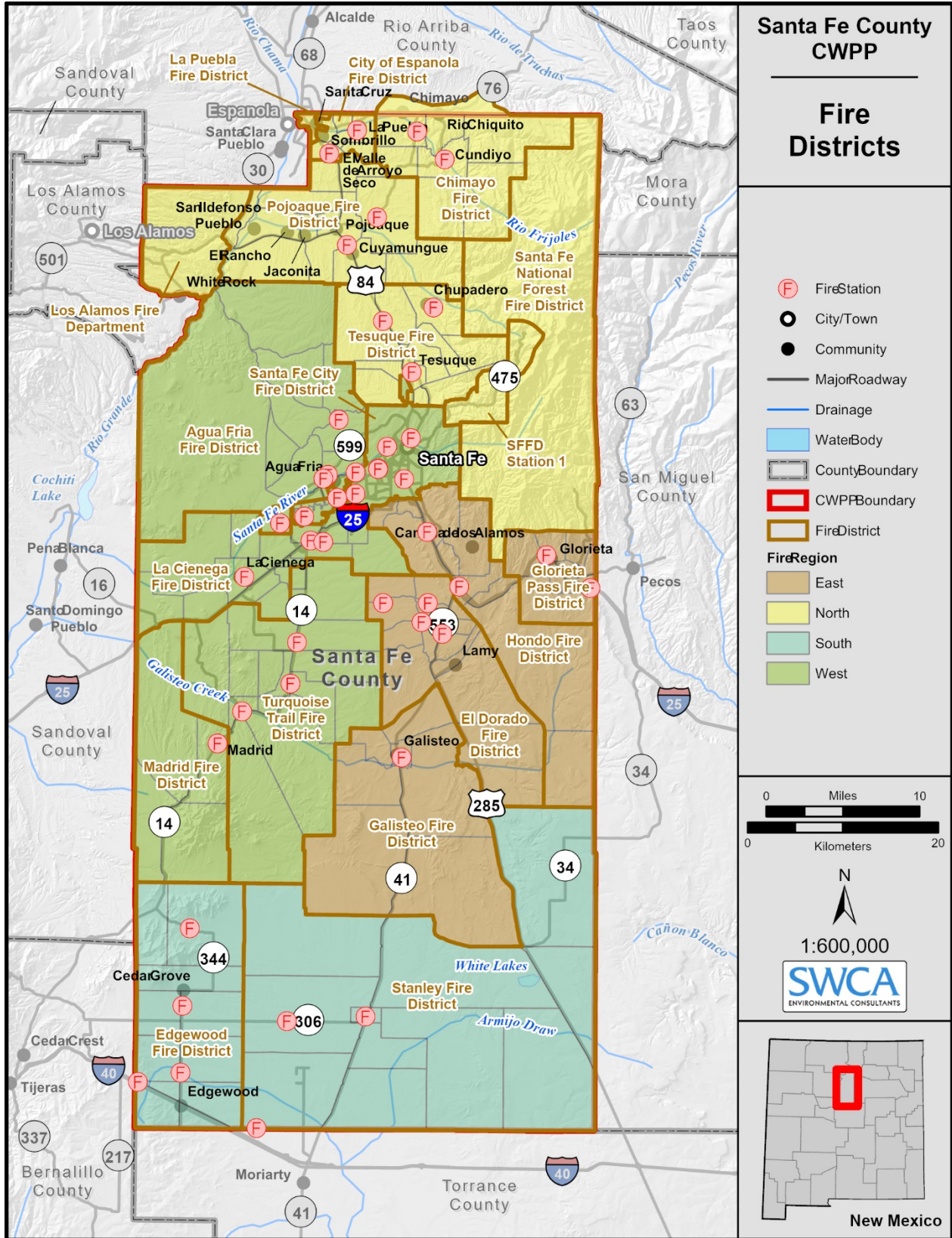
Map 4. Risk assessment inputs: rate of spread.



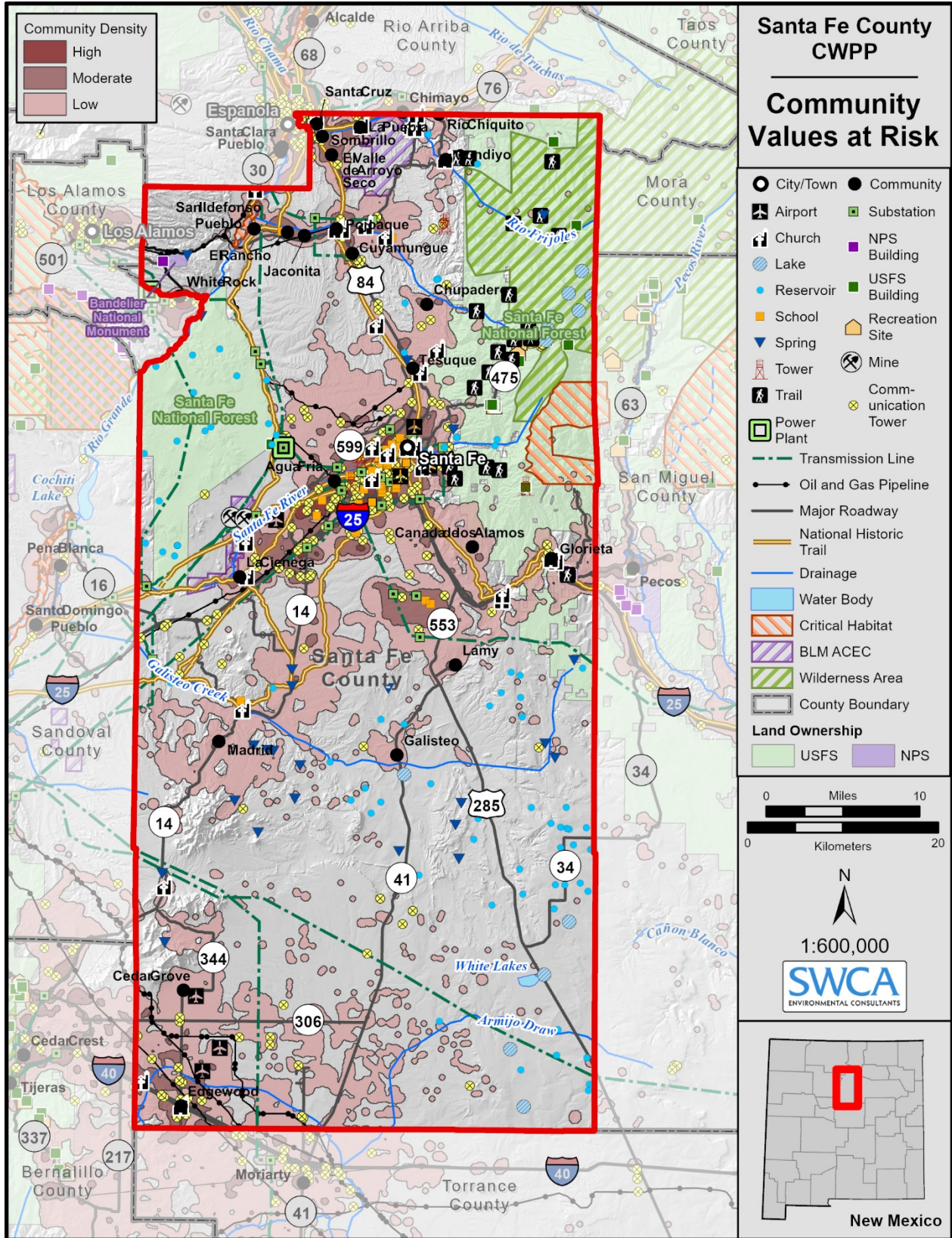
Map 5. Risk assessment inputs: Crown Fire activity.



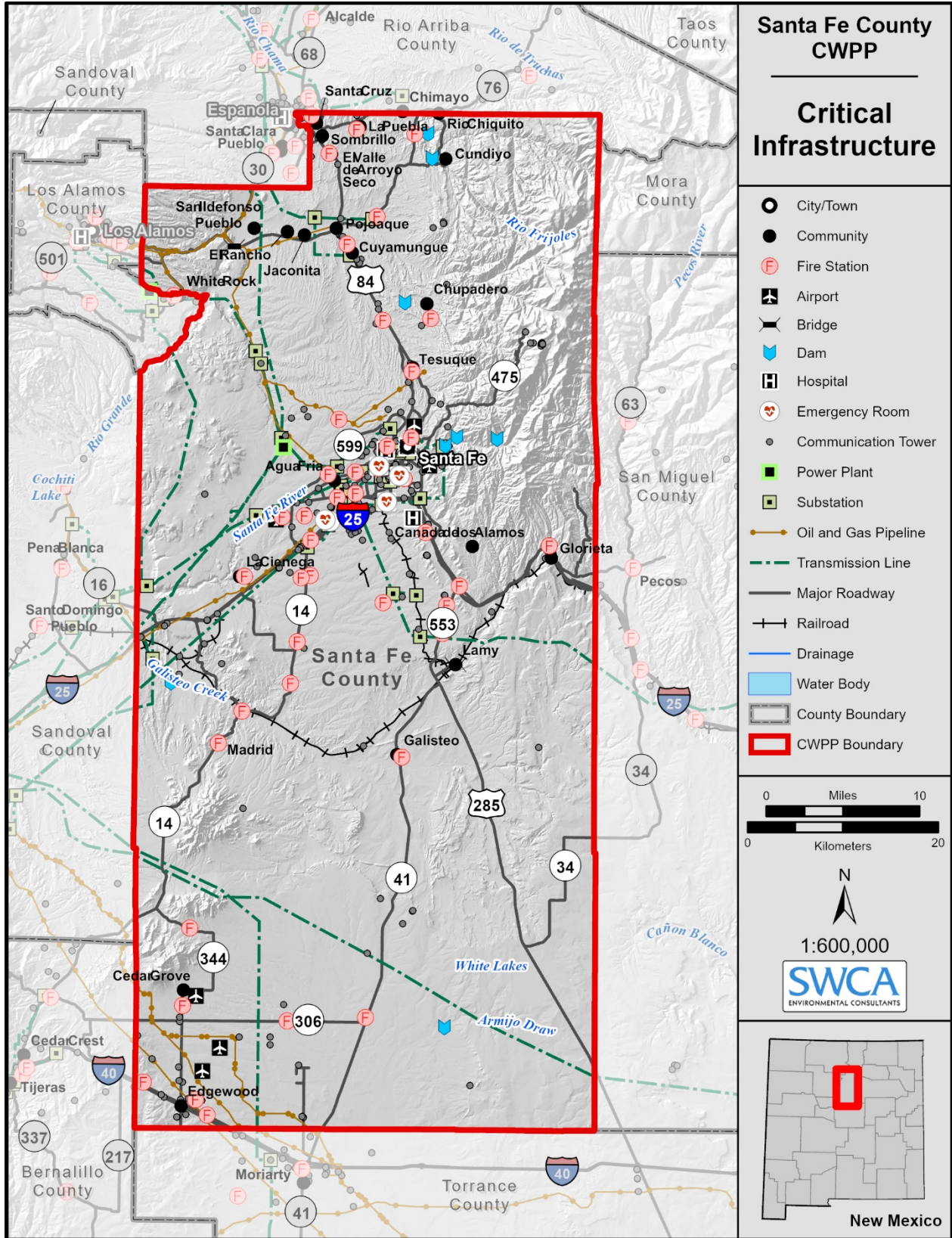
Map 6. Risk assessment inputs: fire occurrence density.



Map 7. Fire district boundaries.



Map 8. Community Values at Risk.



Map 9. Critical infrastructure.

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APPENDIX C:

Core Team List

SWCA

Name	Organization
Captain Michael Feulner	Santa Fe County Fire Department
Remington Gillum	Santa Fe County Fire Department
Captain Martin Vigil	Santa Fe County
Porfirio Chavarria	City of Santa Fe Fire Department
Carlos Saiz	City of Santa Fe Fire Department
Greg Gallegos	City of Santa Fe Fire Department
Dennis Carril	United States Forest Service
David Isackson	United States Forest Service
Teresa Rigby	Bureau of Land Management
Robert Brown	New Mexico State Forestry
Randy Baker	Bureau of Indian Affairs
Erik Litzenberg	Santa Fe County
Brenda Smythe	Edgewood Soil & Water Conservation District
Kelly Smith	Edgewood Soil & Water Conservation District
Todd Haines	New Mexico State Forestry
Victoria Amato	SWCA Environmental Consultants
Cody Stropki	SWCA Environmental Consultants
Anne Russell	SWCA Environmental Consultants
Arianna Porter	SWCA Environmental Consultants

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SWCA

APPENDIX D:

Community Descriptions and Hazard Ratings

SWCA

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SANTA FE COUNTY WILDLAND URBAN INTERFACE COMMUNITIES

La Puebla Fire District

Sombrillo and Cuarteles

LEGAL: Santa Cruz Land Grant

DESCRIPTIVE LOCATION: 2 miles east of Espanola

VEGETATION FUELS: bosque fuels

POPULATION: 1,107

NUMBER OF LOTS: 1,105

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: flat river bottom **SLOPE:**0-5% **ASPECT:**

ACCESS: Hwys 76 and 106 out of Espanola

ROADS: Hwy 76, Hwy 106, Sombrillo Road

BRIDGES: Bridge on HWY 88 that goes south out of Cuarteles

DRIVEWAYS: narrow and mostly unmarked

WATER AVAILABILITY: pressurized hydrants are in community

CLOSEST FIRE DEPARTMENT: (in miles): >1 mile to La Puebla Fire Station 1

VALUES AT RISK: Residential structures, churches, schools, commercial businesses

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$83,817,506.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 70- Medium



Figure D.1. Sombrillo residence, within some thick vegetation.



Figure D.2. Google Earth Imagery showing the road layout and residential density within the Sombrillo and Cuartelez communities.

Chimayo Fire District

Chimayo

LEGAL: Santa Cruz Land Grant

DESCRIPTIVE LOCATION: Located 30 miles north of Santa Fe off Hwy 76 east of Espanola

VEGETATION FUELS: Bosque fuels

POPULATION: 3,177

NUMBER OF LOTS: 717

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: flat to rolling hills **SLOPE:** 0-20% **ASPECT:** All

ACCESS: HWY 76 East from Espanola for 6 miles

ROADS: Highway 76, numerous side roads

BRIDGES: 4 bridges on RA 99, RA 97, RA 94, and Shadow Ln, with limit restrictions.

DRIVEWAYS: narrow and poorly marked with limited to no signage

WATER AVAILABILITY: Limited hydrants on main road through town (Hwy 76)

CLOSEST FIRE DEPARTMENT: (in miles): >1 miles from Chimayo Fire Station 1. The northern portion of the community falls in Rio Arriba County; however, Santa Fe County provide fire response.

VALUES AT RISK: Residential structures, commercial businesses, infrastructure, tourism, cultural heritage, historic structures, churches.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$30,852,603.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 69- Medium



Figure D.3. Google Earth Imagery showing the road layout and residential density in and around Chimayo.

Cundiyo

LEGAL: Section 17 T20N R10E

DESCRIPTIVE LOCATION: 30 miles north of Santa Fe

VEGETATION FUELS: piñon-juniper, bosque fuels, agricultural

POPULATION: 110

NUMBER OF LOTS: 140

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: Rolling hills **SLOPE:** 0-15% **ASPECT:**

ACCESS: 30 miles north of Santa Fe off Hwy 503. Roads narrow in places through town.

ROADS: Cundiyo Road, Highway 503

BRIDGES: One on SR 503

DRIVEWAYS: narrow and poorly marked

WATER AVAILABILITY: some pressurized hydrants in town

CLOSEST FIRE DEPARTMENT: (in miles): In Cundiyo, <1 mile located at #5 Jose Simon Drive

VALUES AT RISK: Santa Cruz Lake, agricultural lands, historic structures.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$7,508,405.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 62- Medium



Figure D.4. Google Earth road view, showing narrow road widths in the community.



Figure D.5. Google Earth Imagery showing the road layout and residential density within the Cundiyo community.

Tesuque Fire District

Tesuque Village

LEGAL: Section 25 T18N R09E- Tesuque Village.

DESCRIPTIVE LOCATION: Located 6 miles north of Santa Fe on the east side of HWY 285.

VEGETATION FUELS: Bosque fuels, piñon-juniper

POPULATION: 1,004

NUMBER OF LOTS: 748

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: flat **SLOPE:** 0-10% **ASPECT:**

ACCESS: HWY 285 North from Santa Fe

ROADS: HWY 285, Bishops Lodge Road, Tesuque Village Road

BRIDGES: none

DRIVEWAYS: Narrow and poorly marked, many areas with dense vegetation over driveway

WATER AVAILABILITY: limited hydrants in town, Tesuque Reservoir north of town

CLOSEST FIRE DEPARTMENT: (in miles): 0 miles to Tesuque Fire Station 1

VALUES AT RISK: Residential structures, commercial businesses, historic structures, watershed values.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$255,716,544.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 69- Medium



Figure D.6. There are a number of commercial businesses located within Tesuque Village.



Figure D.7. Google Earth Imagery showing the road layout and residential density within Tesuque Village.

Chupadero

LEGAL: Section 16 T18N R10E

DESCRIPTIVE LOCATION: 13 miles north of Santa Fe

VEGETATION FUELS: piñon-juniper, bosque fuels

POPULATION: 594

NUMBER OF LOTS: 650

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: river bottoms to slight slopes **SLOPE:** 0-20% **ASPECT:** S-SW

ACCESS: via Highway 84 and 592, both surfaced roads.

ROADS: Camino Chupadero, Hwy 592

BRIDGES: none

DRIVEWAYS: most homes situated off Camino Chupadero, narrow with limited space to turnaround

WATER AVAILABILITY: possibly draft from Rio En Medio

CLOSEST FIRE DEPARTMENT: (in miles): 0 miles to Tesuque Fire Station 2

VALUES AT RISK: Rio En Medio and Trail Head

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$153,324,797.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 70- Medium



Figure D.8. Google Earth Street View image, showing residences within the community of Chupadero.



Figure D.9. Google Earth Imagery showing the road layout and residential density within the Chupadero community.

Pacheco Canyon

LEGAL: Section 16 T18N R10E

DESCRIPTIVE LOCATION: Pacheco Canyon is located 13 miles north of Santa Fe

VEGETATION FUELS: piñon-juniper, ponderosa pine, mixed conifer, bosque fuels

POPULATION: 77

NUMBER OF LOTS: 143

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: rugged **SLOPE:** 0-40% **ASPECT:** N-NE

ACCESS: Pacheco Canyon Road

ROADS: Pacheco Canyon Road, Vista del Canon

BRIDGES: none

DRIVEWAYS: off Pacheco Canyon Road, some with gates

WATER AVAILABILITY: canyon bottom may have water that can be drafted

CLOSEST FIRE DEPARTMENT: (in miles): 3 miles from Tesuque Fire Station 2

VALUES AT RISK: residential structures (sparse), watershed values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$25,921,740.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 95- High



Figure D.10. Mixed fuel types within Pacheco Canyon, note the riparian habitat at the bottom of the canyon with densely vegetated slopes above.



Figure D.11. Google Earth Imagery showing the road layout and residential density along Pacheco Canyon Road.

Tano Road

LEGAL: Section 02 T17N R09E

DESCRIPTIVE LOCATION: Located off HWY 599 just north of Santa Fe

VEGETATION FUELS: piñon-juniper

POPULATION: 786

NUMBER OF LOTS: 1676

CONSTRUCTION MATERIALS: wood frame and stucco

ROOF: flat and metal

TERRAIN: rolling hills, variable slopes, steep grades in places **SLOPE:**5-40% **ASPECT:** S-SE

ACCESS: Accessed via Highway 599. Surfaced roads

ROADS: Tano Road

BRIDGES: none

DRIVEWAYS: most off Tano Road and side streets, large gated driveways are common. Many have turnarounds

WATER AVAILABILITY: limited

CLOSEST FIRE DEPARTMENT: (in miles): 4 miles from Tesuque Fire Station 1

VALUES AT RISK: Residential structures, watershed values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$243,126,387.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 96- High



Figure D.12. Homes off Tano Road mixed into the heavy fuels.



Figure D.13. Google Earth Imagery showing the road layout and residential density along Tano Road.

Santa Fe City Fire District

Hyde Park

LEGAL: Section 09 T17N R10E

DESCRIPTIVE LOCATION: North from Santa Fe on Hyde Park Road towards the Santa Fe Ski area

VEGETATION FUELS: piñon-juniper (open and closed canopy), ponderosa pine, mixed conifer

POPULATION: 253

NUMBER OF LOTS: 205

CONSTRUCTION MATERIALS: wood framed and stucco, mostly high-end houses

ROOF: varies from flat to metal pitched to composite

TERRAIN: Rolling hills, foothills of the Mtns, narrow drainages **SLOPE:**10-60% **ASPECT:**
predominantly west facing slopes

ACCESS: Hyde Park Road

ROADS: Hyde Park Road is paved and in good shape the side roads are mostly paved and non-surface roads that are in good shape. Some areas have limited access, but over decent

BRIDGES: NA

DRIVEWAYS: Most driveways are well marked and a mix of paved and non-surfaced. Lots of driveways are gated.

WATER AVAILABILITY: Hydrants are available in neighborhoods

CLOSEST FIRE DEPARTMENT: (in miles): 2 miles from the City of Santa Fe Station 1

VALUES AT RISK: Residential structures, watershed values, commercial business, schools.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$67,254,874.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 103- High

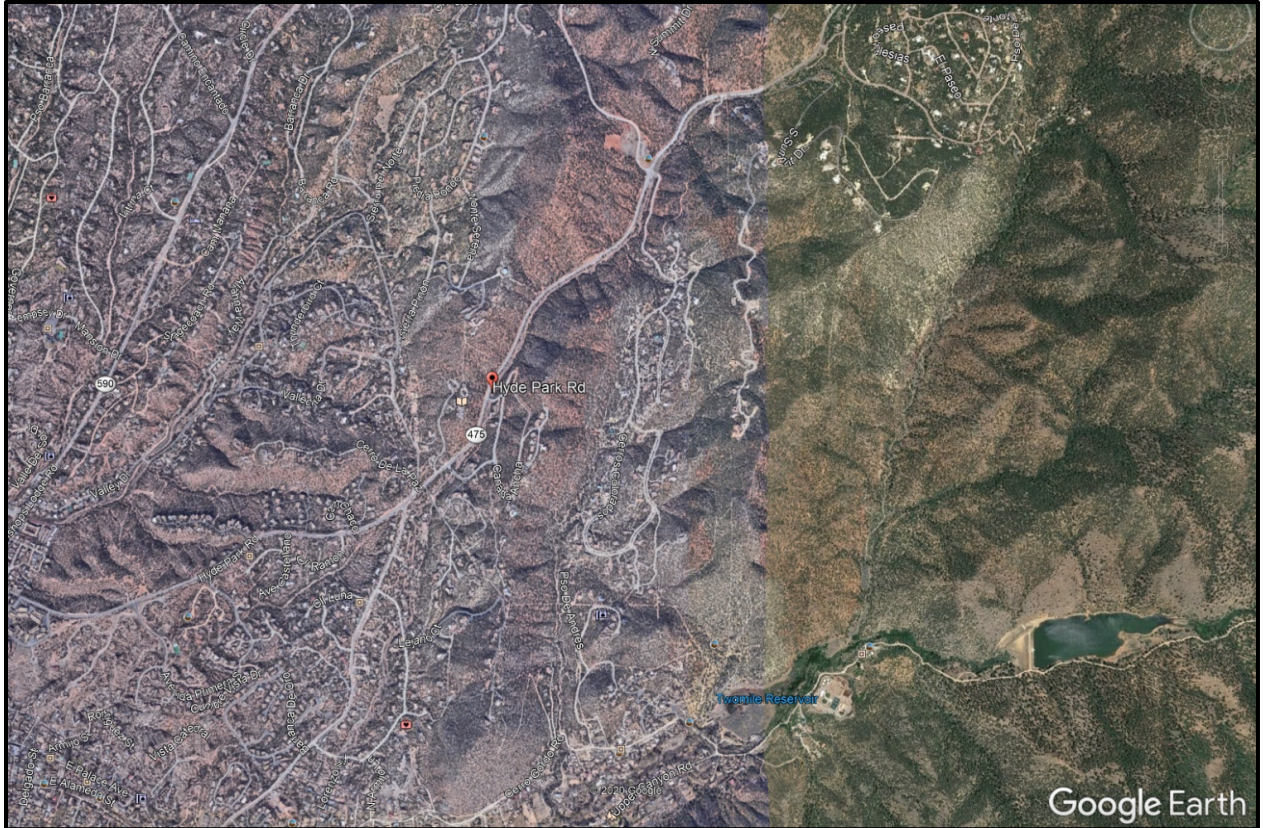


Figure D.16. Google Earth Imagery showing the road layout and residential density within the Hyde Park community.

Bishop's Lodge

LEGAL: Section 05 T17N R10E

DESCRIPTIVE LOCATION:

VEGETATION FUELS: piñon-juniper

POPULATION: 176

NUMBER OF LOTS: 805

CONSTRUCTION MATERIALS: varies, but mostly high-end homes

ROOF: varies

TERRAIN: Rolling hills **SLOPE:**5-30% **ASPECT:** W-SW

ACCESS: North on Bishops Lodge Rd. from the Santa Fe Plaza

ROADS: Bishops Lodge Rd,

BRIDGES: None

DRIVEWAYS: Most off Bishops Lodge Rd, mostly paved, lots of gates

WATER AVAILABILITY: There are hydrants near Bishops Lodge, but not common along main road

CLOSEST FIRE DEPARTMENT: (in miles): 3 miles from City of Santa Fe Station 1

VALUES AT RISK: Residential structures, historic structures, commercial businesses, watershed values.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$119,081,136.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 96- High



Figure D.17. Bishops Lodge community



Figure D.18. Google Earth Imagery showing the road layout and residential density within the Bishops Lodge community.

Agua Fria Fire District

Agua Fria Village

LEGAL: Section 31 T17N R09E

DESCRIPTIVE LOCATION: West side of Santa Fe, located within County.

VEGETATION FUELS: piñon-juniper, grass, urban vegetation

POPULATION:

NUMBER OF LOTS:

CONSTRUCTION MATERIALS: wood framed and stucco

ROOF: flat and metal

TERRAIN: flat to rolling **SLOPE:**0-10% **ASPECT:** all

ACCESS: Good, surfaced streets, multiple routes

ROADS: Highway 599, Agua Fria Road. **BRIDGES:** none

DRIVEWAYS: Short, some with turnarounds

WATER AVAILABILITY: Hydrants available.

CLOSEST FIRE DEPARTMENT: (in miles): Agua Fria Fire and Rescue is in the community

VALUES AT RISK: Residential structures, commercial properties, historic properties

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 39- Low



Figure D.19. Google Earth Imagery showing the road layout and residential density in and around Agua Fria community.

La Tierra

LEGAL: Section 01 T17N R08E

DESCRIPTIVE LOCATION: HWY 599 and Camino La Tierra and head west

VEGETATION FUELS: piñon-juniper

POPULATION: 1,079

NUMBER OF LOTS: 337

CONSTRUCTION MATERIALS: wood framed and stucco

ROOF: flat and metal

TERRAIN: rolling hills **SLOPE:**5-35% **ASPECT:** W-SW

ACCESS: Camino La Tierra Road to Headquarters Trail

ROADS: Camino La Tierra Road, Headquarters Trail

BRIDGES: none

DRIVEWAYS: private community

WATER AVAILABILITY: Limited, but hydrants are available off Camino La Tierra Road

CLOSEST FIRE DEPARTMENT: (in miles): >2 miles from Agua Fria Fire Station 2

VALUES AT RISK: Residential structures, watershed values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$359,704,928.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 68- Medium



Figure D.20. Google Earth Imagery showing the road layout and residential density in and around the La Tierra Subdivision.

Las Campanas

LEGAL: Section 11 T17N R08E

DESCRIPTIVE LOCATION: South west of Santa Fe off Hwy 599

VEGETATION FUELS: piñon-juniper

POPULATION: 2,230

NUMBER OF LOTS: 1558

CONSTRUCTION MATERIALS: Wood framed and Stucco

ROOF: Flat and metal

TERRAIN: rolling hills **SLOPE:**0-20% **ASPECT:**

ACCESS: Hwy 599 to Camino La Tierra to Los Campanas Drive

ROADS: Los Campanas Drive and numerous side streets

BRIDGES: none

DRIVEWAYS: large paved driveways

WATER AVAILABILITY: Pressurized hydrants within community

CLOSEST FIRE DEPARTMENT: (in miles): >2 miles from Agua Fria Fire Station 2

VALUES AT RISK: Residential structures, recreational areas, infrastructure, golf course.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$995,007,386.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 38- Low

La Cienega Fire District

La Cienega

LEGAL: Section 06 T15N R08E

DESCRIPTIVE LOCATION: South of Santa Fe off I-25 along the Santa Fe River

VEGETATION FUELS: Bosque fuels

POPULATION: 1,034

NUMBER OF LOTS: 960

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: river bottom to moderate slopes **SLOPE:**0-25% **ASPECT:** S-SW

ACCESS: I-25 South from Santa Fe to La Cienega exit and head west

ROADS: Entrada La Cienega, Camino Capilla Vieja, Camino San Jose

BRIDGES: Bridge crosses over Santa Fe River on Entrada La Cienega

DRIVEWAYS: Narrow and unmarked, some are rugged and lots have dense vegetation

WATER AVAILABILITY: Hydrants available throughout town, some are pressurized

CLOSEST FIRE DEPARTMENT: (in miles): 0 miles to La Cienega Fire Station 1

VALUES AT RISK: Residential structures, infrastructure, Bosque vegetation, historic structures

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$101,217,689.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 70- Medium



Figure D.22. Crossing over the Santa Fe River showing the dense riparian vegetation mixed with homes.

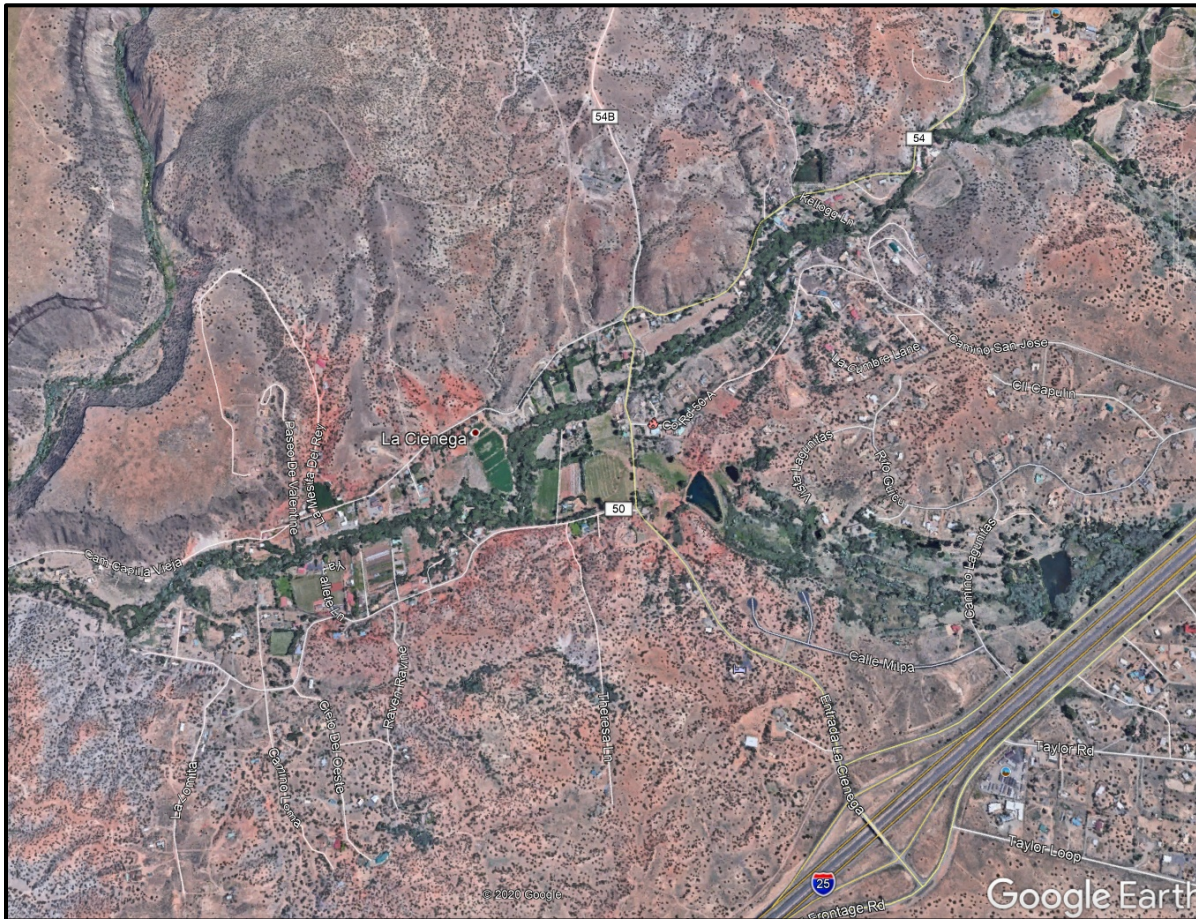


Figure D.23. Google Earth Imagery showing the road layout and residential density in and around La Cienega.

Los Pinos

LEGAL: Section 06 T15N R08E

DESCRIPTIVE LOCATION: South of Santa Fe off I-25 along the Santa Fe River

VEGETATION FUELS: Bosque fuels

POPULATION: 576

NUMBER OF LOTS: 582

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: river bottom to moderate slopes **SLOPE:**0-25% **ASPECT:** S-SW

ACCESS: I-25 South from Santa Fe to the 599 exit and head southwest

ROADS: Los Pinos Rd, Las Estrellas

BRIDGES: several throughout community

DRIVEWAYS: Narrow and unmarked, some are rugged and lots have dense vegetation

WATER AVAILABILITY: Hydrants available throughout town, some are pressurized

CLOSEST FIRE DEPARTMENT: (in miles): 2-3 miles to La Cienega Fire Station 1

VALUES AT RISK: Residential structures, infrastructure, commercial businesses, bosque vegetation, natural areas, Santa Fe Downs, historic structures

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$43,055,698.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 70- Medium



Figure D.24. Google Earth Imagery showing the road layout and residential density in and around the Los Pinos community.

Glorieta Pass Fire District

Glorieta (including Glorieta Estates and Glorieta Mesa)

LEGAL: Section 21 T16N R11E (incorporates Glorieta, Glorieta Mesa and Glorieta Estates).

DESCRIPTIVE LOCATION: Located in the foothills of the Sangre de Cristo Mtns off I-25 south east of Santa Fe. Some homes back to USFS lands.

VEGETATION FUELS: piñon-juniper, ponderosa pine. Limited defensible space around some homes. Some continuous fuels adjacent to homes.

POPULATION: 203

NUMBER OF LOTS: 757

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: steep slopes to flat lands **SLOPE:** 0-40% **ASPECT:**

ACCESS: Glorieta is located 20 miles from Santa Fe, heading north on I-25

ROADS: Main roads are paved and well-marked within Glorieta, but road quality declines further from urban areas. Roads around Glorieta Estates and Glorieta Mesa are unsurfaced and narrow in places, with limited space to allow access by emergency equipment. Fuels are immediately adjacent to the road along sections of Avenida Ponderosa and other side roads.

BRIDGES: NA

DRIVEWAYS: Most are narrow and vary from paved to gravel. Limited signage makes it hard to know where certain addresses are located

WATER AVAILABILITY: Pressurized hydrants are available throughout Glorieta (on the north side of Interstate 25). Hydrant availability is limited in Glorieta Estates and Glorieta Mesa.

CLOSEST FIRE DEPARTMENT: (in miles): 1 mile from Glorieta Pass Fire Station 1

VALUES AT RISK: Residential structures, historic properties, commercial business, churches, watershed values, USFS lands

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$15,477,991.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 95- High



Figure D.25. The Glorieta Post Office is a community value at risk that is located adjacent to train tracks in Glorieta.

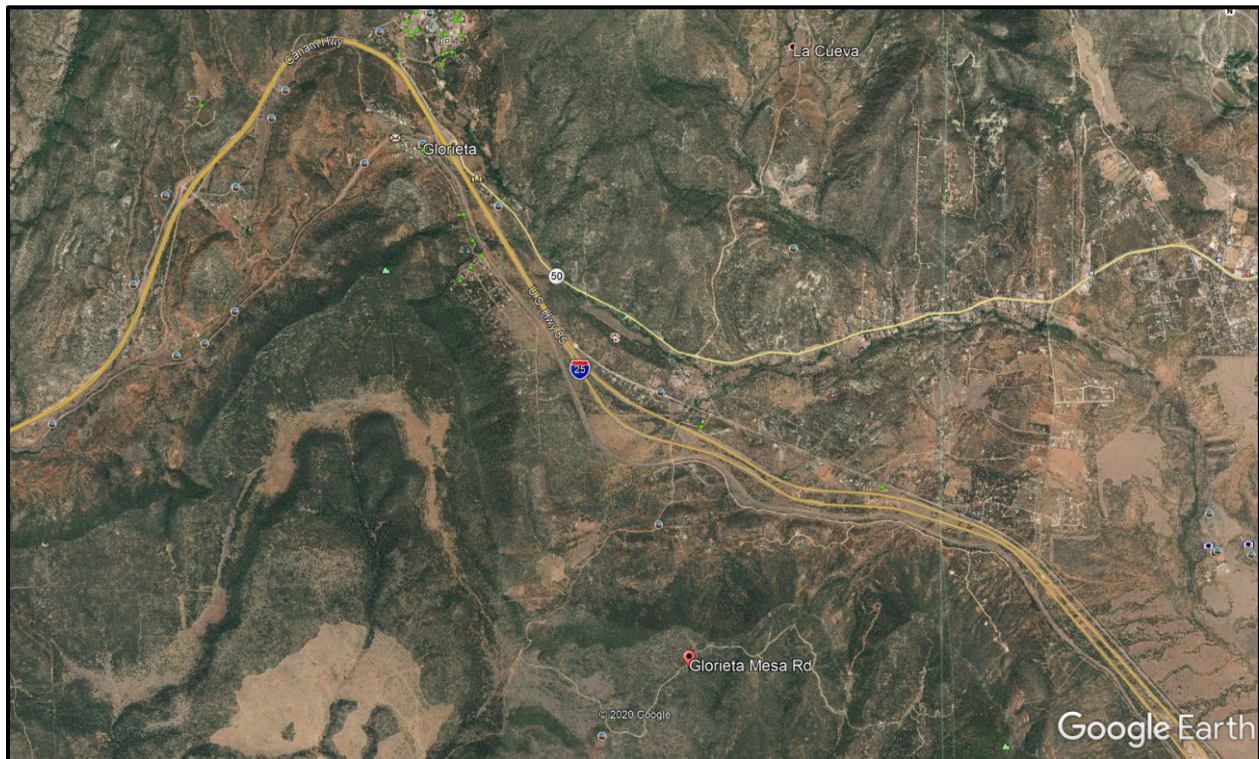


Figure D.26. Google Earth Imagery showing the road layout and residential density within the Glorieta community.

La Cueva Canyon

LEGAL: Section 25 T16N R11E

DESCRIPTIVE LOCATION: North of Hwy 50 out of Glorieta to La Cueva Canyon Rd

VEGETATION FUELS: grasslands, piñon-juniper, ponderosa pine, and mixed conifer

POPULATION: 253

NUMBER OF LOTS: 70

CONSTRUCTION MATERIALS: varies from trailers to wood framed stucco houses

ROOF: varies

TERRAIN: flat meadows to steep slopes **SLOPE:**0-45% **ASPECT:**

ACCESS: Hwy 50 to La Cueva Canyon Rd

ROADS: La Cueva Canyon Rd, La Cueva Rd (63A)

BRIDGES: NA

DRIVEWAYS: off La Cueva Rd, narrow, windy and many are unmarked

WATER AVAILABILITY: limited

CLOSEST FIRE DEPARTMENT: (in miles): 5 miles to Glorieta Pass Fire Station 1

VALUES AT RISK: Residential structures, commercial businesses, watershed values.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$20,897,995.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 112- High



Figure D.27. Narrow unmarked driveways and side roads are common on La Cueva Canyon Road.

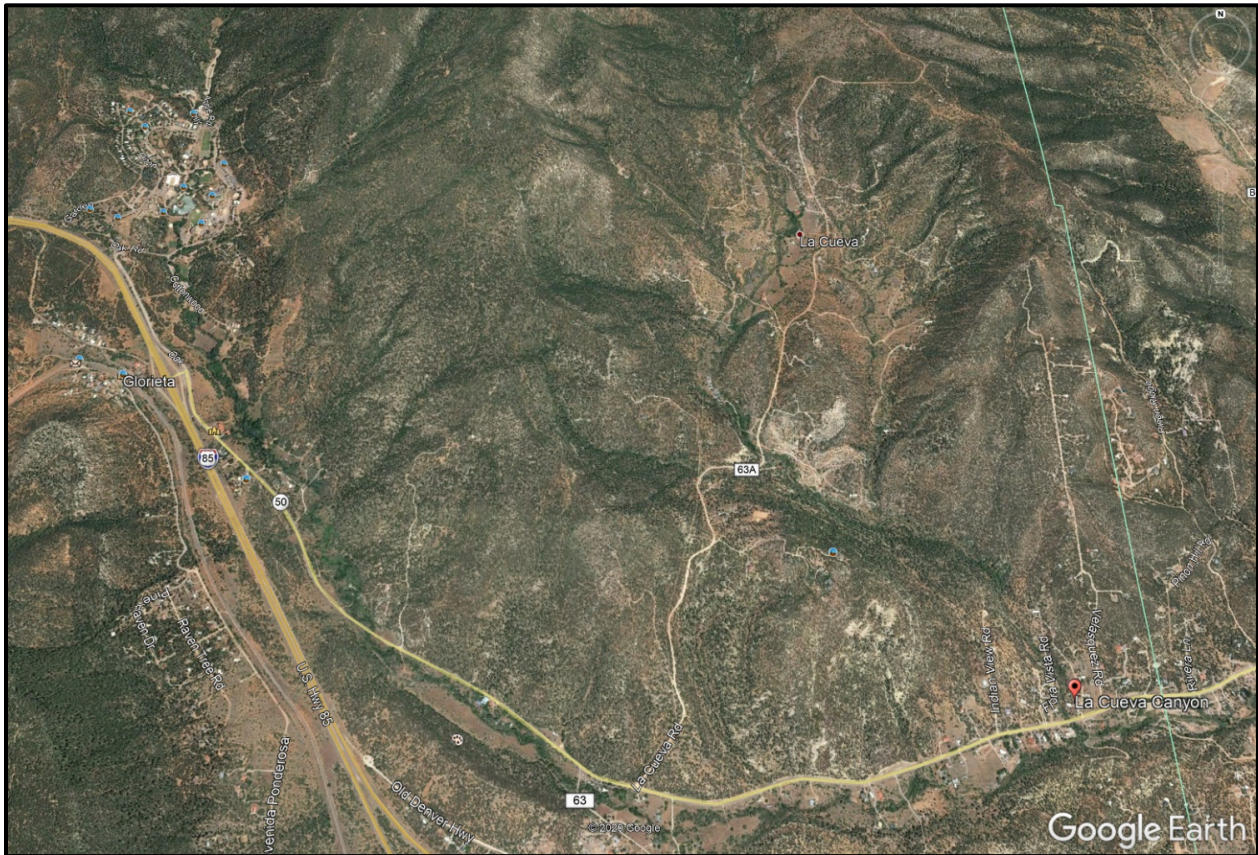


Figure D.28. Google Earth Imagery showing the road layout and residential density within the La Cueva community.

La Jolla

LEGAL: Section 02 T15N R11E

DESCRIPTIVE LOCATION: South on La Jolla Road from HWY 50 north of Glorieta

VEGETATION FUELS: grasslands, piñon-juniper

POPULATION: 276

NUMBER OF LOTS: 80

CONSTRUCTION MATERIALS: varies

ROOF: mostly metal roofs

TERRAIN: Flat **SLOPE:** 0-5% **ASPECT:** S-SE

ACCESS: La Jolla Road

ROADS: La Jolla Road, Old Denver Highway, lower La Jolla Road

BRIDGES: none

DRIVEWAYS: most off La Jolla Road and narrow

WATER AVAILABILITY: limited

CLOSEST FIRE DEPARTMENT: (in miles): 1 mile from Glorieta Pass Fire Station 2

VALUES AT RISK: Residential structures, watershed values.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$19,542,402.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 92- High

Hondo Fire District

La Barbaria

LEGAL: Section 17 T16N R10E

DESCRIPTIVE LOCATION: 7 miles north of Santa Fe on Old Santa Fe Trail

VEGETATION FUELS: piñon-juniper, ponderosa pine, grass/litter understory.

POPULATION: 608

NUMBER OF LOTS: 100

CONSTRUCTION MATERIALS: mostly wood framed houses with stucco

ROOF: flat, metal, and composition

TERRAIN: Steep Slopes, narrow canyon **SLOPE:** >40% **ASPECT:** All

ACCESS: main road access goes from pavement to dirt and narrows as you go in further, one way in and out. Side roads are narrow with minimal areas to turn around. Entrapment potential on driveways and roads leading to mid-upper slope structure locations.

ROADS: Multiple side roads off La Barbaria

BRIDGES: There is a stream that flows down the canyon

DRIVEWAYS: Narrow, some paved, most gravel or dirt

WATER AVAILABILITY: limited, water can be in the creek seasonally, also seems to be a large impoundment near the end of the road

CLOSEST FIRE DEPARTMENT: (in miles): 2 miles from Honda Station 1

VALUES AT RISK: Residential structures, watershed values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$126,594,927.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 110- High.



Figure D.14. Steep slopes and limited defensible space along La Barbara Road. Note the houses in the heavy fuels on steep slopes.

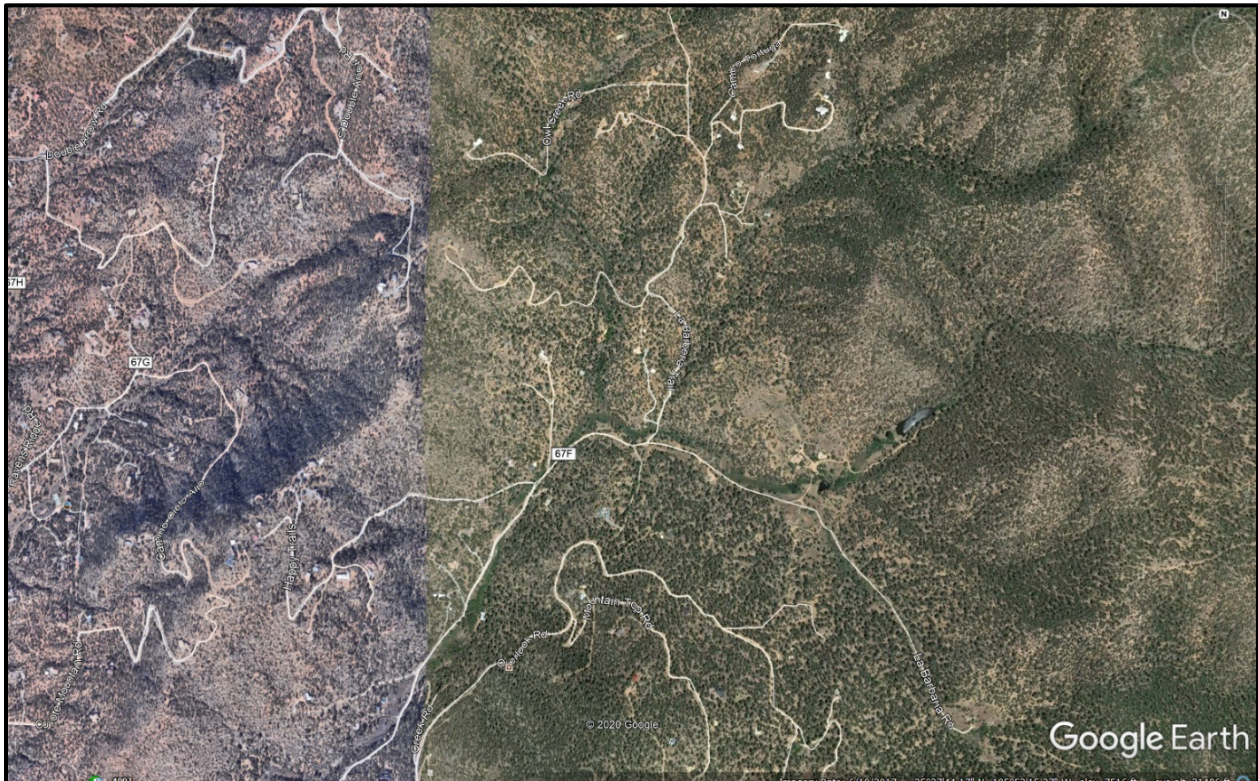


Figure D.15. Google Earth Imagery showing the road layout and residential density within the La Barbara community.

Ojo de la Vaca

LEGAL: Bishop John Lamy Grant

DESCRIPTIVE LOCATION: Accessed off old Las Vegas Hwy just 1 mile south of Canoncito

VEGETATION FUELS: piñon-juniper (open and closed canopy), ponderosa pine, grass and shrubs in canyon bottoms. Beetle kill prominent.

POPULATION: 157

NUMBER OF LOTS: 287

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: Steep Slopes, river bottom **SLOPE:**0-40%+ **ASPECT:** E-NE

ACCESS: Accessed off old Las Vegas Hwy just south of Canoncito

ROADS: Ojo de la Vaca is a narrow paved road with steep slopes and hairpin turns

BRIDGES: low water crossing and bridge in fair condition

DRIVEWAYS: Appear to be narrow, but lots of driveways have gates

WATER AVAILABILITY: possible water in Galisteo Creek

CLOSEST FIRE DEPARTMENT: (in miles): ~4 miles to Hondo District Station 2

VALUES AT RISK: Residential structures, infrastructure, watershed values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$15,367,041.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 99- High



Figure D.31. Homes in the Ojo de la Vaca community.



Figure D.32. Google Earth Imagery showing the road layout and residential density within the Ojo de la Vaca community.

Apache Ridge

LEGAL: Section 0 T15N R10E

DESCRIPTIVE LOCATION: Located near the junction of 285 and old Las Vegas Highway

VEGETATION FUELS: piñon-juniper, ponderosa pine and Gambel oak on woodland upper slopes. Beetle kill in areas. Some defensible space actions visible.

POPULATION: 367

NUMBER OF LOTS: 439

CONSTRUCTION MATERIALS: Varies, single-wide trailers to large single-family homes

ROOF: flat, metal, composite

TERRAIN: some steep slopes **SLOPE:**15-40+% **ASPECT:** SW-SE

ACCESS: 12 miles north of Santa Fe on Old Las Vegas Trail

ROADS: Apache Ridge road is well maintained; however, the side roads are in really poor condition and are very narrow and steep in places with limited turnaround space

BRIDGES: N/A

DRIVEWAYS: very narrow and some are in poor shape, limited room for emergency vehicles to turnaround

WATER AVAILABILITY: Limited, no hydrants in the area

CLOSEST FIRE DEPARTMENT: (in miles): >1 mile from Hondo Station 2

VALUES AT RISK: Residential structures, watershed values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$49,767,851.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 114- High



Figure D.33. Narrow roads, dense vegetation, and limited defensible space is common along Apache Ridge Road.

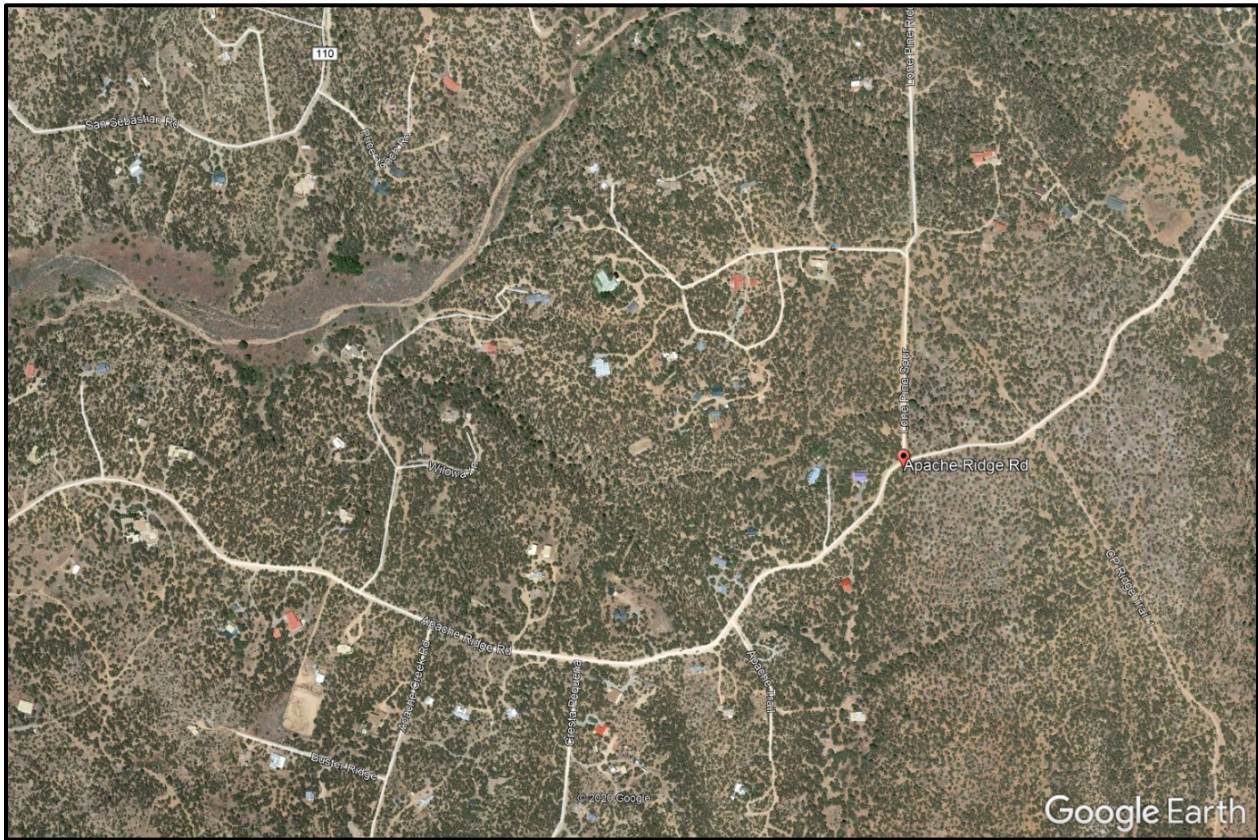


Figure D.34. Google Earth Imagery showing the road layout and residential density within the Apache Ridge Road community.

Canada de los Alamos

LEGAL: Section 27 T16N R10E

DESCRIPTIVE LOCATION: nine miles east of town on Old Santa Fe Trail

VEGETATION FUELS: piñon-juniper

POPULATION: 384

NUMBER OF LOTS: 256

CONSTRUCTION MATERIALS: varies

ROOF: metal and composite

TERRAIN: Rolling hills **SLOPE:**0-30% **ASPECT:** South

ACCESS: Old Santa Fe Trail to Canada Village Road

ROADS: Old Santa Fe Trail, Canada Village Road, Herencia De Prada, Ortiz Road

BRIDGES: none

DRIVEWAYS: Narrow and largely unmarked

WATER AVAILABILITY: none

CLOSEST FIRE DEPARTMENT: (in miles): 4.5 miles to Hondo Station 1

VALUES AT RISK: Residential structures, churches, historic structures, watershed values.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$37,141,230.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 96- High



Figure D.35. Homes mixed into the pinon-juniper are common throughout Canada de los Alamos.



Figure D.36. Google Earth Imagery showing the road layout and residential density within the Canada de los Alamos community.

Canoncito

LEGAL: Section 12 T15N R10E

DESCRIPTIVE LOCATION: Located off Old Las Vegas Hwy and I-25 north of Santa Fe

VEGETATION FUELS: piñon-juniper

POPULATION: 264

NUMBER OF LOTS: 250

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: Steep slopes **SLOPE:**5-40% **ASPECT:** E-NE

ACCESS: Canoncito exit off of I-25

ROADS: Old Las Vegas HWY

BRIDGES: none

DRIVEWAYS: narrow and steep with poor markings; some rough

WATER AVAILABILITY: limited

CLOSEST FIRE DEPARTMENT: (in miles): 3 miles from Hondo Station 2

VALUES AT RISK: Residential structures, watershed values, churches, historic structures, campsites, trails.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$24,866,959.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 90- High



Figure D.37. Nuestra Señora de Luz Church located in Canoncito.



Figure D.38. Google Earth Imagery showing the road layout and residential density within the Canoncito community.

Old Santa Fe Trail

LEGAL: Section 21 T16N R10E

DESCRIPTIVE LOCATION: Old Santa Fe Trail heads north out of Santa Fe and parallels I-25

VEGETATION FUELS: piñon-juniper

POPULATION: 108

NUMBER OF LOTS: 822

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: Rugged and Steep **SLOPE:**15-65% **ASPECT:** S-SW-SE

ACCESS: Old Santa Fe Trail from Santa Fe North

ROADS: Old Santa Fe Trail, numerous side streets

BRIDGES: none

DRIVEWAYS: off Santa Fe Trail and side streets, poorly marked, narrow, rugged, and steep

WATER AVAILABILITY: Some hydrants

CLOSEST FIRE DEPARTMENT: (in miles): >1 mile from Hondo Station 1

VALUES AT RISK: Trail network, historic structures, residential structures, watershed values, churches.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$17,833,305.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 93- High



Figure D.39. Homes off Old Santa Fe Trail with minimal setbacks and poor defensible space.

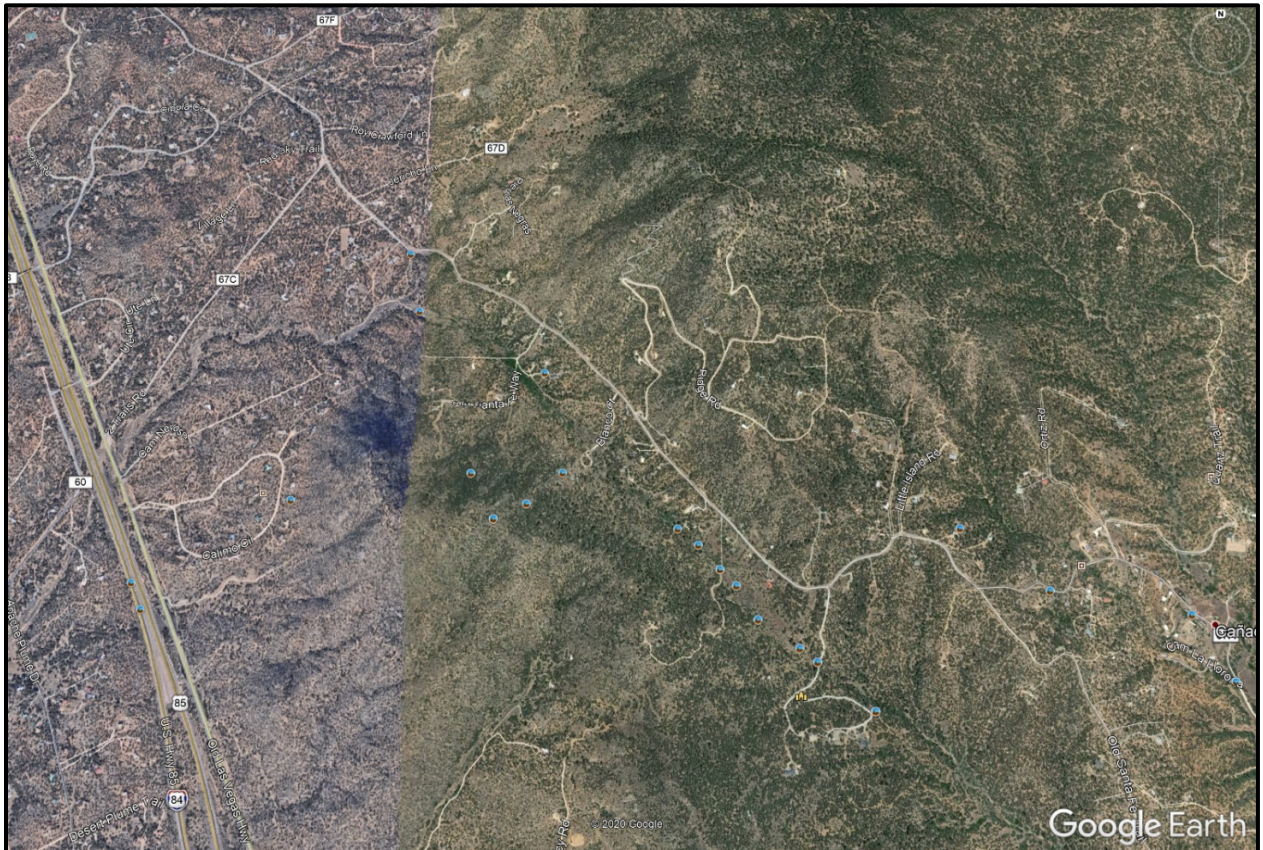


Figure D.40. Google Earth Imagery showing the road layout and residential density around the Old Santa Fe Trail.

Arroyo Hondo

LEGAL: Sebastian De Vargas Grant

DESCRIPTIVE LOCATION: South of I-25

VEGETATION FUELS: piñon-juniper

POPULATION: 651

NUMBER OF LOTS: 205

CONSTRUCTION MATERIALS: most wood framed and stucco

ROOF: flat and metal

TERRAIN: rolling hills **SLOPE:**5-50% **ASPECT:** varies

ACCESS: Old Las Vegas Highway North out of Santa Fe to Arroyo Hondo Road

ROADS: Arroyo Hondo, La Ventana Drive, Seton Village Road

BRIDGES: rail bridges

DRIVEWAYS: most are off side streets, some narrow, but mostly marked (nonreflective)

WATER AVAILABILITY: Limited Hydrants are in the area

CLOSEST FIRE DEPARTMENT: (in miles): 0 miles to Hondo Fire Station 1

VALUES AT RISK: Residential structures, commercial businesses, churches, post office, historical structures, infrastructure

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$160,819,273.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 63- Medium



Figure D.41. homes and rail infrastructure in the Arroyo Hondo area.



Figure D.42. Google Earth Imagery showing the road layout and residential density in the Arroyo Hondo community.

El Dorado Fire District

Lamy

LEGAL: Bishop John Lamy Grant

DESCRIPTIVE LOCATION: 20 miles south of Santa Fe off Highway 285

VEGETATION FUELS: grasslands, piñon-juniper

POPULATION: 147

NUMBER OF LOTS: 607

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: flat to moderate slopes **SLOPE:**0-45% **ASPECT:** E-SE

ACCESS: 285 south to Old Lamy Trail (Highway 33)

ROADS: Old Lamy Trail, Ravens View Road, Los Hornos Road

BRIDGES: none

DRIVEWAYS: narrow and unmarked

WATER AVAILABILITY: some pressurized hydrants in town. Water was extended from Eldorado during recent years, improving water availability to the northern portion of the community.

CLOSEST FIRE DEPARTMENT: (in miles): 5 miles to El Dorado Fire Station 3

VALUES AT RISK: Train Station, museum, historic structures, including the historic diner

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$14,533,510.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 68- Moderate



Figure D.43. The Legal Tender, which is a restaurant, is one of Lamy's oldest structures and is highly valued in the community.



Figure D.44. Google Earth Imagery showing the road layout and residential density within the Lamy community.

Galisteo Fire District

Galisteo

LEGAL: Section 35 T14N R09E

DESCRIPTIVE LOCATION: 12 miles south of Santa Fe off Hwy 41.

VEGETATION FUELS: piñon-juniper, grass, bosque fuels

POPULATION:

NUMBER OF LOTS: 684

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: flat and river bottom **SLOPE:**0-10% **ASPECT:** S-SW

ACCESS: Good access, paved and some unsurfaced roads

ROADS: Highway 41, County Road 42 (Camino Los Abuelos)

BRIDGES: One bridge, with weight limit, but can be avoided.

DRIVEWAYS: short, some turnarounds.

WATER AVAILABILITY: Some hydrants throughout community, gravity fed

CLOSEST FIRE DEPARTMENT: (in miles): Galisteo Volunteer Fire Department station is in town.

VALUES AT RISK: Residential structures, historic structures, churches, watershed values.

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 74- High



Figure D.47. Galisteo street view. Source Google Earth.



Figure D.48. Google Earth Imagery showing the road layout and residential density within Galisteo community.

Turquoise Trail Fire District

San Marcos and Turquoise Trail

LEGAL: Section 12 T14N R08E

DESCRIPTIVE LOCATION: South of Santa Fe off HWY 14

VEGETATION FUELS: piñon-juniper

POPULATION: 767

NUMBER OF LOTS: Turquoise Trail: 261, San Marcos: 133, Total: 394

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: rolling hills **SLOPE:**0-20% **ASPECT:** S

ACCESS: HWY 14 South to HWY 42 and head east

ROADS: HWY 42, Camino Los Abuelos, Don Jose Loop, Crazy Rabbit Drive, numerous side roads off of Turquoise Trail.

BRIDGES: a couple

DRIVEWAYS: varies with some that have turnaround or roundabouts

WATER AVAILABILITY: limited

CLOSEST FIRE DEPARTMENT: (in miles): San Marcos is 2 miles from Turquoise Trail Fire Station 2. Turquoise Trail Fire Stations 1 and 2 are within 5 miles of most areas of the Turquoise Trail.

VALUES AT RISK: Residential structures, commercial businesses, school, infrastructure

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$70,504,108.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 72- High



Figure D.49. Turquoise Trail station 1 serves San Marcos and areas off the Turquoise Trail.



Figure D.50. Google Earth Imagery showing the road layout and residential density in and around the San Marcos community.

Los Cerrillos

LEGAL: Section 17 T14N R08E

DESCRIPTIVE LOCATION: 23 miles south of Santa Fe off Hwy 14

VEGETATION FUELS: piñon-juniper, bosque fuels

POPULATION: 300

NUMBER OF LOTS: 445

CONSTRUCTION MATERIALS: Adobe and Frame

ROOF: varies

TERRAIN: flat and river bottom **SLOPE:**0-10% **ASPECT:** S-SW

ACCESS: Main Street off HWY14

ROADS: Main Street, HWY 14, Gravel Pit Road

BRIDGES: 3 bridges: 2 on Highway 41, south of the village and 1 on Via La Puente, one lane with weight limits

DRIVEWAYS: Narrow and unmarked

WATER AVAILABILITY: Rio Galisteo

CLOSEST FIRE DEPARTMENT: (in miles): 0 miles from Turquoise Trail Fire Station 3 (39 Avenida Vieja)

VALUES AT RISK: Residential structures, commercial and industrial businesses, historic structures, watershed values.

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$20,840,117.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 74- High



Figure D.45. Los Cerrillos residences.



Figure D.46. Google Earth Imagery showing the road layout and residential density within the Los Cerrillos community.

Madrid Fire District

Madrid

LEGAL: Ortiz Mine/Mesita de Juana Lop

DESCRIPTIVE LOCATION: South of Santa Fe on HWY 14

VEGETATION FUELS: piñon-juniper, grasses

POPULATION: 185

NUMBER OF LOTS: 604

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: rolling hills **SLOPE:**0-30% **ASPECT:** Varies

ACCESS: South from Santa Fe for xx miles on Hwy 14

ROADS: HWY 14

BRIDGES: none

DRIVEWAYS: most are narrow and rough with poor signage

WATER AVAILABILITY: limited

CLOSEST FIRE DEPARTMENT: (in miles): 0 miles to Madrid Fire Station 1

VALUES AT RISK: Residential structures, watershed values, infrastructure, commercial businesses, historic buildings

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$17,961,239.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 78- High



Figure D.51. Google Earth Imagery showing the road layout and residential density in and around the Madrid community.

Mailbox Road

LEGAL: Section 35 T13N R07E

DESCRIPTIVE LOCATION: Three miles South of Madrid off HWY 14

VEGETATION FUELS: piñon-juniper savanna and woodland mix

POPULATION: 101

NUMBER OF LOTS: 130

CONSTRUCTION MATERIALS: varies from large single-family homes to trailers

ROOF: varies

TERRAIN: Rolling hills, with steep areas **SLOPE:**5-50% **ASPECT:** West-South-West

ACCESS: The main road is right off Hwy 14 and is one way in one way out, although there maybe a 2-track that goes out another direction.

ROADS: Roads are non-surface and rough in spots. Side roads are narrow and rough with poor markings

BRIDGES: NA

DRIVEWAYS: Driveways are narrow and unmarked with limited access to turn around

WATER AVAILABILITY: Water is not available within the community

CLOSEST FIRE DEPARTMENT: (in miles): 5 miles to Madrid Fire Station

VALUES AT RISK: Residential structures, watershed values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$6,157,362.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 94 – High



Figure D.52. Roof tops dot the landscape off Mailbox road south of Madrid.



Figure D.53. Google Earth Imagery showing the road layout and residential density within the Mail Box Road community.

Edgewood Fire District

San Pedro

LEGAL: Section 34 T12N R07E

DESCRIPTIVE LOCATION: 5 miles north of Cedar Grove on Hwy 344

VEGETATION FUELS: piñon-juniper (closed canopy), brush (oak), ponderosa stands on lower flats. Mixed defensible space.

POPULATION: 180

NUMBER OF LOTS: 310

CONSTRUCTION MATERIALS: Various

ROOF: Various

TERRAIN: Steep slopes to flatland **SLOPE:**0-60% **ASPECT:** S-SE

ACCESS: Poor where access it difficult for apparatus.

ROADS: Roads are unpaved, narrow, and very rough in a lot of areas surrounding South Mountain, poor signage, limited areas to turnaround.

BRIDGES: 3 small wood truss bridges on HWY 344

DRIVEWAYS: very narrow >8 feet and mostly unmarked, driveways that are marked are unreflective

WATER AVAILABILITY: very limited.

CLOSEST FIRE DEPARTMENT: (in miles): Station 3, less than one mile

VALUES AT RISK: Residential Structures, Watershed values, South Mountain

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$11,984,841.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 100 – High



Figure D.54. Road access in San Pedro is difficult due to the narrow unimproved roads with limited space to turn around.

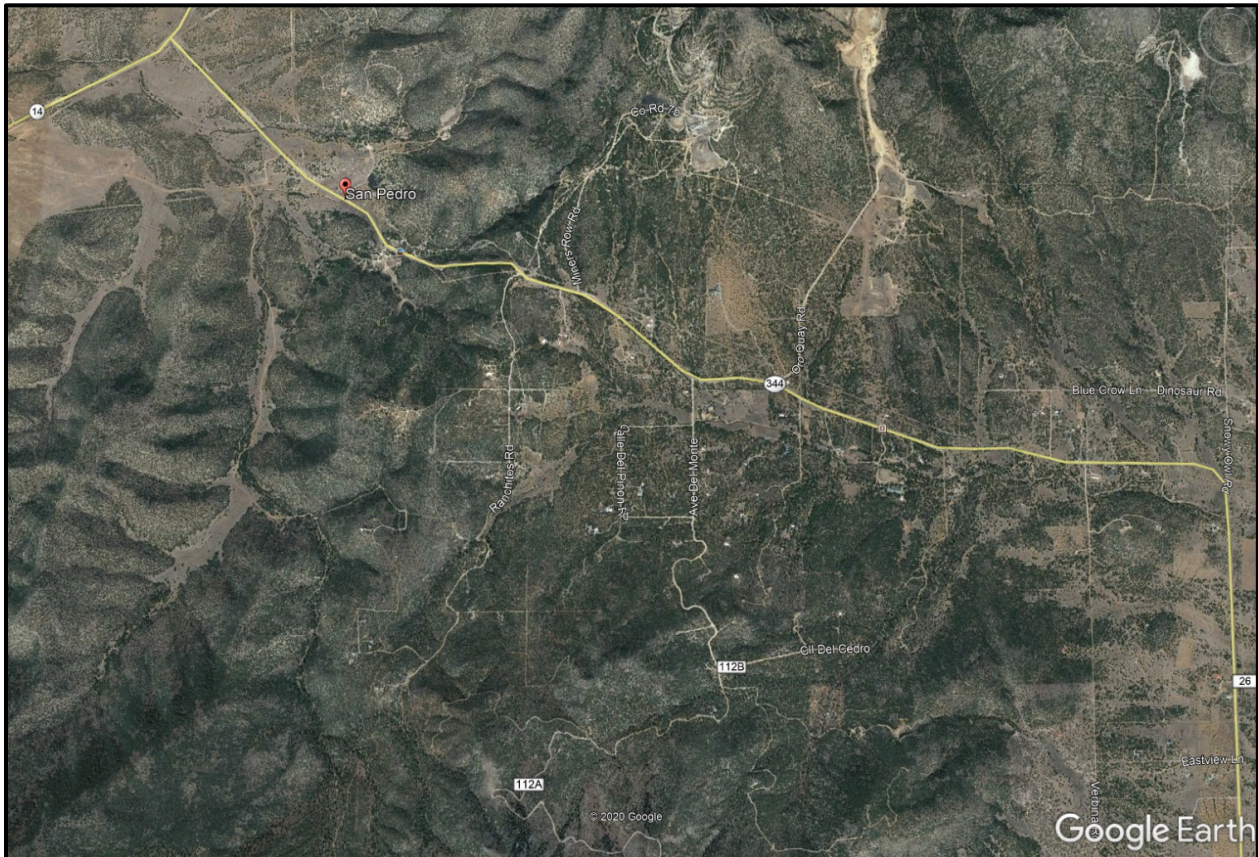


Figure D.55. Google Earth Imagery showing the road layout and residential density within the San Pedro community.

Cedar Grove

LEGAL: Section 22 T11N R07E

DESCRIPTIVE LOCATION: Located at the base of South Mountain. 8 miles north of Edgewood off HWY 344.

VEGETATION FUELS: piñon-juniper- closed canopy, brush (oak), open grassland. Defensible space is sporadic.

POPULATION: 395

NUMBER OF LOTS: 324

CONSTRUCTION MATERIALS: Varies, primarily mobile home/prefabricated/frame

ROOF: Varies

TERRAIN: Steep slopes to flatland **SLOPE:**0-60% **ASPECT:** S-SE

ACCESS: Poor to fair with some steep, winding and narrow roads with few turnarounds

ROADS: Main road HWY 344 is paved, but side roads are unpaved, narrow, and really rough, poor signage

BRIDGES: NA

DRIVEWAYS: mostly unmarked, most driveways that are marked are unreflective, varies from narrow and dirt to wide and paved.

WATER AVAILABILITY: Some hydrants

CLOSEST FIRE DEPARTMENT: (in miles): 0 miles

VALUES AT RISK: Residential structures, watershed values, aerodrome, South Mountain

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$40,469,342.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 100- High



Figure D.56. Cedar Grove is at the base of South Mountain in dense vegetation with limited defensible space

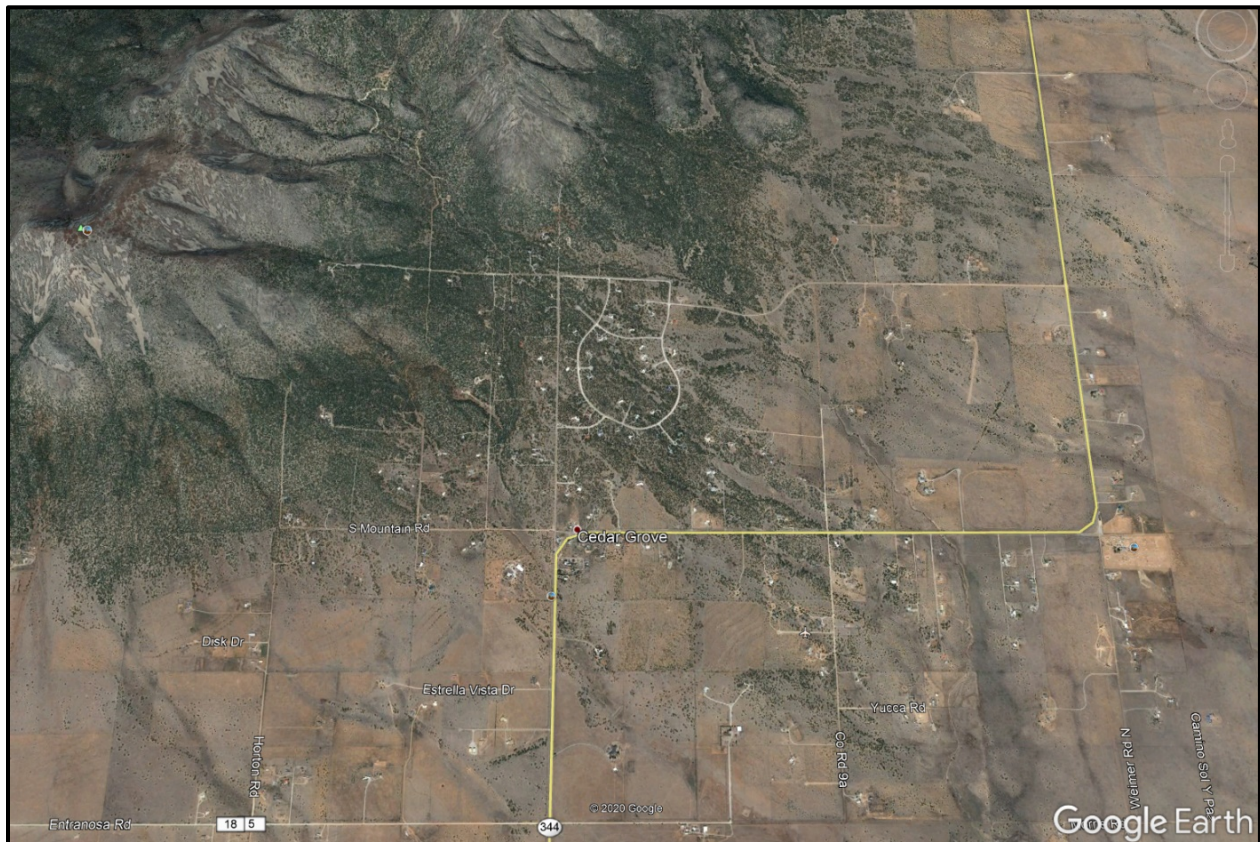


Figure D.57. Google Earth Imagery showing the road layout and residential density within the Cedar Grove community.

Bella Vista

LEGAL: Section 33 T10N R07E

DESCRIPTIVE LOCATION: South of Edgewood and I-40

VEGETATION FUELS: piñon-juniper

POPULATION: 487

NUMBER OF LOTS: 400

CONSTRUCTION MATERIALS: varies

ROOF: varies

TERRAIN: relatively flat with some small rolling hills **SLOPE:** 0-15% **ASPECT:** N-NE

ACCESS: Located off Edgewood 7.

ROADS: Numerous County paved roads

BRIDGES: None

DRIVEWAYS: Narrow with limited space to turnaround, most are non-surfaced, limited markings

WATER AVAILABILITY: Pressurized hydrants are available

CLOSEST FIRE DEPARTMENT: (in miles): 3 miles from Edgewood District Station 4

VALUES AT RISK: Residential structures, churches, businesses

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$39,921,380.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 78- High



Figure D.58. Google Earth Imagery showing the road layout and residential density within the Bella Vista Road community.

Edgewood, Thunder Mountain

LEGAL: Section 18 T10N R07E

DESCRIPTIVE LOCATION: 3 miles west of Edgewood

VEGETATION FUELS: piñon-juniper

POPULATION: 962

NUMBER OF LOTS: 99

CONSTRUCTION MATERIALS: mostly wood frame and stucco

ROOF: varies

TERRAIN: flat to steep slopes **SLOPE:** 0-40% **ASPECT:** All

ACCESS: Hwy 344 north from Edgewood to Dinkle Rd to Thunder Mountain Rd

ROADS: Thunder Mountain Rd, Snowflake Trail

BRIDGES: none

DRIVEWAYS: most off Thunder Mountain Rd, narrow and steep

WATER AVAILABILITY: Some pressurized hydrants in community

CLOSEST FIRE DEPARTMENT: (in miles): >1 mile from Edgewood Station 4

VALUES AT RISK: Residential Structures, livestock, watershed values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$94,726,960.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 83- High



Figure D.59. Thunder Mountain subdivision near Edgewood, NM showing steep slopes, dense vegetation and limited defensible space.



Figure D.60. Google Earth Imagery showing the road layout and residential density within the Thunder Mountain Subdivision.

Stanley Fire District

There are no defined communities at risk within the Stanley Fire District, however there is a relatively large dispersed population with significant structure separation. Fuels tend to be light (grass-shrub). Access is good, but there are long response times to some homes.

Pueblo Communities

San Ildefonso Pueblo

LEGAL: Section 24 T19N R6E

DESCRIPTIVE LOCATION: 3.5 miles west of El Rancho, NM

VEGETATION FUELS: grassland and shrubland, riparian communities

POPULATION: 750

TERRAIN: flat to steep slopes **ASPECT:** all

ACCESS: Highway 84 north from Santa Fe to NM-502 west to Povi Kaa Drive

ROADS: Than Povi Po, Agoyo Po, Tunyo Po

BRIDGES: Tunyo Po, over Pojaque River

DRIVEWAYS: many off 84 & 84B, flat and accessible

WATER AVAILABILITY: very limited hydrants

CLOSEST FIRE DEPARTMENT: (in miles): 7.4 miles from Pojoaque Fire Department

VALUES AT RISK: residential and community structures, watershed values, historical values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$68,124,560.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 53-Moderate



Figure D.61. San Ildefonso Pueblo, showing building material, vegetation, and steep slopes (background).



Figure D.62. Google Earth Imagery showing the road layout and residential density within the San Ildefonso Pueblo.

Pojoaque Pueblo

LEGAL: Section 5 T19N R9E

DESCRIPTIVE LOCATION: 3 miles west of Nambe, NM

VEGETATION FUELS: agricultural, riparian, conifer, shrubland

POPULATION: 1261 as of 2000 census

TERRAIN: flat to moderate slopes **ASPECT:** all

ACCESS: Highway 84 north from Santa Fe

ROADS: Highway 85, NM-503, Camino del Rincon, Oweenge Rd

BRIDGES: 502, over the Tesuque, Rio; 84 over the Tesuque, Rio; 285 over Pojoaque Creek

DRIVEWAYS: many off 503 and 84, flat and accessible

WATER AVAILABILITY: hydrants available

CLOSEST FIRE DEPARTMENT: (in miles): 1.5 miles from Pojoaque Fire Department

VALUES AT RISK: residential and community structures, watershed values, historical values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$171,287,001.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 44-Moderate



Figure D.63. Pojoaque Pueblo, showing building material, vegetation, and moderate slopes (background).

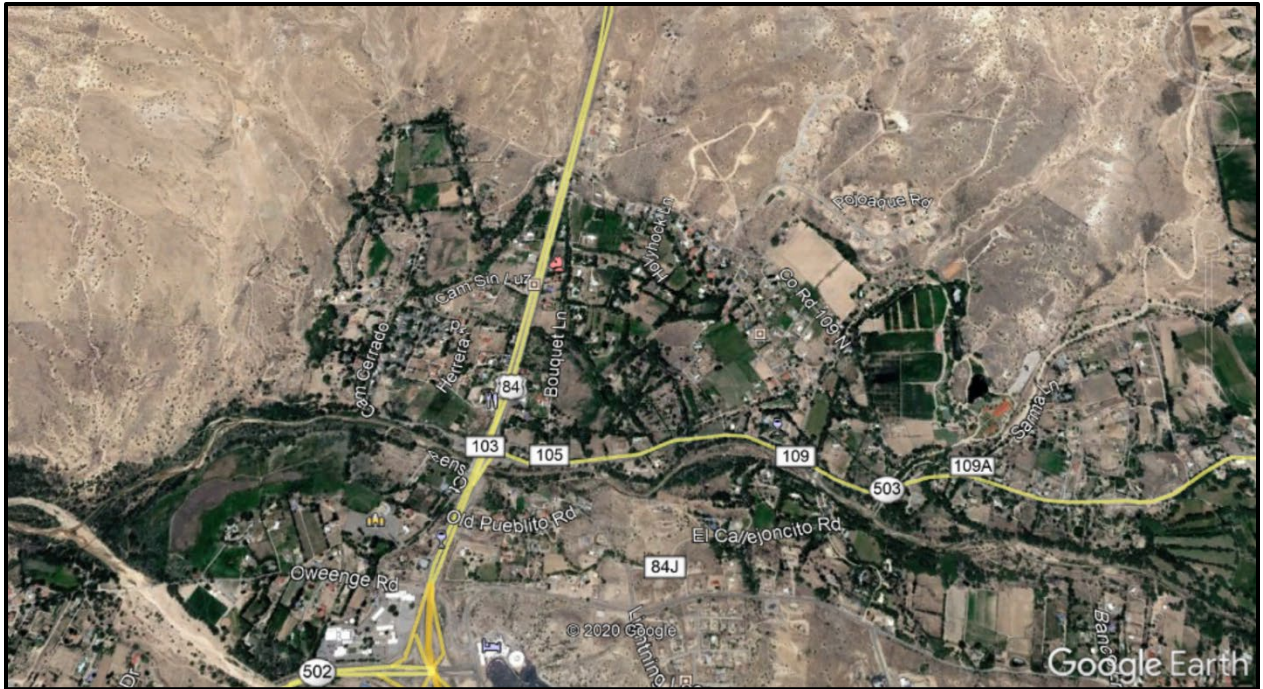


Figure D.64. Google Earth Imagery showing the road layout and residential density within the Pojoaque Pueblo.

Nambe Pueblo

LEGAL: Section 10 T19N R9E

DESCRIPTIVE LOCATION: 6 miles east of Pojoaque, NM

VEGETATION FUELS: grassland & shrubland, riparian communities

POPULATION: 1,818 (2010 census)

TERRAIN: flat to steep slopes **ASPECT:** all

ACCESS: Highway 84 north from Santa Fe to 503 east to Np 101 south

ROADS: 84F, Osaa Pua Poe, Poechunu Poe

BRIDGES: none

DRIVEWAYS: many off 503 and 84 F and G, flat and accessible

WATER AVAILABILITY: limited hydrants

CLOSEST FIRE DEPARTMENT: (in miles): 4.5 miles from Pojoaque Fire Department

VALUES AT RISK: residential and community structures, watershed values, historical values

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$94,691,636.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 51-Moderate



Figure D.65. Nambe Pueblo, showing building material, vegetation, and steep slopes (background).

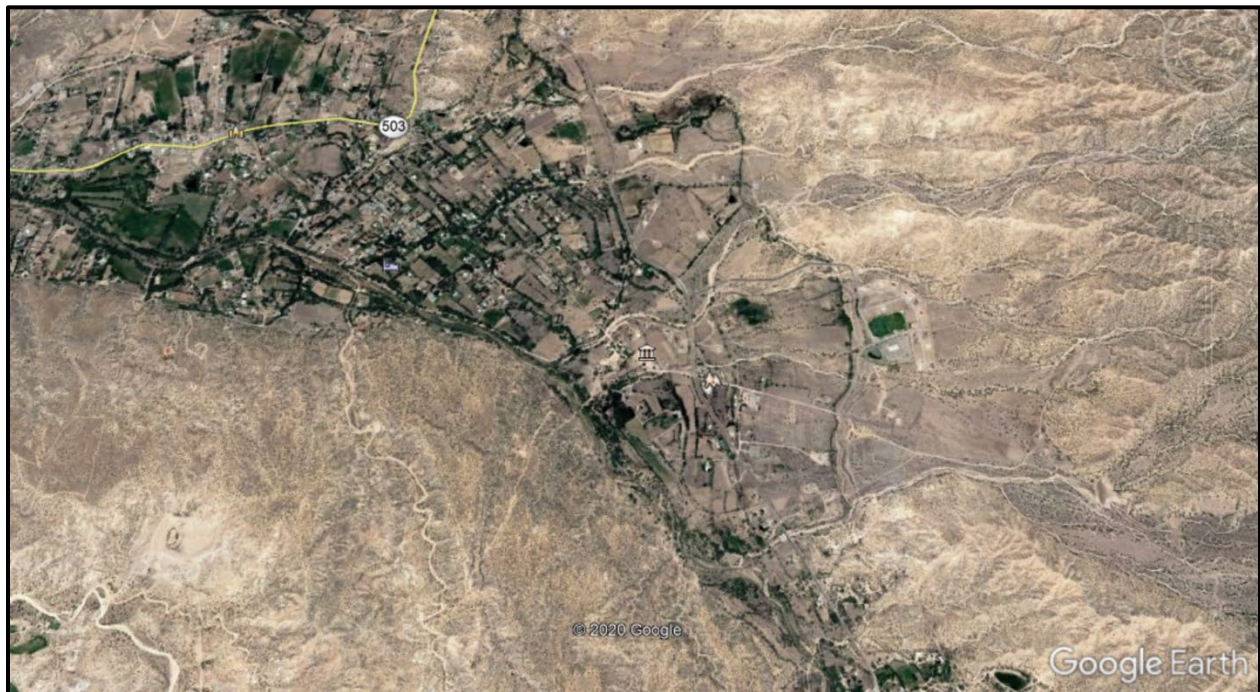


Figure D.66. Google Earth Imagery showing the road layout and residential density within the Nambe Pueblo.

Tesuque Pueblo

LEGAL: Section 8 T18N R9E

DESCRIPTIVE LOCATION: 4.4 miles north of Tesuque, NM

VEGETATION FUELS: grassland & shrubland, conifer

POPULATION: 909 (2000) census

TERRAIN: flat to moderate slopes **ASPECT:** all

ACCESS: Highway 84 north from Santa Fe to NP 806 west

ROADS: NP 806, NP 804, cemetery road, NP 800

BRIDGES: 1, according to 2018 HMP

DRIVEWAYS: many off NP 800 and 804, flat and accessible

WATER AVAILABILITY: limited number of hydrants

CLOSEST FIRE DEPARTMENT: (in miles): 0.5 miles from Tesuque Fire Department- Station 3

VALUES AT RISK: residential and community structures, watershed values, historical resources

COMMUNITY AND HAZARD EXPOSURE TOTALS (from 2018 HMP): \$28,608,603.00

CAR RATING- BASED ON THE NFPA 1144 PROTOCOL: 44-Moderate



Figure D.67. Google Earth Imagery showing the road layout and residential density within the Tesuque Pueblo.

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SWCA

APPENDIX E:
NFPA 1144 Form

SWCA

Means of Access						
Ingress and Egress						
	Points					
Two or more roads in and out	0					
One road in and out	7					
Road Width						
>24 feet	0					
>20 feet, <24 feet	2					
<20 feet	4					
Road Conditions						
Surfaced road, grade <5%	0					
Surfaced road, grade >5%	2					
Nonsurfaced road, grade <5%	2					
Nonsurfaced road, grade >5%	5					
Other than all season	7					
Fire Access						
<300 feet with turnaround	0					
>300 feet with turnaround	2					
<300 feet with no turnaround	4					
>300 feet with no turnaround	5					
Street Signs						
Present–reflective	0					
Present–nonreflective	2					
Not present	5					
Vegetation (fuel models)						
Predominant veg						
Light–1,2,3	5					
Medium–5,6,7,8,9	10					
Heavy–4,10	20					
Slash–11,12,13	25					
Defensible Space						
>100 feet around structure	1					
>70 feet, <100 feet around structure	3					
>30 feet, <70 feet around structure	10					
<30 feet around structure	25					
Topography within 300 Feet of Structures						
Slope						
<9%	1					
10% to 20%	4					
21% to 30%	7					

Means of Access						
31% to 40%	8					
>41%	10					
Additional Rating Factors (rate all that apply)						
Additional Factors						
Topographic features	0-5					
History of high fire occurrence	0-5					
Severe fire weather potential	0-5					
Separation of adjacent structures	0-5					
Roofing Assembly						
Roofing						
Class A	0					
Class B	3					
Class C	15					
Unrated	25					
Building Construction						
Materials (predominant)						
Non-combustible siding, eaves, deck	0					
Non-combustible siding/combustible desk	5					
Combustible siding and deck	10					
Building Set-back						
>30 feet to slope	1					
<30 feet to slope	5					
Available Fire Protection						
Water Sources						
Hydrants 500 gpm, <1,000 feet apart	0					
Hydrants 250 gpm, <1,000 feet apart	1					
Nonpressurized, >250 gpm/2 hours	3					
Nonpressurized, <250 gpm/2 hours	5					
Water unavailable	10					
Organized Response						
Station <5 miles from structure	1					
Station >5 miles from structure	3					
Fixed Fire Protection						
NFPA sprinkler system	0					
None	5					
Placement of Gas and Electric Utilities						
Utilities						
Both underground	0					
One above, one below	3					

Means of Access						
Both aboveground	5					
Totals for Home or Subdivision						
Hazard Rating Scale	<40 Low	>40 Moderate	>70 High	>112 Extreme		

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SWCA

APPENDIX F: Funding Sources

SWCA

FUNDING RESOURCES

The following section provides information on federal, state, and private funding opportunities for conducting wildfire mitigation projects.

I. Federal Funding Information

Source: Pre-disaster Mitigation Grant Program

Agency: Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA)

Website: <http://www.fema.gov/government/grant/pdm/index.shtm>

Description: The DHS includes FEMA and the U.S. Fire Administration. FEMA's Federal Mitigation and Insurance Administration is responsible for promoting pre-disaster activities that can reduce the likelihood or magnitude of loss of life and property from multiple hazards, including wildfire. The Disaster Mitigation Act of 2000 created a requirement for states and communities to develop pre-disaster mitigation plans and established funding to support the development of the plans and to implement actions identified in the plans. This competitive grant program, known as PDM, has funds available to state entities, tribes, and local governments to help develop multi-hazard mitigation plans and to implement projects identified in those plans.

Source: Section 319 Base Grant to State Entities and Indian Tribes

Agency: Environmental Protection Agency (EPA)

New Mexico State 319 Coordinator
David Hogge
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502
Phone: (505) 827-2981
Fax: (505) 827-0160
david_hogge@nmenv.state.nm.us

Website: <http://www.epa.gov>

Description: Funding under this program is often used for reduction of nonpoint-source pollution; however, one community successfully used the grant to obtain funding to reduce hazardous fuels to protect the municipal watershed. For additional information on this success story, visit <http://www.santafewatershed.com>. To learn about obtaining this type of funding for your community, contact New Mexico's 319 Grant Coordinator, Dave Hogge, New Mexico Environmental Department at (505) 827-2981.

This funding opportunity is a Request for Proposals from state entities and Indian tribes for competitive grants under section 319 of the Clean Water Act (CWA). The purpose of this grant program is to provide funding to implement nonpoint-source management programs developed pursuant to CWA section 319(b). The primary goal of this management program is to control nonpoint-source pollution. This is done through implementation of management measures and practices to reduce pollutant loadings resulting from each category or subcategory of nonpoint-

source identified in the grant recipient's nonpoint-source assessment report, which should be developed pursuant to CWA section 319(a). The EPA has set aside a portion of Section 319 funds appropriated by Congress for competitive grant awards to tribes for the purpose of funding the development and implementation of watershed-based plans and other on-the-ground watershed projects that result in a significant step toward solving nonpoint-source impairments on a watershed-wide basis. Please note that the funding opportunity described here is found in Section B of the full announcement. (Section A includes the EPA's national guidelines, which govern the process for awarding noncompetitive base grants to all eligible tribes.)

Source: Funding for Fire Departments and First Responders

Agency: DHS, U.S. Fire Administration

Website: <http://www.usfa.dhs.gov/fireservice/grants/>

Description: Includes grants and general information on financial assistance for fire departments and first responders. Programs include the Assistance to Firefighters Grant Program, Reimbursement for Firefighting on Federal Property, State Fire Training Systems Grants, and National Fire Academy Training Assistance.

Source: Conservation Innovation Grants (CIG)

Agency: National Resource Conservation Service

Website: <http://www.nm.nrcs.usda.gov/programs/cig/cig.html>

Description: CIG State Component. CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program (EQIP) funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, tribes, or individuals. CIG enables the Natural Resources Conservation Service (NRCS) to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with federal, state, and local regulations. The NRCS administers the CIG program. The CIG requires a 50/50 match between the agency and the applicant. The CIG has two funding components: national and state. Funding sources are available for water resources, soil resources, atmospheric resources, and grazing land and forest health.

Source: Volunteer Fire Assistance

Agency: U.S. Forest Service

Website: <http://www.fs.fed.us/fire/partners/vfa/>

Description: U.S. Forest Service funding will provide assistance, through the states, to volunteer fire departments to improve communication capabilities, increase wildland fire management training, and purchase protective fire clothing and firefighting equipment. For more information, contact your state representative; contact information can be found on the National Association of State Foresters website.

Source: Economic Action Programs**Agency:** U.S. Forest Service**Website:** <http://www.fs.fed.us/spf/coop/programs/eap/index.html>

Description: U.S. Forest Service funding will provide for Economic Action Programs that work with local communities to identify, develop, and expand economic opportunities related to traditionally under-utilized wood products and to expand the utilization of wood removed through hazardous fuel reduction treatments. Information, demonstrations, application development, and training will be made available to participating communities. For more information, contact a Forest Service Regional Representative.

Source: Collaborative Forest Restoration Program (CFRP)**Agency:** U.S. Forest Service**Website:** <http://www.fs.fed.us/r3/spf/cfrp/index.shtml>

Description: The Community Forest Restoration Act of 2000 (Title VI, Public Law 106–393) established a cooperative forest restoration program in New Mexico to provide cost-share grants to stakeholders for forest restoration projects on public land to be designed through a collaborative process (the CFRP). Projects must include a diversity of stakeholders in their design and implementation and should address specified objectives including: wildfire threat reduction; ecosystem restoration, including non-native tree species reduction; reestablishment of historic fire regimes; reforestation; preservation of old and large trees; increased utilization of small-diameter trees; and the creation of forest-related local employment. The act limits projects to four years and sets forth cost limits and provisions respecting collaborative project review and selection, joint monitoring and evaluation, and reporting. The act authorizes appropriations of up to \$5 million annually and directs the Secretary to convene a technical advisory panel to evaluate proposals that may receive funding through the CFRP.

Source: Catalog of Federal Funding Sources for Watershed Protection**Agency:** N/A**Website:** <http://cfpub.epa.gov/fedfund/>

Examples of the types of grants found at this site are:

- Native Plant Conservation Initiative: http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=3966
- Targeted Watershed Grants Program, <http://www.epa.gov/owow/watershed/initiative/>
- Pre-disaster Mitigation Program, <http://www.fema.gov/government/grant/pdm/index.shtml>
- Environmental Education Grants, http://www.epa.gov/enviroed/grants_contacts.html

Source: Firewise Communities**Agency:** Multiple**Website:** <http://www.firewise.org>

Description: Many different Firewise Communities activities are available to help homes and whole neighborhoods become safer from wildfire without significant expense. Community cleanup days, awareness events, and other cooperative activities can often be successfully accomplished through partnerships among neighbors, local businesses, and local fire departments at little or no cost. The Firewise Communities recognition program page (<http://www.firewise.org/usa>) provides several excellent examples of these kinds of projects and programs.

The kind of help you need will depend on who you are, where you are, and what you want to do. Among the different activities that individuals and neighborhoods can undertake, the following often benefit from seed funding or additional assistance from an outside source:

- Thinning/pruning/tree removal/clearing on private property—particularly on very large, densely wooded properties
- Retrofit of home roofing or siding to non-combustible materials
- Managing private forest
- Community slash pickup or chipping
- Creation or improvement of access/egress roads
- Improvement of water supply for firefighting
- Public education activities throughout the community or region

Some additional examples of what communities, counties, and states have done can be found in the National Database of State and Local Wildfire Hazard Mitigation Programs at <http://www.wildfireprograms.usda.gov>. You can search this database by keyword, state, jurisdiction, or program type to find information about wildfire mitigation education programs, grant programs, ordinances, and more. The database includes links to local websites and e-mail contacts.

Source: The National Fire Plan (NFP)**Website:** <http://www.forestsandrangelands.gov/>

Description: Many states are using funds from the NFP to provide funds through a cost-share with residents to help them reduce the wildfire risk to their private property. These actions are usually in the form of thinning or pruning trees, shrubs, and other vegetation and/or clearing the slash and debris from this kind of work. Opportunities are available for rural, state, and volunteer fire assistance.

Source: Staffing for Adequate Fire and Emergency Response (SAFER)**Agency:** DHS**Website:** <http://www.firegrantsupport.com/safer/>

Description: The purpose of SAFER grants is to help fire departments increase the number of frontline firefighters. The goal is for fire departments to increase their staffing and deployment

capabilities and ultimately attain 24-hour staffing, thus ensuring that their communities have adequate protection from fire and fire-related hazards. The SAFER grants support two specific activities: (1) hiring of firefighters and (2) recruitment and retention of volunteer firefighters. The hiring of firefighters activity provides grants to pay for part of the salaries of newly hired firefighters over the five-year program. SAFER is part of the Assistance to Firefighters Grants and is under the purview of the Office of Grants and Training of the DHS.

Source: The Fire Prevention and Safety Grants (FP&S)

Agency: DHS

Website: <http://www.firegrantsupport.com/fps/>

Description: The FP&S are part of the Assistance to Firefighters Grants and are under the purview of the Office of Grants and Training in the DHS. FP&S offers support to projects that enhance the safety of the public and firefighters who may be exposed to fire and related hazards. The primary goal is to target high risk populations and mitigate high incidences of death and injury. Examples of the types of projects supported by FP&S include fire-prevention and public-safety education campaigns, juvenile fire-setter interventions, media campaigns, and arson prevention and awareness programs. In fiscal year 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include firefighter safety research and development.

Source: GSA-Federal Excess Personal Property

Agency: USFS

Website: <https://gsaccess.gov/>

Description: The Federal Excess Personal Property (FEPP) program refers to Forest Service-owned property that is on loan to State Foresters for the purpose of wildland and rural firefighting. Most of the property originally belonged to the Department of Defense (DoD). Once acquired by the Forest Service, it is loaned to State Cooperators for firefighting purposes. The property is then loaned to the State Forester, who may then place it with local departments to improve local fire programs. State Foresters and the USDA Forest Service have mutually participated in the FEPP program since 1956.

II. State Funding Information

Source: State and Private Forestry Programs

Agency: National Association of State Foresters

Website: http://www.stateforesters.org/S&PF/coop_fire.html

Description: The National Association of State Foresters recommends that funds become available through a competitive grant process on Wildland Urban Interface hazard mitigation projects. State fire managers see opportunities to use both the State Fire Assistance Program and the Volunteer Fire Assistance Program to improve the safety and effectiveness of firefighters in the interface, as well as in other wildland fire situations. To ensure firefighter safety, minimize property and resource loss, and reduce suppression costs, land management agencies, property owners, local leaders, and fire protection agencies must work cooperatively to mitigate interface fire risks,

as well as to ensure that wildland firefighters receive the training, information, and equipment necessary to safely carry out their responsibilities.

Source: New Mexico Association of Counties: Wildfire Risk Reduction Program

Agency: New Mexico Association of Counties

Website: <https://www.nmcounties.org/services/programs/>

Description: This program targets communities, tribes, counties, and non-profits who service areas of wildfire risk in proximity to BLM lands. The Wildfire Risk Reduction Grant Program funds three categories of projects: Development or updates of Community Wildfire Protection Plans (CWPPs), outreach and education, and hazardous fuels reduction. The program has operated for 15 years with funding provided by the Bureau of Land Management.

Source: HB 266: Forest and Watershed Restoration Act (FAWRA)

Agency: New Mexico State Forestry

Website: <http://www.emnrd.state.nm.us/SFD/FAWRA.html>

Description: The Forest and Watershed Restoration Act (FAWRA) was created by House Bill 266 and signed into law by Governor Michelle Lujan Grisham on March 15, 2019. FAWRA allocates funding annually to New Mexico State Forestry for the purpose of restoring forests and watersheds in the state of New Mexico. A Forest and Watershed Advisory Board has been established to evaluate and recommend projects, and New Mexico State Forestry will administer, implement, and report on the projects. FAWRA funds can be used on public lands for on-the-ground restoration treatments; project planning; economic development programs to advance small diameter trees and woody biomass; and workforce development for wood utilization projects. Applicants should contact their local District Forester (Santa Fe County falls in the Bernalillo District. More information on funding is available: <http://www.emnrd.state.nm.us/SFD/documents/HB0266.pdf> and <http://www.emnrd.state.nm.us/SFD/FWHPlan/documents/HB266%20FAQ%20revised%202019.05.10.pdf>

III. Private Funding Information

Source: The Urban Land Institute (ULI)

Website: <http://www.uli.org>

Description: ULI is a 501(c)(3) nonprofit research and education organization supported by its members. The institute has more than 22,000 members worldwide, representing the entire spectrum of land use and real estate development disciplines, working in private enterprise and public service. The mission of the ULI is to provide responsible leadership in the use of land to enhance the total environment. ULI and the ULI Foundation have instituted Community Action Grants (http://www.uli.org/Content/NavigationMenu/MyCommunity/CommunityActionGrants/Community_Action_Gr.htm) that could be used for Firewise Communities activities. Applicants must be ULI members or part of a ULI District Council. Contact actiongrants@uli.org or review the web page to find your District Council and the application information.

Source: Environmental Systems Research Institute (ESRI)

Website: <http://www.esri.com/grants>

Description: ESRI is a privately held firm and the world's largest research and development organization dedicated to geographic information systems. ESRI provides free software, hardware, and training bundles under ESRI-sponsored Grants that include such activities as conservation, education, and sustainable development, and posts related non-ESRI grant opportunities under such categories as agriculture, education, environment, fire, public safety, and more. You can register on the website to receive updates on grant opportunities.

Source: StEPP Foundation

Website: <http://www.steppfoundation.org/default.htm>

Description: StEPP is a 501(c)(3) organization dedicated to helping organizations realize their vision of a clean and safe environment by matching projects with funders nationwide. The StEPP Foundation provides project oversight to enhance the success of projects, increasing the number of energy efficiency, clean energy, and pollution prevention projects implemented at the local, state, and national levels for the benefit of the public. The website includes an online project submittal system and a Request for Proposals page.

Source: The Public Entity Risk Institute (PERI)

Website: <http://www.riskinstitute.org>

Description: PERI is a not for profit, tax-exempt organization. Its mission is to serve public, private, and nonprofit organizations as a dynamic, forward-thinking resource for the practical enhancement of risk management. With its growing array of programs and projects, along with its grant funding, PERI's focus includes supporting the development and delivery of education and training on all aspects of risk management for public, nonprofit, and small business entities, and serving as a resource center and clearinghouse for all areas of risk management.

IV. Other Funding Information

The following resources may also provide helpful information for funding opportunities:

- National Agricultural Library Rural Information Center:
http://www.nal.usda.gov/ric/ricpubs/fire_department_resources.htm
- Forest Service Fire Management website: <http://www.fs.fed.us/fire/>
- Insurance Services Office Mitigation Online (town fire ratings): <http://www.isomitigation.com/>
- National Fire Protection Association: <http://www.nfpa.org>
- National Interagency Fire Center, Wildland Fire Prevention/Education:
<http://www.nifc.gov/preved/rams.htm>
- Department of Homeland Security U.S. Fire Administration:
<http://www.usfa.dhs.gov/fireservice/grants/rfff/>

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APPENDIX G:
Homeowner Guide

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SANTA FE COUNTY CWPP

HOMEOWNERS GUIDE

This guide has been developed to address site-specific information on wildfire for the Santa Fe County communities. This guide 1) suggests specific measures that can be taken by homeowners to reduce structure ignitability and 2) enhances overall preparedness in the planning area by consolidating preparedness information from several local agencies and departments.

BEFORE THE FIRE—PROTECTION AND PREVENTION

REDUCING STRUCTURE IGNITABILITY

Structural Materials

Roofing—The more fire-resistant the roofing material, the better. The roof is the portion of the house that is most vulnerable to ignition by falling embers, known as firebrands. Metal roofs afford the best protection against ignition from falling embers. Slate or tile roofs are also non-combustible, and Class-A asphalt shingles are recommended as well. The most dangerous type of roofing material is wood shingles. Removing debris from roof gutters and downspouts at least twice a year will help to prevent fire, along with keeping them functioning properly.

Siding—Non-combustible materials are ideal for the home exterior. Preferred materials include stucco, cement, block, brick, and masonry.

Windows—Double-pane windows are most resistant to heat and flames. Smaller windows tend to hold up better within their frames than larger windows. Tempered glass is best, particularly for skylights, because it will not melt as plastic will.

Fencing and trellises—Any structure attached to the house should be considered part of the house. A wood fence or trellis can carry fire to your home siding or roof. Consider using nonflammable materials or use a protective barrier such as metal or masonry between the fence and the house.

If you are designing a new home or remodeling your existing one, do it with fire safety as a primary concern. Use nonflammable or fire-resistant materials and have the exterior wood treated with UL-approved fire-retardant chemicals. More information on fire-resistant construction can be found at <http://www.firewise.org>.

SCREEN OFF THE AREA BENEATH DECKS AND PORCHES

The area below an aboveground deck or porch can become a trap for burning embers or debris, increasing the chances of the fire transferring to your home. Screen off the area using screening with openings no larger than one-half inch. Keep the area behind the screen free of all leaves and debris.

FIREWOOD, KINDLING, AND OTHER FLAMMABLES

Although convenient, stacked firewood on or below a wooden deck adds fuel that can feed a fire close to your home. Be sure to move all wood away from the home during fire season. Stack all firewood uphill, at least 30 feet and preferably 100 feet from your home.

When storing flammable materials such as paint, solvents, or gasoline, always store them in approved safety containers away from any sources of ignition such as hot water tanks or furnaces. The fumes from highly volatile liquids can travel a great distance after they turn into a gas. If possible, store the containers in a safe, separate location away from the main house.

CHIMNEYS AND FIREPLACE FLUES

Inspect your chimney and damper at least twice a year and have the chimney cleaned every year before first use. Have the spark arrestor inspected and confirm that it meets the latest safety code. Your local fire department will have the latest edition of National Fire Prevention Code 211 covering spark arrestors. Make sure to clear away dead limbs from within 15 feet of chimneys and stovepipes

FIREPLACE AND WOODSTOVE ASHES

Never take ashes from the fireplace and put them into the garbage or dump them on the ground. Even in winter, one hot ember can quickly start a grass fire. Instead, place ashes in a metal container, and as an extra precaution, soak them with water. Cover the container with its metal cover and place it in a safe location for a couple of days. Then either dispose of the cold ash with other garbage or bury the ash residue in the earth and cover it with at least 6 inches of mineral soil.

PROPANE TANKS

Your propane tank has many hundreds of gallons of highly flammable liquid that could become an explosive incendiary source in the event of a fire. It should be located at least 30 feet from any structure. Keep all flammables at least 10 feet from your tank. Learn how to turn the tank off and on. In the event of a fire, you should turn the gas off at the tank before evacuating, if safety and time allow.

SMOKE ALARMS

A functioning smoke alarm can help warn you of a fire in or around your home. Install smoke alarms on every level of your residence. Test and clean smoke alarms once a month and replace batteries at least once a year. Replace smoke alarms once every 10 years.

FIRE-SAFE BEHAVIOR

- If you smoke, always use an ashtray in your car and at home.
- Store and use flammable liquids properly.
- Keep doors and windows clear as escape routes in each room.

DEFENSIBLE SPACE

The removal of dense, flammable foliage from the area immediately surrounding the house reduces the risk of structure ignition and allows firefighters access to protect the home. Pruning and limbing trees along with the selective removal of trees and shrubs is recommended to create a minimum defensible space area of 30 feet. Steep slopes require increased defensible space because fire can travel quickly uphill.

Within the minimum 30-foot safety zone, plants should be limited to fire-resistant trees and shrubs. Focus on fuel breaks such as concrete patios, walkways, rock gardens, and irrigated garden or grass areas within this zone. Use mulch sparingly within the safety zone, and focus use in areas that will be watered regularly. In areas such as turnarounds and driveways, nonflammable materials such as gravel are much better than wood chips or pine needles.

Vegetative debris such as dead grasses or leaves provide important erosion protection for soil but also may carry a surface fire. It is simply not feasible to remove all the vegetative debris from around your property. However, it is a good idea to remove any accumulations within the safety zone and extending out as far as possible. This is particularly important if leaves tend to build up alongside your house or

outbuildings. Removing dead vegetation and leaves and exposing bare mineral soil are recommended in a 2-foot-wide perimeter along the foundation of the house. Also, be sure to regularly remove all dead vegetative matter including grasses, flowers, and leaf litter surrounding your home and any debris from gutters, especially during summer months. Mow the lawn regularly and promptly dispose of the cuttings properly. If possible, maintain a green lawn for 30 feet around your home.

All trees within the safety zone should have lower limbs removed to a height of 6–10 feet. Remove any branches within 15 feet of your chimney or overhanging any part of your roof. Ladder fuels are short shrubs or trees growing under the eaves of the house or under larger trees. Ladder fuels carry fire from the ground level onto the house or into the tree canopy. Be sure to remove all ladder fuels within the safety zone first. The removal of ladder fuels within about 100 feet of the house will help to limit the risk of crown fire around your home. More information about defensible space is provided at <http://www.firewise.org>.

FIRE RETARDANTS

For homeowners who would like home protection beyond defensible space and fire-resistant structural materials, fire-retardant gels and foams are available. These materials are sold with various types of equipment for applying the material to the home. They are like the substances applied by firefighters in advance of wildfire to prevent ignition of homes. Different products have different timelines for application and effectiveness. The amount of product needed is based on the size of the home, and prices may vary based on the application tools. Prices range from a few hundred to a few thousand dollars. An online search for "fire blocking gel" or "home firefighting" will provide a list of product vendors. Residents should research and consider environmental impacts of chemicals.

ADDRESS POSTING

Locating individual homes is one of the most difficult tasks facing emergency responders. Every home should have the address clearly posted with numbers at least three inches high. The colors of the address posting should be contrasting or reflective. The address should be posted so that it is visible to cars approaching from either direction.

ACCESS

Unfortunately, limited access may prevent firefighters from reaching many homes in the planning area. Many of the access problems occur at the property line and can be improved by homeowners. First, make sure that emergency responders can get in your gate. This may be important not only during a fire but also to allow access during any other type of emergency response. If you will be gone for long periods during fire season, make sure a neighbor has access, and ask them to leave your gate open in the event of a wildfire in the area.

Ideally, gates should swing inward. A chain or padlock can be easily cut with large bolt cutters, but large automatic gates can prevent entry. Special emergency access red boxes with keys are sold by many gate companies but are not recommended by emergency services. The keys are difficult to keep track of and may not be available to the specific personnel that arrive at your home. An alternative offered by some manufacturers is a device that opens the gate in response to sirens. This option is preferred by firefighters but may be difficult or expensive to obtain.

Beyond your gate, make sure your driveway is uncluttered and at least 12 feet wide. The slope should be less than 10%. Trim any overhanging branches to allow at least 13.5 feet of overhead clearance. Also make sure that any overhead lines are at least 14 feet above the ground. If any lines are hanging too low, contact the appropriate phone, cable, or power company to find out how to address the situation.

If possible, consider a turnaround within your property at least 45 feet wide. This is especially important if your driveway is more than 300 feet in length. Even small fire engines have a hard time turning around

and cannot safely enter areas where the only means of escape is by backing out. Any bridges must be designed with the capacity to hold the weight of a fire engine.

NEIGHBORHOOD COMMUNICATION

It is important to talk to your neighbors about the possibility of wildfire in your community. Assume that you will not be able to return home when a fire breaks out and may have to rely on your neighbors for information and assistance. Unfortunately, it sometimes takes tragedy to get people talking to each other. Don't wait for disaster to strike. Strong communication can improve the response and safety of every member of the community.

PHONE TREES

Many neighborhoods use phone trees to keep each other informed of emergencies within and around the community. The primary criticism is that the failure to reach one person high on the tree can cause a breakdown of the system. However, if you have willing and able neighbors, particularly those that are at home during the day, the creation of a well-planned phone tree can often alert residents to the occurrence of a wildfire more quickly than media channels. Talk to your neighborhood association about the possibility of designing an effective phone tree.

NEIGHBORS IN NEED OF ASSISTANCE

Ask mobility-impaired neighbors if they have notified emergency responders of their specific needs. It is also a good idea for willing neighbors to commit to evacuating a mobility-impaired resident in the event of an emergency. Make sure that a line of communication is in place to verify the evacuation.

ABSENTEE OWNERS

Absentee owners are often not in communication with their neighbors. If a home near you is unoccupied for large portions of the year, try to get contact information for the owners from other neighbors or your neighborhood association. Your neighbors would probably appreciate notification in the event of an emergency. Also, you may want to contact them to suggest that they move their woodpile or make sure that the propane line to the house is turned off.

HOUSEHOLD EMERGENCY PLAN

A household emergency plan does not take much time to develop and will be invaluable in helping your family deal with an emergency safely and calmly. One of the fundamental issues in the event of any type of emergency is communication. Be sure to keep the phone numbers of neighbors with you rather than at home.

It is a good idea to have an out of state contact, such as a family member. When disaster strikes locally, it is often easier to make outgoing calls to a different area code than local calls. Make sure everyone in the family has the contact phone number and understands why they need to check in with that person in the event of an emergency. Also, designate a meeting place for your family. Having an established meeting site helps to ensure that family members know where to go, even if they can't communicate by phone.

CHILDREN

Local schools have policies for evacuation of students during school hours. Contact the school to get information on how the process would take place and where the children would likely go.

The time between when the children arrive home from school and when you return home from work is the most important time frame that you must address. Fire officials must clear residential areas of occupants to protect lives and to allow access for fire engines and water drops from airplanes or helicopters. If your area is evacuated, blockades may prevent you from returning home to collect your children. It is crucial to have a plan with a neighbor for them to pick up your children if evacuation is necessary.

PETS AND LIVESTOCK

Some basic questions about pets and livestock involve whether you can evacuate the animals yourself and where you would take them. Planning for the worst-case scenario may save your animals. An estimated 90% of pets left behind in an emergency do not survive. Don't expect emergency service personnel to prioritize your pets in an emergency. Put plans in place to protect your furry family members.

PETS

Assemble a pet disaster supply kit and keep it handy. The kit should contain a three-day supply of food and water, bowls, a litter box for cats, and a manual can opener if necessary. It is also important to have extra medication and medical records for each pet. The kit should contain a leash for each dog and a carrier for each cat. Carriers of some kind should be ready for birds and exotic pets. In case your pet must be left at a kennel or with a friend, also include an information packet that describes medical conditions, feeding instructions, and behavioral problems. A photo of each pet will help to put the right instructions with the right pet.

In the event of a wildfire you may be prevented from returning home for your animals. Talk to your neighbors and develop a buddy system in case you or your neighbors are not home when fire threatens. Make sure your neighbor has a key and understands what to do with your pets should they need to be evacuated.

If you and your pets were evacuated, where would you go? Contact friends and family in advance to ask whether they would be willing to care for your pets. Contact hotels and motels in the area to find out which ones accept pets. Boarding kennels may also be an option. Make sure your pets' vaccinations are up to date if you plan to board them.

Once you have evacuated your pets, continue to provide for their safety by keeping them cool and hydrated. Try to get your pets to an indoor location rather than leaving them in the car. Do not leave your pets in your vehicle without providing shade and water. It is not necessary to give your pets water while you are driving but be sure to offer water as soon as you reach your destination.

LIVESTOCK

Getting livestock out of harm's way during a wildfire is not easy. You may not be able or allowed to return home to rescue your stock during a wildfire evacuation. Talk to your neighbors about how you intend to deal with an evacuation. If livestock are encountered by emergency responders, they will be released and allowed to escape the fire on their own. Make sure your livestock have some sort of identification. Ideally, your contact information should be included on a halter tag or ear tag so that you could be reached if your animal is encountered.

If you plan to evacuate your livestock, have a plan in place for a destination. Talk to other livestock owners in the area to find out whether they would be willing to board your stock in the event of an emergency. Often in large-scale emergencies, special accommodations can be made at fair and rodeo grounds, but personal arrangements may allow you to respond more quickly and efficiently.

If you do not own a trailer for your horses or other livestock, talk to a neighbor who does. Find out whether they would be willing to assist in the evacuation of your animals. If you do own a trailer, make sure it is in working condition with good, inflated tires and functioning signal lights. Keep in mind that even horses that are accustomed to a trailer may be difficult to load during an

emergency. Practicing may be a good idea to make sure your animals are as comfortable as possible when being loaded into the trailer.

HOUSE AND PROPERTY

Insurance companies suggest that you make a video that scans each room of your house to help document and recall all items within your home. This video can make replacement of your property much easier in the unfortunate event of a large insurance claim. See more information on insurance claims in the "After the Fire" section below.

PERSONAL ITEMS

During fire season, items you would want to take with you during an evacuation should be kept in one readily accessible location. As an extra precaution, it may be a good idea to store irreplaceable mementos or heirlooms away from your home during fire season.

It is important to make copies of all of your important household paperwork, such as birth certificates, titles, and so forth. Store them away from your home, such as in a safe deposit box. Important documents can also be protected in a designated firesafe storage box within your home.

IN THE EVENT OF A FIRE

NOTIFICATION

In the event of a wildfire, announcements from the local Emergency Management office will be broadcast over local radio and television stations. Media notification may be in the form of news reports or the Emergency Alert System (EAS). On television, the emergency management message will scroll across the top of the screen on local channels. The notice is not broadcast on non-local satellite and cable channels.

One good way to stay informed about wildfire is to use a National Oceanic and Atmospheric Administration weather alert radio. The radios can be purchased at most stores that carry small appliances, such as Target, Sears, or Radio Shack. The radio comes with instructions for the required programming to tune the radio to your local frequency. The programming also determines the types of events for which you want to be alerted. The weather alert radio can be used for any type of large incident (weather, wildfire, hazardous materials, etc.), depending on how it is programmed. Local fire personnel can assist with programming if needed.

WHEN FIRE THREATENS

Before an evacuation order is given for your community, there are several steps you can take to make your escape easier and to provide for protection of your home. When evaluating what to do as fire threatens, the most important guideline is: **DO NOT JEOPARDIZE YOUR LIFE.**

Back your car into the garage or park it in an open space facing the direction of escape. Shut the car doors and roll up the windows. Place all valuables that you want to take with you in the vehicle. Leave the keys in the ignition or in another easily accessible location. Open your gate.

Close all windows, doors, and vents, interior doors, and i your garage door. Disconnect automatic garage openers. Leave exterior doors unlocked. Move furniture away from windows and sliding glass doors. If you have lightweight curtains, remove them. Heavy curtains, drapes, and blinds should be closed. Leave a light on in each room.

Turn off the propane tank or shut off gas at the meter. Turn off pilot lights on appliances and furnaces.

Move firewood and flammable patio furniture away from the house or into the garage.

Connect garden hoses to all available outdoor faucets and make sure they are in a conspicuous place. Turn the water on to "charge," or fill your hoses and then shut off the water.

Place a ladder up against the side of the home, opposite the direction of the approaching fire, to allow firefighters easy access to your roof.

EVACUATION

When evacuation is ordered, you need to go *immediately*. Evacuation not only protects lives; it also helps to protect property. Some roads are too narrow for two-way traffic, especially with fire engines. Fire trucks often can't get into an area until the residents are out. Also, arguably the most important tool in the WUI toolbox is aerial attack. Airplanes and helicopters can be used to drop water or retardant to help limit the spread of the fire, but these resources cannot be used until the area has been cleared of civilians.

Expect emergency managers to designate a check-out location for evacuees. This process helps to ensure that everyone is accounted for and informs emergency personnel as to who may be remaining in the community. Every resident should check out at the designated location before proceeding to any established family meeting spot.

A light-colored sheet closed in the front door serves as a signal to emergency responders that your family has safely left. This signal saves firefighters precious time, as it takes 12–15 minutes per house to knock on each door and inform residents of the evacuation.

AFTER THE FIRE

RETURNING HOME

First and foremost, follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Do not attempt to return to your home until fire personnel have deemed it safe to do so.

Even if the fire did not damage your house, do not expect to return to business as usual immediately. Expect that utility infrastructure may have been damaged and repairs may be necessary. When you return to your home, check for hazards, such as gas or water leaks and electrical shorts. Turn off damaged utilities if you did not do so previously. Have the fire department or utility companies turn the utilities back on once the area is secured.

INSURANCE CLAIMS

Your insurance agent is your best source of information as to the actions you must take in order to submit a claim. Here are some things to keep in mind. Your insurance claim process will be much easier if you photographed your home and valuable possessions before the fire and kept the photographs in a safe place away from your home. Most if not all of the expenses incurred during the time you are forced to live outside your home could be reimbursable. These could include, for instance, mileage driven, lodging, and meals. Keep all records and receipts. Don't start any repairs or rebuilding without the approval of your claims adjuster. Beware of predatory contractors looking to take advantage of anxious homeowners wanting to rebuild as quickly as possible. Consider all contracts very carefully, take your time to decide, and contact your insurance agent with any questions. If it appears to be a large loss, consider whether you should hire a public adjuster that is licensed by the state department of insurance who will represent and advocate for you as the policyholder in appraising and negotiating the claimant's insurance claim to ensure you get the best outcome and recovery from your insurance company. Most public adjusters charge a small percentage of the settlement that is set by the state and primarily they appraise the damage, prepare an estimate and other claim documentation, read the policy of insurance to determine coverages, and negotiate with the insurance company's claims handler.

POST-FIRE REHABILITATION

Homes that may have been saved in the fire may still be at risk from flooding and debris flows. Burned Area Emergency Rehabilitation (BAER) teams are professionals who work to mitigate the effects of post-fire flooding and erosion. These teams often work with limited budgets and manpower. Homeowners can assist the process by implementing treatments on their own properties as well as volunteering on burned public lands to help reduce the threat to valuable resources. Volunteers can assist BAER team members by planting seeds or trees, hand mulching, or helping to construct straw-bale check dams in small drainages.

Volunteers can help protect roads and culverts by conducting storm patrols during storm events. These efforts dramatically reduce the costs of such work as installing trash racks, removing culverts, and re-routing roads.

Community volunteers can also help scientists to better understand the dynamics of the burned area by monitoring rain gauges and monitoring the efficacy of the installed BAER treatments.

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APPENDIX H:
Community Outreach

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PUBLIC OUTREACH

Table H.1 presents examples of the public outreach completed as part of the CWPP development. Due to the COVID-19 pandemic, public gatherings were not permitted. Therefore, online resources were used to provide information to the public and solicit feedback. Figures H.1 through H.4 show examples of online posts.

Table H.1. Public Outreach Resources

Resource Description	Location	URL	Figure Number	Date Published
Newspaper article	Santa Fe Reporter	Link not available	n/a	Week of September 21, 2020
Social media post	Next Door	Link	1	July 29, 2020
Social media post	Next Door	Link	n/a	August 21, 2020
Online news article	Santa Fe Today	Link	n/a	n/a
Website post	New Mexico Fire Information	Link	2	July 30, 2020
Social media post	Twitter: New Mexico Fire Information	Link	3	July 30, 2020
Social media post	Facebook: New Mexico Fire Information	Link	4	July 30, 2020
Social media post	Twitter: New Mexico State Forestry	Link	n/a	July 25, 2020
Social media post	Twitter: WUI Santa Fe Fire	Link	n/a	July 29, 2020
Social media post	Twitter: Southwest Fire Consortium	Link	n/a	August 25, 2020
Social media post	Twitter: Cibola National Forest & Grasslands	Link	n/a	July 30, 2020
ArcGIS story map	ArcGIS Online	Link	5-8	July 28, 2020
Podcast	The Richard Eeds Show	Link	n/a	August 20, 2020

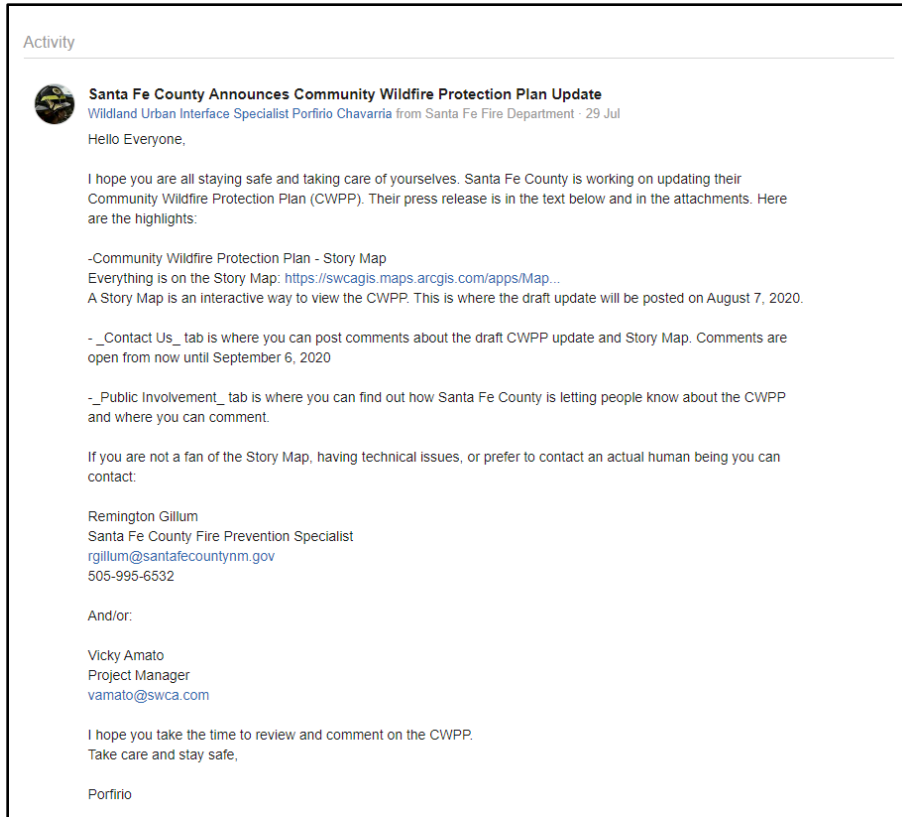


Figure H.1. Next Door post regarding CWPP from the Santa Fe County Fire Department.



Figure H.2. New Mexico Fire Information post regarding CWPP from the BLM.



Figure H.3. Twitter post from New Mexico Fire Information regarding CWPP.

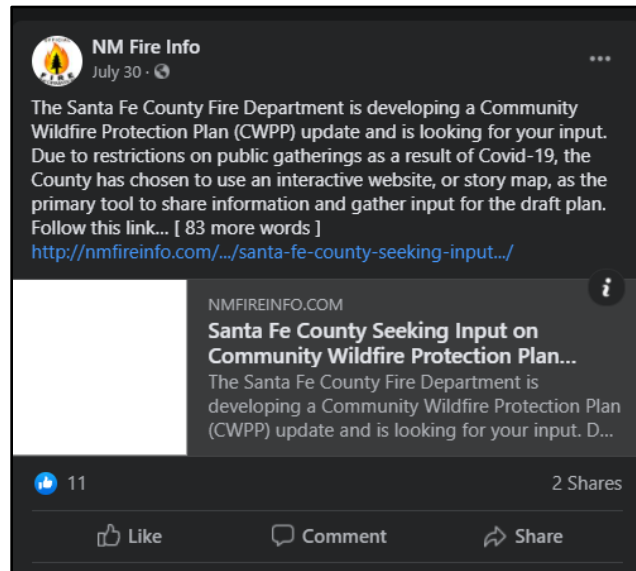


Figure H.4. Facebook post from New Mexico Fire Information regarding CWPP.

The County developed the CWPP story map (online content, link in Table H.1) to accommodate engagement with the public during the COVID-19 pandemic. The story map provides opportunities for both information sharing and gathering between the public and the Core Team. The story map has several tabs, each demonstrating information from various chapters in the CWPP document. The introductory tab presents the purpose of the story map, project history, instructions for navigating the content, and the National Cohesive Wildland Fire Management Strategy framework (Figure H.5). Next, the public involvement tab invites viewers to view the Santa Fe County Fire Department press release (text included in the July 29, 2020, Next Door posting [see Table H.1]), listen to the radio interview podcast (see Table H.1), and view the informational flyer from the Santa Fe County Fire Department. The fire environment, values at risk, WUI hazard and risk assessment, mitigation strategies, and monitoring and evaluation strategies tabs present the bulk of the CWPP content (Figures H.6 and H.7). These tabs introduce the WUI concept, fire regimes and fire history in the County, information regarding County fire planning and response, County values at risk from wildfire, areas with high versus low risk, wildfire mitigation actions, and monitoring strategies for applied treatments.

The story map also links the viewer to the CWPP document and contact information for the Santa Fe County fire prevention specialist and the CWPP project manager. The figures below (H.5–H.7) demonstrate the spatial information that is conveyed through the story map. Each map is interactive, with several clickable layers providing information on numerous aspects of wildfire, including but not limited to communities in high-risk areas, vegetation and fuels, current mitigation projects, and fire behavior.

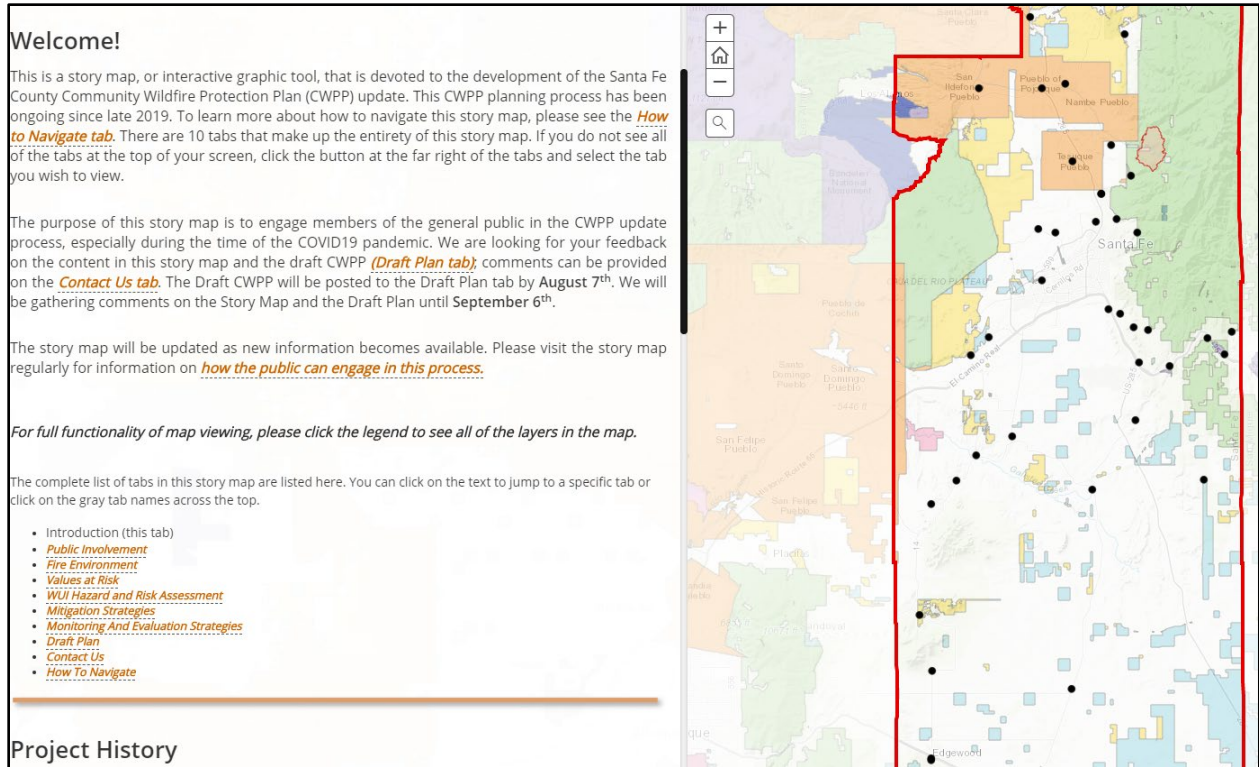


Figure H.5. CWPP story map introduction tab sample.

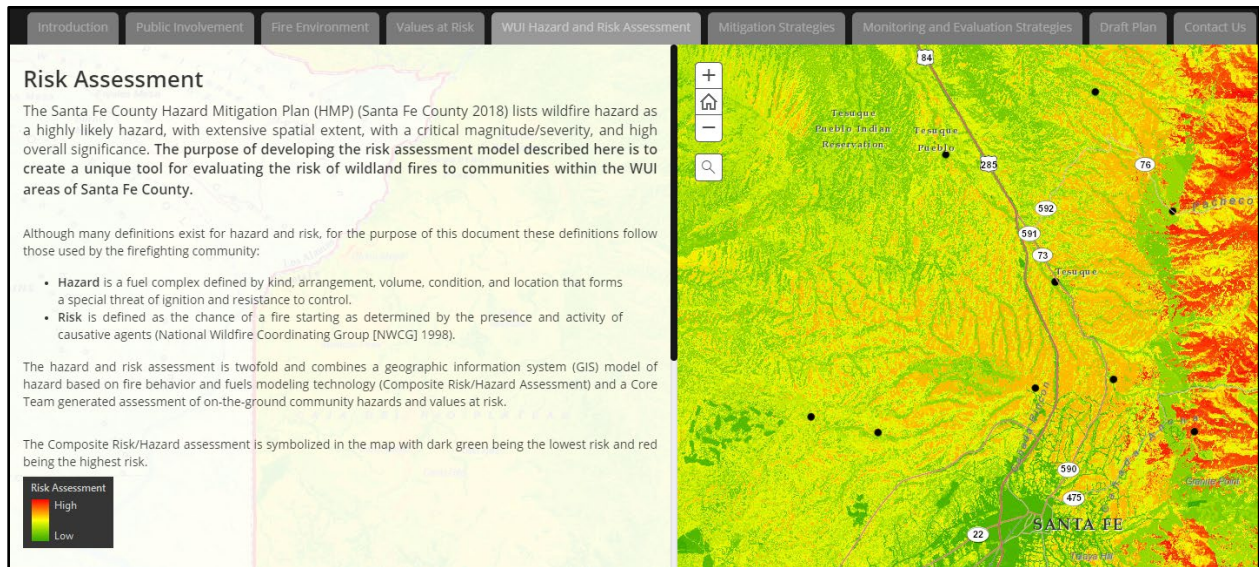


Figure H.6. CWPP story map WUI hazard and risk assessment tab sample.

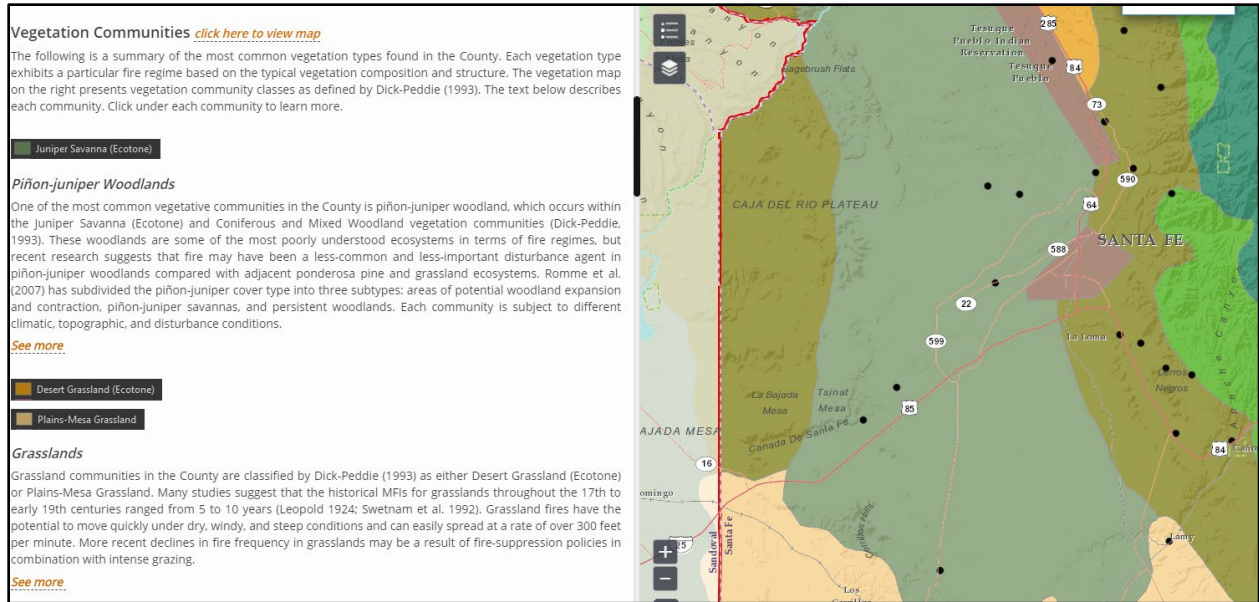


Figure H.7. Story map WUI hazard and risk assessment tab sample.

The story map tool allowed the project team to assess the number of views per day. Figure H.8 shows the average number of views per day and related graphical information. The number of views from July 17, 2020 (when the story map was originally posted for Core Team review) through September 15, 2020, was 978, and the average number of views per day was just over 16 (see Figure H.8).

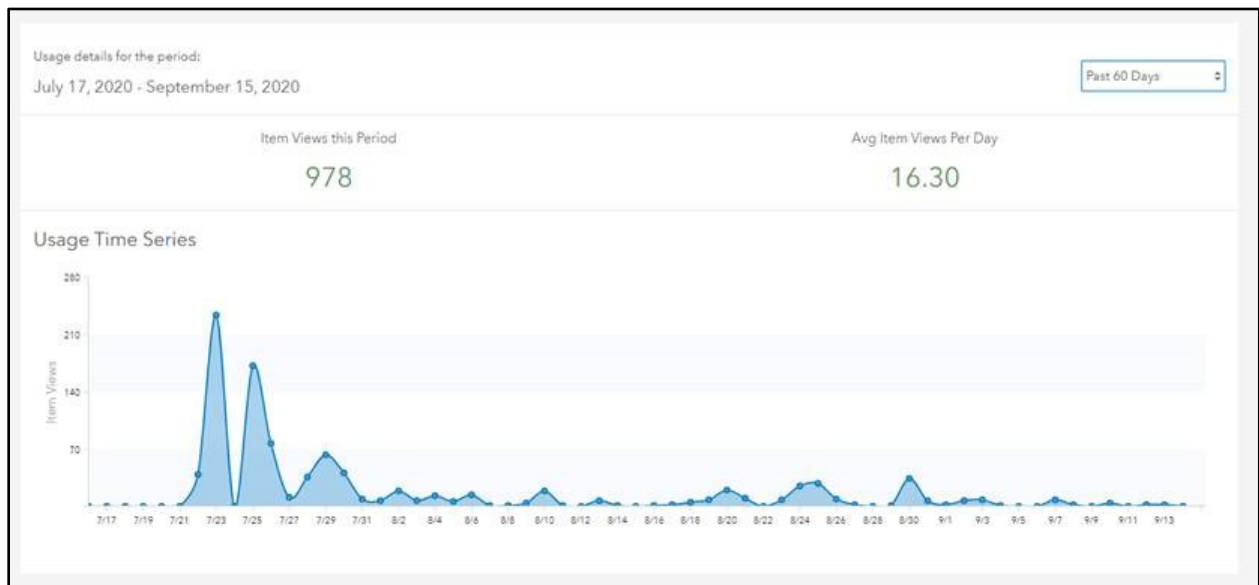


Figure H.8. Story map views from July 17 through September 13, 2020.

Henry P. Roybal
Commissioner, District 1

Anna Hansen
Commissioner, District 2

Rudy N. Garcia
Commissioner, District 3



SANTA FE COUNTY

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Commissioner, District 5

Katherine Miller
County Manager

The entities listed below participated in the development of and/or reviewed and are in support of the Santa Fe County Community Wildfire Protection Plan:

Signature

Katherine Miller, Santa Fe County Manager

12-4-2020
Date

Approved as to form:

Roberta D. Joe for G.S.S.

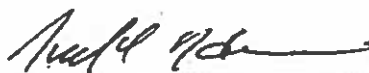
12/2/2020

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Date

Santa Fe County Finance Director 12/3/2020

The entities listed below participated in the development of and/or reviewed and are in support of the Santa Fe County Community Wildfire Protection Plan:



Signature

Name (printed)

Date

District Forester – Bernalillo District NMSF
Agency /Position (printed)



Santa Fe County Fire Department



The entities listed below participated in the development of and/or reviewed and are in support of the Santa Fe County Community Wildfire Protection Plan:



Signature

Erik Litzenberg

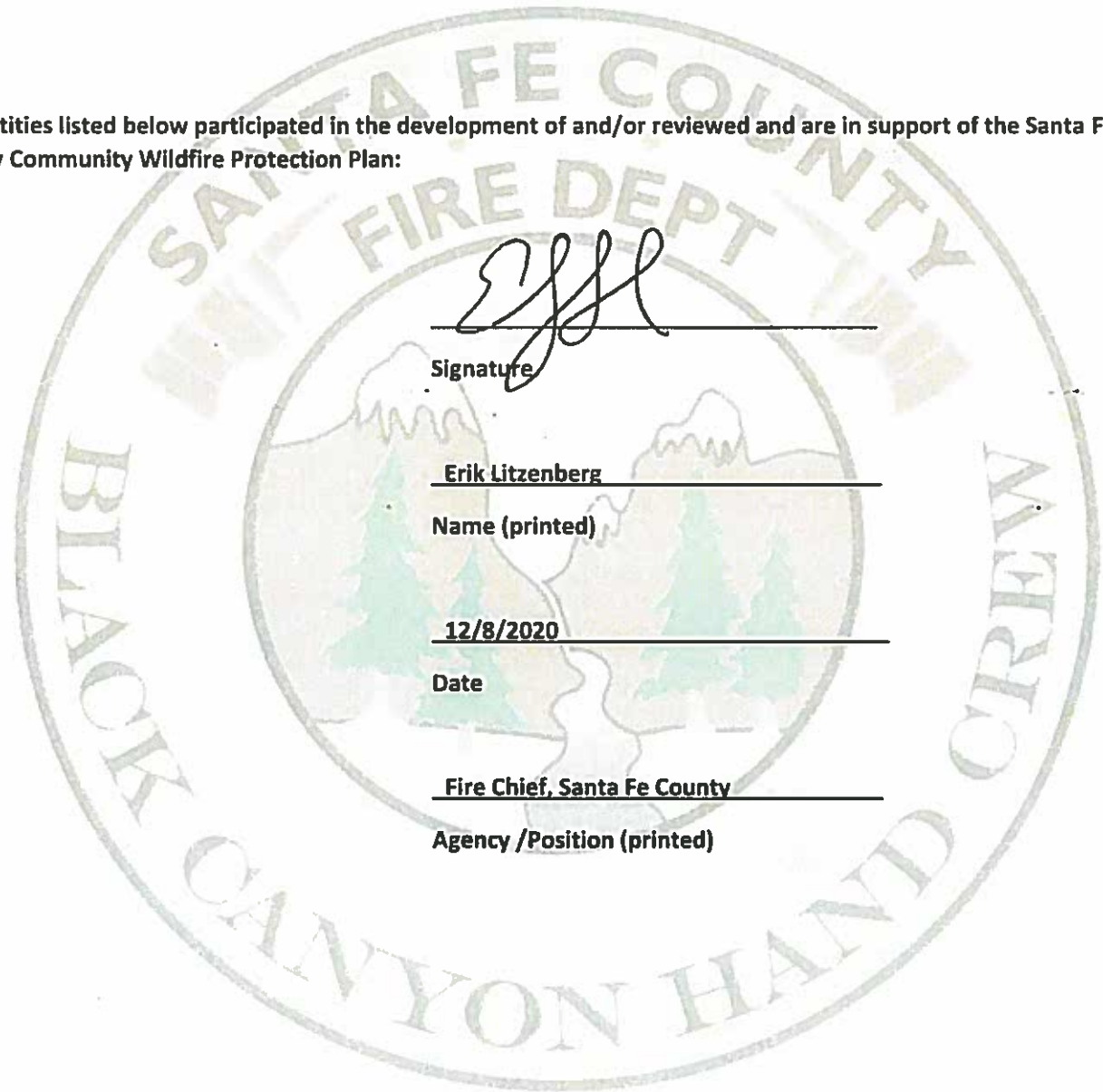
Name (printed)

12/8/2020

Date

Fire Chief, Santa Fe County

Agency /Position (printed)





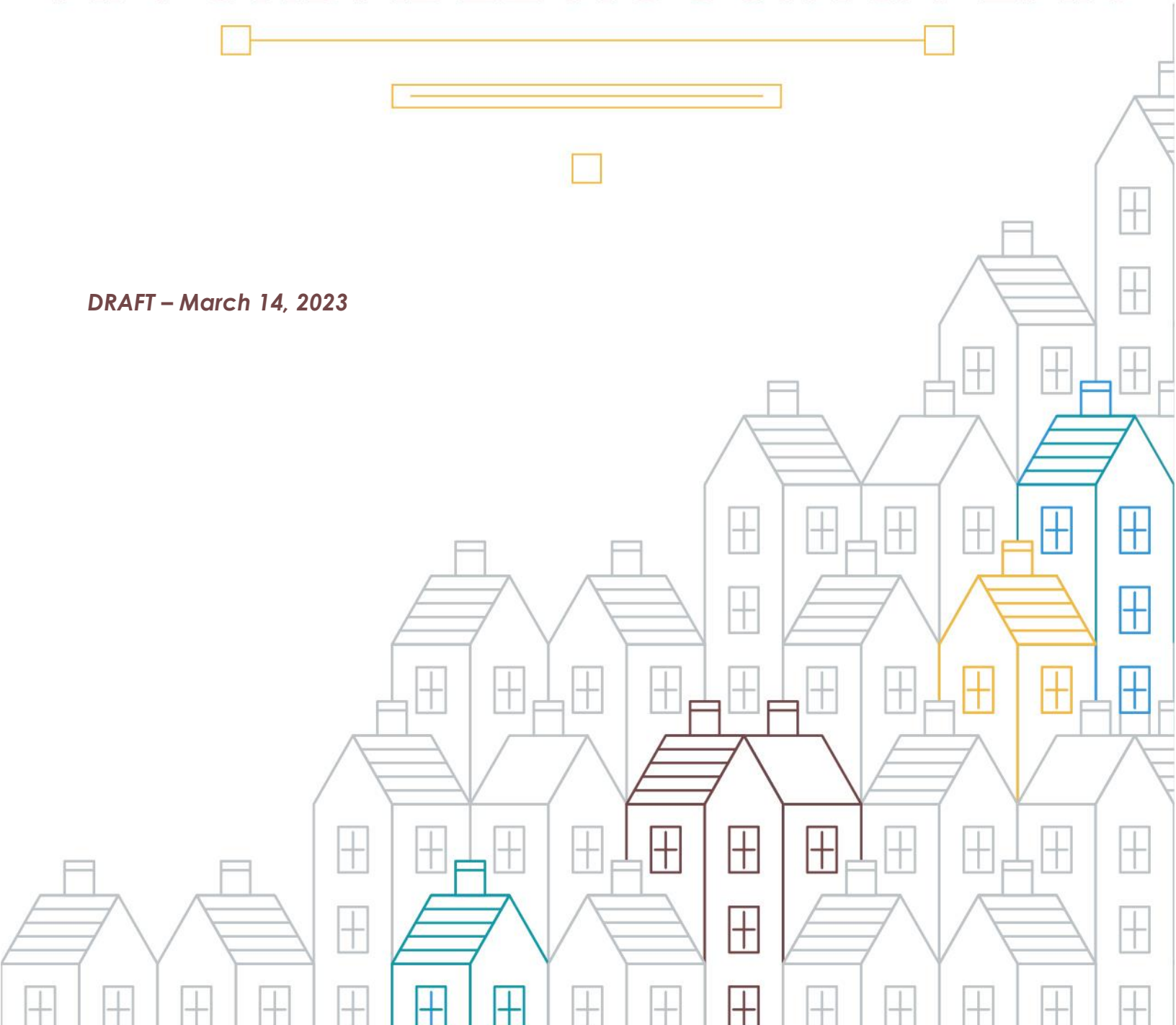
Appendix I: Affordable Housing Plan



AFFORDABLE HOUSING PLAN



DRAFT – March 14, 2023



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Thank you to the following funders, elected officials, and community stakeholders:

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Anna T. Hamilton, Chairperson (District 4)
Hank Hughes, Commissioner (District 5)

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EXECUTIVE SUMMARY

Background

The Santa Fe County Affordable Housing Plan documents a wide-ranging and multi-faceted housing crisis contributing to economic and social uncertainty due to housing-price escalations, a lack of housing supply, restrictive housing policies, and a lack of supportive programs. The County utilizes a successful variety of affordable housing programs and policies, however more programs are necessary to satisfy existing needs and systematic change is necessary to decrease the amount of support needed. This plan recommends a series of new and expanded programs and policy changes designed to increase housing services, encourage long-term accessible and affordable housing, and improve sustainable land use practices.

Purpose

The principal purpose of this plan is to establish compliance with the New Mexico Affordable Housing Act by demonstrating a need for affordable housing services and justification for financial support. This plan is the result of a public involvement process and analysis of data and best practices. The views expressed herein are those of the authors and are intended to offer policy options and guidance to the County. However, the recommendations contained in this plan do not mandate the implementation or alteration of policies or programs by the County. The implementation or alteration of Santa Fe County policies related the recommendations made in this plan to support affordable housing initiatives may be adopted by future resolutions of the Board of County Commissioners of Santa Fe County. The plan will be adopted in conjunction with Ordinance No. _____ to establish the County's Housing Assistance Grant/Loan Programs to permit the County to provide public, financial support for affordable housing initiatives. Ordinance No. _____ does not amend or supersede the Sustainable Land Development Code (SLDC), but this plan does offer recommendations on regulatory changes to the SLDC that would further promote the creation of affordable housing in the County.

Methodology

This plan analyzes data from the Santa Fe County Housing Data Report (2021) drafted by the University of New Mexico Bureau of Business and Economic Research, American Community Survey data (2019, 2020,

Executive Summary

and 2021; 1-year & 5-year), Decennial Census data (2020), and data available through City, County, and local sources (see Data Sources & Analysis, pg. 17). This plan also relies heavily on local knowledge and experiences. County Staff and an advisory committee of local experts worked throughout the entire process to craft and direct content. Additional contributions were provided by housing service providers and housing developers who shared stories of success and failure in trying to provide additional housing options in Santa Fe County.

Organization of the Plan

The **Executive Summary** summarizes the scope of Santa Fe County's affordable housing crisis and the contents of the Plan.

Chapter 1, **Community Profile**, provides analysis into County demographics, specifically identifying households with special housing needs including homelessness, those with mobility disabilities, and seniors.

Chapter 2, **Housing Profile and Analysis**, looks at housing occupancy, affordability and existing costs for owners and renters, trends in the housing market, and the cost of various types of residential development.

Chapter 3, **Housing Needs Assessment**, looks both at the need for additional housing units (housing shortage) and the need for specific types of housing assistance or amenities based on different demographics, and population estimates performed in the County.

Chapter 4, **Land Use & Policy Review**, identifies Santa Fe County land use regulations and policies which can be modified to facilitate the construction of affordable housing. The chapter also suggests two general strategies to enhance the creation of more affordable housing in the County.

Finally, Chapter 5, **Goals, Policies, & Objectives**, describes new projects and strategies to address affordable housing needs and reduce structural challenges for new affordable development. The chapter also recommends quantitative targets for the construction and rehabilitation of housing units.

Recommendations

The plan has three main recommendations for Santa Fe County:

1. **Incentivize Affordable Housing** by modifying existing structural challenges for development and providing financial incentives which encourage and enable the development of housing affordable to low- and moderate-income households.
2. Remedy barriers preventing the adequate supply housing through the passage of **Pro-Housing Land Use Policies** which address long-term, comprehensive, housing affordability and market health.
3. **Expand, Strengthen and Fund Housing Assistance Programs** which directly assist families and individuals in need. This includes County support for non-profit partners who operate shelters, provide housing support services, or who rehabilitate housing units. This also includes County-administered programs like the creation of a Housing Trust Fund, Down Payment Assistance, Foreclosure Assistance, Home Buying Financing Assistance, Housing Choice Vouchers, Family Self Sufficiency and Renter Assistance Programs, Inclusionary Zoning, a County-created Third-Party Development entity, and the use of County and publicly owned land to develop affordable housing.

Key Findings & Concepts

Santa Fe County is experiencing a housing crisis which profoundly impacts its livability, economy, and culture. The Santa Fe County Affordable Housing Plan (the Plan) permits the County to administer and support affordable housing services and affordable housing development. The Plan provides an analysis of important community data, calculates various types of housing needs, identifies barriers to the development of affordable housing, and recommends strategies and programs to increase housing affordability. Although the Plan only applies to the unincorporated areas of Santa Fe County, data analysis includes incorporated municipalities such as the City of Santa Fe and portions of Espanola and Edgewood.

Housing Crisis

The Santa Fe housing crisis is wide-ranging and multi-faceted. Several hundred families, or households, lack stable and secure homes and more than twenty thousand families struggle to afford their existing housing. This results in about a third of County residents at risk of being displaced due to unaffordable or inaccessible housing. Data reviewed for this plan shows that, every year, approximately ten thousand Santa Fe residents migrate out of Santa Fe County and either find new jobs and communities elsewhere or join the tens of thousands of commuters who work in Santa Fe but live outside of the community.

Available data suggests that Santa Fe County housing is becoming increasingly unaffordable for families with average incomes, especially those with less saved wealth; and that current tools and efforts, while helpful, have not adequately addressed the fundamental factors causing the housing crisis.

Two different but closely connected trends are noticeable in this crisis:

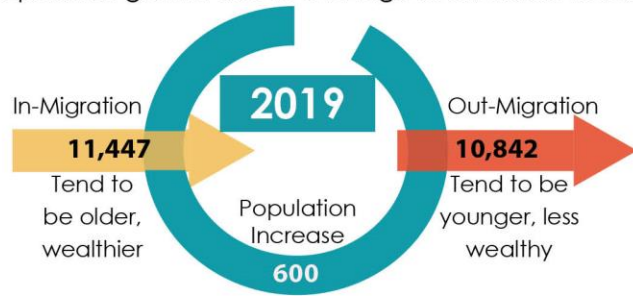
1. Housing prices have been rising rapidly and at rates much faster than the growth of household incomes, leading to a disparity in which low-, moderate-, and even higher-income households are increasingly unable to afford to live in Santa Fe County.
2. The existing quantity, or supply, of housing is low relative to demand – making it increasingly difficult for families to find adequate housing, even when they can afford it. The result further increases the cost of housing but also results in a more exclusive and competitive market that shuts out young families and County natives—including those who work in the community.

Figure 1 Summary Findings & Recommendations

SANTA FE COUNTY AFFORDABLE HOUSING PLAN - PRINCIPAL FINDINGS

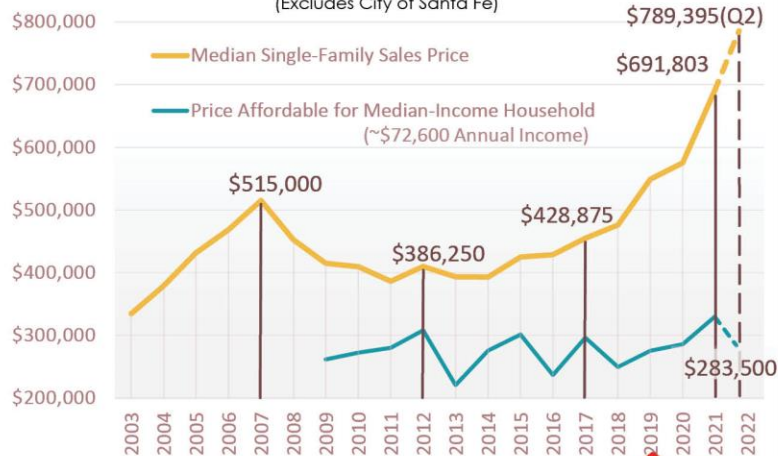
COMMUNITY CHANGES

Lots of new people moving in & existing people moving out (~5-9% of population leaving annually) but low overall population growth due to shortage of available housing.



HOUSING PRICES

Santa Fe County Median Single-Family Housing Sales Prices
(Excludes City of Santa Fe)



Median Single-Family Housing Sales Price:
\$691,803 (2021)
\$789,395 (Q2 2022)

Average Rent:
\$1,528 (2021)

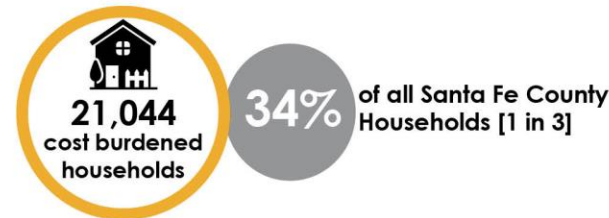
2016 - 2021 Trends:

Income NOT Keeping up with Rising Housing Costs



AFFORDABLE HOUSING CRISIS

\$ only 10% of households have incomes that can afford a median priced single-family home
Assuming a minimal down payment for Santa Fe County Residents



34% of all Santa Fe County Households [1 in 3]

6,232 subsidized or affordable rental units needed (at prices less than \$1400 per month)

HOUSING SHORTAGE



>17,000 ADDITIONAL HOUSING UNITS

Needed between **2022** and **2025** to accommodate existing employees and residents

PRIMARY RECOMMENDATIONS

HOUSING PROGRAMS & SERVICES

- Housing Trust Fund
- Rehab Program
- Down Payment Assistance
- Inclusionary Zoning
- Foreclosure Prevention
- Public Development Entity
- County Land Disposition
- Loan Program
- Rental Assistance
- Developer Incentives
- Financing Assistance
- Public Housing
- Housing Choice Vouchers

HOUSING SUPPLY STRATEGIES

Suggested Minimum Affordable Housing Densities:

Housing for Purchase: 10 du/acre
Housing for Rent: 14 - 20 du/acre

Land Use Strategy #1 - Incentivize Affordable Housing

- Allow Affordable Density by-right
- Remove Housing Barriers
- Streamline Approvals
- Allow Development Flexibility
- Expand Inclusionary Zoning

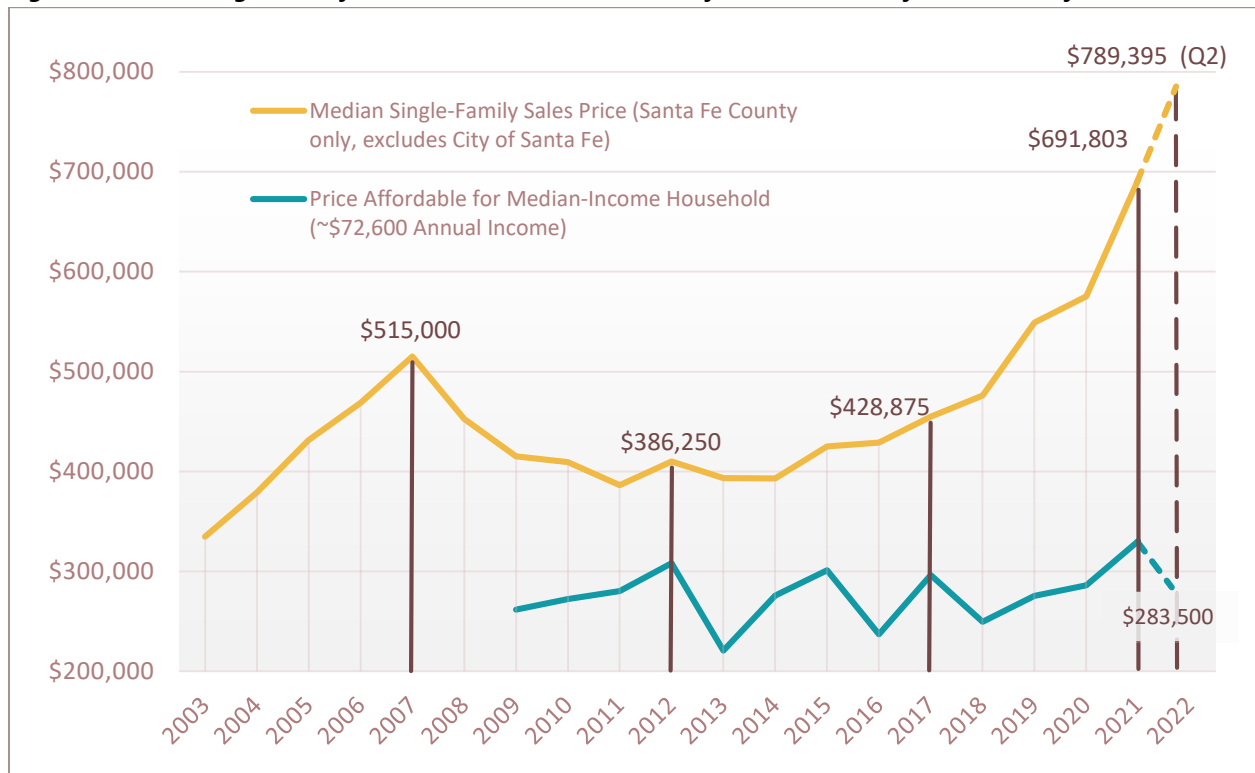
Land Use Strategy #2 - Equity & Affordability Code Updates

- Remove Systemic/Exclusionary Barriers to Affordable Housing
- Reduce Redundant Procedures
- Improve Consistency & Clarity

Escalating Housing Prices

The price of housing has been increasing rapidly in Santa Fe County. Between 2016 and 2021, the median annual income rose by only 16 percent yet average rental rates increased by an unprecedented 58 percent and average single-family home purchase prices increased by 61 percent. Average monthly rental rates have nearly doubled since 2012 and, in the past year, the price for single-family homes rose nearly 14 percent (2021-2022). This creates an ever-widening gap between the price of housing affordable for median-income households and the market price of available housing (See Figure 2 **Error! Reference source not found.**).

Figure 2 Median Single-Family Sales Prices versus Affordability (Santa Fe County, Excludes City of Santa Fe)



Source: Santa Fe Association of Realtors (2022); Santa Fe County (2022)

Families looking to purchase a home in Santa Fe County quickly confront the reality that an average single-family home is unaffordable for 90 percent of households (unless they have several hundred thousand dollars to put towards a down payment). A typical three-person household is estimated to make about \$73,000 per year, can afford a monthly mortgage payment of about \$1,800 (30% of gross income), and can likely afford a mortgage of about \$275,000 (see Table 5, "Affordability Calculations," page 32).

The average (median) single-family home in Santa Fe County is \$790,000 as of 2022 (excluding the City of Santa Fe). To provide an example demonstrating the disparity in housing accessibility, consider the fact that an average or median income household has an annual income of approximately \$72,600 and should

Executive Summary

have a monthly mortgage payment of \$1,800 or less and a total mortgage of about \$275,000 or less¹. If the average household wanted to purchase an average home (\$790,000) and wanted a relatively affordable monthly mortgage payment, they would need a down payment of about \$515,000² to cover the gap between the purchase price of the home (\$790,000) and the mortgage they can afford (275,000)³. Even for higher-income households making \$145,000 annually, a down payment of approximately \$240,000 would be needed to achieve an affordable mortgage.

To afford the average single-family home and with a 3% – 20% down payment, a family should probably have an income of between \$175,000 and \$200,000.

Unless a family has a large down payment to shrink the total mortgage, the high cost of home prices likely excludes service workers, professionals, and almost all Santa Fe County employees. In fact, only about 10% of households in Santa Fe County have incomes which can afford the average single-family home with a standard down payment (3-20% down). This disparity of access to housing for County residents is concerning for employers of all types as wages are often insufficient to keep employees who lack affordable, long-term housing in Santa Fe.

There are various factors contributing to escalated housing prices, many of which are difficult, if not impossible, for local governments to remedy. Santa Fe County has become attractive for wealthier, out-of-state migrants and as a vacation destination, which serves to drive up the cost of housing. Labor and construction materials have been getting more difficult to find and more expensive to source over the past several years. Wages for working families have been relatively flat compared to a rising cost of living. The distribution of wealth between the haves and the have-nots is growing. COVID and inflation have further exacerbated the problem. These forces are generally part of larger, macro-economic trends impacting the housing market and local governments tend to be fairly limited in their ability to directly mitigate market volatility and rising prices. Public, or non-market housing can be an effective strategy to insulate housing prices from volatile economic forces but is often intensive, limited in scale, and unpopular.

Two significant factors inflating housing costs that are firmly within the scope of local government are the regulation of housing supply and the barriers, or cost of compliance, imposed by local policies and regulations (e.g., zoning). Adequate supply satisfies the otherwise unmet demand for housing and housing services, is a relief for housing service providers, and moderates price escalation. The evaluation of land use barriers results in additional housing supply, lower minimum development costs, and can achieve more efficient, affordable housing units.

Lack of Adequate Housing Supply

¹ Housing costs are recommended to be no more than 30 percent of a family's gross income (see Table 5).

² Average down payments in New Mexico are in the range of \$20,000 to \$30,000.

³ Down Payment = Purchase Price – Mortgage



The lack of sufficient housing supply is a significant factor that escalates housing prices. A basic economic principle is that markets with high demand and low supply will result in higher costs for the same item. In the Santa Fe housing market, which has high demand and low supply, households with more financial resources out-compete households with less financial resources. Further, when the surplus of housing is non-existent (representing an exclusive and limited market) users struggling to secure access can lead to bidding wars that then create rapid price escalations. This competition drives the market price of existing housing upwards and encourages housing developers to produce more expensive, or luxury housing units rather than more affordable or moderately priced units.

This plan (and previous studies) has identified that Santa Fe County lacks sufficient housing supply. Many families are excluded from the community - not only because of the high cost of housing, but also due to a lack of housing availability. The supply of single-family homes for sale has been dwindling since 2009 and the rental market ran out of effective capacity around 2014 or 2015. Though the City of Santa Fe has recently begun permitting more multi-family residential units, there are not enough units being permitted through the County or the City to keep up with existing demands and population growth.

The lack of supply means that, even for families who can afford the high cost of housing, it is like a giant game of musical chairs to see who can stay and who must leave.

Supply and affordability are correlated, but consider a few instances about how a lack of housing affects the community - aside from higher prices:

- **Special Housing Needs and Preferences:** For families with special needs or preferences (e.g., ADA-access, larger family sizes, proximity to transit), the lack of supply results in many less opportunities to find housing adequate for the household. Even for families with satisfactory financial resources, the right type of housing might not be available due to the lack of housing options.
- **"Risky" Tenants:** Housing can be particularly challenging for families perceived as being "risky" tenants or those with less employment stability (e.g., students, newly hired employees, tenants with children or pets, professional artists). With high demand and limited supply, property managers can be pickier about who they choose to lease to and how they screen applicants. It is possible that more stringent screening can negatively impact certain demographics or affect the creative, eclectic, and unique composition of Santa Fe County.
- **Rental Assistance:** Both non-profit organizations and the Santa Fe County Housing Trust provide families with rental assistance that allows them to afford market-rate rental units. Due to the growing lack of housing supply, however, some families are sometimes unable to find housing – even with financial assistance. This both negatively impacts individuals who qualify for rental assistance and also limits the effectiveness in which housing service providers can help those in need.

Whether we consider long-time families that have been in Santa Fe for generations, the essential workers that keep the economy churning, committed community actors, or even professionals trying to work in Santa Fe County schools and businesses, the fact is that there is not enough available housing to support the rich community and economy of Santa Fe County.

Both renters and homebuyers are faced with escalating prices which can make remaining in Santa Fe County financially prohibitive. As of 2018, it was estimated that more than 24,000 commuters live outside of – and commute into – Santa Fe County (US Census Bureau LEHD, 2018). A commuter survey conducted by the City of Santa Fe in 2013 showed that most individuals who commute into Santa Fe and who were previous residents, moved out of the area because housing was too expensive, wasn't available, or wasn't adequate for their needs. This plan estimates that Santa Fe County (including incorporated areas) is short by more than 17,000 housing units. This estimate is calculated based on the unmet demand from in-commuters and existing residents⁴, and conservatively excludes speculative or projected economic growth related to, for instance, the expansion of Los Alamos National Laboratories (see page 51)

This plan additionally examined the unmet demand for special, or specific, housing needs (e.g., need for ADA-accessible housing). It is estimated that Santa Fe County (including incorporated areas) needs additional housing that can support 450-500 homeless or housing insecure households, 2,300 senior households, and 9,800 households with mobility disabilities. In addition, there are more than 8,000 low-income renters who pay more than 30% of their income for their existing housing and who could be eligible for rental assistance.

Housing and Disparate Impacts

A reflection point for Santa Fe County relates to whether local regulations and policies might inadvertently and disproportionately exclude lower-income, lower-wealth families from housing or impose disparate impacts on groups of people protected by the Civil Rights Act and the Fair Housing Act. This type of dialogue would likely involve a collective review of community ethics, inclusivity, and values. Regulations or policies which disproportionately exclude or impact people based on race, gender, or disability should also consider civil rights and the Fair Housing Act (Title VIII of the Civil Rights Act of 1968, 42 U.S.C. 3601–3619).

The Fair Housing Act prohibits housing discrimination related to protected characteristics⁵ such as race, gender, or disability. Guidance by the US Department of Housing and Urban Development has further mandated that, for cities and counties to affirmatively further fair housing (AFFH⁶), they must proactively and meaningfully “overcome patterns of segregation, promote fair housing choice, eliminate disparities in opportunities, and foster inclusive communities free from discrimination” (Federal Register: 86 FR 30779).

Initial data analysis suggests that racial segregation and the disproportionate displacement of protected classes is inadvertently increasing within the county - primarily due to increasing housing prices and a lack

⁴ Shortage of housing units calculated by estimating a relatively low population growth (5,074 for 2019-2025), unmet demand from existing residents (2,573), the estimated number of in-commuters who want to relocate in Santa Fe (12,169), and recognizing that approximately 2,600 units have been added in 2020 and 2021.

⁵ Characteristics protected by Title VIII of the Civil Rights Act include race, color, national origin, religion, sex (including gender identity and sexual orientation), familial status, and disability.

⁶ See www.hud.gov/AFFH

of available housing. As homes become less affordable, households identifying as Hispanic, Native American, or headed by Women and which have proportionately lower incomes are displaced at a disproportionate rate. Similarly, when less housing is available, it becomes increasingly difficult for households requiring special accommodations for particular physical needs, such as ADA-accessibility, to find adequate housing. To achieve housing policies which satisfy the intents of the Fair Housing Act, this plan strives to address racial segregation and disproportionate displacement by proposing policies, programs, and initiatives that assist in remedying existing barriers to housing and specifically supporting those most in need.

Recommended Housing Services and Affordable Housing Programs

The Santa Fe County Affordable Housing section of the Community Development Department utilizes a variety of successful programs including support for low-income homeowners with needed roof repairs, assistance for first-time homebuyers trying to assemble a down payment, and protections for low-income households who are at risk of foreclosure. Existing programs are effective but insufficient in scale when compared with the need for assistance in our community.

This Plan recommends a series of new and expanded programs to support and provide for Santa Fe residents. Program recommendations include:

- Rehabilitation grants to maintain existing affordable housing units or to convert existing spaces into affordable housing.
- Down payment grants to assist households in qualifying for homes and achieving affordable mortgages.
- Renter assistance to help families access and remain in stable, affordable housing.
- Landlord/tenant support to ensure fair and equitable practices.
- Developer incentives to encourage the construction of affordable housing.
- Financing strategies that would unlock various forms of low-interest loans for the maintenance and development of housing projects.

These and other housing programs could be significantly funded through a County-administered housing trust fund capable of generating multiple millions of dollars annually. A full list of recommended housing programs is presented in the " each other's existing housing efforts, how their respective regulations and programs affect the housing market, and identify potential areas for collaboration and similarity.

Executive Summary

Recommended & Existing Housing Programs” section of this Plan⁸⁶.

Unfortunately, the need for housing assistance vastly outweighs Santa Fe County’s capacity to provide services. It is essential that the County consider and implement, when possible, all available housing programs and tools to support those most vulnerable to displacement and exclusion. Also, the County must attempt to remedy the structural regulatory issues which prevent or discourage the development of affordable housing.

Land Use Barriers⁷

The regulation of land is an essential function of local governments. However, some regulations can have particularly detrimental effects on the supply and provision of affordable housing. Land use policies balance various, sometimes competing community values like environmental conservation, sustainability, neighborhood preservation, economic development, and affordable housing. Policies which do not explicitly prioritize housing affordability can inadvertently:

- Increase the cost of housing through high development fees and expensive technical studies,
- Increase uncertainty by extending the period for project review,
- Constrain, discourage, or prohibit more efficient and affordable housing types,
- Inhibit the development of new housing and the rehabilitation of existing housing.

The Santa Fe County Sustainable Land Development Code (SLDC - 2016) has a progressive vision for sustainable development and was drafted with a great deal of public input. In discussing current housing challenges with low-income housing service providers, with affordable housing developers, with market-rate developers, and with some County employees, however, many individuals and organizations identified that implementation of the SLDC has inadvertently resulted in preventing – rather than encouraging – efficient and sustainable styles of development and has resulted in more low-density, automotive-oriented communities with high environmental and infrastructural costs instead of compact, village-style development.

Additionally, it has been noted that implementation of SLDC regulations appears to increase development costs, discourage unique or creative designs, increase project uncertainty, extend the length of review and approval times, and may limit or prohibit some affordable housing strategies (such as those receiving financing affordable housing developments with funding sources that require alternative design criteria). Together, these regulatory challenges are seen as barriers that contribute to the housing supply shortage and result in less affordable housing options for Santa Fe County residents.

Housing development cost estimates calculated by this Plan demonstrate that housing is considerably more affordable when developed at medium or high densities versus low and very low densities (see Development Costs of New Housing, page 45). When developed at one dwelling unit per acre, the cost of a site-built home is estimated to be about \$783,361 and the cost of a pre-manufactured home is estimated to cost \$415,761. However, when developed at a more compact ten dwelling units per acre, the estimated cost is \$396,902 for site-built housing (49 percent decrease) and \$284,227 for pre-manufactured housing (32 percent decrease). Rental housing has similar efficiencies: units developed at seven units per acre are estimated to cost about \$387,649 but units developed at twenty dwelling units per acre are estimated to cost \$266,308 (31 percent decrease). These lower prices are achieved by using land more efficiently, providing compact infrastructure, and building smaller homes.

⁷ This Plan identifies land use barriers and offers potential land use solutions capable of achieving more affordable housing but should not be construed as a comprehensive analysis of Santa Fe County land use or as a comprehensive or detailed list of recommendations.

Through this Plan, Santa Fe County recognizes that compact development is generally more fiscally sustainable due to the exceedingly high cost of maintaining aging infrastructure⁸. The County should ensure that its land use code promotes compact, higher-density developments in growth areas with feasible access to County utilities, such as the Community College District (CCD). To encourage the development of housing within sustainable growth areas, regulations and approval processes should be clarified and streamlined and more affordable housing types should be capable of being approved “by-right.” These proposed changes will better achieve sustainable growth management and reduce the need for public and non-profit social services to bridge affordability gaps.

This Plan recommends changing land use regulations and policies to encourage sustainable housing development in areas targeted for sustainable growth or which have feasible access to adequate public infrastructure. In areas which are not currently sustainable for growth, this Plan recommends focusing on housing assistance and rehabilitation programs rather than the development of new housing.

This Plan recommends two strategies related to land use regulations which can achieve additional affordable housing in Santa Fe County:

1. **Incentivize Affordable Housing.** To encourage the development of affordable housing, the County should amend its affordable housing ordinances to:
 - a. Define an “Affordable Housing Development” as 30% or more affordable units per development, allowing developments that meet this criteria to be eligible for additional incentives and financial assistance.
 - b. Create new, innovative incentives to support affordable housing.
 - c. Extend inclusionary zoning requirements across the County and to all developments, and evaluate the level of inclusionary zoning requirements between rural and non-rural areas.
2. **Equitable, Sustainable Housing & Land Use (SLDC).** To achieve equitable and sustainable housing and land use, the County should:
 - a. Initiate a review and evaluation of land use regulations, specifically thinking about equity and community welfare, affordable housing, and how to achieve more environmental, social, and economically sustainable development.
 - b. Update relevant regulations and policies as needed.

This Plan encourages consideration of the following:

- Minimizing or removing restrictions on density and housing types, as appropriate, in areas where mixed-use and intensive development are already allowed. This should also target areas where access to transit services and additional services that benefit affordable and general housing are available or can be expanded.
- Streamline review and approval processes to reduce the time, cost, and complications involved in approving housing development approvals, especially for affordable housing projects. Alternatively, this could involve clarifying existing review processes and approval criteria to address a perception that Santa Fe County is a difficult, risky, and extremely expensive jurisdiction to get housing approved.
- Where appropriate and benefitting the public interest, work to minimize the requirements for additional studies, reports, and assessments which intend to evaluate the potential impacts of a

⁸ Consider the difference between an area with 1000’ of road and utilities and serves 10 single-family homes (100’ of linear infrastructure per housing unit), versus a development which has 600’ of road and utilities but serves 30 single-family homes (20’ of linear infrastructure per housing unit)

housing project, particularly in areas already identified as suitable for growth and infrastructure expansion, and where previous studies have already identified the area as appropriate for development.

- Dimensional standards, setbacks, and open space requirements that may have a negative impact on compact, neighborhood-oriented housing types. This includes limitations on building footprints, reduction of developable areas, or setbacks which are inconsistent with sustainable growth intentions and may prohibit typical multi-family development types.
- Design standards that make specific, phased, and smaller-scale housing developments difficult (examples include setbacks, height, multi-use, and limited multi-family units per building). The same or similar standards could be applied on a different scale or in a different way and achieve the same overall intentions without preventing or limiting smaller scale development proposals.
- Adjusting limitations to accessory dwelling units which inadvertently inhibit the efficient use and rehabilitation of single-family housing units and reduces the opportunity for homeowners to provide more affordable housing types.

Additionally, Santa Fe County should define, "Affordable Housing Developments," as providing twice the minimum number of affordable units (which is a public good for the community). For "Affordable Housing Developments," it is recommended that the County provide additional incentives and expedited regulatory review processes that (as appropriate to protect the public welfare), allow greater security/certainty for investment in affordable housing projects. Thus, this plan recommends that in the interest of creating affordable housing at a more efficient and rapid pace, the County work to provide new and innovative processes to support the creation of affordable and market rate housing at a drastically increased rate in order to serve the demand for local families and community members to be able to live and work in the community.

Consolidated Recommendations

1) *Incentivize Affordable Housing*

Incentivize and support the development of affordable housing in areas targeted for or capable of sustainable growth.

2) *Equitable, Sustainable Housing, and Land Use Update*

Initiate a review and evaluation of the SLDC to incorporate and encourage environmental, social, and economically sustainable development.

3) *Strengthen Housing Assistance Programs*

Expand, strengthen, and fund housing assistance programs provided by the County and non-profit partners.

Plan Content

In accordance with the New Mexico Mortgage Finance Authority, this plan contains the following sections and contents:

Community Profile

This chapter provides analysis of community demographic information including population growth, income, race, age, and groups that have special housing needs such as homeless, disabled, and senior households. A large quantity of information is summarized from the 2020 Santa Fe County Housing Data Report prepared by the Bureau of Business & Economic Research (Housing Data Report), and which is attached as an appendix. The Housing Data Report provides additional, essential data to ensure compliance with the Affordable Housing Act. Demographic data is predominately based on American Community Survey 2019 One- and Five-Year Estimates and the 2020 Decennial Census but has been supplemented with data from local service providers and the New Mexico Mortgage Finance Authority.

Housing Profile and Analysis

This chapter provides analysis of housing-related information including housing occupancy, an affordability calculator, housing costs for existing homeowners and renters, a housing market analysis, market sales prices, and residential development considerations. Some of the information is summarized from the 2020 Santa Fe County Housing Data Report prepared by the Bureau of Business & Economic Research (Housing Data Report) and which is attached as an appendix. The Housing Data Report provides additional, essential data to ensure compliance with the Affordable Housing Act and is based on American Community Survey 2019 One- and Five-Year Estimates. Other information is sourced from private market reports, from information provided by the Affordable Housing Plan Advisory Committee, and from interviews with affordable housing developers and service providers.

Housing Needs Assessment

This chapter provides an assessment of housing needs within Santa Fe County, split up into:

1. The need for additional housing units (housing shortage) which estimates the unmet demand from existing employees (commuters) and residents (over-crowded households).
2. The need for specific types of housing assistance or amenities from homeless and housing insecure households, and also by estimating the number of households that meet specific demographic criteria like seniors in poverty and individuals with ADA needs.

Land Use and Policy Review

The policy review examines relevant planning documents and the impacts of public policy on affordable housing. This section also describes other governmental and non-governmental constraints to affordable housing development, including land use and environmental barriers.

Goals, Policies, and Objectives

This section puts forth objectives for the number of housing units by type to be built or rehabilitated. The Goals chapter provides a description of projects and strategies that could be utilized by Santa Fe County to address affordable housing needs and eliminate barriers in Santa Fe, including project types, potential locations, opportunities for cooperation with other entities, and potential policy actions by the County.

Data Sources & Analysis

Unless otherwise noted, the terms “Santa Fe County” includes the entire population and geographic area of the County including incorporated communities like the City of Santa Fe.

Identified trends and Identified Inconsistencies:

As much as possible, this report should be used to understand general housing trends in Santa Fe County. Multiple sources demonstrate that the availability of affordable housing has diminished or that affordable housing is generally inaccessible - resulting in the exclusion and displacement of Santa Fe County residents. Due to deviations between different data sources, different survey techniques, different statistical strategies, and different estimation methods, however, there is a degree of inconsistency between figures and estimations used in this report.

Regarding data from the US Census Bureau, the American Community Survey (ACS) which is averaged over 5 years (ACS – 5y) is slightly different than data that has been averaged over one year (ACS – 1y). Similarly, at the time of data analysis, data was only available for 2019 and a complete analysis was only performed on trends prior to that date. Though updates for 2020 and 2021 have sometimes been made to demonstrate the changes that have happened since the start of the COVID pandemic, a complete reanalysis was not possible for this plan.

Market and financial volatility have also caused a degree of uncertainty and complicated analysis and estimated affordability. Mortgage interest rates, for instance, have experienced wild volatility over the last couple years. HUD generally uses an average of the previous calendar year’s interest rates to estimate the affordable purchase price for households at different income levels. The average interest rate in 2021 was abnormally low but interest in 2022 raised significantly. Rather than use abnormally low interest rates from 2021, this plan instead used an average from the middle of 2022 (FreddieMac average 5.5% 30-year fixed-rate mortgage interest rate from June to September 2022). Interest rates are still volatile and have a significant impact on affordability for households who lack the capacity for large down payments. Mortgage interest rates above 5.5% will decrease the affordability of homes for purchase.

Though specific data points are variable depending on the specific source or date of acquisition, the trend or general take-away of this plan is that housing in Santa Fe County is generally unaffordable for a significant portion, if not the majority, of Santa Fe residents and that housing costs are especially unaffordable for those with average or lower household income and wealth.

Santa Fe County Housing Data Report (July 2021):

For the Santa Fe County Housing Data Report (Housing Data Report) Santa Fe County worked with The University of New Mexico Bureau of Business and Economic Research (UNM BBER) to compile data sets to inform a new affordable housing plan and address the long-term housing needs of communities within the county. Data from the US Census Bureau American Community Survey (ACS), ATTOM Data Services, Santa Fe REALTORS Association, and other public sources were collected and compiled. These data sets record community snapshots, population trends, and housing stock details. The results provide projections of population and housing needs, and also examine zoning/land use match analysis. A phone survey requesting data from apartment properties within Santa Fe County was conducted to further understand the current housing situation. A survey effort began on October 19, 2020, and was completed

Executive Summary

by December 18, 2020. A total of 20 surveys were collected. Survey information provides a picture of how current economic situations, policies, and practices affect multi-family housing and development within the county. Furthermore, this data can aid in guiding decisions on how to manage the needs of the communities within Santa Fe County.

Note that the Housing Data Report predominately uses ACS 2019 1-year datasets which have a higher degree of data variation than 5-year datasets and which deviate from 2020 Decennial Census data which was not available at the time of data analysis.

Santa Fe County Affordable Housing Plan (2022):

Data usually covers the entire population and geographic area of Santa Fe County including the City of Santa Fe. Data which excludes the City of Santa Fe and only covers the rest of Santa Fe is noted as such. Unless otherwise noted, assume that the data in this report covers both the County of Santa Fe, the City of Santa Fe, and all other incorporated areas of the County.

The Affordable Housing Plan (The Plan) utilizes census and survey data documented in the Housing Data Report in addition to documents, data, and discussions with Santa Fe County Staff, affordable housing service providers, affordable housing developers, and market-rate housing developers.

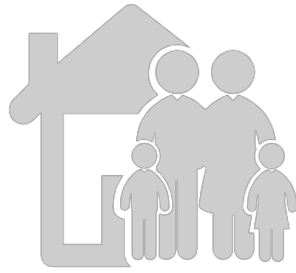
New Mexico Affordable Housing Act

The State of New Mexico enacted amendments to the New Mexico Affordable Housing Act in 2007. The Affordable Housing Act permits State and local governments to provide or pay the cost of land, buildings or necessary financing for affordable housing projects. Affordable housing projects are residential housing primarily for persons or households of low to moderate income.

Under the provisions of the Act, a municipality may:

- "A. donate, provide, or pay all, or a portion, of the costs of land for the construction on the land of affordable housing.
- B. donate, provide, or pay all or a portion of the costs of conversion or renovation of existing buildings into affordable housing.
- C. provide or pay the costs of financing or infrastructure necessary to support affordable housing projects; or
- D. provide or pay all or a portion of the costs of acquisition, development, construction, financing, operating, or owning affordable housing."

The Act requires the local governing body to adopt an Affordable Housing Plan and Ordinance if it wishes to provide donations towards affordable housing. Analyses conducted for this plan indicate that such donations will help the County accomplish its housing goals.

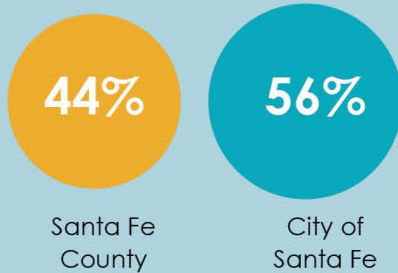
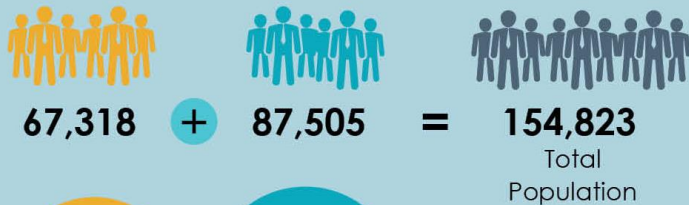


1.0

COMMUNITY PROFILE

DATA DASHBOARD

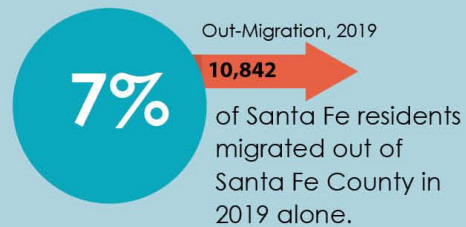
POPULATION



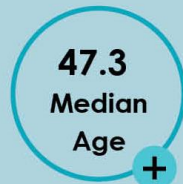
POPULATION GROWTH



MIGRATION



HOUSEHOLDS



Note: Data covers the entire population and geographic area of Santa Fe County including the City of Santa Fe and other Incorporated areas and communities.

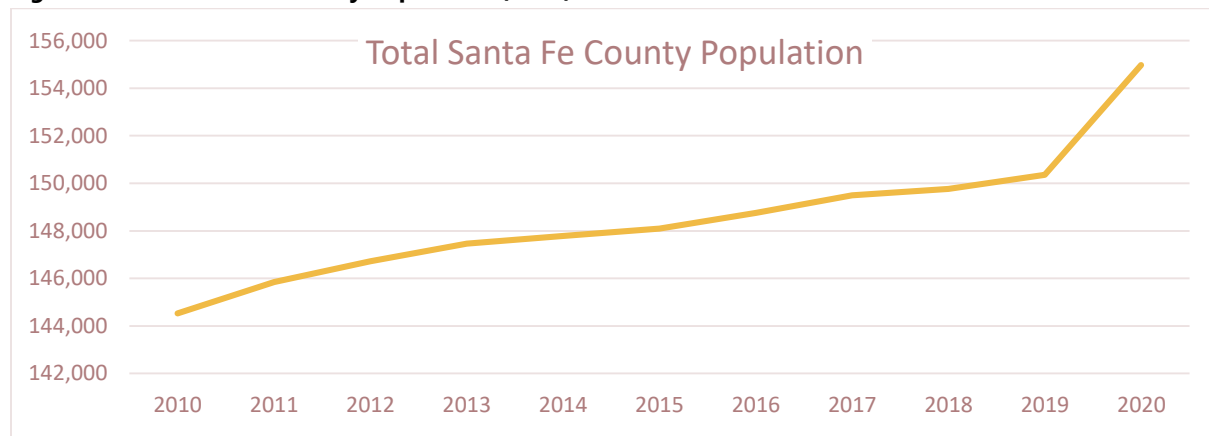
This section summarizes data provided by the 2020 Santa Fe County Housing Data Report prepared by the Bureau of Business & Economic Research (Housing Data Report) and attached as an appendix. More information on demographic characteristics including age, income, and housing trends is available in the Housing Data Report. Unless otherwise noted, the term “Santa Fe County” includes the entire population and geographic area of the County including incorporated communities like the City of Santa Fe.

Demographic Summary

Population, Growth & Migration

The Santa Fe County population – including the City of Santa Fe, Edgewood, and portions of Española – rose from 144,170 in 2010 to 154,823 in 2020 according to the 2020 Census. Santa Fe County’s population growth rate was 7.2 percent from 2010 to 2020 which is well above the state’s growth rate of 2.6 percent, and equal to national growth during the same period.

Figure 3. Total Santa Fe County Population (2020)

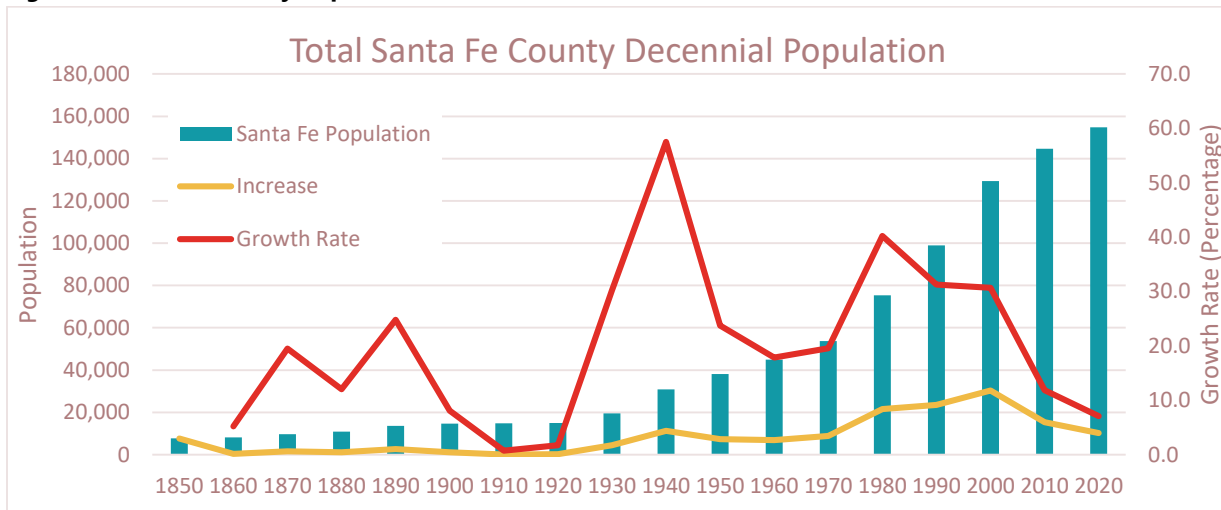


Source: US Census Bureau American Community Survey 5 Year Estimates, 2020

Santa Fe County growth is mostly attributed to migration versus “natural growth” (births minus deaths). Between 2018 and 2019, for instance, approximately 1,189 residents were born and 1,191 residents died - a net natural growth of -2 people. Over that same year, an estimated 11,447 people migrated into Santa Fe County and approximately 10,842 residents migrated out. Though net-migration resulted in a meager growth of only about 600 residents, the out-migration of 10,842 people represents a loss of 7.2 percent of all residents who were living within Santa Fe County in only a single year (2019 ACS 1-year estimates). In- and out-migration appears to be similarly high in 2020 and 2021 (approximately 5-7 percent of residents). The high rate of out-migrants is partially attributed to existing households being unable to find adequate or affordable housing and exacerbated by the fact that in-migrants from other states have about 30 percent higher wages. A past survey identified that 98 percent of the in-commuters who left Santa Fe did so due to the high cost or general lack of adequate housing (City of Santa Fe, 2013).

UNM Geospatial Population Studies projects that Santa Fe County’s population will increase to a total population of approximately 163,000 by 2025, to approximately 174,000 by 2035, and to approximately 187,000 by 2050. Though the in- and out-migration of people is significant and members of the community have expressed concern about the rate of growth, it is important to note that since the 1910’s, Santa Fe County has never experienced such a low population growth rate (see Figure 4).

Figure 4. Santa Fe County Population Trends & Decennial Growth Rate



Source: US Census Bureau Decennial Census, 2020

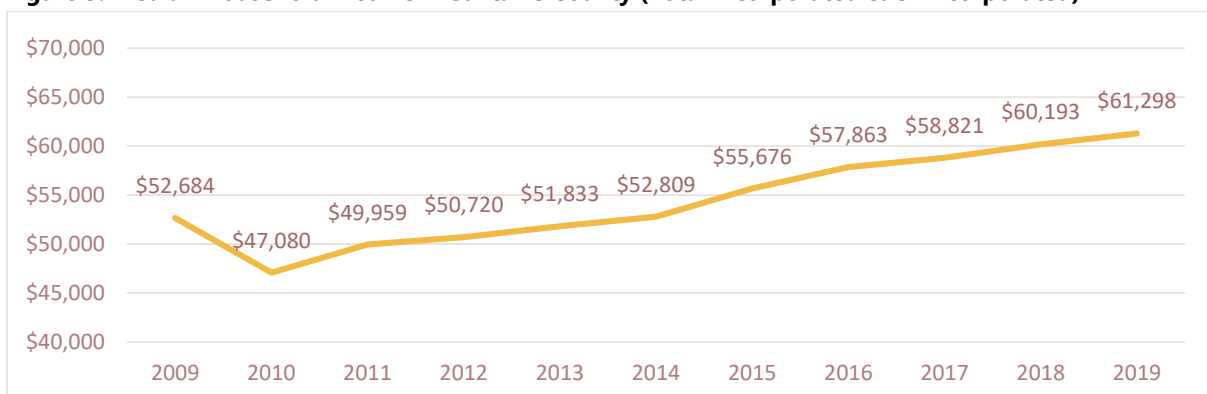
Median Household Income

In 2019, the median household income for Santa Fe County (incorporated and unincorporated areas) was \$61,298 according to the ACS 1-year estimates (see Figure 5). This is \$9,353 more than New Mexico’s median household income (\$54,945) and \$4,414 less than the United States median household income.

Because median earnings in 2019 were so far below U.S. median earnings, but homes in Santa Fe are not correspondingly less expensive, typical workers in Santa Fe County have a relatively greater difficulty paying rent or qualifying for mortgages. This is illustrated by the fact that 24,338 employees, representing 38 percent of the County workforce, commute into the County rather than residing here.

Median household income in Santa Fe increased 16 percent, or \$8,614 since 2009. Income growth is about the same as in the rest of New Mexico (16 percent) and much lower than the growth of median household income in the United States (22 percent). Though some of the income growth could simply be attributed to rising wages, some of this change is also due to in-migrants from other states which have 30 percent higher wages than existing Santa Fe County residents and the annual out-migration of approximately 11,000 residents who are from comparatively lower-income households.

Figure 5. Median Household Income in Santa Fe County (Total Incorporated & Unincorporated)



Source: SFC Housing Data Report; US Census Bureau American Community Survey 1 Year Estimates, Table DP03

Between 2016 and 2021, income rose approximately 16 percent from \$57,863 to \$67,341. During this same five-year period, the median sales price of a single-family home in Santa Fe County rose 61 percent from \$428,875 to \$691,803.

Figure 6. 2019 Household Income Ranges



Source: SFC Housing Data Report; US Census Bureau American Community Survey 1 Year Estimates Table DP03

Compared to New Mexico, Santa Fe County has a larger percentage of households making over \$60,000 per year but less than the United States (see Figure 6. 2019 Household Income Ranges). Santa Fe County also has a comparatively higher number of household incomes falling in the \$30,000 to \$49,000 income range. In the Less than \$20,000 range, Santa Fe County is lower than New Mexico but higher than the United States.

The median worker in Santa Fe County earned \$30,919 in 2019 according to ACS 1-year estimates. Santa Fe County’s median earnings for workers were over \$5,000 below the United States median worker earnings and only \$532 above the New Mexico statewide worker earnings.

Employment

Santa Fe County’s average annual employment was 62,595 in 2019 (NM Department of Workforce Solutions). This was an increase of 2.1 percent from the 2018 level (61,314). Over the past decade, employment in Santa Fe has shifted from the government sector toward the private sector. Health Care and Social Assistance, Accommodation and Food, and the Retail Trade are the largest employment industries.

Government employment has long been a pillar of Santa Fe County’s economy, as Santa Fe is home to the State Capitol. Between 2009 and 2019, however, government employment in Santa Fe County fell from roughly 30 percent of total employment to 24 percent (8,865 employees). Meanwhile, private industry employment grew from 70 to 76 percent, or from 43,174 to 47,275 jobs between 2009 and 2019. The Accommodation and Food Services sector accounts for over 10,000 employees and the Retail Trades accounts for over 8,000 employees. These two sectors generally pay lower wages which negatively impacts the ability to live within Santa Fe.

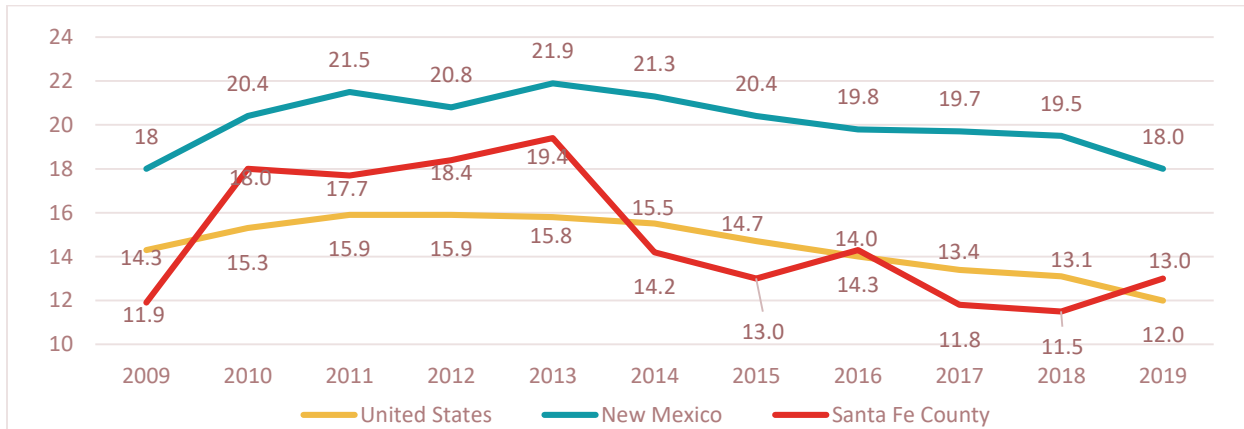
Approximately 38 percent of the workforce lives outside of and commutes into the County for work representing approximately 24,338 individuals (US Census Bureau LEHD, 2018). It is estimated that 98 percent of in-commuters who left Santa Fe did so due to the high cost or general lack of adequate housing and that about 50 percent would move back if they could find adequate housing (City of Santa Fe, 2013). This equates to approximately 12,169 in-commuters who desire additional, adequate housing units (housing shortage).

Poverty

In 2019, 13 percent of households living within Santa Fe County (including residents in incorporated and unincorporated areas) were below the poverty line (see Figure 7). Santa Fe poverty rates are lower than New Mexico and similar to the United States. Santa Fe County’s percentage of people in poverty has, along with New Mexico and the United States been trending downward over the last several years. Compared to the larger geographic areas and likely due to the higher proportion of seniors, Santa Fe has a much higher proportion of households who receive Social Security and Retirement Income (41.7 percent and 32.0 percent).

Though higher household incomes and lower rates of poverty can signify improving conditions, it is important to note that, when combined with a large annual outflux of existing residents (5-7 percent annually), it can also be representative of a gradual exclusion of lower-income households or the replacement of lower-income households with those of higher incomes or greater wealth.

Figure 7. Percentage of Total Santa Fe County Households under the Poverty Line



Source: Housing Data Report; US Census Bureau American Community Survey 1-Year Estimates, DP03

Table 2. Households Receiving Supplemental Income

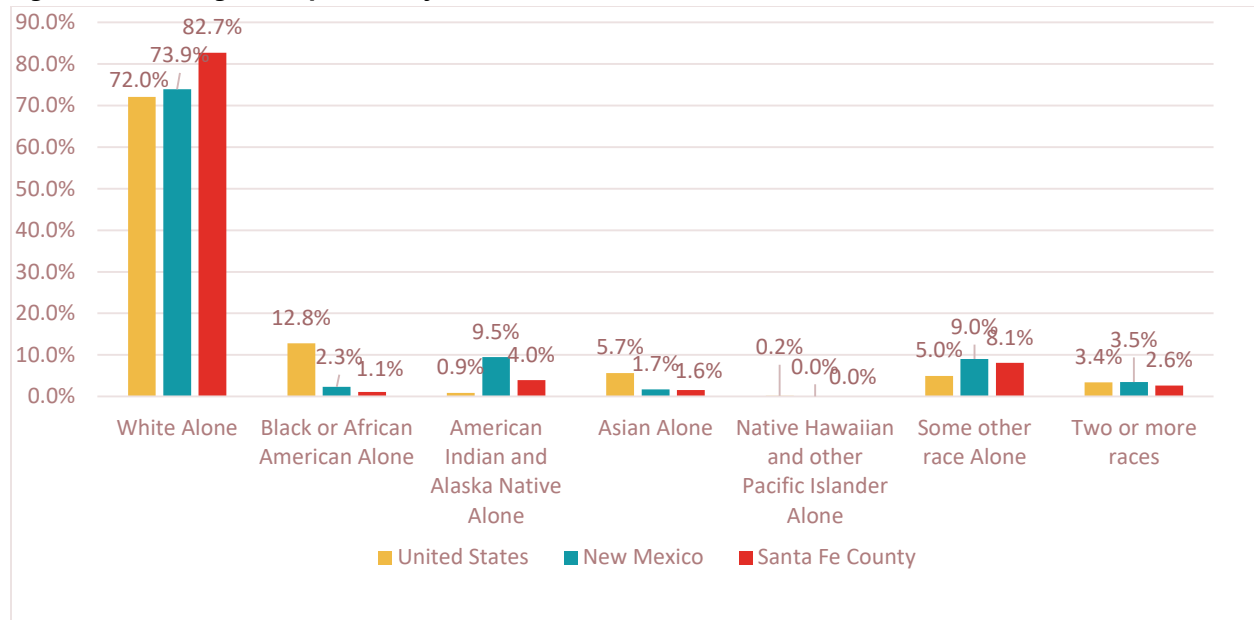
ACS 2019 1 Year Estimate Households	With Social Security	With retirement income	With Supplemental Security Income	With cash public assistance income	With Food Stamp/SNAP benefits in the past 12 months
United States	38,937,269	30,088,849	6,368,156	2,678,217	13,173,722
Percent	31.7%	24.5%	5.2%	2.2%	10.7%
New Mexico	286,344	198,307	46,745	28,349	130,113
Percent	36.1%	25.0%	5.9%	3.6%	16.4%
Santa Fe County	25,935	19,868	2,915	1,922	6,910
Percent	41.7%	32.0%	4.7%	3.1%	11.1%

Source: Housing Data Report; US Census Bureau American Community Survey 1 Year Estimates 2019, Table DP03.

Race and Ethnicity

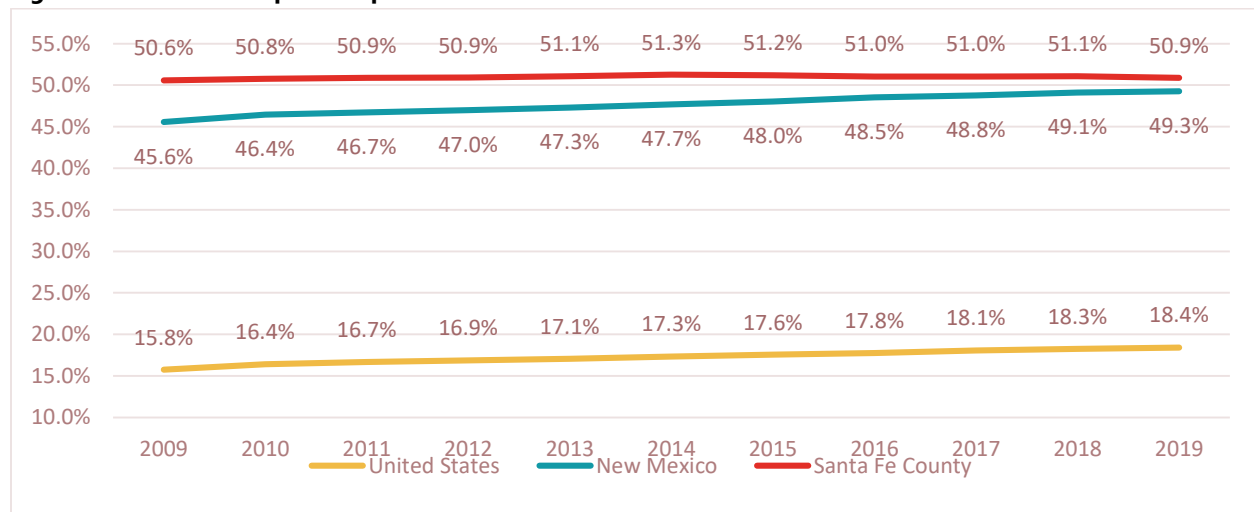
Santa Fe County has a higher proportion of people who identify their primary race as “White Alone” at 82.7 percent versus 73.9 percent in New Mexico and 72 percent in the United States. Compared to the rest of New Mexico, the clearest difference in Santa Fe County is the lower proportion of American Indian and Alaskan Native which is only 4.0 percent compared to 9.5 percent across the state. Santa Fe County’s ethnic demographics are similar to New Mexico with about half of the population identifying as Hispanic.

Figure 8. Percentage of Population by Race 2019



Source: SFC Housing Data Report; US Census Bureau American Community Survey 1-year Estimates Table DP05

Figure 9. Percent of Hispanic Population



Source: SFC Housing Data Report; US Census Bureau American Community Survey 1 Year Estimates Table DP05

Regulations and policies which have a disparate impact on race and ethnicity may violate the Fair Housing Act (specifically, the mandate regarding Affirmatively Furthering Fair Housing). The County should explore the impacts of regulations and policies on race, ethnicity, and other “protected classes.” Initial data analysis suggests that the County of Santa Fe may be inhibiting or excluding the growth of Hispanic

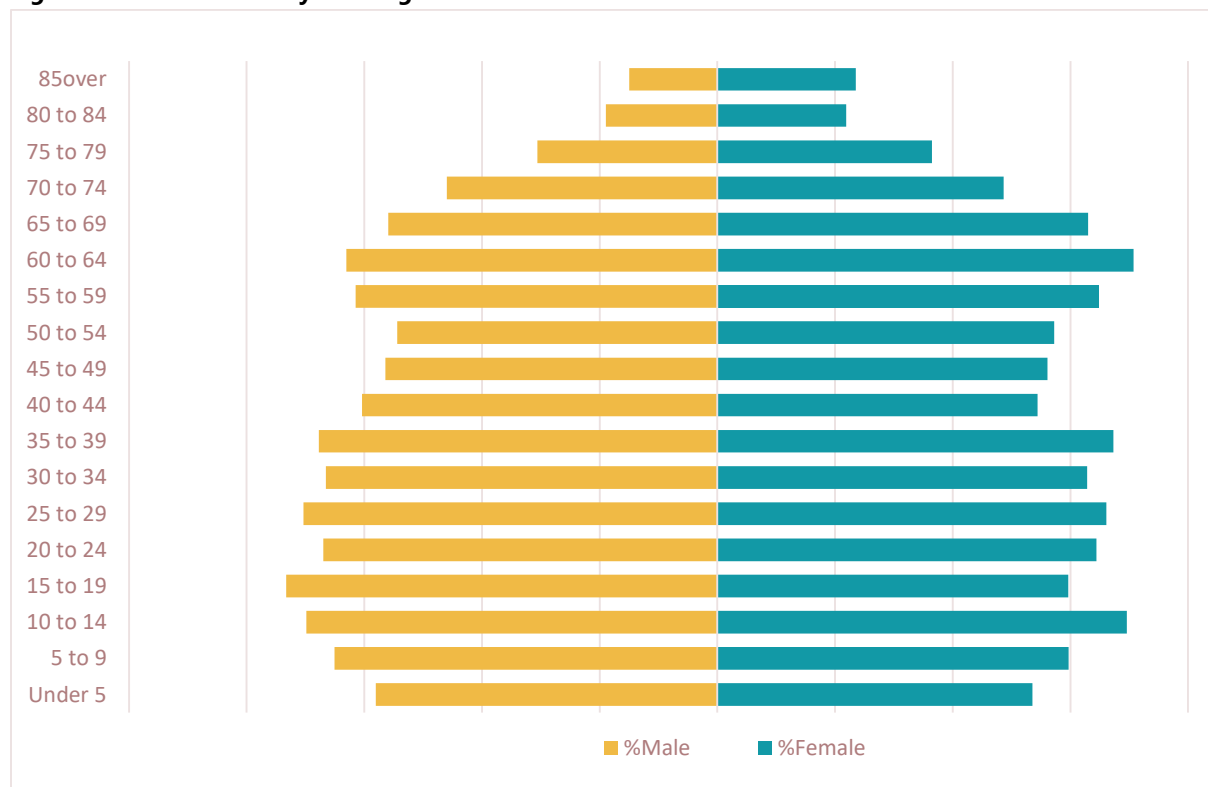
households in such a way that could create racial segregation between both areas of the County and also between Santa Fe County and the City of Santa Fe.

Between 2015 and 2020, population growth within the City of Santa Fe has been almost entirely due to the proportional growth of Hispanic-identifying individuals. Santa Fe County, however, has almost the exact opposite trend. Within the same time period, growth in Santa Fe County (excluding the City of Santa Fe) has been almost entirely due to the proportional growth of non-Hispanic identifying individuals. The non-Hispanic population has grown 4.6 percent whereas the Hispanic population has grown only 0.8 percent. While causation cannot be determined with these numbers alone, this could be related to lower incomes and wealth attainment of Hispanic households combined with the lack of permitted housing in Santa Fe County (especially prohibitions on affordable, multifamily housing) and the higher cost of housing in the County versus the City. Racial segregation, regulatory exclusion, and potential violations to the Fair Housing Act should be taken seriously by the County. Funds may be available from federal and other sources to engage in a more thorough study into disparate impacts on protected classes.

Age

The median age in Santa Fe is 47.3, according to the 2019 ACS 1-year estimates. That figure has risen by 4.1 years since 2010, when the median age was 43.2. This increase is due to both an already ageing population and the age demographic of people who move in from other areas. The average age of people moving into Santa Fe County is 41.1 years of age for 2019. In 2010, 23.3 percent of Santa Fe County’s population was 60 years or older. By 2050, that cohort is projected to be 30.6 percent. Support will be needed to provide housing and related services to the growing proportion of seniors in the community.

Figure 10. Santa Fe County 2019 Age & Sex



Source: Housing Data Report; US Census Bureau 2019 American Community Survey 1-Year Estimates, Table DP05

Population Groups with Special Housing Needs

There are several categories of households and individuals in Santa Fe County that may have special housing needs (see Table 3). These include households that are either homeless or otherwise housing-insecure, individuals with disabilities, seniors, and victims of domestic violence. These groups may need short term emergency assistance or longer-term assistance, including affordable housing and/or supportive services.

Table 3. Groups with Special Housing Needs

Population Groups with Special Housing Needs	Total Santa Fe County + City of Santa Fe
Homelessness and Unstable Housing	
Homeless Households	412 - 600 ⁹
Individuals	363 - 400 ¹
Families	49 - 100 ¹
Youth (18-25 years old) (duplicated counting)	18 - 50 ¹
Chronically Homeless Households (duplicated counting)	205 - 300 ¹
"Disconnected Youth" with Unstable Housing (14-26 years old)	160 - 300
Families with Children in Unstable Housing (Adelante Program)	185
Children Enrolled in the Adelante Program	423
Survivors of Domestic Violence	60 - 200
Demographic-Based Housing Needs	
Disabled Individuals (Ambulatory)	9,812
Female-Headed Households	19,690
Female-Headed Households with Children (<18 years old)	3,300
Senior Households in Poverty	2,290

Sources: New Mexico Coalition to End Homelessness (2022); US Census – ACS 5-year Estimate 2020; Reconnecting Youth Survey 2017; Esperanza Shelter

Measures of Homelessness & Housing Instability

Homelessness and housing instability are often underreported or under-addressed. This can be attributed to the current prevalence of informal, temporary housing or home sharing agreements, individuals or households who do not want to disclose their unstable living conditions, and the use of a different data systems (most of which are not connected) to track the housing needs of special populations. Households with unstable housing can include individuals who are sheltered but may not have stable or permanent housing.

⁹ The lower recorded number of homeless households is based off an August 2022 estimation of individuals registered or recorded on shared data platforms which is an underestimation of actual need. Given the fact that many needs are unrecorded, some service providers do not use shared data platforms, and the great number of individuals who are turned away from programs, the estimated, long-term need could be much greater than the recorded numbers.

Community Profile

According to a Santa Fe Homeless and Housing Needs report (Fall 2022), which uses information from two distinct data platforms, there were 363 individuals, 49 families, and 18 homeless youth in Santa Fe (aged 18-25). 205 of the individuals are "Chronically Homeless," defined as a household with an individual who has a qualifying disability and 1 year of continuous homelessness, or 12 months of homelessness within the last three years.

It is important to note that the previous measurements do not include the following additional statistics from the year 2020 (some of which overlap with other data):

- 144 individuals/families turned away from Esperanza Shelter over the course of 5 months
- 46 youth who were homeless or housing insecure but who, at the point of recording, were not receiving housing services
- 50-60 households on a closed waitlist for Santa Fe Community Housing Trust units
- 2000 households on a waitlist for housing units with the Santa Fe County Housing Authority
- 300 households on a closed waitlist for housing units at the Santa Fe Civic Housing Authority

Additional 2020 measures evaluating households which include children and youth can also be helpful:

- The Reconnecting Youth Working Group of Opportunity Santa Fe did a study into "Disconnected Youth," defined as residents between the ages of 14 and 26 either not in school, not working, or who are at risk of not being in school or working. Of the 457 individuals surveyed, 35.5 percent, or about 160 youth were dealing with unstable housing over the previous 30 days.
- The Adelante Program operated by the Santa Fe School District identified 185 families which including 423 children as dealing with unstable housing including overcrowded housing, camping, or living out of RV's, couch surfing, at-risk of eviction, or living with grandparents.

Survivors of Domestic Violence are a unique population group needing special types of housing assistance and a variety of associated supportive services. The Esperanza Shelter provides both support programs and housing assistance.

Multiple types of housing are needed for households experiencing homelessness and unstable, or precarious housing. These are covered in more detail in the Housing Needs Chapter.

- Non-Congregate Shelters and Managed, Safe Outdoor Spaces – Intended for very short-term stays up to 90 days This housing type can benefit unsheltered households, individuals/families needing immediate or temporary shelter, and survivors of domestic violence.
- Transitional and/or Rapid Re-housing – Assistance intended for an intermediary period, typically from 18-24 months. In Rapid Rehousing, it becomes a permanent housing unit with only temporary subsidies to establish the renter. Will sometimes provide services such as job training, mental health assistance, services for domestic violence situations, incarceration reentry, and those recovering from substance abuse.
- Permanent Supportive Housing (PSH) – Time unlimited housing for households with qualifying disabilities (physical or behavioral) and chronic homelessness (12 months documented). PSH clients are usually expected to pay 30 percent of their income in rent.

Individuals with Disabilities

The US Census estimates 9,812 individuals with “ambulatory” disabilities which means individuals who have serious difficulty walking or climbing stairs. Ambulatory disabilities require ADA-accessible homes and will sometimes also require live-in or visiting caretakers.

Table 4 Populations with a Disability

Populations with a Disability	Santa Fe County	% of Santa Fe County Population
Total Civilian Noninstitutionalized Population	148,639	
Disabled Individuals	21,127	14.2%
With a hearing difficulty	7,109	4.8%
With a vision difficulty	4,254	2.9%
With a cognitive difficulty	7,598	5.3%
With an ambulatory difficulty	9,812	6.9%
With a self-care difficulty	3,836	2.7%
With independent living disability/difficulty	6,670	5.5%
Disabled Individuals under 18 years of age	1,413	1.0%
Disabled Individuals over 65 years of age	10,327	6.9%

Source: US Census – ACS 5-year Estimate 2020

Female-Headed Households

Female-headed households (no spouse or partner present), especially those with children under the age of 18, are more likely to be disadvantaged in regard to income. Compared to married couple families, female-headed households are two or three times as likely to be in poverty and full-time, year-round female workers make about 93 percent of full-time, year-round males.

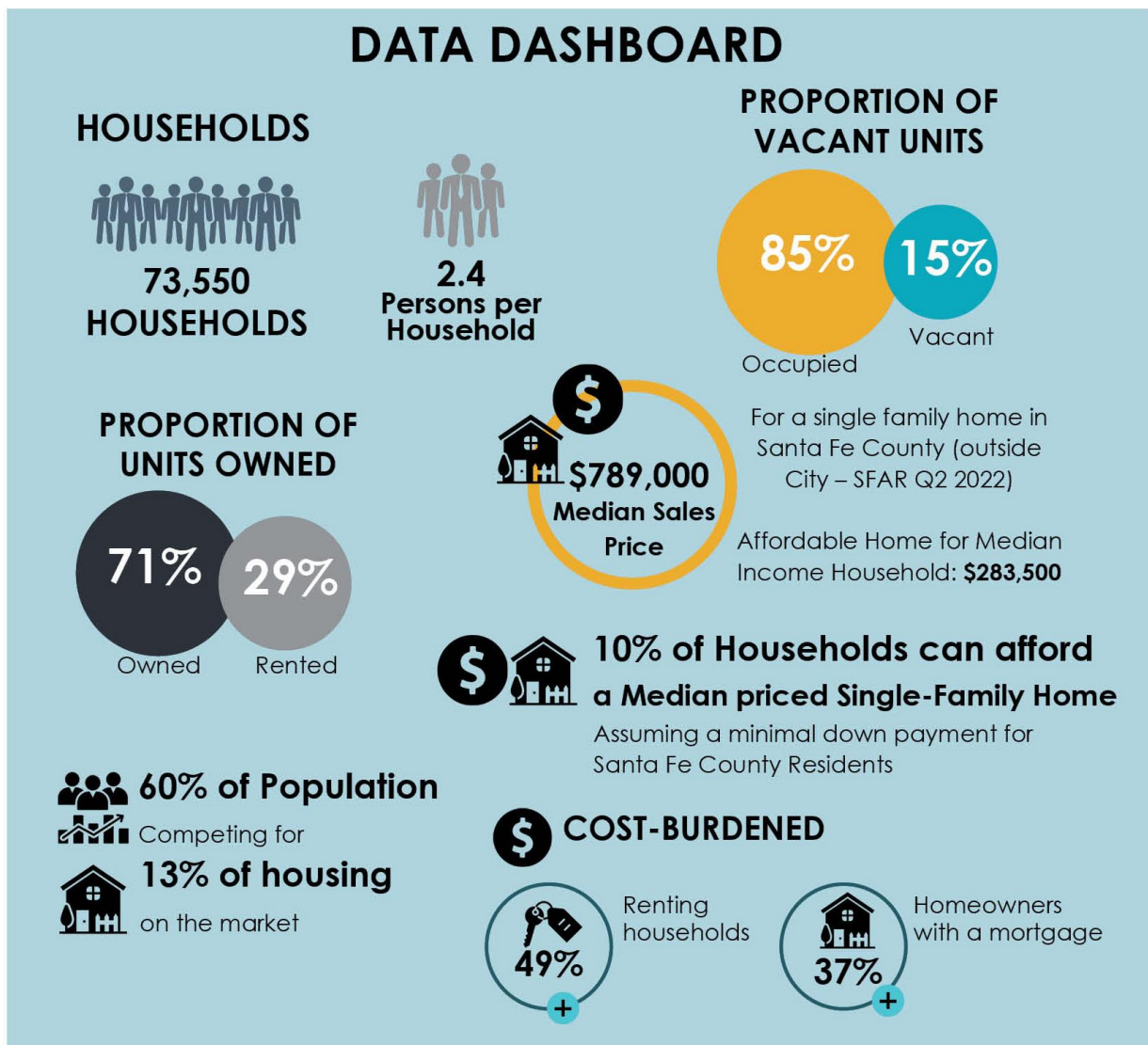
Seniors

Seniors are one of the fastest growing demographic groups and by 2030, the US Census Bureau predicts that 26.4 percent of the New Mexico population will be made up of seniors. Seniors often experience changing housing needs as they age. Initially, many wish to downsize and have less responsibility for the maintenance that comes from owning one’s home, while later, they may have health issues that require additional care and special housing needs. Because seniors are often on a fixed income, there is a greater need for affordable housing. Females living alone, which are often elderly women, typically have the lowest income of any household type. Potential housing types that may appeal to seniors include active living (retirement) communities that provide a range of opportunities (both independent and group housing care facilities), condominiums and apartments.



2.0

HOUSING PROFILE AND ANALYSIS

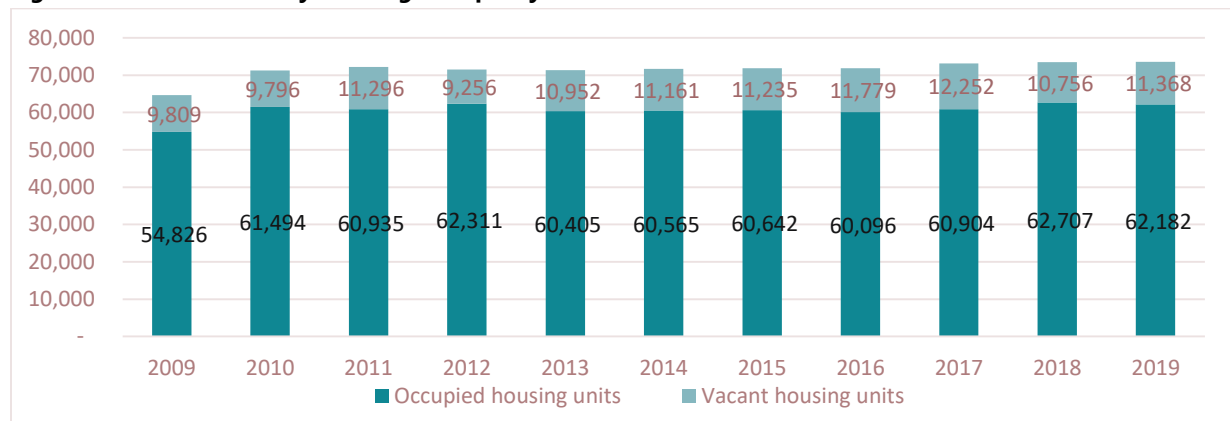


This section summarizes data provided by the 2020 Santa Fe County Housing Data Report prepared by the Bureau of Business & Economic Research (Housing Data Report) and attached as an appendix. More information on housing characteristics including occupants per room, vacancy type, and demographic conditions is available in the Housing Data Report. Unless otherwise noted, the term “Santa Fe County” includes the entire population and geographic area of the County including incorporated communities like the City of Santa Fe.

Housing Occupancy, Tenure, and Age

The US Census Bureau estimates the total housing units for 2019 in all of Santa Fe County (including incorporated and unincorporated areas) at 73,550; of these, 62,182 (85 percent) were occupied and about 15 percent were vacant, which is higher than state and national averages but reflects the higher proportion of “seasonally occupied” or second homes. Of the occupied housing units, 44,385 are owner-occupied (71 percent) and 17,797 are renter-occupied (29 percent).

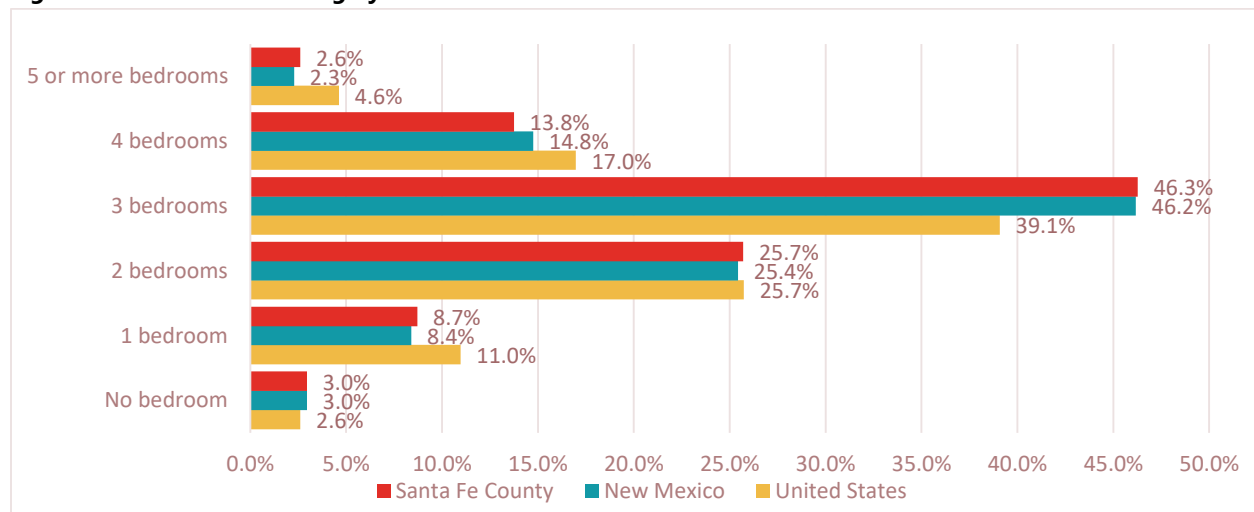
Figure 11. Santa Fe County Housing Occupancy



Source: US Census Bureau American Community Survey 1-year estimates Table Dp04

Santa Fe households are slightly smaller (2.4 people per household) than New Mexico (2.6 people) and the United States (2.6 people) but both Santa Fe and New Mexico have more three-bedroom units and less one-bedroom units than in the United States. Santa Fe generally needs to fill gaps for studios and one-bedroom units versus further construction of three-bedroom units. “Family size” better describes the number of persons living within a housing unit and is estimated to be 3.1 per 2020 Census Data.

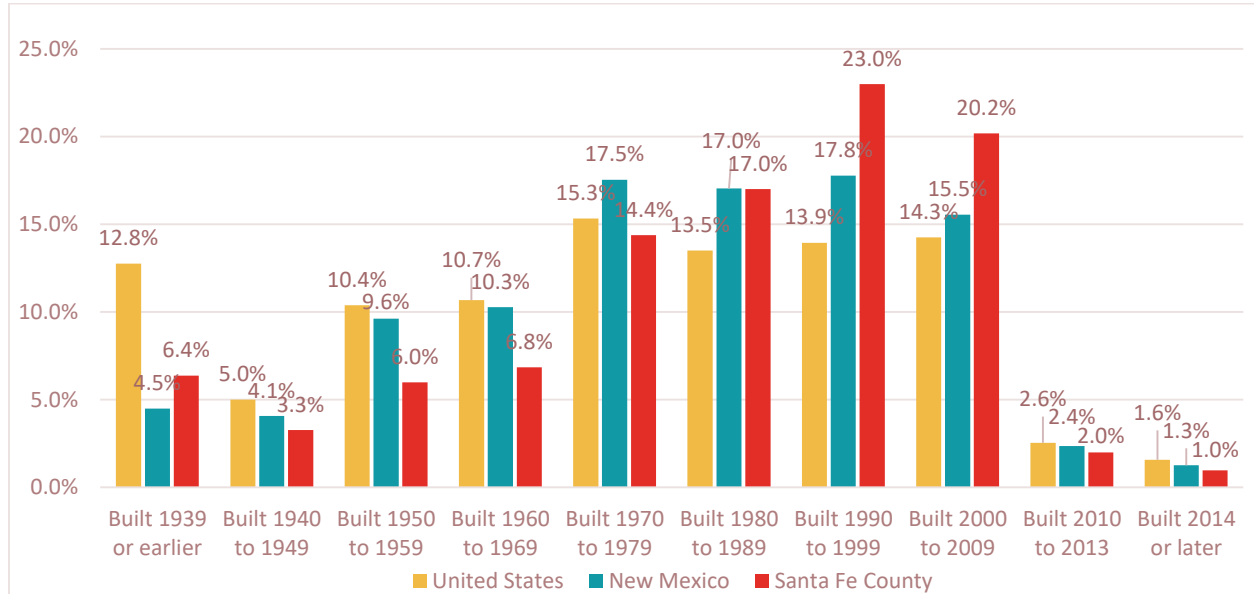
Figure 12. Percent of Housing by Number of Bedrooms



Source: US Census Bureau American Community Survey 1-Year Estimates, 2019 Table DP04

Santa Fe County Housing is generally newer than New Mexico and the United States and a larger proportion has been built between 1980 and 2009. Like in other areas, housing construction was generally low following the Great Recession in 2008.

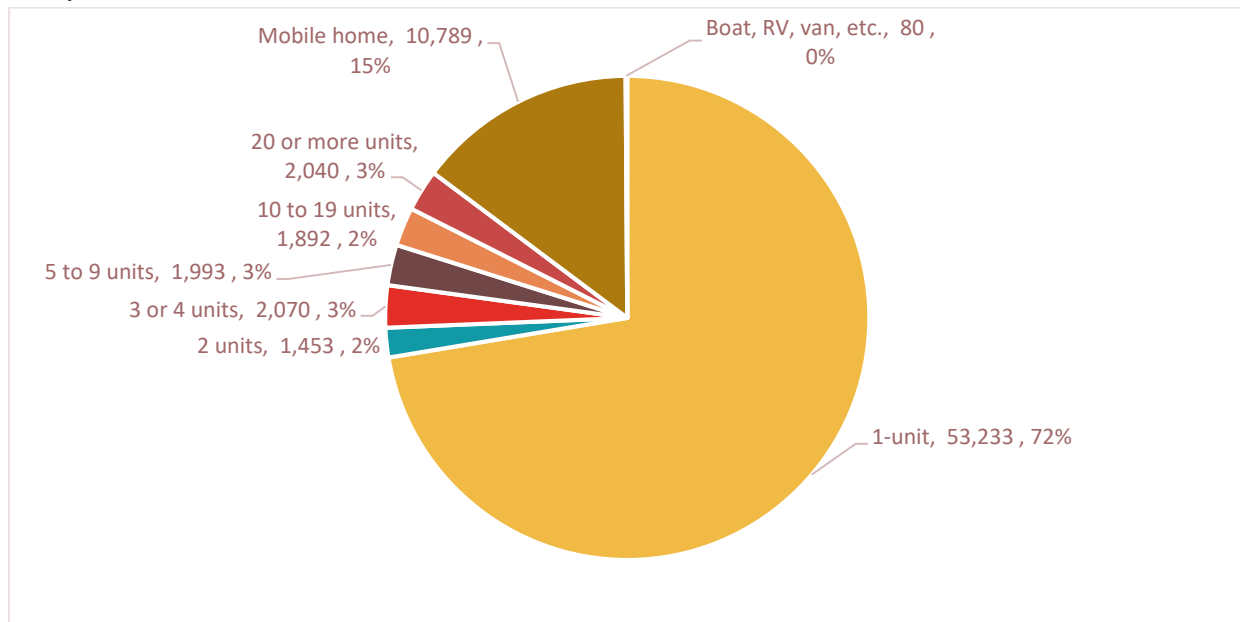
Figure 13. Year Housing Structure was Built (includes Santa Fe County and City of Santa Fe)



Source: US Census Bureau American Community Survey 5-year Estimates 2018 Table DP04

Housing structures within the total Santa Fe area are primarily single-family and detached (72 percent). The second most prevalent housing type is mobile homes (15 percent). Compared with the nation, Santa Fe and the rest of New Mexico have, on average, more mobile homes and about a third the proportion of the multi-family housing structures with 20 or more units. It is important to note that the quantity of multi-family housing structures is predominately located within the City of Santa Fe rather than within the County. This may be indicative of an opportunity to expand multi-family housing.

Figure 14. Santa Fe County Housing by Units in Structure 2019 (Includes incorporated and unincorporated areas)



Source: US Census Bureau American Community Survey 1-Year Estimates Table DP04

Housing Market Analysis

HUD Area Median Income and Affordable Housing Calculations

“The Department of Housing and Urban Development (HUD) sets income limits that determine eligibility for assisted housing programs including the Public Housing, Section 8 project-based, Section 8 Housing Choice Voucher, Section 202 housing for the elderly, and Section 811 housing for persons with disabilities programs. HUD develops income limits based on Median Family Income estimates and Fair Market Rent area definitions for each metropolitan area....” – HUD Income Limits 2022

The following table takes HUD income limits and the HUD-recommendation that “affordable” housing should be no more than 30 percent of a household’s income and calculates a hypothetical rent and home purchase price. 100% AMI is the “Median Income,” 80% AMI is defined as “Low Income,” 50% AMI is “Very Low Income,” and 30% AMI is “Extremely Low Income.”

A household size of 3 people is used because the average number of people living in a housing unit is 3.1 (2020 Census). Note that these calculations use a June – September 2022 average mortgage interest rate of 5.5% rather than an average of the previous year’s mortgage interest rates which were significantly lower (2.96%) and unrealistic with current mortgage calculations. A 3 percent down payment is used which is the minimum required down payment for conventional loans.

For a median-income Santa Fe household (100% AMI), \$1,815 is considered an affordable rent and \$283,500 is considered an affordable home purchase price. For a low-income Santa Fe household (80% AMI), \$1,452 is considered an affordable rent and \$226,750 is considered an affordable home purchase price.

Table 5. Santa Fe County Affordable Housing Calculations - 2022

SFC Affordable Housing Calculations - 2022 (3 - person Household)			Affordable Rent (30% Monthly Income)			Affordable Purchase Price (30% Monthly Income)
AMI	Income 3p/HH	Monthly Income		Affordable Mortgage	Down Payment (3%)	
30%	\$21,780	\$1,815	\$545	\$82,473	\$2,551	\$85,000
50%	\$36,300	\$3,025	\$908	\$137,454	\$4,251	\$141,750
60%	\$43,560	\$3,630	\$1,089	\$164,945	\$5,101	\$170,000
70%	\$50,820	\$4,235	\$1,271	\$192,436	\$5,952	\$198,500
80%	\$58,080	\$4,840	\$1,452	\$219,927	\$6,802	\$226,750
100%	\$72,600	\$6,050	\$1,815	\$274,908	\$8,502	\$283,500
115%	\$83,450	\$6,954	\$2,086	\$315,993	\$9,773	\$325,750
120%	\$87,050	\$7,254	\$2,176	\$329,625	\$10,195	\$339,750
150%	\$108,850	\$9,071	\$2,721	\$412,173	\$12,748	\$425,000
200%	\$145,100	\$12,092	\$3,628	\$549,438	\$16,993	\$566,500

Sources: HUD 2022 Income Limits Summary; City of Santa Fe 2022; County of Santa Fe 2022

*25% affordable rent calculation plus additional housing costs (e.g., utilities) expected to be less than 30% of monthly household income.

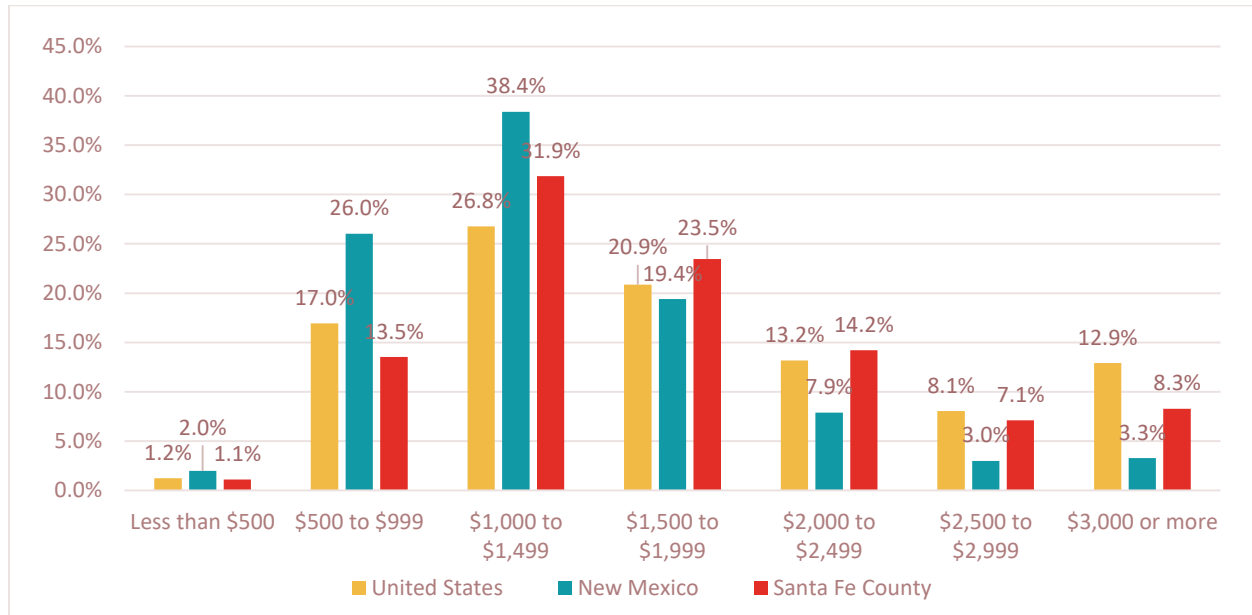
**HUD formula assumes 3% down payment and 2.96 assumptions: 3% down payment, 14% taxes and insurance, 5.5% annual interest (FreddieMac Avg 2022 30-yr fixed rate)

Monthly Home Ownership Costs (Census)

According to US Census data, most Santa Fe County owners with a mortgage paid between \$1,000 and \$1,499 in monthly housing costs with a median monthly housing cost of \$1,577 for owners with a mortgage (see Figure 15). This monthly cost is intended to include taxes, association fees, insurance, and utilities but is considered by some Santa Fe housing practitioners to under-calculate the total cost of housing and does not reflect the current, market cost of housing (see Figure 23).

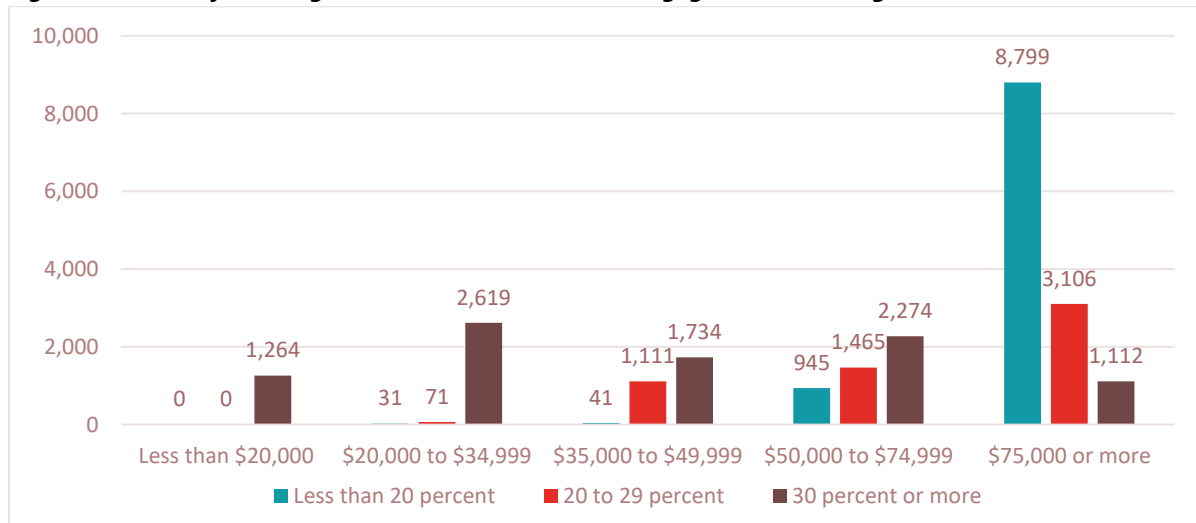
The median monthly housing cost of \$1,577 is approximately affordable (meaning that less than 30 percent of the monthly income is spent on housing) for median income households (100% AMI households can afford approximately \$1,800 in housing costs per month). Though homeowners experience less price volatility in housing costs due to mortgage payment stability, it is important to recognize that major renovations and second mortgages can quickly make an existing home unaffordable.

Figure 15. Selected Monthly Owner Costs of Housing Units with a Mortgage



Source: US Census Bureau American Community Survey 1-Year Estimates 2019 Table DP04

Figure 16. Monthly Housing Costs for Owners with a Mortgage as a Percentage of Household Income

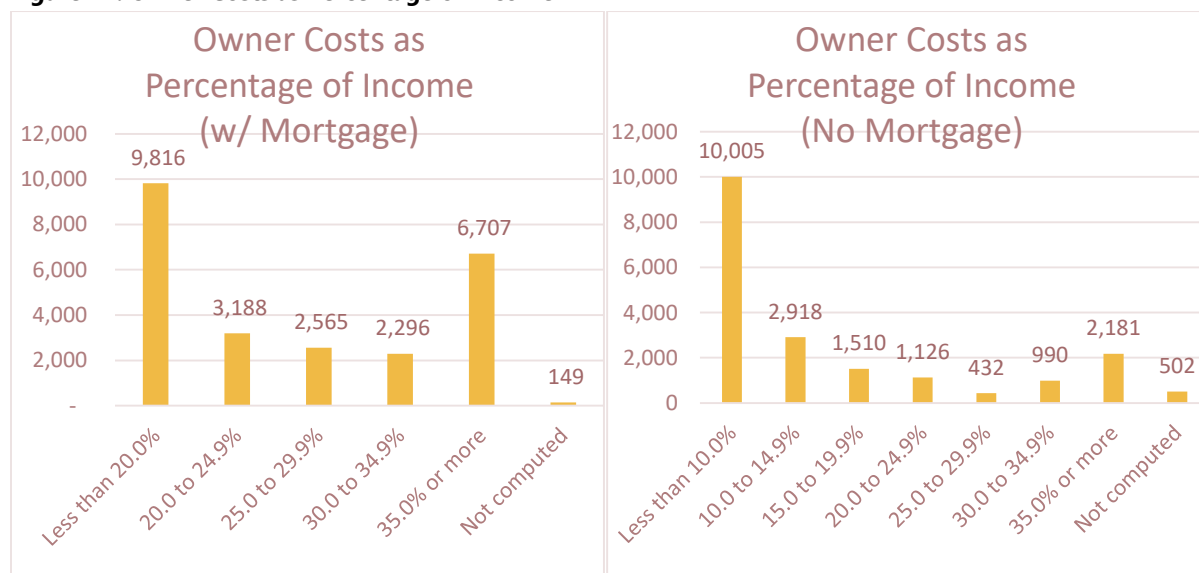


Source: US Census Bureau American Community Survey 1-Year Estimates 2019 Table DP04

Most households with a total annual income of over \$75,000 (~100%AMI) and who own a home with a mortgage are not cost-burdened but almost half (48 percent) of all households who make \$50,000-\$74,999 are considered cost-burdened (pay over 30 percent of their monthly income on housing costs). Though homeowners with an existing mortgage are not likely to be the recipient of most forms of housing assistance, recognizing when households tend to be cost-burdened can help identify need and justify programs.

For homeowners with a mortgage, about 36 percent are cost-burdened, which means they pay more than 30% of their income on housing. For homeowners without a mortgage, only about 16.5 percent are cost-burdened. In total, the number of cost-burdened households who own their own home is 12,174. The proportion of cost-burdened homeowners is higher in Santa Fe County than in New Mexico and the United States.

Figure 17. Owner Costs as Percentage of Income

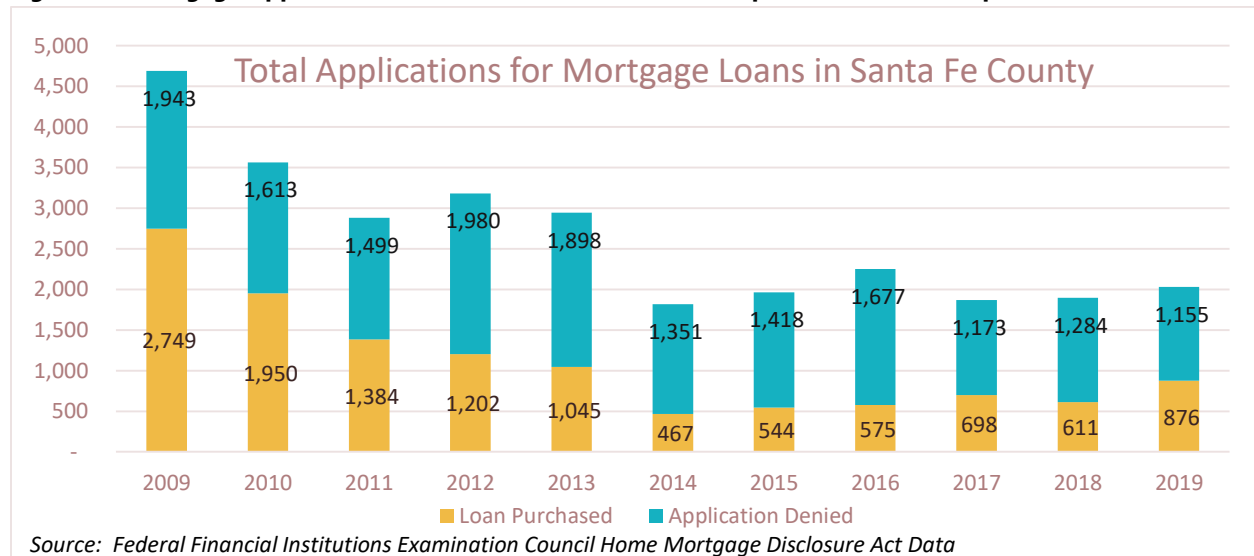


Source: US Census ACS 1-Year Estimates 2019 Table DP04

Home Mortgage Disclosure Act

The Home Mortgage Disclosure Act (HMDA) provides data on accepted and denied mortgage loans. Since the great recession, the application for mortgages had declined in Santa Fe County from a high of 4,692 in 2009 to a low of 1,818 in 2014. Since 2014, the annual number of mortgage loan applications has remained around 2,000 a year (see Figure 18). Notable in the Santa Fe area is that there are many more denied loans each year than purchased. Since 2009, an annual average of 61 percent of all loans have been denied. Data on the reason for mortgage denials was not available but is typically reported as being due to unfavorable debt-to-income ratios or applicants with unsatisfactory credit history.

Figure 18. Mortgage Application Loans in Santa Fe (Includes incorporated and unincorporated areas)



Monthly Rental Costs (Census)

According to 2019 Census Data (ACS 1-yr), most renters in Santa Fe County (64 percent) pay between \$500 and \$1,499 in monthly housing costs and the median monthly cost for renters is estimated to be \$1,030. This monthly cost is intended to include taxes, fees, insurance, and utilities but is considered by some Santa Fe housing practitioners to under-calculate the total cost of housing. A survey by UNM and provided in the Housing Data Report estimated the median rent and utilities for market-rate apartments to be about \$1,275 (single-family rental units are expected to be more expensive than apartments).

Rental costs are higher compared to New Mexico averages and similar to national averages. A \$1,500 monthly rent would likely be affordable (less than 30 percent of a household's monthly income) for a median-income household, but 49 percent of all renters are estimated to be cost-burdened (pay more than 30 percent of their income on housing costs).

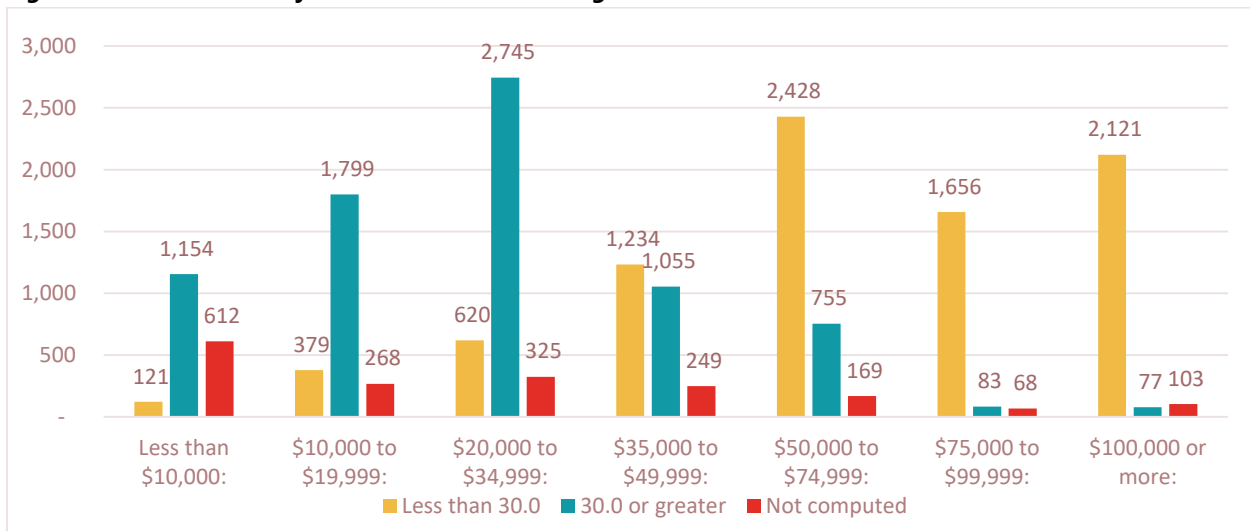
Figure 19. Santa Fe Monthly Rental Housing Costs by Number of Households



Source: US Census Bureau American Community Survey 1-Year Estimates 2019 Table DP04

Most rental households with a total annual income of over \$50,000 (~70%AMI) are not cost burdened but almost half (46 percent) of all households who make \$35,000-\$49,999 (~50-70% AMI) are considered cost-burdened. Though rental assistance may not be targeted at 50-70% AMI households, recognizing when households tend to be cost-burdened can help identify needs and justify programs.

Figure 20. Santa Fe County Gross Rent as a Percentage of Household Income in the Past 12 Months



Source: US Census Bureau American Community Survey 5-Year Estimates 2019, Table B25074

Of the almost 18,000 renters within the incorporated and unincorporated areas of Santa Fe, approximately 49 percent, or 8,870, are cost-burdened (pay more than 30 percent of their income on housing costs). This estimate comes from analysis and filling gaps in US Census data found in the UNM Housing Data Report. Using similar assumptions, it is estimated that approximately 8,163 low-income (<80% AMI) rental households are cost burdened. This number is consistent with estimates from the Mortgage Finance Authority that there are approximately 7,343 low-income, cost burdened rental households in Santa Fe.

Impact of Utilities on Housing Cost & Affordability

Per HUD regulations, a household's total housing cost must include the cost of the household's rent or mortgage payment plus the cost of the household's monthly utility expenses. Data shows that estimated utility costs for low and extremely low-income households in Santa Fe County make up a large percentage of the household's total housing costs and gross annual income.

Assuming that a home utilizes gas and electricity for utility services, households at 30% AMI (~\$17,000-28,000) spend approximately 9 percent of their gross annual income on utility expenses. Households at 50% AMI (~\$28,000-\$40,000) spend approximately 5 percent of their gross annual income on utility expenses and households at 80% AMI (~\$45,000-\$65,000) spend approximately 3 percent of their gross annual income on utility expenses.

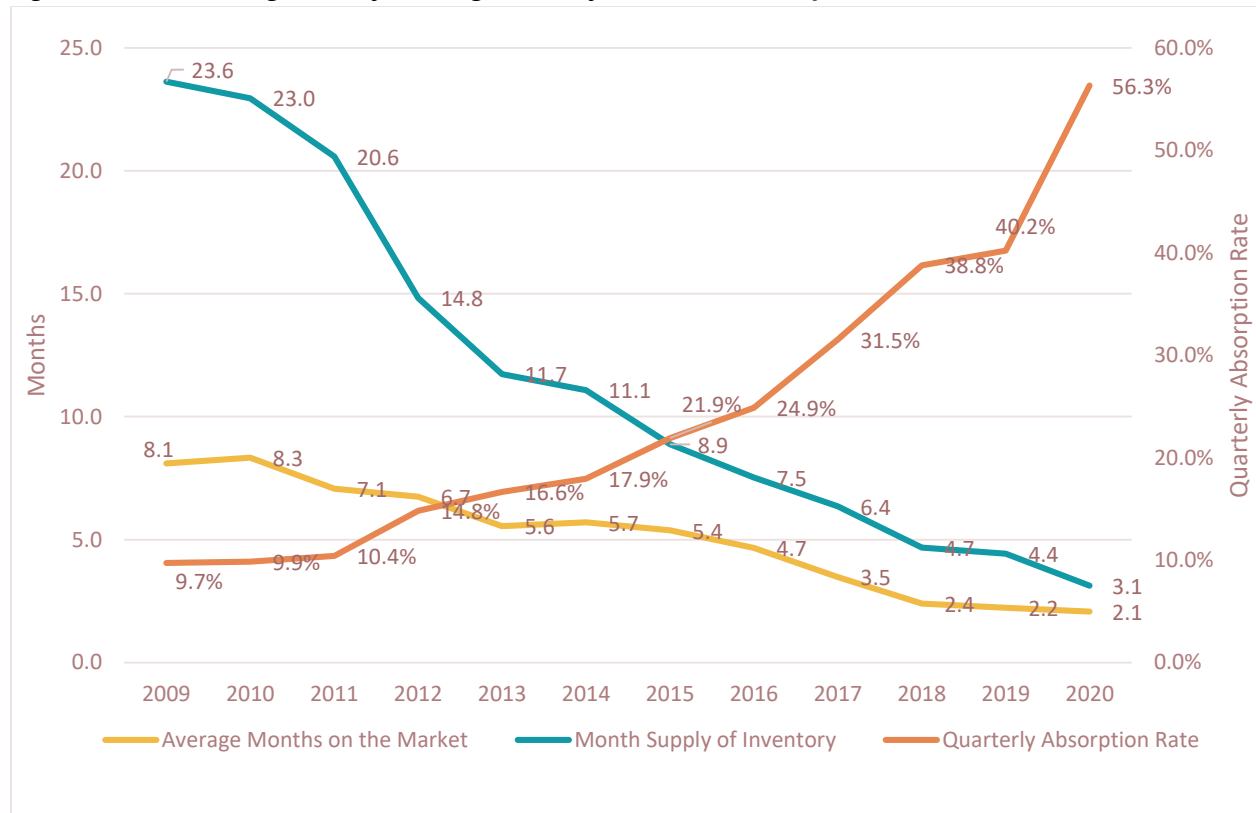
If a household only utilizes electricity for energy services, the percentage of gross annual income spent on utility expenses increases. A household at 30% AMI that utilizes only electricity to power their home spends approximately 14.5 percent of their gross annual income on utility expenses. Households at 50% AMI spend approximately 9 percent of their gross annual income on utility expenses, and households at 80% AMI spend approximately 6 percent of their gross annual income on utility expenses. At 100% AMI or higher, estimated utility costs become a negligible percentage of a household's gross annual income. However, as utility rates continue to increase for electricity, water, sewer, natural gas and propane, low-income households will continue to spend a larger proportion of their income on utility expenses.

Given the disproportionate amount of household income spent on utility expenses by low-income households in the County, increasing energy efficiency measures for low-income tenants and homeowners is a tangible mechanism for increasing housing affordability. Retrofitting affordable homes with solar, low-flow toilets, high efficiency aerators and energy efficiency appliances is a way to reduce overall housing expenses by decreasing a household's monthly utility expenses.

Single-Family Inventory Shortage

Compared to demand, the single-family housing market has an extremely low inventory of units for sale. Since 2009, the monthly supply of housing inventory has been steadily declining from a high of 23.6 months to a low of 3.1 months in 2020 (see Figure 21). Related statistics documenting the number of months the average unit sits on the market and the percentage of housing units which are absorbed each quarter reinforce the severity of the housing supply issue. Even prior to the effects of COVID, the demand has grown for limited housing despite an extremely limited supply.

Figure 21. Santa Fe Single-Family Housing Inventory and Market Absorption



Source: Santa Fe Association of Realtors' Multiple Listing Service Report – Includes both incorporated and unincorporated areas of Santa Fe County

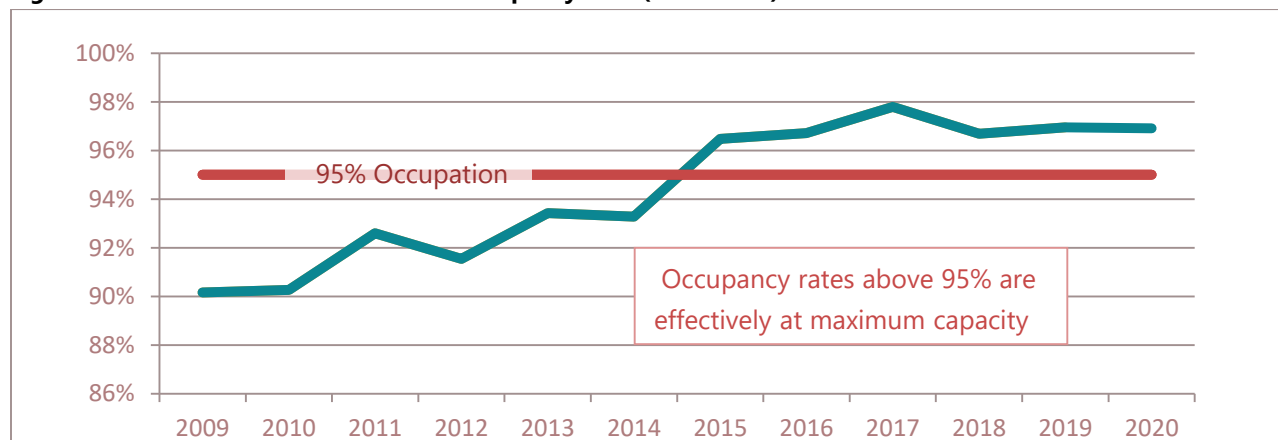
Rental Housing Inventory Shortage

The inventory of rental housing units is comparable to the inventory for single-family homes. Rental vacancy rates should generally be at least 5 percent in a healthy, well-functioning market. That rate is sometimes considered the minimum vacancy that still allows tenant turnover, unit maintenance, and healthy market competition between landlords. Rental vacancy rates below 5 percent (or occupancy rates above 95 percent) are extremely constrained markets with a limited housing inventory.

Past rental surveys have documented that Santa Fe has a critical shortage of rental housing with less than 5 percent vacancy. Various past surveys of multi-family properties have documented vacancy rates ranging from 2.3 percent to 3.2 percent¹⁰. CBRE real estate data from 2009 to 2020 documents vacancy rates shrinking below 5 percent between 2014 and 2015 and remaining below 5 percent since (see Figure 22).

A recent market study released in December, 2022 of 46 housing projects and 5,797 units identified a combined rental vacancy of 2.1 percent (97.9 percent occupied). Of the 27 projects which include some sort of tax credit or subsidy, the occupancy rate was 100 percent (Market Feasibility Analysis of Nueva Acequia, Vogt Strategic Insights, 2022).

Figure 22. Santa Fe Market Rate Rental Occupancy Rate (2009-2020)



Source CBRE January Multifamily Market Survey, includes both market and affordable properties.

¹⁰ New Mexico Mortgage Finance Authority, Housing Needs Assessment, 2020 – 2.3 percent multi-family vacancy rate

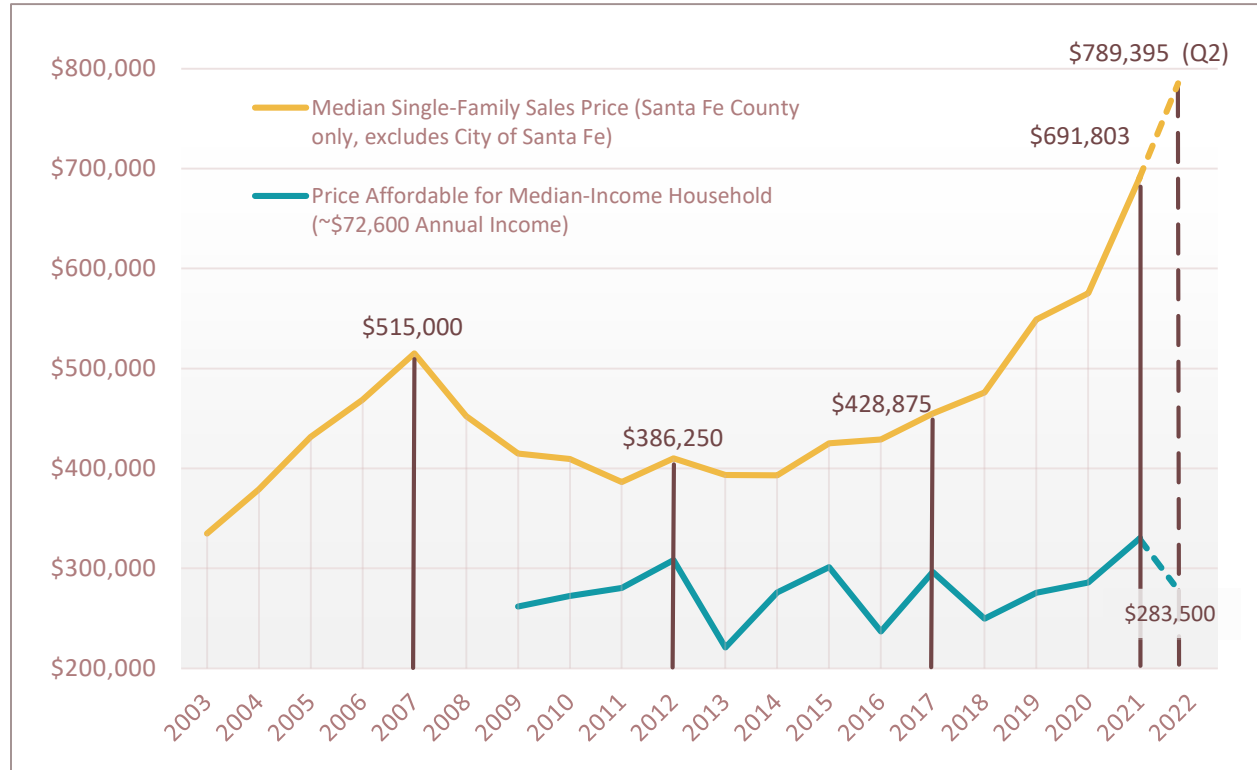
UNM Bureau of Business and Economic Research, Santa Fe Housing Data Report, 2020 – 2.6 percent multi-family vacancy rate

UNM Bureau of Business and Economic Research, New Mexico Apartment Survey, 2021 – 3.2 percent multi-family vacancy rate

Current Housing Market Purchase & Rental Prices

Housing has generally become less affordable over the last decade but has risen extremely fast over the past 5 years. Between 2016 and 2021, the median sales price of a single-family home in Santa Fe County rose 61 percent from \$428,875 to \$691,803 (see Figure 23). Median household income during this same five-year period rose only 16 percent from \$57,863 to \$67,341 (see Figure 25). Data from Quarter 2 of 2022 documents a median single-family sales price of \$789,395 which is a 14 percent increase from the year before and an 84 percent increase from 2016.

Figure 23. Median Single-Family Sales Prices versus Affordability (Santa Fe County, Excludes City of Santa Fe)

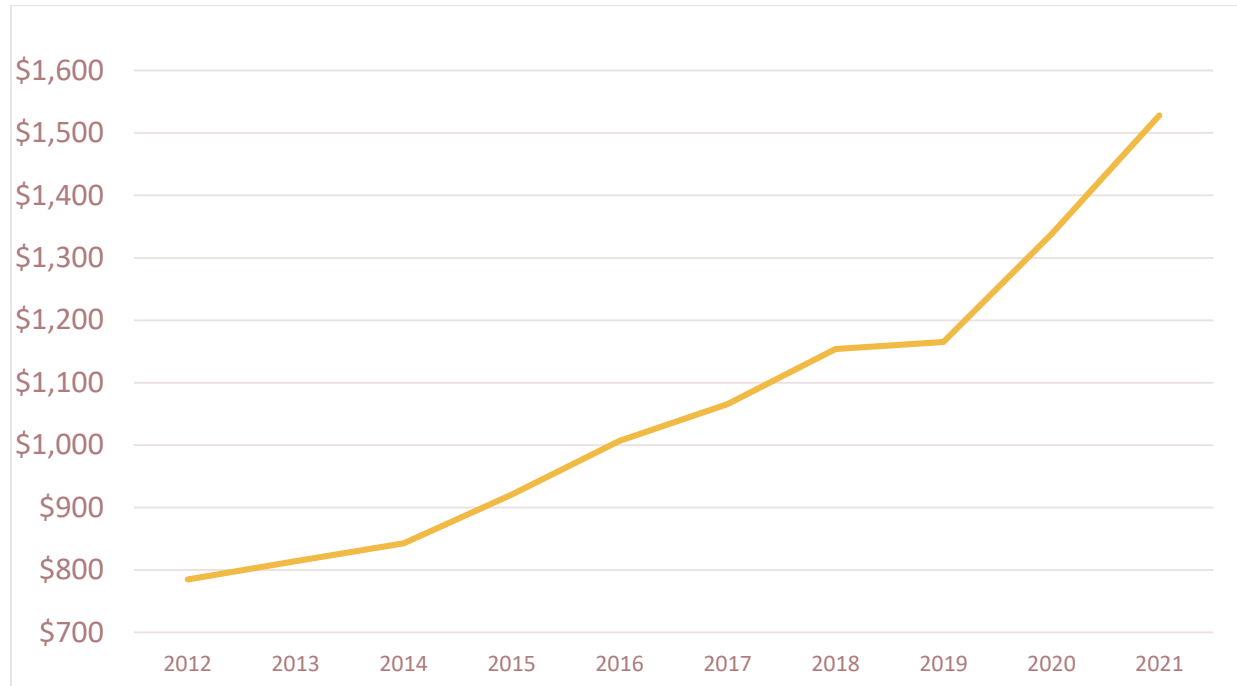


Source: Santa Fe Association of Realtors (2022); Santa Fe County (2022)

Average rental prices show a similar cost escalation (see Figure 24). Between 2016 and 2021, average monthly rental rates increased approximately 52 percent from an average of \$1,007 per month to \$1,528. Between 2012 and 2021, the average monthly rent increased approximately 95 percent from \$785 to \$1,528 paid per month while median household income rose by only about 33 percent.

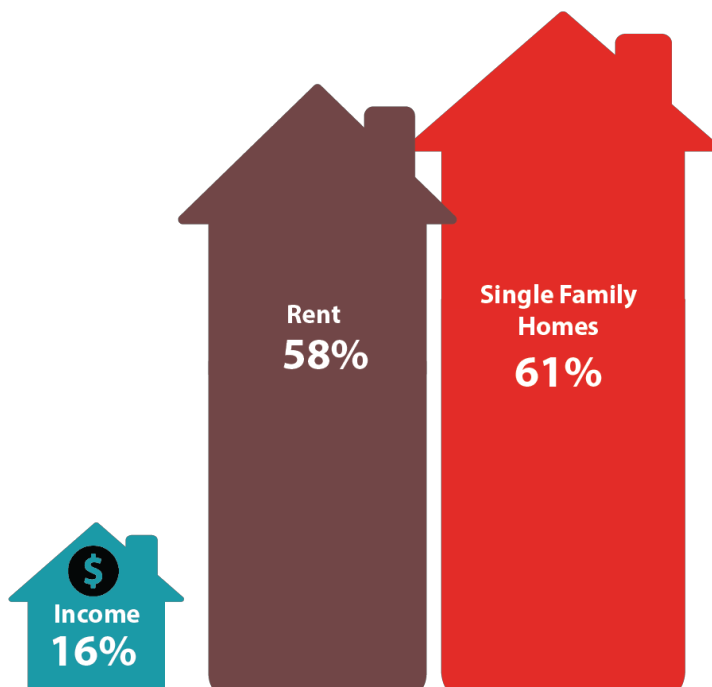
Between 2016 and 2021, household income increased by only about 16 percent, but average rents increased by 52 percent and median single family home prices (County only) increased by 61 percent (see Figure 25). Rapidly increasing housing costs without a corresponding increase in household income is an alarming concern. This disparity results in an increasing lack of accessible, affordable housing and can discourage a wide range of families from staying or relocating in the Santa Fe area.

Figure 24. Santa Fe City & County Average Monthly Rental Rates



Source: CBRE Rental Market Surveys 2012-2021

Figure 25. Changes in Income versus Housing Prices (2016 – 2021)



Housing Market Affordability & Distribution

Assuming a minimum, 3 percent down payment, only about 10% of Santa Fe households have annual incomes capable of affording the County’s median single-family sales price of over \$750,000 (2022, County only). Conversely, approximately 90% of existing Santa Fe households are unable to afford the median sales price for a single-family home in Santa Fe County without a significant down payment.

According to affordable housing calculations for Santa Fe County, the median income household (100% AMI, \$72,600 annual income) can afford about \$1,800 in monthly housing costs or a \$283,500 home with the minimum 3 percent down payment (See Table 5). Approximately 50 percent of Santa Fe households (35,000 households – or 75,000 people) – make less than this “median annual income” and need housing that is available at lower prices. The other 50 percent of Santa Fe make more than this income or and can afford housing that is priced higher. Table 6 divides Santa Fe households (City and County) into three categories: low-, moderate-, and higher-income households who respectively comprise of 44, 18, and 38 percent of the households in Santa Fe.

Table 6 Income Distribution & Affordable Purchase Price

AMI%	Annual Income	Affordable Purchase Price	Number of Households	% Santa Fe County Households
<80%	<\$58,080	<\$226,750	~32,000	~44%
80-120%	\$58,080 - \$87,050	\$226,750 - \$339,750	~12,600	~18%
>120%	>\$87,050	>\$339,750	~26,600	~38%

Table 7 lays out the distribution of single-family housing units sold by year and price group in both the incorporated and unincorporated areas of the County. Note that this includes homes requiring costly rehabilitation improvements. Over the last decade, homes have gotten significantly more expensive to the point where practically zero homes are being sold for less than \$250,000 (an affordable price for a median, or moderate-income Santa Fe County household).

Table 7. Number of Santa Fe City & County Single Family Home Sales According to Price Point

Price Range	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	% of 2021 Total Sales
\$0-150k	97	58	61	42	36	19	15	16	9	2	0%
\$150,001-250K	324	337	349	358	310	333	230	129	46	20	1%
\$250,001-350K	199	281	269	311	362	405	421	424	392	247	12%
\$350,001-450k	184	201	182	213	230	266	293	323	343	389	20%
\$450,001-550k	132	116	114	165	163	193	241	223	260	256	13%
\$550,001-650k	73	69	95	89	114	139	137	163	184	227	11%
\$650,001-750k	66	69	70	67	75	85	98	108	156	147	7%
\$750001+	174	180	216	209	227	299	353	350	450	704	35%
TOTAL	1,249	1,311	1,356	1,454	1,517	1,739	1,788	1,736	1,840	1,992	100%

Source: Santa Fe Association of Realtors (2022)

Current market sales prices are generally unaffordable, or inaccessible for about 62 percent of Santa Fe households (City and County).

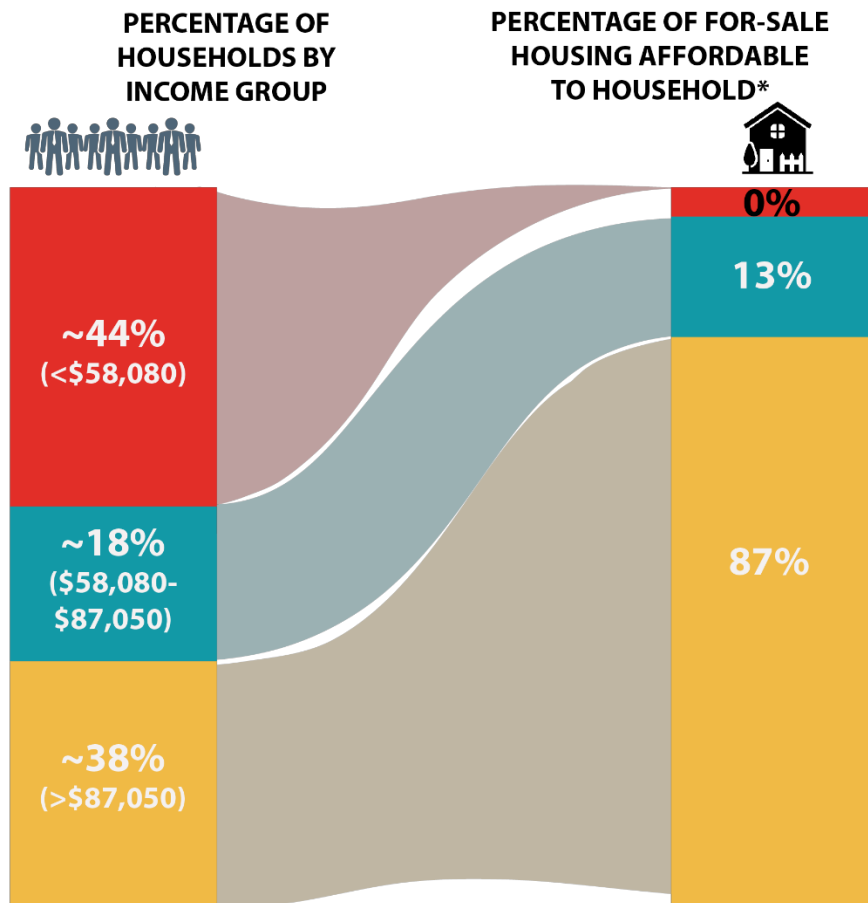
- Low- and very low-income households making \$58,050 or less per year (<80% AMI) constitute about 44 percent of Santa Fe County households but sales data from 2021 demonstrates that there are virtually 0 homes accessible at a price that would be affordable (0.01 percent of sales).
- Moderate- and median-income households making between \$58,050 and \$87,050 per year (80%-120% AMI) constitute about 18 percent of Santa Fe County households and would hypothetically be able to compete for 13 percent of the sales volume.
- Only 13 percent of housing is being sold at rates that are affordable for up to 62 percent of the population (up to 120% AMI).
- A household making the median annual income (~\$72,550) with a minimum down payment is effectively unable to afford a home in the incorporated or unincorporated areas of Santa Fe County.

Table 8 Income Distribution and Percentage of Market Which is Affordable

AMI%	Annual Income	Affordable Purchase Price	Number of Households	% Santa Fe County Households	% of Market Which is Affordable
<80%	<\$58,080	<\$226,750	~32,000	~44%	~0%
80-120%	\$58,080 - \$87,050	\$226,750 - \$339,750	~12,600	~18%	~13%
>120%	>\$87,050	>\$339,750	~26,600	~38%	~87%

Sources: Sources: HUD 2022 Income Limits Summary; County of Santa Fe 2022; Sites Southwest 2022

Figure 26 Percent of Housing Affordable to Santa Fe Households



Sources: Sources: HUD 2022 Income Limits Summary; City of Santa Fe 2022; County of Santa Fe 2022; Sites Southwest 2022

*Affordability calculated via Table 5

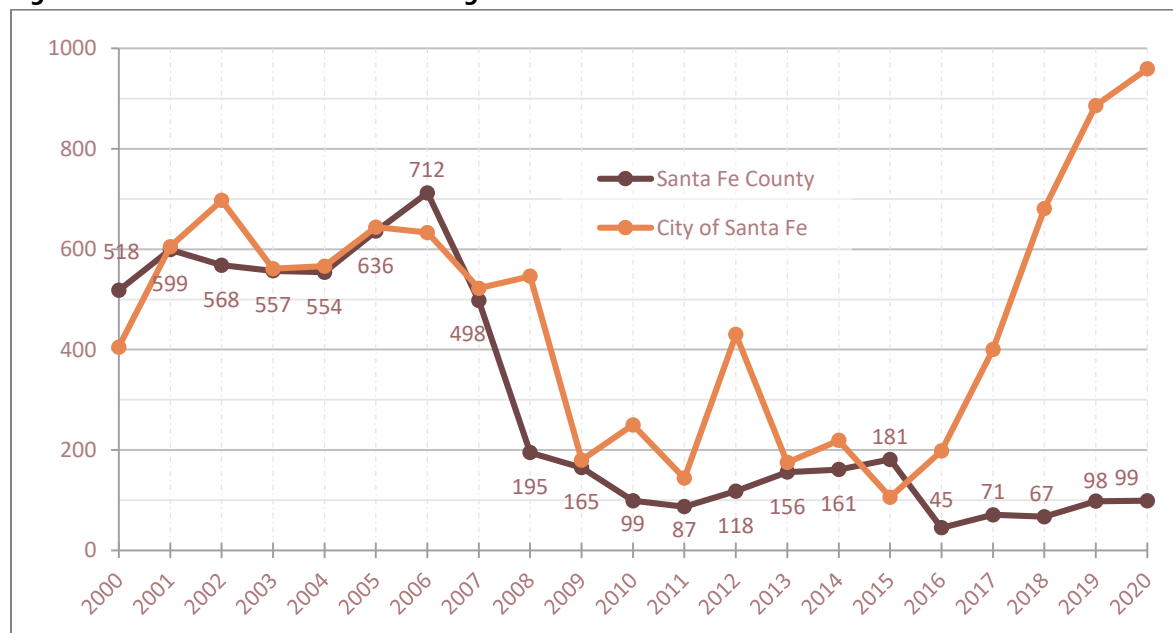
New Construction

Santa Fe County and the City of Santa Fe are two independent permitting jurisdictions which independently have a large impact on growth and development. In the 1980's, the City permitted around 700 residential units per year, but annual units dropped to around 500 units per year in the 1990's (see Figure 27).

Between 2000 and 2004, both the City and County were independently permitting over 500 units per year but, starting in 2005, County permits quickly dropped into the hundreds. The City of Santa Fe continued permitting over 500 housing units until the 2008 housing crisis and then joined the County in permitting only a small amount of new housing units.

In 2016, the City loosened regulatory restrictions which made it easier to develop multi-family housing units and national housing trends began to more robustly seek development opportunities. The City of Santa Fe quickly began approving several hundred housing units per year. Santa Fe County enacted the Sustainable Land Development Code in 2016 which was intended to encourage and focus development in sustainable areas but, as of yet, has not benefited from the national boom in housing development or started permitting a higher number of housing units.

Figure 27. Permitted Residential Dwelling Units 2000-2020



Sources: UNM Housing Data Report, US Census Bureau – Annual Building Permits Survey; Santa Fe County Building Permits; City of Santa Fe Building Permits

Note that the number of Santa Fe County permitted dwelling units may vary from this chart depending on the source and calculation type.

Development Costs of New Housing

Simplified proformas show estimated development costs for the conventional construction of housing for purchase (assumed to be single-family), of housing for rent (assumed to be multi-family), and of pre-manufactured housing.

The development cost of new housing has been estimated using reasonable land, infrastructure, construction, finance, and softs costs which have been evaluated through discussions with public agencies, development consultants, and with private for-profit and non-profit development professionals experienced in both market-rate and affordable housing projects at small and large scales. Development costs are extremely variable and are conditioned on a wide range of factors. The purpose of these proformas is to compare the cost of different development types at different densities to understand how density might impact the affordability of housing.

The simplified proformas show that site-built housing developed for purchase can range drastically depending on the densities at which it is developed (see Table 9). For housing developed at a density of one to four dwelling units per acre, the cost is estimated to be around \$600,000 to \$800,000. If housing is developed around ten dwelling units per acre, the cost is estimated to be around \$400,000, representing almost a 50 percent decrease in purchase costs.

Though increasing development densities can drastically reduce the total development cost of housing and, if applicable, reduce the level of subsidies required to provide units affordable to low- and moderate-income families, site-built single-family housing is expected to remain high in comparison to multi-family (rental or condos) and pre-manufactured housing.

Table 9. Development Cost Estimates of Housing for Purchase

Development Cost Estimates of Site-built Housing for Purchase	Very Low Density	Low Density	Medium Density	Maximum Density
	1 DU/ac	4 DU/ac	7 DU/ac	10 DU/ac
Number of Units	1	4	7	10
Land Cost Per Unit	\$100,000	\$80,000	\$60,000	\$40,000
Site Work, Infrast./Unit	\$80,000	\$65,000	\$55,000	\$50,000
Building Constr. Cost/ S.F.	\$200	\$200	\$200	\$200
Average S.F./Unit	2,000	1,700	1,200	1,100
Permit/Application Fees/Unit	\$3,850	\$3,850	\$3,152	\$3,152
Development Cost Estimate:				
Total Land Cost/ac	\$100,000	\$320,000	\$420,000	\$400,000
Total Site Work/ Infrastructure	\$80,000	\$260,000	\$385,000	\$500,000
Total Permit Costs	\$3,850	\$15,400	\$22,064	\$31,520
Building Constr. Cost	\$400,000	\$1,360,000	\$1,680,000	\$2,200,000
Constr. Loan Interest Total (8%)	\$32,000	\$108,800	\$134,400	\$176,000
Soft Costs (20%)	\$123,170	\$412,840	\$528,293	\$661,504
Sales Costs (6%)	\$44,341	\$148,622	\$190,185	\$238,141
Total Development Cost	\$783,361	\$2,477,040	\$3,169,757	\$3,969,024
Total cost per sf	\$392	\$364	\$377	\$361
Cost Per Unit	\$783,361	\$619,260	\$452,822	\$396,902

Table 10. Site-Built Affordability Gaps - Indicated by Negative Numbers (Assumes Family of 3)

Gap Between Development Cost and Affordable Prices	1 DU/ac	4 DU/ac	7 DU/ac	10 DU/ac
	\$783,361	\$619,260	\$452,822	\$396,902
30% AMI Affordable Price	\$85,000	\$85,000	\$85,000	\$85,000
<i>Gap or Surplus Affordability</i>	-\$698,361	-\$534,260	-\$367,822	-\$311,902
50% AMI Affordable Price	\$141,750	\$141,750	\$141,750	\$141,750
<i>Gap or Surplus Affordability</i>	-\$641,611	-\$477,510	-\$311,072	-\$255,152
60% AMI Affordable Price	\$170,000	\$170,000	\$170,000	\$170,000
<i>Gap or Surplus Affordability</i>	-\$613,361	-\$449,260	-\$282,822	-\$226,902
70% AMI Affordable Price	\$198,500	\$198,500	\$198,500	\$198,500
<i>Gap or Surplus Affordability</i>	-\$584,861	-\$420,760	-\$254,322	-\$198,402
80% AMI Affordable Price	\$226,750	\$226,750	\$226,750	\$226,750
<i>Gap or Surplus Affordability</i>	-\$556,611	-\$392,510	-\$226,072	-\$170,152
100% AMI Affordable Price	\$283,500	\$283,500	\$283,500	\$283,500
<i>Gap or Surplus Affordability</i>	-\$499,861	-\$335,760	-\$169,322	-\$113,402
120% AMI Affordable Price	\$339,750	\$339,750	\$339,750	\$339,750
<i>Gap or Surplus Affordability</i>	-\$443,611	-\$279,510	-\$113,072	-\$57,152
150% AMI Affordable Price	\$425,000	\$425,000	\$425,000	\$425,000
<i>Gap or Surplus Affordability</i>	-\$358,361	-\$194,260	-\$27,822	\$28,098
200% AMI Affordable Price	\$566,500	\$566,500	\$566,500	\$566,500
<i>Gap or Surplus Affordability</i>	-\$216,861	-\$52,760	\$113,678	\$169,598

The below example shows simplified proformas for rental housing that demonstrate a range of project densities from seven to twenty units per acre. This shows that at approximately 7 units per acre, projects would resemble smaller, one and two-story clustered housing built as either single-family detached units or as duplexes and triplexes. At approximately twenty units per acre, projects would resemble two and three-story townhomes or suburban garden apartments with parking and some open space. After discussing development costs with several developers, the inferred understanding is that twenty dwelling units per acre and about 60 or 100 units per development is an approximate minimum density at which they can build low or moderately-priced multifamily projects – this is especially relevant if there are requirements to include affordable housing.

Table 11. Development Cost Estimates of Rental Housing

Development Cost Estimates of Rental Housing	Medium Density	Medium Density	Medium/High Density	High Density
	7 DU/ac	10 DU/ac	14 DU/ac	20 DU/ac
Number of Units	7	10	14	20
Land Cost Per Unit	\$60,000	\$40,000	\$30,000	\$30,000
Site Work, Infrast./Unit	\$50,000	\$40,000	\$30,000	\$20,000
Building Constr. Cost/ S.F.	\$200	\$200	\$200	\$200
Average S.F./Unit	1,000	1,000	800	800
Permit/Application Fees	\$3,940	\$3,820	\$3,820	\$3,820
Development Cost Estimate:				
Land Cost	\$420,000	\$400,000	\$420,000	\$600,000
Site Work/ Infrastructure	\$350,000	\$400,000	\$420,000	\$400,000
Permits	\$27,580	\$38,200	\$53,480	\$76,400
Building Constr. Cost	\$1,400,000	\$2,000,000	\$2,240,000	\$3,200,000
Constr. Loan Interest Total (8%)	\$112,000	\$160,000	\$179,200	\$256,000
Pre-funded Reserves (\$1,200/unit)	\$8,400	\$12,000	\$16,800	\$24,000
Soft Costs @ 20%	\$395,564	\$510,876	\$564,026	\$769,752
Total Development Cost	\$2,713,544	\$3,521,076	\$3,893,506	\$5,326,152
Average Cost Per Unit	\$387,649	\$352,108	\$278,108	\$266,308
Total Cost per SF	\$388	\$352	\$348	\$333
Funding Sources				
Owner's Equity (20%)	\$542,709	\$704,215	\$778,701	\$1,065,230
Mortgage (80%)	\$2,170,836	\$2,816,861	\$3,114,805	\$4,260,922
Total Sources of Funding	\$2,713,544	\$3,521,076	\$3,893,506	\$5,326,152
Monthly Operating Proforma				
Owner's Monthly ROI (7% annual)	\$3,166	\$4,108	\$4,542	\$6,214
Annual Debt Cost (30yr, 5% int)	\$11,605	\$15,059	\$16,652	\$22,779
Operating Cost (\$400/unit/mo)	\$2,800	\$4,000	\$5,600	\$8,000
Total Monthly Cost	\$17,571	\$23,167	\$26,794	\$36,992
Occupancy Rate	95%	95%	95%	95%
Monthly Rent Per Unit	\$2,642	\$2,439	\$2,015	\$1,947

The simplified proformas show that rental housing can be developed at around \$250,000 to \$400,000 per unit and would rent for between \$1,900 and \$2,600 per month (see Table 11). Developing rental housing at twenty dwelling units per acre has the potential to lower rental costs by 25 percent in comparison to seven units per acre. At the current development costs, it may be feasible to develop rental housing at levels that are almost affordable to the median Santa Fe County household (100% AMI) (see Table 12).

Table 12. Rental Affordability Gaps - Indicated by Negative Numbers (Assumes Family of 3)

Gap Between Development Cost and Affordable Prices	7 DU/ac	10 DU/ac	14 DU/ac	20 DU/ac
	\$2,642	\$2,439	\$2,015	\$1,947
30% AMI Affordable Price	\$545	\$545	\$545	\$545
<i>Gap or Surplus Affordability</i>	-\$2,098	-\$1,894	-\$1,470	-\$1,402
50% AMI Affordable Price	\$908	\$908	\$908	\$908
<i>Gap or Surplus Affordability</i>	-\$1,735	-\$1,531	-\$1,107	-\$1,039
60% AMI Affordable Price	\$1,089	\$1,089	\$1,089	\$1,089
<i>Gap or Surplus Affordability</i>	-\$1,553	-\$1,350	-\$926	-\$858
70% AMI Affordable Price	\$1,271	\$1,271	\$1,271	\$1,271
<i>Gap or Surplus Affordability</i>	-\$1,372	-\$1,168	-\$744	-\$676
80% AMI Affordable Price	\$1,452	\$1,452	\$1,452	\$1,452
<i>Gap or Surplus Affordability</i>	-\$1,190	-\$987	-\$563	-\$495
100% AMI Affordable Price	\$1,815	\$1,815	\$1,815	\$1,815
<i>Gap or Surplus Affordability</i>	-\$827	-\$624	-\$200	-\$132
120% AMI Affordable Price	\$2,176	\$2,176	\$2,176	\$2,176
<i>Gap or Surplus Affordability</i>	-\$466	-\$262	\$162	\$229
150% AMI Affordable Price	\$2,721	\$2,721	\$2,721	\$2,721
<i>Gap or Surplus Affordability</i>	\$79	\$283	\$707	\$774
200% AMI Affordable Price	\$3,628	\$3,628	\$3,628	\$3,628
<i>Gap or Surplus Affordability</i>	\$985	\$1,189	\$1,613	\$1,681

Pre-manufactured homes that meet the standards of the New Mexico Manufactured Housing Act are an affordable alternative to conventional, or on-site construction. Pre-manufactured homes are built to the same HUD and Uniform Building Code requirements and, per State law, are to be treated the same way as conventional single-family homes.

The simplified proformas for pre-manufactured housing used purchase cost estimates from 2021 which are expected to be significantly higher in 2022 given inflation, interest, and construction cost increases. Regardless, proformas for pre-manufactured housing show that housing can be considerably cheaper when developed at off-site manufacturing facilities and shipped into the Santa Fe area. The cost of developing pre-manufactured housing is expected to range from around \$450,000 when developed at a density of one unit per acre to around \$250,000 when developed at a density of ten dwelling units per acre (see **Table 13**). Pre-manufactured housing at ten dwelling units per acre is expected to be affordable for median Santa Fe County households (100% AMI) and may even achieve affordable prices when developed at lower densities.

Table 13. Development Costs of Pre-Manufactured Housing

Development Costs of Pre-Manufactured Housing	Very Low Density	Low Density	Medium Density	Maximum Density
	1 DU/ac	4 DU/ac	7 DU/ac	10 DU/ac
Number of Units	1	4	7	10
Land Cost Per Unit	\$100,000	\$80,000	\$60,000	\$40,000
Site Work, Infrast./Unit	\$80,000	\$65,000	\$55,000	\$50,000
Average Purchase Cost (2021)	\$123,200	\$123,200	\$123,200	\$123,200
Delivery & Foundation	\$10,000	\$10,000	\$10,000	\$10,000
Permit/Application Fees/Unit	\$3,000	\$3,000	\$3,000	\$3,000
Development Cost Estimate:				
Total Land Cost/ac	\$100,000	\$320,000	\$420,000	\$400,000
Total Site Work/ Infrastructure	\$80,000	\$260,000	\$385,000	\$500,000
Total Permit Costs	\$3,000	\$12,000	\$21,000	\$30,000
Building Constr. Cost	\$133,200	\$532,800	\$932,400	\$1,332,000
Constr. Loan Interest Total (8%)	\$10,656	\$42,624	\$74,592	\$106,560
Soft Costs (20%)	\$65,371	\$233,485	\$366,598	\$473,712
Sales Costs (6%)	\$23,534	\$84,055	\$131,975	\$170,536
Total Development Cost	\$415,761	\$1,400,909	\$2,199,590	\$2,842,272
Total cost per sf	\$42	\$35	\$31	\$28
Cost Per Unit	\$415,761	\$350,227	\$314,227	\$284,227

Table 14. Pre-Manufactured Affordability Gaps - Indicated by Negative Numbers (Assumes Family of 3)

Gap Between Development Cost and Affordable Prices	1 DU/ac	4 DU/ac	7 DU/ac	10 DU/ac
	\$415,761	\$350,227	\$314,227	\$284,227
30% AMI Affordable Price	\$85,000	\$85,000	\$85,000	\$85,000
<i>Gap or Surplus Affordability</i>	-\$330,761	-\$265,227	-\$229,227	-\$199,227
50% AMI Affordable Price	\$141,750	\$141,750	\$141,750	\$141,750
<i>Gap or Surplus Affordability</i>	-\$274,011	-\$208,477	-\$172,477	-\$142,477
60% AMI Affordable Price	\$170,000	\$170,000	\$170,000	\$170,000
<i>Gap or Surplus Affordability</i>	-\$245,761	-\$180,227	-\$144,227	-\$114,227
70% AMI Affordable Price	\$198,500	\$198,500	\$198,500	\$198,500
<i>Gap or Surplus Affordability</i>	-\$217,261	-\$151,727	-\$115,727	-\$85,727
80% AMI Affordable Price	\$226,750	\$226,750	\$226,750	\$226,750
<i>Gap or Surplus Affordability</i>	-\$189,011	-\$123,477	-\$87,477	-\$57,477
100% AMI Affordable Price	\$283,500	\$283,500	\$283,500	\$283,500
<i>Gap or Surplus Affordability</i>	-\$132,261	-\$66,727	-\$30,727	-\$727
120% AMI Affordable Price	\$339,750	\$339,750	\$339,750	\$339,750
<i>Gap or Surplus Affordability</i>	-\$76,011	-\$10,477	\$25,523	\$55,523
150% AMI Affordable Price	\$425,000	\$425,000	\$425,000	\$425,000
<i>Gap or Surplus Affordability</i>	\$9,239	\$74,773	\$110,773	\$140,773
200% AMI Affordable Price	\$566,500	\$566,500	\$566,500	\$566,500
<i>Gap or Surplus Affordability</i>	\$150,739	\$216,273	\$252,273	\$282,273



3.0

HOUSING NEEDS ASSESSMENT

DATA DASHBOARD

HOUSING UNITS



17,216 ADDITIONAL HOUSING UNITS

Needed between **2022** and **2025** to accommodate existing employees and residents

COST-BURDENED



34%

of the Santa Fe County population [1 in 3]



6,232 subsidized or affordable rental units needed

(at prices less than **\$1400** per month)

HOUSING ASSISTANCE NEEDED FOR HOMELESS AND HOUSING INSECURE:

75-150 spaces
Non-Congregate & Outdoor Spaces

173-350 units
Transitional and/or Rapid Re-Housing

176-300 units
Permanent Supportive Housing



HOUSING ASSISTANCE NEEDED FOR LOW-INCOME HOUSEHOLDS:

8,400 vouchers
for Low-Income Renters

6,163 loans & grants
for Down Payment Assistance

322 loans & grants
for housing rehabilitation

Housing Needs Analysis

The housing needs in Santa Fe County are significant and multi-faceted. This assessment includes all of Santa Fe County, including both incorporated and unincorporated areas of the County. The research used to develop this Plan has identified that 34% of existing residents are burdened by the unaffordable cost of housing and the majority of Santa Fe County households have incomes too low to compete within the current housing market. Relatedly, many households in Santa Fe County have special housing needs involving physical, mental, income, or temporary living conditions. These special housing needs are the focus of many public and non-profit programs.

This housing plan considers two distinct categories of housing need:

1. The need for additional, physical housing units to satisfy the existing housing shortage. This requires the development of new housing units to reduce inequitable exclusionary housing displacement, facilitate a healthy housing market, and to achieve more affordable housing prices. This is typically addressed through housing development projects from private for- and not-for-profit developers.
2. The need for various types of targeted housing assistance programs based on burdens and special housing needs. This can include, or overlap with, the development of new housing units but is more particularly focused on providing assistance which can help people access and stay in affordable housing units. These needs are typically addressed through private and public housing assistance programs.

More information can be found in the 2020 Santa Fe County Housing Data Report prepared by the Bureau of Business & Economic Research (Housing Data Report) and attached as an appendix. Unless otherwise noted, the term “Santa Fe County” includes the entire population and geographic area of the County including incorporated communities like the City of Santa Fe.

Housing Shortage

Conservative Demand for New Units

The lack of affordable housing in Santa Fe County is most impacted by a shortage of available housing units or, put of another way, by the unmet demand for units which results in elevated housing costs and the displacement of existing residents – especially those with lower incomes and those who have been historically disenfranchised.

Impact of Utilities on Housing Cost & Affordability

Per HUD regulations, a household’s total housing cost must include the cost of the household’s rent or mortgage payment plus the cost of the household’s monthly utility expenses. Data shows that estimated utility costs for low and extremely low-income households in Santa Fe County make up a large percentage of the household’s total housing costs and gross annual income.

Assuming that a home utilizes gas and electricity for utility services, households at 30% AMI (~\$17,000-28,000) spend approximately 9 percent of their gross annual income on utility expenses. Households at 50% AMI (~\$28,000-\$40,000) spend approximately 5 percent of their gross annual income on utility expenses and households at 80% AMI (~\$45,000-\$65,000) spend approximately 3 percent of their gross annual income on utility expenses.

If a household only utilizes electricity for energy services, the percentage of gross annual income spent on utility expenses increases. A household at 30% AMI that utilizes only electricity to power their home spends approximately 14.5 percent of their gross annual income on utility expenses. Households at 50% AMI spend approximately 9 percent of their gross annual income on utility expenses, and households at 80% AMI spend approximately 6 percent of their gross annual income on utility expenses. At 100% AMI or higher, estimated utility costs become a negligible percentage of a household's gross annual income. However, as utility rates continue to increase for electricity, water, sewer, natural gas and propane, low-income households will continue to spend a larger proportion of their income on utility expenses.

Given the disproportionate amount of household income spent on utility expenses by low-income households in the County, increasing energy efficiency measures for low-income tenants and homeowners is a tangible mechanism for increasing housing affordability. Retrofitting affordable homes with solar, low-flow toilets, high efficiency aerators and energy efficiency appliances is a way to reduce overall housing expenses by decreasing a household's monthly utility expenses.

Housing Needs Assessment

Single-Family .

Multiple studies have used different methodologies to estimate Santa Fe's housing shortage:

- Santa Fe Association of Realtors/New Mexico Apartment Advisors, 2017:
 - Shortage of Multi-Family Apartment Housing – 9,624 units
- New Mexico Mortgage Finance Authority Housing Needs Analysis, 2020:
 - Shortage of Affordable, Low-Income Housing – 7,343 units
- University of New Mexico, BBER, Santa Fe County Housing Data Report, 2019:
 - Total Shortage in 2020: 10,672 units
 - Total Shortage by 2025: 15,466 units
 - Shortage of Owner-Occupied Housing – 11,239 units
 - Shortage of Renter-Occupied Housing – 4,227 units

Using a methodology that focuses on existing, overcrowded residents and existing employee demand but which conservatively excludes¹¹ cost-burdened households, housing market competition, and speculative or planned job growth, this report estimates:

Total Shortage 2022-2025: 17,296 units

- **Shortage of Owner-Occupied Housing – 10,330 units**
- **Shortage of Renter-Occupied Housing – 6,886 units**

The calculated shortage of new housing units includes the following (see Table 15):

- Estimated demand from existing in-commuters (employees) who want to live in Santa Fe (Surveys)
- Existing households which are overcrowded and need additional space (U.S. Census)
- Demand due to population growth (UNM-estimated low-growth projections)
- Estimated permitted housing units (proxy for new housing construction since 2020)

The calculated shortage for new housing units conservatively excludes the following:

- Existing, cost-burdened households (21,044) who need financial assistance or lower cost housing which does not *directly* equate to a unit shortage (see Cost-Burdened Households pg.54)
- Demand by in-migrants and competition with or displacement of existing residents (see Population, Growth & Migration pg.20)
- Demand for seasonal or vacant units (gap between new and occupied units ~6.8 percent)
- Demand for employee housing to satisfy growing industries (speculative)
- Demand from Los Alamos National Laboratories expansion (expected 500 units annually¹²)

Table 15. Housing Shortage – 2020

Shortage - 2020-2025	Number of Housing Units
Shortage in 2020	14,742
In-Commuter Housing Shortage	12,169
Existing Overcrowded Units	2,573
Demand per Population Growth 2020-25 (Housing Data Report)	5,074
Shortage of Housing Units 2020 – 2025; Total	19,816

Source: Commuter Surveys; U.S. Census; Housing Data Report; Sites Southwest

Table 16. Housing Shortage - 2022

Shortage - 2022-2025	Number of Housing Units
2020-2025 Identified Shortage	19,816
Estimated New Permits (2020 - 2021) (Housing Data Report)	-2600
City of Santa Fe (Two-year cumulative estimate)	2,000
Santa Fe County (Two-year cumulative estimate)	600
Shortage of Housing Units 2022 – 2025; Total	17,216

Source: U.S. Census; Housing Data Report; Sites Southwest

¹¹ Excluded factors were decided based on potentially redundant or overlapping demand for housing units a.

¹² Los Alamos County expects LANL to hire "...2,000 new employees annually for the next three to five years..." (10/26/2022 Planning & Zoning Commission Staff Report). LANL Senior Staff estimated 4,500-6,200 new hires between 2021-2023 (8/10/2021 – Beierschmitt; 6/14/2022 – Mason). 26 percent of current employees live in Santa Fe and at least that proportion is expected to similarly locate (~1,400 between 2021-2023 and about 500 annually for 2023-2025).

Housing Shortage: Location & Tenure

The need for new housing units can be divided between tenure, jurisdiction, and price. Distribution between owner-occupied and renter-occupied units is divided at a ratio of 60- to 40 percent approximately representing future feasible development (see Table 17). Distribution of the shortage can also be divided between how many units could be built within the City of Santa Fe versus Santa Fe County. This has been divided in accordance with the population ratio between the two jurisdictions.

Table 17. Housing Shortage Distribution by Tenure and Jurisdiction

Housing Shortage by Tenure and Jurisdiction	Total Santa Fe County + City of Santa Fe	Assumed Santa Fe County (44%)	Assumed City of Santa Fe (56%)
Demand for Additional Housing Units by 2025	17,216	7,575	9,641
Owner-Occupied Units (60%)	10,330	4,545	5,785
Renter-Occupied Units (40%)	6,886	3,030	3,856

Source: Sites Southwest

Housing Burdens

Cost-Burdened Households

Households are considered to have a housing cost burden if they pay more than 30 percent of their annual income on housing related costs including mortgage or rent payments, utilities, and other typical housing expenses. When a household pays more than 30 percent for housing, they may have difficulty affording other necessities such as food, clothing, transportation, and medical care which disproportionately affects low-income families. Aid which can help cost-burdened households includes rental assistance, utility fee waivers, maintenance or rehabilitation improvements, and relocation assistance.

The measurement of cost-burdened households can provide a false understanding of affordability due to the reliance on historic and lower home valuations, historic and lower mortgage interest rates, older lease agreements, paid-off homes, substandard housing, and family- or non-market-based rental and living arrangements. Housing costs experienced by existing residents can be significantly less than the cost of “modern” housing prices available on the market. To illustrate this difference, we can compare the Census-estimated median valuation of all homes in Santa Fe County at \$314,000 (2019 ACS 1-year estimates) with the average market purchase price for owner-occupied housing, including single-family, condos, triplexes, and mobile homes at \$527,000 or the median price of single-family housing at \$590,000 (2021 Santa Fe Association of Realtors – Includes City and County). According to HUD standards and the affordability chart included in this plan (Table , p.32), \$314,000 is affordable for a 3-person, 115% AMI household (\$83,450 annual income), whereas the current market prices of around \$527,000 or \$590,000 are only affordable to a 3-person, 200% AMI household (\$145,100 annual income).

Approximately 34 percent of all Santa Fe County households (21,044 households), are cost-burdened in the current place they live. This includes 12,174 owners who own their home (16 percent of all owners) and 8,870 households who rent (49 percent of all renters) (see Table 18).

Table 18 Cost-Burdened Households

Cost-Burdened Households	# of Units	% of Total Households
Occupied Housing Units	62,182	
Total Non-Cost-Burdened Households	41,138	66%
Total Cost-Burdened Households	21,044	34%
Cost-Burdened Owners	12,174	16% of owners
<i>Cost-Burdened Owners with a Mortgage</i>	<i>8,900</i>	<i>36% of owners with mortgage</i>
Cost-Burdened Renters	8,870	49% of renters
<i>Low-Income Cost-Burdened Renters</i>	<i>8,163</i>	

Source: US Census Bureau American Community Survey 1-Year Estimates 2019 Table DP04; UNM Housing Data Report; Sites Southwest

For owner-occupied households, owners with a mortgage are of greater concern and 36 percent of them are cost-burdened. For owners with a mortgage, the \$75,000 annual income level is a division point (approximately 100% AMI). Above \$75,000 and owners with a mortgage are not generally cost-burdened but almost half (48 percent) of the owners with annual incomes of between \$50,000 and \$74,999 are cost-burdened. Though homeowners with an existing mortgage are not likely to be the recipient of most forms of housing assistance, recognizing when households tend to be cost-burdened can help identify need and justify programs.

For renter-occupied households, 49 percent are cost-burdened and the \$50,000 annual income level is a division point (approximately 70% AMI). Renters making more than \$50,000 are generally not cost-burdened, but almost half (46 percent) of renters making between \$35,000 and \$49,999 are cost-burdened (ACS, 2019). Though direct rental assistance is less likely to target 50-70% AMI households due to limited capacity, the county should consider whether inclusionary zoning or other policies can be used to help encourage the provision of housing affordable to these income groups.

Household Crowding

HUD has adopted a standard that more than one person per room indicates “overcrowding.” In Santa Fe (incorporated and unincorporated areas) overcrowded housing is found with both homeowners and with renters though it is more common in renter households. It should be noted that the concept of “crowding” can vary by location and among cultures. HUD’s research has shown that overcrowding is more common in urban areas than in rural areas and that Hispanic households have the highest rate of overcrowding among racial and ethnic groups, but Santa Fe County should consider the range of reasonings behind “crowded” housing when addressing the issue. For some households, HUD’s definition of “crowding” is simply not culturally relevant, as many households prefer intergenerational living; for

others it is due to a lack of larger housing units which can accommodate the household; and for others it is a way to distribute housing costs and make housing more affordable.

Typical remedies for household overcrowding include creating more units at an affordable rate to accommodate the large household size, programs that assist homeowners in adding to their existing home, or creating a greater quantity of affordable housing options that allow the doubled-up household to separate, if that is their choice.

Table 19 Household Crowding

Household Crowding	Not Over-Crowded	Over-Crowded
Owner-Occupied	42,784 units	1,601 units
% of Owner-Occupied Units	96.4%	3.6%
Renter-Occupied	16,825 units	972 units
% of Renter-Occupied	94.5%	5.5%

Source: US Census Bureau American Community Survey 1-Year Estimates 2019 Table DP04; UNM Housing Data Report

Special Housing Needs

Need for Special Housing Services

Table 20. Special Housing Needs

Special Housing Needs	Total Santa Fe County + City of Santa Fe
Homelessness and Unstable Housing	
Homeless Households	412 - 600
Individuals	363 - 400
Families	49 - 100
Youth (18-25 years old) (duplicated counting)	18 - 50
Chronically Homeless Households (duplicated counting)	205 - 300
"Disconnected Youth" with Unstable Housing (14-26 years old)	160 - 300
Families with Children in Unstable Housing (Adelante Program)	185
Children Enrolled in the Adelante Program	423
Survivors of Domestic Violence	60 - 200
Demographic-Based Housing Needs	
Disabled Individuals (Ambulatory)	9,812
Female-Headed Households	19,690
Female-Headed Households with Children (<18 years old)	3,300
Senior Households in Poverty	2,290

Sources: New Mexico Coalition to End Homelessness (2020); US Census – ACS 5-year Estimate 2020; Reconnecting Youth Survey 2017; Esperanza Shelter

Housing Needs by Type

Housing needs can be divided into:

- The need for physical units, especially those at price points which are affordable to existing low- and moderate-income households.
- The need for particular types of housing services (e.g., rehabilitation assistance) or the need for housing which satisfies a particular need (e.g., ADA-accessible housing).

Estimated housing needs are provided in Table 21. The need for additional housing units is based on an identified shortage of housing (Table 16) that is affordable to existing low and moderate-income households and divided by tenure (purchase versus rent) and different income classifications. The need for housing services, however, is based on identified housing needs (Table 3) which includes services for households with unstable housing, the need for ADA-accessible housing, and the need for senior housing.

Different housing types can overlap: ADA-accessible units, for instance, overlap with subsidized senior housing and both types overlap with the need for subsidized rental housing. The calculated gap in Table 21 uses the identified need for additional housing units from Table 17. **Error! Reference source not found.** and distributes them according to corresponding affordability levels. Special housing needs are distributed across corresponding housing types. Homeless households, for instance, are partially supported by emergency shelters, partially by rapid rehousing, partially by permanent supportive housing, and partially by subsidized rentals.

It is important to note that market-rate housing is a critical need for overall housing affordability. Despite Table 21 identifying only a small gap between market rate housing units, additional market rate units increase overall inventory, increase seller competition, and reduce the inflationary pressures on older, smaller, or otherwise less expensive housing units.

- Housing of any type, even higher-end housing can lower the cost of comparable housing types by providing alternatives.
- Especially when the supply is adequate, housing tends to depreciate over time, so even higher-cost housing (especially absent large renovations) depreciates into lower-cost, sometimes more affordable housing.
- Lastly, the creation of higher-end housing can have rippling effects (especially downward) leading to reduced competition and displacement. Without adequate supply, households with a high purchasing-power out-compete households with a lower purchasing-power and will raise (bid-up) the cost of housing. Providing higher-end housing reduces inter-group competition and increases availability across the spectrum of housing price brackets.

Table 21 can help highlight developments that are particularly beneficial for Santa Fe but for the above reasons, it should not be used to discourage or exclude other housing types.

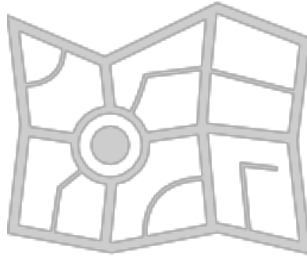
Table 21. Housing Needs by Type (Santa Fe County - Incorporated and Unincorporated Areas)

Type of Housing	Target Market	Gap in Units
Gap or Need for Additional Housing Units (Not Overlapping)		
Entry Level and Low-Income Affordable Home Ownership	Homebuyers with an annual household income of around \$30,000 to \$60,000 depending on household size (50-80% AMI, approximate purchase price ~\$150,000 to ~\$250,000).	6,163
Affordable Workforce Home Ownership	Homebuyers with an annual household income of around \$45,000 to \$90,000 depending on household size (80-120% AMI, approximate purchase price ~\$225,000 to ~\$350,000).	2,970
Market-Rate Home Ownership	Homebuyers with an annual household income greater than about \$70,000 to \$95,000 depending on household size (> 120% AMI, approximate purchase price more than \$350,000).	1,322
Very Low-Income Affordable Rental Housing	Renters with an annual household income of less than about \$35,000 to \$45,000 depending on household size (<60%AMI, approximate rent and utilities less than \$1,000).	4,958
Low-Income Affordable Rental Housing	Renters with an annual household income of around \$35,000 to \$60,000 depending on household size (60-80% AMI, approximate rent and utilities ~\$800 to ~\$1,500).	1,274
Affordable Workforce Rental Housing	Renters with an annual household income of around \$45,000 to \$95,000 depending on household size (80-120% AMI, approximate rent and utilities ~\$1,200 to ~\$2,200).	508
Market-Rate Rental Housing	Renters with an annual household income greater than about \$70,000 to \$90,000 depending on household size (> 120% AMI, approximate rent and utilities greater than ~\$2,000)	21
Gap or Need for Housing Services, Assistance, and Special Housing Characteristics (Overlapping Needs)		
Housing Rehabilitation	Housing rehabilitation is needed to preserve and maintain currently affordable homes. Units that cannot be rehabilitated should be replaced. Rehabilitation assumed based on the number of units without plumbing facilities per US Census estimates.	322
Non-Congregate Shelters & Managed/Safe Outdoor Spaces	Intended for very short-term stays of up to 90 days. This housing type can benefit unsheltered households, individuals/families needing immediate or temporary shelter, and survivors of domestic violence.	75-150
Transitional and/or Rapid Re-Housing	Assistance intended for an intermediary period, typically from 18-24 months. In Rapid Rehousing, it becomes a permanent housing unit with only temporary subsidies to establish the renter. Will sometimes provide services such as job training, mental health assistance, services for domestic violence situations, incarceration reentry, and those recovering from substance abuse.	173-350

Type of Housing	Target Market	Gap in Units
Permanent Supportive Housing	Time unlimited housing for low-income households with qualifying disabilities (physical or behavioral) and documented experience with chronic homelessness (12 months or more).	176-300
ADA-Accessible Housing	Households whose members have ambulatory disabilities and require ADA-accessibility.	9,812
Subsidized Senior Housing	Senior-headed households with a cost burden (includes all cost-burdened seniors).	2,290

Affordable Housing Resources

Affordable housing resources available to residents of Santa Fe County are listed in Appendix A. It is desirable to increase participation of County residents in these programs. Making residents aware of the assistance that is available, and assisting residents find the most appropriate services and programs is important to increasing participation. Housing programs have limited capacity, which makes it even more important to help County residents find the appropriate program.



4.0

LAND USE & POLICY REVIEW

Summary

The provision and availability of affordable housing in Santa Fe County is significantly inhibited by a lack of housing supply. Though some of this supply shortage is caused by volatile or unpredictable external forces such as material costs and labor shortages, historically the County, through Board adopted policies, has also inadvertently contributed to a limited housing supply through restrictive land use regulations that are intended to provide safe, environmentally sensitive and neighborhood friendly developments. This Plan recommends that removing regulatory challenges to new housing development, particularly affordable housing development, providing increasingly consistent information to the community, and simplifying review and entitlement processes, when feasible, can be effective and efficient strategies to achieve accessible affordable housing.

This Plan provides suggestions related to the Sustainable Land Development Code (SLDC) which are intended to encourage the development of more affordable and accessible housing, reduce the complexity of regulations related to housing, and to encourage sustainable development. The SLDC encourages compact, cluster or village-style development in areas with viable infrastructure and capable of sustaining additional growth. It is noted that some land use regulations can inadvertently conflict with SLDC intentions to achieve compact development by requiring potentially expensive or duplicative review processes or by imposing complicated or time-consuming barriers. The application of the SLDC is perceived to increase housing development costs, discourage creative design, increase uncertainty, and contribute to the housing supply shortage resulting in the exclusion of affordable housing for Santa Fe County residents. This perception is not clearly defined with existing data and should be examined in future studies.

Density and development costs are a critical analysis tool to review land use policies. In the Housing Profile chapter, feasible development costs have been estimated to show the cost of providing housing units at different densities ranging from 1 to 20 dwelling units per acre (see Table 9 through Table 14). This analysis demonstrates that estimated home ownership begins to achieve more affordable prices (for average Santa Fe County residents) when developed at a density of around 10 dwelling units per acre of land (du/ac). Table 9, illustrates that building at 10 du/ac instead of 1 du/ac results in a 49 percent cost decrease in development costs. Following the same efficiency principles, housing for rent begins to become more affordable when built to approximately 14 - 20 dwelling units per acre.

The summary of this data analysis is:

1. Cost reductions can be achieved through relatively simple changes in land use policies.
2. Regulatory challenges and complications on moderate and higher-density development can be a barrier to affordable housing development.

Target Density to Achieve Reasonably¹³ Priced Housing:

Housing for Purchase: 10 dwelling units per acre

Housing for Rent: 14 – 20 dwelling units per acre

Outside of the Community College District but within areas targeted for County growth, SLDC regulations and practices often limit housing to 1 – 2.5 dwelling units per acre (e.g., Mixed-Use, Planned Development, Commercial General). Up to 20 dwelling units per acre could be achieved through the acquisition and approval of TDRs (the transfer of development rights) but the program is just achieving maturity and adds time, cost, and complexity to private development. Additionally, the TDR program is planning amendments that allow exemption of TDR requirements to achieve density for affordable housing projects.

The predominant method of achieving new, affordable housing in Santa Fe is to develop relatively expensive housing (at low densities) and then to use limited public or private funds to subsidize affordable units. Achieving low-density affordable housing is typically due to abnormal conditions - a deviation from typical market constraints, below-market land valuations, underpaid or volunteer labor, non-profit or community efforts, or atypical financing rates. A more consistent and cost-effective strategy is to remove existing housing barriers and encourage efficient and affordable housing developments.

This chapter reviews and addresses land use policies and challenges that may inadvertently restrict the development of affordable housing and recommends two strategies to remedy the identified barriers.

1. Review SLDC requirements to determine how to incentivize the production of new, affordable housing units by waiving and streamlining specific requirements for "affordable housing developments."

¹³ In this instance, "reasonably-priced" housing is considered to be housing that the average Santa Fe County resident (approximately 100% area median income) would find affordable.

2. Complete a thorough review of the SLDC with the goal of enhancing the production of new market-rate and affordable housing units.

General Analysis of Land Use

Sustainable Land Development Code (SLDC)

The SLDC was enacted in 2016 to meet the community's need for managing and encouraging increased growth and development. Although the SLDC refined and improved some growth management regulations and increased the revenue it collects from building permits, it does not appear that additional housing growth and development have resulted from the SLDC's passage (see Figure 27. Permitted Residential Dwelling Units 2000-2020). Interviews with developers and County staff indicate that the additional processes, requirements, and restrictions have resulted in a perception of increased inconsistency, uncertainty, and difficulty, as well as increases in project costs. Further analysis is needed to evaluate how and why the SLDC has comprehensively changed the environmental, economic, and social sustainability of land development.

Sustainable Development Areas

The Sustainable Land Use Code (SLDC) intends to encourage environmentally sustainable development by limiting and focusing development. One sustainable development area (SDA-1) is intended to handle the growth for the county and has the potential to provide appropriate infrastructure and services. The other two areas (SDA-2 and SDA-3) have limited density and the focus of the code is on preserving ranching, agriculture, and open space in these rural areas, as services are not able to be provided at this time.

To satisfy Santa Fe County's housing shortage and to increase the availability of affordable housing accessible to County residents, additional housing should be planned, strongly encouraged, and incentivized in SDA-1. In the less-developed SDA-2 and SDA-3 areas, the focus should instead be on supporting and retaining existing affordable units.

12.2.4.2. SDA-1 is characterized as an area where adequate public facilities presently exist, are planned, budgeted or reasonably available. This is a primary growth area that was targeted for growth in the SGMP. Facilities and services within SDA-1 include water, sewer, stormwater, emergency services, parks, open space and trails, and transportation.

Figure 28. Santa Fe County Sustainable Development Areas

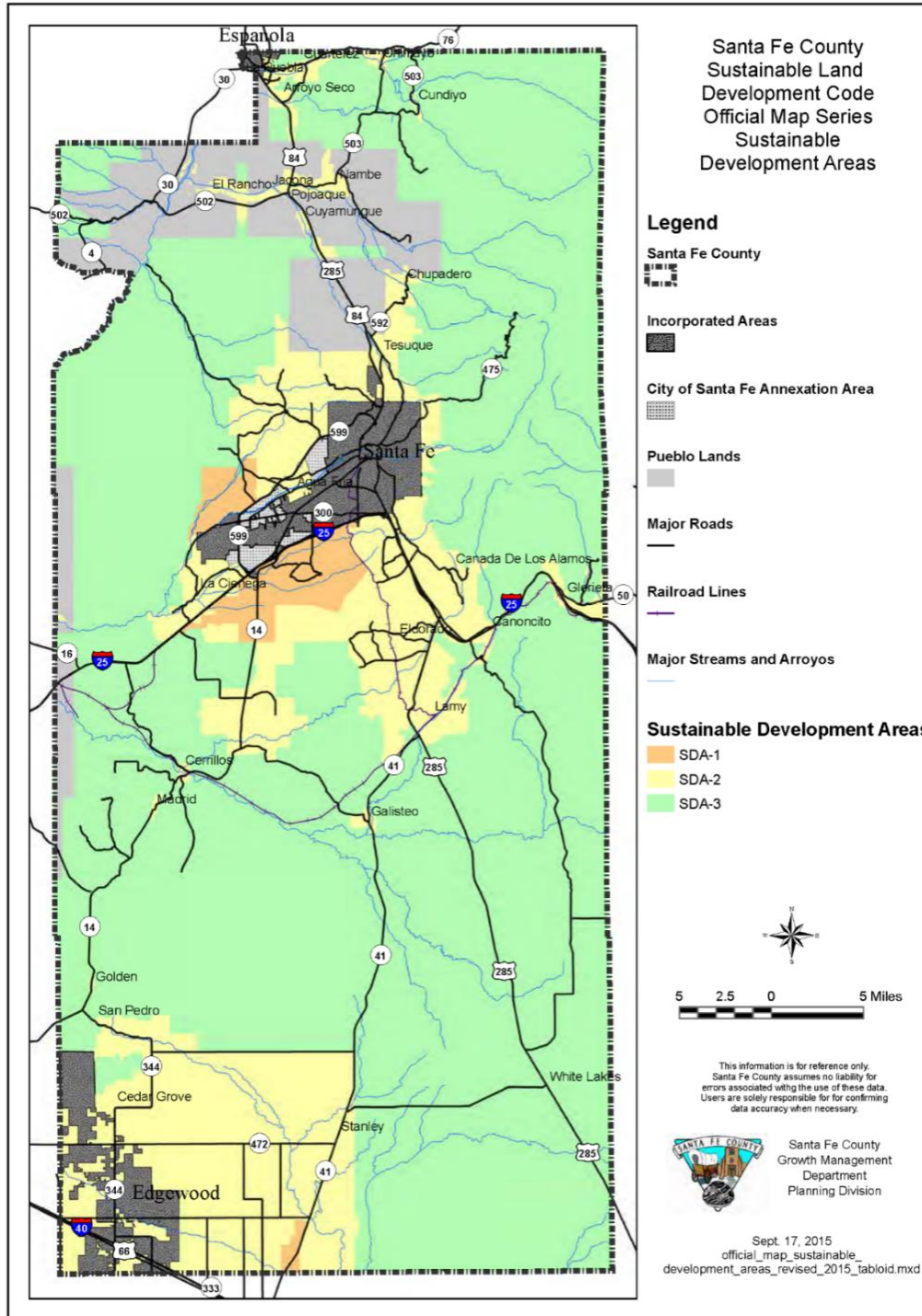


Table 22. Santa Fe County Zoning Development Standards

Zoning District	Residential Base Density Allowed	Height (max) feet	Lot Coverage (%)	Front Setback (min) feet	Side Setback (min) feet	Rear Setback (min) feet
Agriculture/Ranching (A/R)	1 DU per 160ac (0.00625 DU/ac)	36 (residential)	-	25	50	50
Rural (RUR)	1 DU per 40ac (0.025 DU/ac)	36 (residential)	-	25	25	25
Rural Fringe (RUR-F)	1 DU per 20ac (0.05 DU/ac)	36 (residential)	-	25	25	25
Rural Residential (RUR-R)	1 DU per 10ac (0.1 DU/ac)	24	-	20	25	25
Residential Fringe (RES-F)	1 DU per 5ac (0.2 DU/ac)	24	-	10	25	25
Residential Estate (RES-E)	1 DU per 2.5ac (0.4 DU/ac)	24	-	10	25	25
Residential Community (RES-C)	1 DU per 1ac	24	-	5	5	5
Traditional Community (TC)	1 DU per 0.75ac (1.33 DU/ac)	24	-	5	5	5
Commercial General (CG)	2.5 DU/ac (20 DU/ac with TDRs)	40 (48 with TDRs)	60 (80 with TDRs)	5 min – 25 max	0	30
Commercial Neighborhood (CN)	2.5 DU/ac*	24	80	5 min – 25 max	0	30
Public/Institutional (PI)	2.5 DU/ac*	48	80	5	5	10
Mixed Use (MU)	1 DU per 1ac (20 DU/ac with TDRs)	27 (48 with TDRs)	40% (80% with TDRs)	0-25' for property boundaries; 50'-100' Setback		
Planned Development (PD)	1 DU per 1ac (20 DU/ac with TDRs)	27 (48 with TDRs)	40% (80% with TDRs)	5-10' for property boundaries; 50-100' setback minimum from zoning district boundaries		
Planned District: Community College District (CDD) – Includes 10 Subdistricts	Minimum 3.5 DU per acre; 1 DU per acre in CCD Fringe and CCD Rural)	Height varies by Subdistrict	50% req. open space for subdivisions over 5 lots	Setbacks established by subdistrict requirements		

Additional information regarding zoning details, acreage, permit history, property assessment, and infrastructure availability is provided in the Housing Data Report.

Santa Fe Community College District

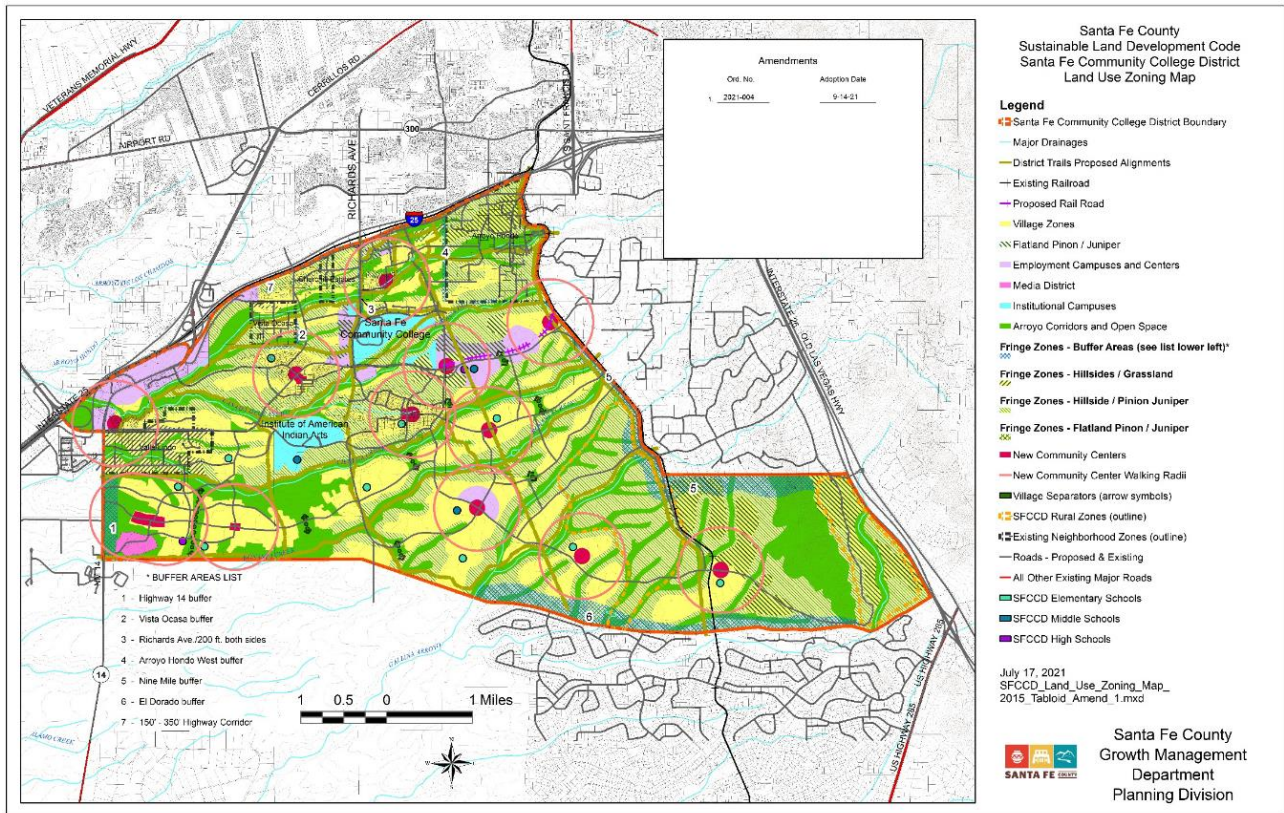
The Santa Fe Community College District is an ambitious overlay plan covering approximately 17,000 acres, the majority of which is undeveloped. The plan, which dates to 2000, envisioned the creation of small, compact, rural villages served by water, sewer, transit and featuring small commercial and community-oriented centers.

“The CCD was created to curb sprawl, maximize infrastructure efficiency, and preserve open space in an area of Santa Fe County under substantial development pressure, and otherwise to implement the vision, goals, and principles of the CCD Plan. The CCD is expected to be the first of a number of new communities to be developed outside the urban area over the next 20 years.” (Community College District Plan – 2000)

The area is located within SDA-1 and has feasible access to infrastructure and public services. Because of the availability of infrastructure and proximity to existing population and employment nodes, the CCD and surrounding area is recognized as one of the most suitable locations for future population and economic growth. Support for this recognition is documented in the Community College District Plan (2000), the Sustainable Growth Management Plan (2015), the SLDC and the Housing Data Report.

The CCD overlay allows some types of higher density, efficient development and is capable of achieving more affordable housing. The CCD regulations also inadvertently include complicated review processes, prescriptive design requirements, and prevents the full flexibility intended via planning documents.

Figure 30. Community College District Land Use Zoning Map



Cost of Time & Complexity in Entitlement Review

The cost of time is a significant factor affecting both market rate and affordable housing projects. The entitlement period is the length of time it takes for a project to be reviewed and, if successful, given final approval. Long entitlement times are especially challenging for affordable housing projects which have limited periods of time in which they can use grants and incentives, and extended review/approval times may disrupt project feasibility or prevent proposals for affordable housing. Similarly, for projects relying on private capital, long entitlement times contribute to uncertainty, market risk, price volatility, and opportunity costs.

An entitlement period of approximately twelve to sixteen months can reasonably be incorporated into the typical “soft costs” of a project. Extended entitlement time, added processes, and additional meetings, generate added costs and complexities which ultimately raise the cost of the resulting housing units. Experienced developers, those with extensive experience in Santa Fe, and those with the capacity to hire lawyers and consultants, can use resources and expertise to get through the entitlement process. For smaller developers who do not have the same expertise or resources to hire consultants, complicated entitlement processes are a prohibitive hurdle in attempting to complete a development package. It should also be noted that the entitlement period is greatly reduced when adequate public services are already in close proximity to a project site, but lack of public services near a project site can substantially increase the entitlement period.

Anecdotal evidence suggests that some developers (especially of affordable housing) avoid proposing housing in Santa Fe (City and County) due to what they perceive as complicated, inconsistent, expensive, and abnormally long entitlement periods. National developers have reported that, compared to other areas of the country, the risk, uncertainty, and cost of entitlements in the Santa Fe area is significantly higher and results in higher sales or rental costs – beyond what their business plan, marketing strategy, and construction style typically aims for. When the Santa Fe housing market has unmet demand for high-cost housing (current conditions) some developers will build more expensive housing while other developers will pursue opportunities in different housing markets.

The cost of an additional six months of entitlement (beyond twelve-to-sixteen months) adds approximately five percent to the total project cost. For a \$20 million dollar project, an extra six months could add \$1 million dollars and an extra two years could add \$4 million dollars to the total project cost.

Figure 31 Potential Cost of Entitlements, Time on Residential Development

Housing Project “A”	Housing Project “B”	Housing Project “C”
50 Homes	50 Homes	50 Homes
12-16 month Approval Process	18-22 month Approval Process	36-40 month Approval Process
Total Development Cost: \$20,000,000	Total Development Cost: \$21,000,000	Total Development Cost: \$24,000,000

(\$400,000 per unit)	(\$420,000 per unit)	(\$480,000 per unit)
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Evaluation of Suitability

Evaluating suitable development areas is most effectively simplified by evaluating areas which have access to, and which can efficiently provide public infrastructure and services like roads, water, sewer, police, and fire. The County has identified that the areas designated within SDA-1 have existing or potential access to these services and that growth and development should be directed into SDA-1 rather than SDA-2 or SDA-3.

Water is an extremely important factor when considering additional population growth and developed land within Santa Fe County. The County Water Division has calculated that 7,500 new housing units divided between the more water-intensive single-family homes and the less-intensive multi-family homes would equate to approximately 1,500-acre feet per year. The County’s Utility Division has confirmed that this water demand is feasible and would not impact the provision of water services. The Utility Division has approximately 1,000-acre feet per year which could hypothetically offset and incentivize affordable housing development but most housing will be required to acquire privately-owned water rights and transfer them to the County.

To ensure long-term water sustainability, it is important that the County consider increased water-conservation and encourage the development of multi-family homes, particularly affordable multi-family housing, which use significantly less water than single-family homes (0.14 versus 0.25-acre feet per year).

Suitable Land

Access to services and potential housing development is most feasible within the CCD and the County should consider additional development within this area. Longer-term, the county should also explore potential housing development in the rest of SDA-1 such as land between the City of Santa Fe and Caja del Rio and along NM State Road 14 in the multi-use zoned areas.

For new developments in undeveloped areas, the biggest concern is usually the high cost to construct new infrastructure, but the County should additionally consider the long-term maintenance costs for various infrastructure and services. Santa Fe County should consider strategic investment into infrastructure and services in the County’s primary growth areas, which accomplishes or supports affordable housing goals and satisfies long-term fiscal and environmental objectives. An effective strategy to lower the per-unit cost of infrastructure (increase efficiency) and reduce the environmental land use impacts is to build for a large number of users (e.g.: housing units) and to keep the service area relatively small, or compact.

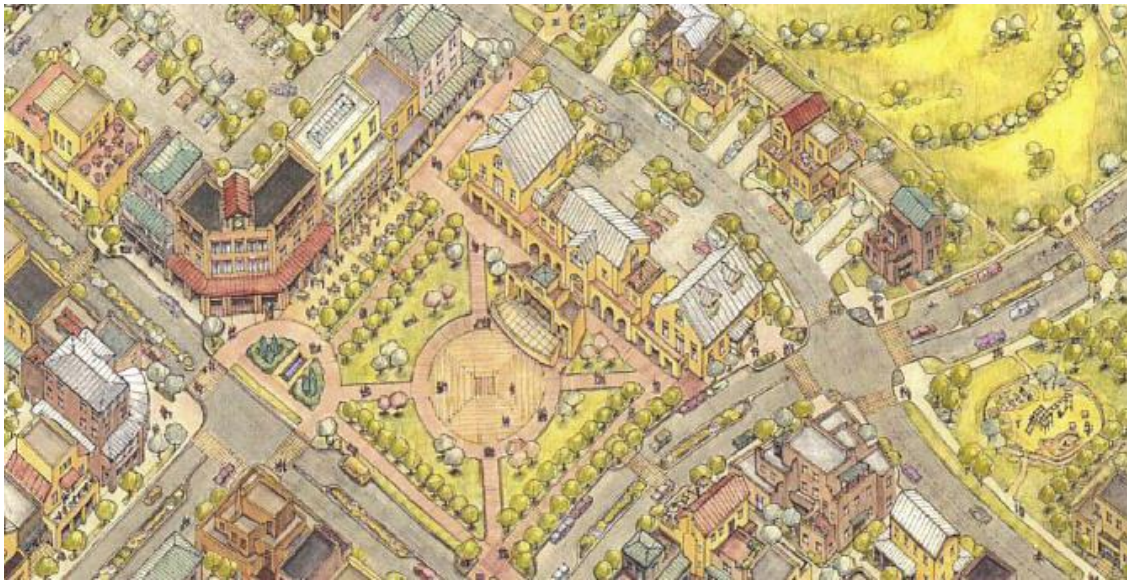


The County should also consider the acquisition and disposition of land in strategic ways to accomplish long-term goals. County owned land, when managed properly, can reduce regulatory complexities and can be sold, leased or leverage to subsidize or bond against in order to achieve County affordability goals.

State Land in Community College District

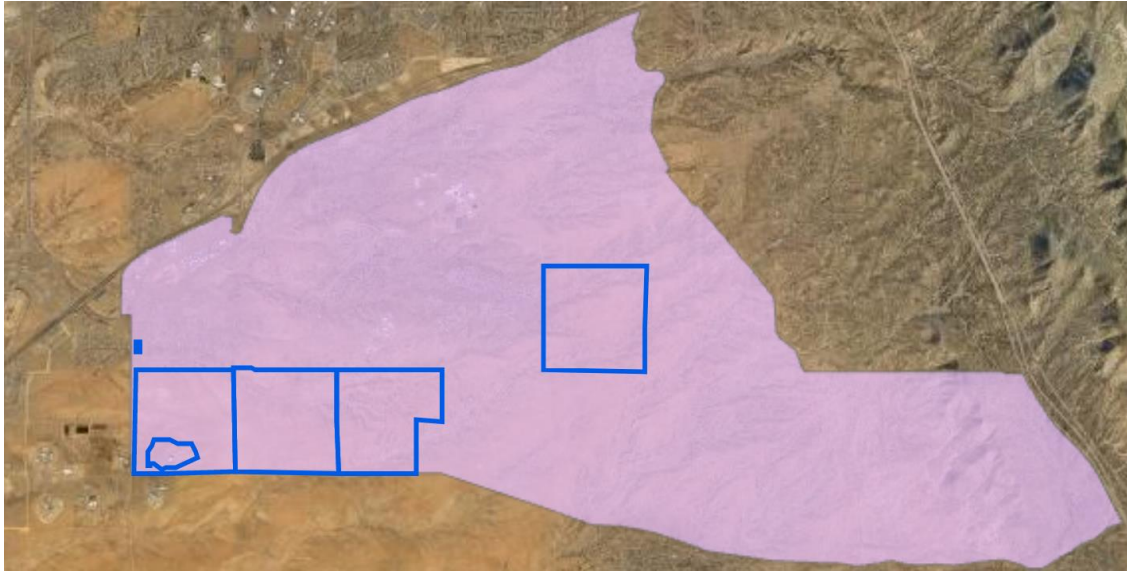
The State of New Mexico via the State Land Office (SLO), owns over 2,000 acres of land within the Community College District (SDA-1) which has ample opportunity for residential development but would require the extension of infrastructure to the area. A master plan from 2001 envisioned “The San Cristobal Village” on 1,800 acres of land managed by the SLO. The proposed village is located east of New Mexico State Highway 14 and approximately one-mile south of New Mexico State Highway 599. The master plan suggested that this area could be developed for compact, vibrant, mixed-use, mixed-income housing developments which include a high-proportion of affordable housing. The development and management of these lands could be accomplished by the County and SLO based on experiences learned from the Tierra Contenta project (City of Santa Fe).

Figure 32. San Cristobal Master Plan, 2001



Source: San Cristobal Master Plan 2001 – Artist Rendition of a central plaza area.

Figure 33 State Land in the Community College District



Source: Santa Fe County SLDC Zoning Map, 2022\

Caja Del Rio

Another area of potentially suitable land exists between State Route 599 and Caja Del Rio. Some of this area is currently developed with large industrial uses but other portions of the area are undeveloped and could be suitable for residential development, as it is currently zoned mixed use. Some of this land is also managed by the State Land Office and the County could attempt to acquire or facilitate the development of it with housing and other neighborhood or commercial uses. Infrastructure development costs, such as roads, water and sewer, would likely require public investments and both public and private commitment(s) to build a sizeable amount of development in the area.

General Land Use Recommendations

The following recommendations and policy suggestions are intended to assist County staff in advancing affordable housing initiatives to benefit the community. The recommendations should decrease housing development costs, increase the supply of market rate housing, and encourage the development and construction of affordable housing units. Unlike financial subsidies and aid programs which require financial and administrative resources, the following recommendations cost relatively little to implement and often reduce administrative burdens for both the County and developers.

The recommendations are split into two distinct but related strategies.

1. The first strategy incentivizes affordable housing development by reducing existing regulatory barriers, and creating financial and other incentive programs to support and encourage affordable housing development.
2. The second strategy focuses more broadly on land use regulations and policies that support the creation of all types of housing development throughout Santa Fe County to allow for natural

occurring affordable housing and to create downward pressure on current market prices by increasing the overall housing supply.

Both strategies are designed to work in tandem to remove structural regulatory hurdles for the development of new affordable housing.

Strategy #1: Amending Chapter 13 of the SLDC, Defining “Affordable Housing Development,” and Incentivizing Affordable Housing Development

The first strategy provides suggestions to help remove existing challenges to affordable housing and provides incentives for developments which include, or exceed, the number of affordable housing units provided on-site. This strategy would focus on changes to Chapter 13 of the SLDC, “Fair and Affordable Housing” to amend inclusionary zoning. It would also call for the County to define, through its affordable housing ordinances and resolutions, “Affordable Housing Developments,” and to incentivize developments that meet the definition of “Affordable Housing Development”. Affordable housing incentives include flexibility and waivers to specific regulations, and alternative compliance methods. Related to Santa Fe County housing programs, a variety of financial incentives and partnerships are also proposed. This strategy would likely result in a moderate increase in the quantity of new affordable housing for low- and moderate-income households.

- Amend the Affordable Housing requirements for Inclusionary Zoning to reflect the following:
 - Apply inclusionary zoning requirements to all developments adding residential units (single family, multifamily, accessory dwelling units, and mixed use) by evaluating inclusionary requirements based on the number of homes being provided rather than the number of lots being subdivided, as the current affordable housing requirements apply to subdivision of 5 lots or more which primarily pertains to single family developments. Inclusionary zoning requires the on-site construction of affordable housing units (or alternative compliance). Areas designated for growth or which have access to utilities could be held to a higher standard than areas which do not have access to utilities and other infrastructure.
 - The County should consider an alternative compliance policy that includes a fee-in-lieu option whereby the fee would be calculated based on the difference in value between the proposed residential construction (no on-site affordable housing) and the recognized cost of an affordable home (per HUD standards). This would result in higher fees for more expensive housing units and lower fees for units that cost closer in value to targeted affordable prices.
 - “Inclusionary” housing developments should be defined as projects which include on-site affordable housing at the amount of 15% of the project.
- Define an “Affordable Housing Development” as a project which provides twice (two times) the number of affordable housing units as required by the inclusionary zoning standards (e.g., 30 percent affordable units instead of only 15 percent).
 - This policy would require a mixed-use development to have the same standards as a residential project (e.g., 30% of the entire project is required to be devoted

to affordable housing) in order to be considered an "Affordable Housing Development" and benefit from provided incentives.

- For additions to existing developments (e.g., new, income restricted ADU with existing single-family unit) or for multi-phase developments (e.g., Phase 1 achieves alternative compliance, Phase 2 includes the required on-site affordable housing) incentives will apply only to the portion of the development which provides the required, built affordable housing units.
- 13.6 "Affordable Housing Incentives." The County should evaluate and consider multiple incentive options for "Affordable Housing Developments" (as defined above). The incentives could include, but are not limited to, the following options.
 - Current policies waive permit and development fees for each affordable housing unit. If the development qualifies as an "Affordable Housing Development" (30% or more of the project devoted to affordable housing) waive fees for the entire project.
 - Consider waiving impact fees to the full extent possible (per impact fee and affordable housing statutes) for an "Affordable Housing Development."
 - For an "Affordable Housing Development" with single-family housing, permit a by-right density allowance of 10 dwelling units per acre.
 - For an "Affordable Housing Development" with Multi-family development, permit a by-right density allowance of 20 dwelling units per acre.
 - "Affordable Housing Developments" may receive any applicable TDR benefits as if the development had a full complement of TDRs.
 - "Affordable Housing Developments" are provided a 50% reduction in required open space and an allowance for the applicant to request a further 50% waiver (100% waiver of open space) through a discretionary review process if an appropriate quantity of open space is provided within 1,000 feet of the property.
 - Increase the maximum building height for an "Affordable Housing Development" to 48 feet, regardless of zoning and subdistrict building height restrictions. If the zone or subdistrict allows 48 feet or more, the "Affordable Housing Development" will be allowed to build an extra 12 feet in height beyond district standards. Setback and stepback rules to neighboring properties would still apply.
 - Waive all setbacks and stepbacks internal to the "Affordable Housing Development" (building and fire code requirements would still apply)
 - Provide streamlined project approval process for "Affordable Housing Developments" to reduce the number of hearings and defer administrative approvals, when appropriate, (e.g., conceptual plans, preliminary development plans) to facilitate approval of more affordable housing developments.
 - Consider a third-party plan review option for "Affordable Housing Developments" to streamline review processes per the recommendations in the NMMFA Housing Strategy Report (2022), especially during times of high demand and activity to reduce the review demands on limited County staff resources.

- For "Affordable Housing Developments," eliminate the restriction of multifamily buildings to no more than twelve units per building. Building no more than twelve units per multifamily building is often functionally and economically prohibitive (10.21.2 "Units").
- Consider waiving or amending requirements to include commercial uses with "Affordable Housing Developments." An option could be to require the first floor to be structurally capable of commercial occupation to allow options for commercial activity if market conditions support it.
- Consider waiving or reducing the requirement for a mixture of housing uses within a "Affordable Housing Development" if a beneficial diversity of housing options is provided at the neighborhood level.
- Provide height and density bonuses for "Affordable Housing Developments" within a ½ mile of a transit stop.
- Provide height and density bonuses for "Affordable Housing Developments" with increased environmental or utility conservation standards.
- 13.9 "Long-Term Affordability:" Santa Fe County should allow affordability liens to be held by developers when it can be ensured that the liens will be reinvested into housing affordability programs. This would assist with the financing and development of affordable housing and incentivize affordable housing developers to work with the County.

Strategy #2: Evaluating and Amending the SLDC to Increase the General Housing Supply and Providing for Naturally Occurring Affordable Housing

In order to remedy existing regulatory barriers which may have prevented or discouraged the adequate supply of housing and which have inadvertently contributed to the rising cost of housing, the County should consider structural changes to the SLDC. These changes would require a more comprehensive analysis of land use regulations and, in addition to increasing affordability, could increase the environmental, social, and economic sustainability of development. This strategy would likely result in a moderate increase of new housing units, will help to reduce the rising cost of housing, and should increase the affordability and accessibility of housing for all Santa Fe County residents. It is envisioned that this process could be accomplished with little cost through establishment of a committee (SLDC Committee) of local and regional development and housing professionals who could provide effective and reasonable recommendations for code revisions. The following section contains recommendations for the County to consider that could assist in effectuating the implementation of this strategy. These recommendations were provided by the Housing Plan Advisory Committee, which were put forth for consideration to assist in the creation of more naturally occurring affordable homes. It should be noted these recommendations are not mandates or directives and could be refined in the future.

- **SLDC Review Committee:** The SLDC is a relatively new land use code (2016) that combined innovative SGMP goals with regulations intended to provide protections against potentially negative impacts from various land uses that might be applied within the County. Since the passage of the SLDC in 2016, users of the code have developed a more nuanced understanding of the barriers, redundancies, and potential places for improved efficiency within the code, particularly in regard to the provision of affordable and market rate housing. Many regulations appear to hinder innovative options for housing and inadvertently result in development that is costly for developers to propose and build, costly for staff to review, costly for residents to inhabit, and with infrastructure that could be costly to maintain. This plan recommends that a committee of local and regional stakeholders be established to review the SLDC and propose comprehensive amendments to assist staff and the development community to provide additional affordable and market rate housing in Santa Fe County. This effort should seek to address social equity and community sustainability, fiscal sustainability, long-term housing goals, the viability of small and local businesses, along with flexible land use policies, and ultimately strive to implement the goals and intentions of both the SLDC and the SGMP.
 - This committee should also review areas of regulatory consistency and clarity. There appear to be instances where regulations overlap and where regulations conflict with each other or with the direct statements and intentions of the SGMP. Complex and unclear regulations may result in conflicting, discretionary, and/or administratively arduous review that are difficult for staff to navigate in an unclear public environment (e.g., politics may make interpretation of the code very difficult). This committee may also make suggestions to the Board to provide a system whereby staff interpretations of code requirements can be routinely considered for adoption as amendments to the existing code.

- This committee should also examine options to allow for review and suggestions on modifying overlays and Planned Development Districts: Overlays and subdistricts which may inadvertently create regulatory complexity for staff, professional developers, and individual property owners. This committee should review options to allow for more housing development with emphasis on supporting affordable housing in these areas.
- This committee may also make suggestions regarding the need for higher density residential development where appropriate, especially in sustainable areas with access to infrastructure (e.g.: SDA-1). The code should encourage innovative, traditional, village-style clusters that can support transit, jobs, and excellent residential amenities while still balancing the protection of open space. The SLDC generally reflects the intentions of the SGMP but some of its regulations regarding density do not support affordable housing development, in some circumstances. A higher base, or by-right density could be permitted to facilitate affordable and sustainable development, where appropriate.
- This committee may also make suggestions regarding general development and long-term infrastructure costs for installation and maintenance to help determine sustainable infrastructure requirements.
- Additional consideration should be given to administrative and discretionary decision criteria (including CUP and variance requests). This plan advises that decision makers should be allowed to avoid stringent interpretations of code in order to facilitate flexible decisions on affordable and market housing development. This will include adding criteria concerning the need to balance immediate negative impacts to surrounding neighborhoods with County housing priorities.
 - Note: Santa Fe County has identified through adoption of this Plan that the construction and provision of affordable housing is a community priority and that regulatory barriers should be avoided in order to support the achievement of additional affordable housing. The County should consider that inadvertent “regulatory barriers” to affordable housing can be a valid criterion of hardship as evaluated in discretionary approvals (e.g., variance to code requirements).
- 1.4 “Purpose and Intent:” In addition to encouraging environmental sustainability), this Plan also suggests that the SLDC should also consider social equity and economic, or fiscal sustainability in review processes in order to strive to accomplish long-term priorities such as the promotion of affordable housing for residents of all income levels.
- 3.5 “Hearing Officer;” 4.4 “Procedural Requirements:” This Plan suggests the consideration of the role of the Hearing Officer and whether this officer can be a benefit to facilitating affordable housing approvals that could then be administratively approved. The position might be equipped to review SLDC text amendments and might be capable of approving variance and CUP requests (versus a secondary review by the Planning Commission) but might not be needed for conceptual plans which will be reviewed by the Planning Commission and the Board of County Commissioners. The idea with this suggestion is to make the approval of affordable housing projects easier for staff and the related County committees.
- 4.4 “Procedural Requirements:” This Plan also suggests that the County’s procedural requirements may inadvertently impose unnecessary costs and uncertainty to residential development proposals through reviews or hearings which, if simplified, may benefit staff, applicants, and officials. Santa Fe County should consider whether each of the review steps are necessary for all

developments to ensure compliance with the zoning code and whether it would benefit the community to provide additional affordable housing options by simplifying various approval processes.

- 4.4.7 "Agency Review:" This Plan also suggests that the County consider how and when to best incorporate external (e.g., State Agency) review and ensure that it is a parallel process which does not add extra time to the approval process.

- Chapter 5 "Subdivisions, Land Divisions, Other Plat Reviews:" This Plan suggests that the County consider means to ensure that land development submission requirements ask for the proper amount of information at the right time. It is essential to ensure that any proposal complies with applicable regulations prior to final building permit approvals. However, it is perceived that some requirements are presented too early in the approval process which can create a barrier to development. For example, Section 5.7.7 "Preliminary Plat Approval" requires a preliminary plat to conform to all provisions of the SLDC (prior to the Final Development Plan). The Final Development Plan asks for construction drawings which may not be necessary until submission of the building permit and may be most suitable for staff review rather than review by the BCC.
- Chapter 6 "Studies, Reports, and Assessments:" The preparation of SRA's are essential to the evaluation of a project and can also carry significant costs, impose lengthy drafting times, and are sometimes unnecessary for project review. This Plan suggests that environmental impacts, adequate public facilities, water availability, and traffic impacts should be evaluated as part of the comprehensive plan or greater area plan, when appropriate for review of affordable housing proposals. For example, if an affordable housing project is proposed in SDA 1, where there has been extensive planning and consideration of infrastructure, growth patterns and environmental conditions, additional studies should be evaluated based upon unique, unforeseen, or unplanned conditions rather required as mandatory items that have already been provided through the land use planning process or through previous studies submitted to the County.
- Chapter 7 "Sustainable Design Standards:" This plan recommends that in areas intended to have compact, village-style development and walkability, the County may consider reducing or changing how standards apply. Density, open space, a mix of residential types, and a mix of uses should be ideally planned at the larger, neighborhood level to ensure adequate access for residents while also allowing clustered, or village-style residential and commercial. Requiring an acre of open space (subdivisions with 24 or more lots) for every estimate of 100 residents (e.g 38-unit multi-family development), may be prohibitive and the open space requirements may be provided to the community through alternate means The same issues with feasibility can be relevant when requiring commercial development being required in a residential phase of development or requiring multi-family and single-family housing in the same phase of a development. Adjusting phasing and use requirements during phased development can facilitate the feasibility of creating more affordable and market rate housing in the community.
- 8.3 "Establishment of Zoning Districts:" This plan also suggests that the County would benefit from re-evaluating the complexity of zoning districts, Community College planned subdistricts, planned development districts, and overlay zones. This suggestion aims to allow for more flexibility in administrative and formal development approvals.
- A8.6 "Residential Zoning Districts," 8.7 "Nonresidential Zoning Districts," 8.9 "Mixed Use," 8.10.3 "Planned District Santa Fe Community College District:" and 9.10 "Planned Development Districts:" This Plan recommends that the County consider adjustments to these zoning districts to allow higher base densities to facilitate the construction of both affordable and market rate housing to allow for affordable homes for both median and/or moderate Santa Fe households. For development in infill areas, areas with sufficient infrastructure, or areas within SDA-1, development options should include and encourage sustainable densities per the SGMP and to

address the need for housing as identified in this Plan. Additionally, setbacks in mixed use areas (1,000 feet) to adjoining community districts may be adjusted.

- 10.4 "Accessory Dwelling Units:" This Plan recommends consideration of providing additional flexibility in the approval of accessory dwelling units. This includes allowing accessory units to be two stories (e.g., on top of a garage or existing residential structure) and allowing property access through the rear of the lot or from an adjacent alley (if applicable). The County may consider regulations similar to those enacted by the City of Santa Fe that support the construction of new accessory dwelling units. Which can help to increase available housing stock for the community.
- 10.21 "Multifamily Housing:" This plan recommends amending the limit of 12 units on multifamily housing units per building to allow for economically feasible, multifamily developments.



5.0

GOALS, POLICIES, & OBJECTIVES

Compliance with External Affordable Housing Policies

Affirmatively Furthering Fair Housing (AFFH)

The Federal Fair Housing Act prohibits housing discrimination related to protected characteristics¹⁴ such as race, gender, or disability (Title VIII of the Civil Rights Act of 1968, 42 U.S.C. 3601–3619). Guidance by the US Department of Housing and Urban Development (HUD) has further mandated that, for cities and counties to affirmatively further fair housing (AFFH¹⁵), they must proactively and meaningfully “overcome patterns of segregation, promote fair housing choice, eliminate disparities in opportunities, and foster inclusive communities free from discrimination” (Federal Register: 86 FR 30779).

Initial data suggests that racial segregation and the disproportionate displacement of protected classes is inadvertently increasing within the county - primarily due to dramatically rising housing prices and a lack of available housing stock, especially for low- and middle-income community members. As homes become less affordable, households identifying as Hispanic, Native American, or headed by women and which have proportionately lower incomes, are displaced at a disproportionate rate. Similarly, when less housing is available, it becomes increasingly difficult for households requiring special physical designs, such as ADA-accessibility, to find adequate housing.

¹⁴ Characteristics protected by Title VIII of the Civil Rights Act include race, color, national origin, religion, sex (including gender identity and sexual orientation), familial status, and disability.

¹⁵ See www.hud.gov/AFFH

Between 2015 and 2020, population growth within the City of Santa Fe has been almost entirely due to the proportional growth of Hispanic-identifying individuals. Santa Fe County, however, has almost the exact opposite trend. Within the same time period, growth in Santa Fe County (excluding the City of Santa Fe) has been almost entirely due to the growth of non-Hispanic identifying individuals. The non-Hispanic population has grown 4.6% whereas the Hispanic population has grown by only 0.8%. While causation cannot be determined with these numbers alone, the trend identified by analysis of available data could be related to Hispanic households having, on average, lower incomes and wealth attainment combined with higher household costs. Additionally, regulatory requirements for development of new affordable housing in the County and in the City of Santa Fe, (with each municipality having unique regulatory and political types of challenges) may be contributing to this inadvertent cause and effect for housing access in the region .

To achieve housing policies which satisfy the goals and intent of the Fair Housing Act, this Plan recommends that Santa Fe County continue to address racial segregation and disproportionate displacement by proactively identifying and remedying barriers to housing and specifically aim to support those most in need of affordable housing. Funds may be available from federal and other sources to engage in a more thorough study into disparate impacts on protected classes.

Land Use and Housing Development Recommendations

Santa Fe County has the following goals which aim to address existing barriers and constraints to housing development in Santa Fe County. Housing alternatives take many forms. The scale of the affordable housing need in the community demonstrates that all options for the provision of affordable housing are important in facilitating a healthy housing market capable of providing for the diverse needs of Santa Fe County residents and additional people who migrate here.

Addressing the Housing Shortage

An overall shortage of housing units in the greater Santa Fe area is identified as the most significant factor inhibiting the accessibility and provision of affordable housing units. The shortage includes housing across the price spectrum, from luxury housing to appropriately priced housing, and the lack of supply tends to increase the price of housing and land (potential housing). It is also important to recognize that the housing demands can be fluid, adaptable, and can have significant impacts on the community. Without adequate supply, higher-income families can out-compete and potentially displace middle-income families, and middle-income families can do the same to lower-income families. How Santa Fe addresses housing directly impacts how the community includes or excludes certain types of people and the constitution of the community.

Goals, Policies, & Objectives

In stark terms, this plan identifies that if Santa Fe would like to provide adequate housing for existing households that live or work within the whole Santa Fe area (City and County), it would need to add approximately 17,216 housing units to the housing stock by (this equates to approximately 5,738 units per year from 2022 - 2025). It is important to note that this number does not include economic growth, tourism, or the full impacts of in-migration. These estimates point to the obvious problem of insufficient housing stock and the truly huge challenges for the community to increase all types of housing in order to house and keep residents (teachers, health care workers, public safety workers, small business workers and owners, tourism and retail workers, and local government employees, to name a few categories) in the area.

Based on analysis of available data, Santa Fe County is currently permitting about one hundred units per year and the City of Santa Fe is permitting about one thousand units annually. If the County and City were able to approve between 1,000 and 1,500 units per year, this rate should satisfy historically relevant annual growth rates and modest population projections for new housing. However, this rate of new housing approval is not expected to satisfy the existing shortage of housing and associated problems like rising prices and displacement of existing residents. This means that current City and County policies are likely to maintain but not improve the housing shortage and its related symptoms.

This Plan recommends that Santa Fe County should aim to permit two or three times as many housing units as it currently allows to tackle the existing housing shortage and that the County should develop strategies that ensure new housing meets the County's environmental, social, and financial growth management priorities.

Suggested Land Use Policy Changes

The supply and regulation of housing, especially through land use policies, is one of Santa Fe County's most powerful tools in addressing housing prices and the housing shortage. Permitting and incentivizing more housing, especially affordable housing, can help address the supply shortage; allowing or requiring more efficient and fiscally sustainable designs can significantly lower the cost of housing and infrastructure maintenance obligations; and abbreviating or simplifying the approval processes can make Santa Fe County more attractive and, hopefully, achieve the intentions of the Sustainable Growth Management Plan.

This Plan suggests the following adjustments to the County's land use practices to achieve more affordable housing, to achieve more market-rate housing, and to decrease the escalating rate of housing costs. Unlike financial subsidies and aid programs which require financial and administrative resources, the following land use recommendations cost relatively little to implement and should reduce administrative burdens for County staff.

1. Chapter 13 – Inclusive Affordable Housing Amendments
Amendments to Chapter 13 can remove development barriers and incentivize the construction of inclusive, affordable housing developments. Correctly implemented, these amendments could feasibly result in the construction of one to two hundred additional housing units each year with a particular incentive to build affordable housing accessible to low- and moderate-income households.
2. SLDC – Amendments to Facilitate Additional Housing Stock
SLDC amendments can result in more equitable land development policies which prioritize housing, particularly affordable housing, and increase the environmental, social, and economic sustainability of development. The County can alleviate the lack of access to housing and the displacement of low-income families by supporting the creation of safe, functional, and appropriately sized housing units across a range of housing price points. Additionally, Federal funding may be available to support the creation of new housing and assist in addressing identified housing barriers.

Land Use Practices and Policies

Data analysis is essential in understanding and prioritizing regulatory amendments, but land use data appears to be limited and difficult to find and use. Santa Fe County should:

1. Create better tracking tools to clearly demonstrate the number and types of units approved or denied by the County, including the length of time it takes between initial submission, final approvals or denials, and the receipt of vertical building permits, if applicable. Entitlement periods of over 18 or 24 months may create significant challenges to the creation of new, affordable housing.
2. Create tools to track potential regulatory challenges, inconsistencies, and interpretations related to the SLDC. Using an Excel spreadsheet is an easy tool to record issues identified by staff along

with interpretations of the code that can be clear and easily available to the public. These recorded issues and interpretive solutions would increase the consistency of code applications and contribute to regular code updates.

3. This Plan recommends that Santa Fe County regularly undertake small and specific code amendments but that it should also schedule a reoccurring process to implement “omnibus” or miscellaneous code updates.

Housing Authority Developments

The Santa Fe County Housing Authority provides safe, decent, and sanitary housing to low-income households in Santa Fe County. Programs include the development and management of affordable housing, the distribution of funds for rehabilitation and infrastructure, and the distribution of vouchers. These programs are covered in more detail in later parts of this chapter.

The Housing Authority’s strategic plan recommends the creation of approximately 200 new units per year to address the lack of affordable housing in the community. The Nueva Acequia project is anticipated to create 130 units. If the Housing Authority could do a similar project every two years, it could achieve approximately 65 units per year.

Collaboration with Other Organizations

Non-Profit Organizations

Santa Fe County has good relationships with shelter and housing service providers and should continue to identify opportunities to collaborate and partner on a variety of services. External, non-profit organizations can sometimes increase efficient distribution of services or expand the development capacity of a program. The County expects to contract out programs like the Rehab Program and Down Payment Assistance to a third party (see section on Community Development Programs below).

Santa Fe County funds non-profit housing services which pay for navigation, flexible funds to respond to an enrolled person’s emerging or immediate crisis involving housing, transportation, utilities, access to food, personal safety, and other unmet social determinants of health. Many of the housing assistance programs planned for the County are anticipated to be contracted out to non-profit partner organizations.

Santa Fe County Partner Organizations for Non-Profit Housing Services:

- Consuelo’s Place
- Espanola Pathways Shelter
- Interfaith Shelter
- SFPS Adelante
- St. Elizabeth Shelter
- The Life Link

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The County should also consider creating non-profit or quasi-governmental organizations which could engage in property acquisition, distribution, management, and development. This could resemble the City of Santa Fe's relationship with the Tierra Contenta Corporation, the Railyard Corporation, or could alternatively embody the partnership between the City of Albuquerque and the Sawmill Community Land Trust.

For-Profit Organizations

The vast majority of housing development and property management is led and managed by private, for-profit organizations. Any initiative to modify the housing market or address market failures should attempt to understand and anticipate the market reactions. Santa Fe County should work with private development to address the housing shortage and the acute lack of affordable housing development in the community.

In addition to addressing regulatory challenges for new housing, the County should bolster its capacity to:

- Enter into public-private partnerships,
- Acquire and dispose of land,
- Fund land and infrastructure improvements.

The County should also explore innovative financial assistance tools to achieve feasible, affordable housing, including but not limited to:

- Tax Increment Development District (TIDD)
- Tax Increment Financing (TIF)
- Bond Issuances

Joint City/County Commitments

In 2022, the City of Santa Fe and Santa Fe County entered into a formal agreement acknowledging affordable housing priorities and establishing general goals. Collaboration and consistency between the two jurisdictions is critical. The six agreement areas include:

- 1) **PRESERVATION AND PREVENTION:**
Increase resources and develop strategies to prevent homelessness, including the preservation of existing affordable housing and enhanced utilization of social services; increased financial supports, such as the City and County Affordable Housing Trust Funds, to prevent homelessness and stabilize those who are precariously housed; and support for local regulation and land use policy changes that increase housing stability for residents.
- 2) **EMERGENCY SHELTER:**
Support the creation and development of collective community agreements specific to emergency shelter provision, including expanding options for emergency shelter care along with safe and legal outdoor sleeping spaces and non-congregate shelter options and improving shelter access to housing and supportive service resources.
- 3) **BUILDINGS/HOUSING UNITS:**
Quantify the need for additional affordable units and, through new construction, conversion, subsidization, and redevelopment, increase the local affordable housing stock inventory with a goal of 100-200 units per year.
- 4) **INDIVIDUAL VOUCHERS/PROGRAM BASED VOUCHERS:**
The County should aim to increase funding for housing vouchers, both short- and long-term, and develop strategies to ensure that those vouchers can be flexibly utilized in ways that promote equity and housing choice; and ensure that existing voucher programs are fully utilized.
- 5) **SUPPORTIVE SERVICES:**
Ensure all interested individuals and families participating in housing programs have high-quality crisis intervention, behavioral healthcare, and other supportive services in order to maintain safe housing.
- 6) **SYSTEM INFRASTRUCTURE:**
Continue development of the community-wide homeless response system, which includes strategic planning and clarifying the roles, function, and authority of each partner. The system infrastructure development should include collective identification of system gaps through the collection and analysis of accurate data, creation of cooperative strategies to address gaps, and consistent cross-agency communication on funding opportunities, housing initiatives, and overall system development.

As the two significant housing regulators, both Santa Fe County and the City of Santa Fe should clearly understand each other's existing housing efforts, how their respective regulations and programs affect the housing market, and identify potential areas for collaboration and similarity.

Recommended & Existing Housing Programs

The following programs are recommended through this housing plan and through previous efforts of the County. Together, the programs constitute a more comprehensive approach to the needed provision of housing services and will increase the accessibility of affordable housing.

Housing Trust Fund

Santa Fe County's Housing Trust Fund will be an impactful source of revenue benefiting the construction, reconstruction, rehabilitation, and preservation of affordable housing. Funds can assist non-profit housing service providers, development entities, individual renters, and first-time homebuyers. The fund can be used to acquire land or housing (including assistance to homebuyers), facilitate construction of new affordable housing units, convert structures into housing opportunities, assist in achieving preferential financing tools, and can rehabilitate existing housing ensuring that residents have suitable amenities.

Rehab Program

This Plan recommends expansion of the current Santa Fe County Housing Rehabilitation Program (or Happy Roods Program) to better support small- and large-scale rehabilitations or renovations that expand access to affordable housing. Supported projects should include rehabilitation of non-residential property into residential property, the rehabilitation of existing residential properties, and renovations or building improvements which lower utility and energy costs. The Rehabilitation Program is for attached single family homes, detached single family homes, modular and mobile homes. Rehabilitation should be targeted for both home ownership and rental opportunities. Rehabilitation is intended to support individuals who own or agree to rent out to households at 100% (or lower) AMI. The affordability period is aimed to be for 30 years and rentals should be inspected annually. Full rehabs would adhere to the current building code and should exceed energy code requirements. This initiative could be funded through the Santa Fe County Housing Trust and Federal funding sources. This program is envisioned to be administered through a contracted third party.

Down Payment Assistance

Down payment assistance (DPA) is a County program that provides grants to perspective homebuyers. To obtain down payment assistance, the applicant must submit an application and supporting material. The maximum down payment assistance should be targeted to 3% of the purchase price or the amount required to complete and qualify for the first mortgage. The annual gross income of an applicant for down payment assistance may not exceed 100% AMI. Assistance is intended to be determined using information obtained by the County or its designated agent through the use of a desktop underwriting system. This program is envisioned to be administered through a contracted third party.

Inclusionary Zoning

Inclusionary Zoning is an administrative procedure which requires a developer to provide affordable housing as part of the development approval procedures. The County may provide alternate means of compliance, including fee in lieu of actual housing unit development and/or offsite development. Zoning designations with access to county supplied water and sewer would have the highest percentage of affordable housing requirements. Lower percentages of affordable units would be required where less infrastructure services are required. All proposed residential units are required to adhere to these zoning requirements. Suggested amendments to Chapter 13 of the SLDC would also include a new definition for an inclusive affordable housing development in addition to an affordable housing unit. Affordable housing will be defined as what housing is affordable to 100 percent of median income or less. Developer incentives to facilitate onsite affordable housing will be enhanced. This program is intended to be operated internally by County staff.

Foreclosure Prevention

SFC's Program and Policy establishes an equitable process through which staff will review situations that threaten the possession of affordable homes, make decisions concerning the issues threatening the transaction, and, when necessary and feasible, purchase homes that could be lost to affordable buyers.

Options that are available are:

- 1) refinancing
- 2) loan modification
- 3) mortgage assistance
- 4) voluntary sale

The financial assistance is envisioned to be in the form of a mortgage that shall not exceed 24 months or \$5,000.00. This program is intended to be operated internally by County staff.

County-created Third-Party Development Entity

The Santa Fe County Housing Authority has created the Nueva Acequia Developers, LLC, a limited liability corporation that will act as the agency's development arm for the Nueva Acequia affordable housing development. Nueva Acequia will be a 130-unit affordable multifamily rental complex located on the south-side of the City of Santa Fe and will be adjacent to the Housing Authority's existing Camino Jacobo public housing site. The creation of the Nueva Acequia Developers LLC, and the Nueva Acequia multifamily complex, will be the Housing Authority's first attempt at affordable housing development through the Low-Income Housing Tax Credit Program.

Use of County Owned Land

The County of Santa Fe continually reviews and assesses any land holdings that may be used for the development of Affordable Housing. Currently the former Public Works facility on Galisteo Street is in a pre-development stage of assessment. This program is intended to be operated internally by County staff.

Loan Program

This Plan recommends that the County develop a Loan Program to provide capital for owner occupied, rental, single family housing, modular, mobile homes, and Accessory Dwelling Units (ADU) located in the unincorporated areas of Santa Fe County. Loans can be used for full or partial rehabilitation, increasing energy efficiency, utility improvements, or the simple purchase of materials and equipment, such as solar arrays. Interest rates will vary from zero to two percent. This program is envisioned to be administered through a contracted third party.

Renter Assistance Program

This Plan recommends that Santa Fe County develop a voucher program for emergency rental needs in the future, but the immediate priority is in the building and preserving affordable rental units. Due to the extreme lack of housing supply, existing voucher holders are having difficulties or are otherwise unable to find units where they can use their vouchers. This program will leverage Federal Homeless Funds and is envisioned to be run by the Housing Authority.

Developer Incentives

This Plan recommends that the County create and enhance a program for developments that either provide "lower income" affordable units under 80% AMI (inclusionary zoning requirements) or for those which provide 100% of the units at "moderate" affordability levels and encourages a developer to voluntarily provide some kind of community benefit in exchange for building incentives. Some of the types of incentives that can be offered by SFC may include height, density, reduced parking requirements, fee waivers, adjustments to open space requirements and expedited County approvals.

Landlord Tenant Hotline

This Plan also envisions the creation of a Landlord and Tenant Hotline to be used to assist both tenants and landlords with questions regarding their rights, lease agreements and tenant duties for repairs/upkeep along with many other resources to assist in housing issues.

Developer Capital Incentives

The Capital Developer Assistance Program envisioned through this Plan can assist with acquisition, new construction, and rehab of multifamily and non-congregate shelters/transitional housing. It can also be used for capital expenditures for infrastructure, site enhancements, and security enhancements. It is intended that some of these funds would come from state legislative capital appropriations and federal appropriations.

Financing Assistance

This Plan proposes accessing financing mechanisms available for making infrastructure improvements and community improvements for affordable housing developments. They can be a combination of State or federal grants, local sales and property taxes, land or property specific taxes from special districts, and user fees. Financing Strategies are the means by which these funds can be leveraged through various mechanisms including debt financing, special district formations, tax increment financing and other value capture techniques. Below is a listing of financing mechanisms that are available for infrastructure financing:

- **Multifamily Housing Revenue Bonds:** These are issued to provide tax-exempt and/or taxable financing for the construction or rehabilitation of multi-family housing projects for low-income individuals, pursuant to the County Revenue Bond Act and Municipal Housing Law.
- **Public Improvement Districts (PIDs):** PIDs are authorized to finance various kinds of infrastructure and improvements, including water and sewer systems, streets and trails, parks, electrical systems, gas and telecommunications systems, public buildings, libraries and cultural facilities, school facilities, equipment and related costs of operation and administration. PIDs are funded through: (i) levying property taxes on land within a PID, (ii) imposing special levies based on benefit to property, front footage, acreage, cost of improvements (or other factors apart from assessed valuation), or (iii) by providing for use charges for improvements or revenue-producing projects or facilities. PID taxes, levies and charges may be pledged to pay debt service on bonds or other indebtedness issued by a PID.
- **Tax Increment Financing (TIFs):** the method by which the growth of the tax base in a designated development area is used to finance infrastructure development in that area, is limited and more recent than that of other jurisdictions. This method of financing has been expanded and refined with TIDDs (see below).
- **Tax Increment Development Districts (TIDDs):** A Tax Increment Development District, or TIDD, is a tool which couples the growth of the tax base in a designated development area with the financing of infrastructure improvements in that area. Tax increment financing is a method of financing public improvements through the reimbursement of tax receipts that are received over and above the receipts stream that existed prior to the new development—i.e., the taxes generated by a new project are used to finance infrastructure.

Public Housing Program

The Santa Fe County Housing Authority currently manages 198 Public Housing units located at three housing sites. Law enforcement officers reside in all three housing neighborhoods.

The Valle Vista Housing Neighborhood, located off State Rd. 14, initially consisted of 100 public housing units. As a result of renovation and sale, 29 public housing units have been sold or are for sale leaving 71 units available for rent in the neighborhood. The neighborhood has an on-site office and manager as well as a satellite Boy's & Girls Club located in the community center. The Housing Authority has built 12 new

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townhomes scattered throughout the neighborhood that will be sold to qualifying families under the Homeownership Program. Three of these town homes have been sold leaving nine available for sale. The neighborhood has active Resident Council and Block Leader Programs, both of which meet monthly.

The Valle de Esperanza Housing Neighborhood, located in Santa Cruz, has a total of 61 units available for rent. This housing neighborhood includes the Abedon Lopez Senior Center and a satellite Boy's & Girls Club. The Housing Authority is in the process of establishing an office in the neighborhood and implementing part-time on-site management. The neighborhood has a Resident Council that meets monthly.

The Camino de Jacobo Housing Neighborhood has 68 units available for rent. The neighborhood includes a satellite Boy's & Girls Club located in the community center. The neighborhood also has an active Resident Council. The Housing Authority's Administration Office is located in this neighborhood.

Housing Choice Voucher Program

The Housing Authority currently manages 241 Housing Choice Vouchers (previously called the Section 8 Program). The Housing Choice Voucher Program assists qualifying families with rental assistance in the private market within Santa Fe County. Once a family comes up on the waiting list and the Housing Authority determines that the family still qualifies for assistance, the family will be issued a "Voucher." The Voucher allows the family to seek and secure a housing unit that is inspected by Housing Authority staff to ensure that it is decent, safe, and sanitary and to also ensure the unit meets the family's needs. Once the unit is approved, the family enters into a lease agreement with the landlord, and the Housing Authority enters into a Housing Assistance Payments (HAP) Contract with the landlord.

Family Self Sufficiency Program (FSS)

The Family Self-Sufficiency ("FSS") Program is a contractual program that is available only to existing Public Housing residents, VASH, Mainstream and Housing Choice Voucher participants. The program is designed to help families become self-sufficient and off of welfare assistance within a five-year period. The Housing Authority provides housing assistance and works closely with agencies in the community that provide needed resources to participating families. The family enters into a five-year Contract of Participation with the Housing Authority and sets specific goals to be achieved over the term of the Contract. As part of the Contract, the Housing Authority opens an escrow account for each participating family and any time there is an increase to the family's earned income during the term of the Contract, money is deposited into the family's escrow account. Upon successful completion of the Program, the family receives the balance in their escrow account.

The Housing Authority also provides monthly training to these families in the areas of healthcare, parenting, financial management, budgeting, stress management, employment preparedness and training, homeownership, and life-skills training.

Resident Opportunity and Self-Sufficiency Program ("ROSS")

The Resident Opportunity and Self-Sufficiency ("ROSS") Program is designed to assess the needs of public housing residents and coordinate available resources in the community to meet those needs. The ROSS Program works to promote the development of local strategies to coordinate the use of assistance under the Housing Authority's Public Housing Program. A primary function of the ROSS Program is to connect participating residents with public and private resources, including supportive services and various resident empowerment activities. The services provided to ROSS Participants should enable participating families to increase earned income, reduce or eliminate the need for welfare assistance and make progress towards achieving economic self-sufficiency. In the case of elderly or disabled residents, the services provided by the ROSS Program help improve living conditions, allowing residents to age-in-place.

Homeownership Voucher Program

The Housing Choice Voucher Home Ownership Program offers eligible individuals or families the opportunity to own their own home. Instead of making monthly payments to a landlord, the family will make their own mortgage payment and Santa Fe County Housing Authority will make mortgage assistance payments to the lender. As with any other program there are requirements which must be met.

To be eligible to participate in this exciting program the family or individual must:

- Currently receive Housing Choice Voucher rental assistance
- Have maintained their voucher rental assistance for a minimum of one-year
- Be enrolled in the Family Self-Sufficiency Program
- Meet the HUD definition of "first-time homebuyer"
- Enter into a Statement of Homeowner Obligations
- Attend and successfully complete homeownership counseling classes
- Provide the required down payment of at least 3% of the purchase price, of which a minimum of \$500.00 must be paid from the individual's or family's personal resources.
- Must be employed on a full-time basis (except in the case of elderly or disabled families). Full-time is defined as not less than 30 hours per week.
- Elderly/disabled individuals or families may qualify depending on the amount of monthly Social Security or SSI payments.

Special Voucher Programs

Veterans Assistance Supportive Housing (VASH) Program

The VASH Program is a supportive housing program in partnership with the Veterans Administration facility in Santa Fe, New Mexico. The HUD–VASH program combines HUD Housing Choice Voucher rental assistance for homeless veterans with case management and clinical services provided by the Department of Veterans Affairs at its medical centers and in the community.

Mainstream Voucher Program

The Mainstream Voucher Program functions in the same manner as the Housing Choice Voucher Program; however, Mainstream Vouchers are only provided to individuals who are non-elderly (under the age of 62) and are disabled.

Foster Youth to Independence (FYI) Program

The FYI program provides voucher funding to youth between the ages of 18 and 24 who are homeless (or at risk of becoming homeless) and who have or will be getting out of the child welfare system within 90 days of the time of their application. This is a bridge program intended to help youth transition from state custody into stable housing.

Quantifiable Goals

These quantifiable goals are based off the identified needs, opportunities, and constraints covered in earlier sections.

Table 23 Goals - Construction of New Units

Type of Housing	Identified Need (City + County)	Santa Fe County 5-yr Goal	Avg Annual Goals	Example of Contributing Programs & Potential Strategies
Entry Level and Affordable Home Ownership	6,163	440	88	Adjustments to Land Use regulations, Private Development, Housing Trust Fund, Down Payment Assistance, Inclusionary Zoning, Use of County-Owned Land, SF County Loan Program, Developer Incentives
Affordable Workforce Home Ownership	2,970	880	176	Adjustments to Land Use regulations, Private Development, Housing Trust Fund, Down Payment Assistance, Inclusionary Zoning, Use of County-Owned Land, SF County Loan Program, Developer Incentives, etc.
Market-Rate Home Ownership	1,322*	440*	88*	Adjustments to Land Use regulations, Infrastructure Improvements
Subsidized & Affordable Rental Housing	6,232	440	88	Adjustments to Land Use regulations
Affordable Workforce Rental Housing	508	110	22	Adjustments to Land Use regulations
Market-Rate Rental Housing	21*	9*	2*	Adjustments to Land Use regulations, Infrastructure Improvements
Total Units	17,216	2,319	464	

*Market rate housing is critical to the overall affordability of the housing market but needs and corresponding goals are not prioritized in this table.

Table 24 Goals - Provision of Housing Services

Type of Service	Identified Need (City + County)	Santa Fe County 5-yr Goal	SFC Annual Avg	Contributing Programs & Strategies
Overcrowded Households	2,573	220	44	Private Development (Inclusionary Housing); Housing Authority Development, Renter Assistance Program (Vouchers), Down Payment Assistance
Cost-Burdened Homeowners	12,174	1,320	264	Private Development (Inclusionary Housing); Housing Authority Development, Renter Assistance Program (Vouchers), Down Payment Assistance
Cost-Burdened Renters	8,870	880	176	Private Development (Inclusionary Housing); Housing Authority Development, Renter Assistance Program (Vouchers), Down Payment Assistance
Non-Congregate Shelters & Managed/Safe Outdoor Spaces	75-150	18	4	Development by private and public housing service providers, Housing Trust Fund, Loan Program
Transitional and/or Rapid Re-Housing	173-350	33	7	Development by private and public housing service providers, Renter Assistance Program, Housing Trust Fund, Loan Program
Permanent Supportive Housing	176-300	18	4	Development by private and public housing service providers, Renter Assistance Program, Housing Trust Fund, Loan Program, Rehab Program
ADA-Accessible Housing	9,812	88	18	Private Development; Housing Authority Development, Renter Assistance Program (Vouchers), Down Payment Assistance
Subsidized Senior Housing	2,290	66	13	Private Development; Housing Authority Development, Renter Assistance Program (Vouchers), Down Payment Assistance

Plan Implementation

It is intended that this Plan will be fully implemented over a 5-year period. The implementation process will begin following the approval of the Plan and the associated ordinance by the Board of County Commissioners (“BCC”) of Santa Fe County and the New Mexico Mortgage Finance Authority. Implementation of the Plan will be phased depending on the availability of funding and other resources necessary for implementation. Each program outlined in the Plan, which provides housing assistance grants and/or loans to qualifying households, will be established via resolution. These resolutions will require BCC approval and will contain the policies and procedures for each individual housing assistance grant and/or loan program.

It is anticipated that housing assistance grant and/or loan programs implemented through this Plan will be funded through a variety of funding sources, including federal, state and county sources. On May 25, 2021, the BCC approved Resolution No. 2021-050, which confirmed the BCC’s commitment to the creation of a County Affordable Housing Trust Fund. Pursuant to Resolution No. 2021-050, some of the potential funding sources for the Affordable Housing Trust Fund could include:

- A portion of the gross receipts tax revenue attributable to short term rentals;
- A percentage of future increases in property tax revenue;
- Revenue provided through the Low-Income Taxpayer’s Property Tax Rebate;
- Revenue provided through the County’s Occupancy Tax Ordinance, as amended; and
- A recurring general fund appropriation in the County budget.

In addition to these potential sources, revenues received from affordable mortgage payoffs and developer fees accrued through the County’s inclusionary zoning program will also be used as a revenue source to fund housing assistance grant and/or loan program activity. Lastly, it is anticipated that the County could access and leverage other sources of revenue, such as the New Mexico Affordable Housing Trust Fund, additional federal grants, and other sources of funding for the purpose of achieving the Plan’s affordable housing goals and initiatives.



Appendix J: La Cienega and La Cieneguilla Domestic Well Monitoring Program

La Cienega and La Cieneguilla Domestic Well Monitoring Program

Prepared for
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March 27, 2023

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Executive Summary

Daniel B. Stephens & Associates, Inc. (DBS&A) and the New Mexico Bureau of Geology and Mineral Resources (NMBGMR) have worked together with Santa Fe County (the County) on the first phase of domestic well monitoring program planning services for the La Cienega and La Cieneguilla area. The project has been focused on documenting current conditions in the La Cienega and La Cieneguilla (LCLC) planning area, and summarizing the previous and existing County requirements and procedures for domestic wells. The County selected a consultant to complete the domestic well monitoring program review in order to solicit third-party recommendations on how to implement and improve the existing program.

Santa Fe County has an existing domestic well monitoring program; however, staff resources and well owner engagement have been limited to date. The current project objectives were to document the area's groundwater levels and trends, estimate current and project future water demand, initiate community member involvement in the project, identify the existing requirements that apply to domestic wells in the LCLC planning area, review and develop recommendations for how to improve the existing domestic well management program. Examples of other well management programs were also reviewed. The overarching goal of the project is to develop a functional and efficient process to monitor, conserve, and protect the local groundwater resource. County staff seek to collaborate on the domestic well monitoring program at the local, County, and state levels, and to leverage existing resources for the greatest benefit.

NMBGMR prepared a summary of the hydrogeologic setting for the LCLC planning area, which is included as an appendix to this report. This region is hydrologically unique, with numerous springs, seeps, and wetlands emerging in the valleys and along the river channels. Repeat groundwater elevation measurements are important for understanding changes in water volume stored in an aquifer. Groundwater level records in the area stretch back more than 50 years for some area wells. These long-term records of water levels in the area show consistent declines by as much as 0.3 foot per year. Since 2012, water levels in the La Cienega area have begun to stabilize and, in some cases, even begun to recover. This is likely the result of efforts to connect upgradient water users to the County water utility and to transition to using more surface water and less groundwater. Ongoing monitoring is crucial for continuing to assess the trends in groundwater levels, especially as population increases and drought persists.

The LCLC planning area includes 1,341 parcels, and based on information from the Office of the State Engineer New Mexico Water Rights Reporting System (NMWRRS), a total of 934 permitted wells. These include 823 domestic wells permitted under NM Stat §72-12-1. Permitted groundwater diversions total 2,332.00 acre-feet per year (ac-ft/yr) in the LCLC planning area. This total includes 1,658.00 ac-ft/yr for 72-12-1 NMSA domestic one-household wells and 292.00 ac-ft/yr for 72-12-1 NMSA domestic multiple-household wells. Domestic water demand in the LCLC planning area is not well constrained, as there are very few domestic well meter readings available. Current domestic water demand could range anywhere from approximately 150 to 1,100 ac-ft/yr, depending on the per-household demand and number of households served by each shared domestic well. Future water demand was also projected. Assuming that current domestic water demand is 250, 500, or 750 ac-ft/yr, and that the LCLC planning area domestic water demands increase by 5, 10, or 15 percent per decade (population growth in the LCLC planning area was more than 8 percent between 2010 and 2020), projected 2060 domestic water demand in the LCLC planning area ranges from approximately 300 to 1,300 ac-ft/yr.

DBS&A discussed the current project's outreach methods and media platforms with County staff, and one project open house was held. The project open house event was held at the La Cienega Community Center on September 14, 2022; approximately 60 people attended. Open house participants expressed concern over local water supplies, nearby development (e.g., car washes), the cost of connecting to the County water utility and the subsequent costs for County water utility customers, and water quality. Participant questions were answered, and feedback was gathered regarding participants top water resource issues of interest. The water resource issue with the most interest (highest priority and total votes) was domestic groundwater supply, followed by water quality and growth management. A total of 15 well surveys were turned in at the project open house. Feedback received from the returned well surveys included:

- Concern over the long-term sustainability of the local groundwater resources
- Desire for development to be controlled in this area
- Concern over acequia water supply due to upstream development
- Interest in having any new development be served by the County water utility
- Opposition to any new large water users in the area
- Concern about groundwater quality
- Desire that the domestic well monitoring program be funded and that the County staff the program to allow for actual monitoring

The County also set up a project-specific website to post the open house materials and recording, update participants on the project progress, and announce future project events.

Previous and existing requirements that apply to domestic wells in the LCLC planning area were reviewed. The 2016 Sustainable Land Development Code (SLDC) supersedes the earlier requirements; however, the earlier requirements were reviewed and summarized to show what requirements have been adopted over time, which may have affected water usage. Specific SLDC requirements include:

- A shared well system or an individual well shall be capable of providing the water requirements of the proposed development for up to 99 years.
- All plats and non-residential development shall file signed water restrictions and covenants with the plat or site development plan. Total water use shall not exceed that specified in the development order, plat note, or the SLDC.
- The annual water use for domestic purposes for new residential dwellings constructed on any lot created after the effective date of the SLDC shall not exceed 0.25 ac-ft/yr, or such lower amount as may be established in the development order approving the land division.
- All development using a well shall participate in the well use metering program. Santa Fe County-approved meters are required to be installed on wells for any development subject to the SLDC. The meter shall be read by the property owner and meter readings shall be provided annually.
- All properties that are required to have water meters shall also be required to test their water meter for reading accuracy every ten years and replace it if necessary.
- A County domestic well permit is required in order to drill a new domestic well within the service area of the County water utility after the effective date of the SLDC. A County permit is not required if the well owner will be replacing, supplementing, or deepening an existing domestic well.
- In the LCLC Community District Overlay area, all new lots created as part of residential land divisions and subdivisions and all new non-residential development shall be required to connect to the County water utility when the system is extended to within 200 feet of the property line of a lot, unless that lot has previously connected to a community water system, provided that adequate capacity exists in the system and that water taps are available.

Plat notes and the SLDC both govern new development on the lots with well restrictions under the La Cienega Watershed Conditions. If the plat notes are stricter than the SLDC or require a connection to the County water utility sooner than the SLDC, and the notes have never been vacated by the Board of County Commissioners (BCC), the plat notes control the requirements for a specific property. If the SLDC is stricter or requires a connection to County water utility sooner than the plat notes, then the SLDC will control the requirements for a specific property. Some lots may be subject to restrictive covenants that are stricter than the SLDC; however, the County does not enforce restrictive covenants. Development of lots with restrictive covenants is governed by the SLDC.

The County's existing domestic well monitoring program has been implemented intermittently as staff resources have been available. The program has been moved between different County departments, and has not had consistent staffing or support. Moving forward, County staff resources and program funding will need to be dedicated to the program in order for it to be successful. We recommend:

- Moving the program to the Public Works Department where staff have experience with the subject matter (e.g., hydrogeology), and creating a new full-time position to serve as the lead in implementing the program.
- County staff from Public Works, Growth Management, and Sustainability collaborate on a 6-month work planning process to identify the program's next steps.
- Working with domestic well owners in the LCLC planning area to implement a domestic well metering and meter reading program, collecting the data necessary to estimate current local groundwater demand.
- Adding a final inspection requirement for all new domestic wells to verify that meters have been installed, and requiring that all new domestic wells participate in the domestic well monitoring program going forward. This will increase the number of monitored domestic wells and the amount of groundwater diversion data collected for this area.
- Expanding the existing water level measurement program to include a total of 50 locations, to be measured once per year, within and upgradient (northeast) of the LCLC planning area. This will allow for better assessment of trends in the groundwater elevations over time, especially as conditions are projected to become warmer and drier in the future.
- Reviewing which parcels in the LCLC planning area are connected to the County water utility, evaluating the possibility of connecting additional parcels using existing infrastructure, and

potentially extending the water lines to connect additional parcels. This would reduce the number of domestic wells being used as the source of water supply in the LCLC planning area, and would help to conserve the local groundwater resource.

- The County water utility providing water supply to the La Cienega MDWCA and Wild and Wooley Trailer Park to help conserve the local groundwater resource. The La Cienega MDWCA is the largest community water system in the planning area, and it has an emergency connection with the County water utility, but obtains its water supply from wells. The Wild and Wooley Trailer Park is not currently connected.
- Addressing water quality in future outreach to County domestic well owners, potentially distributing educational materials that give recommendations for the parameters that should be monitored and options for where samples can be analyzed.
- Including a series of public outreach events in the next phase of the project, with an outside mediator/facilitator.
- Making this report available to the Water Policy Advisory Committee (WPAC), La Cienega Valley Association, City/County Water Conservation Committee, and public for review.

Funding for the program will need to be identified. DBS&A and the NMBGMR are not aware of any grant programs that will support annual recurring costs for the proposed domestic well monitoring program, but the report identifies some potential funding sources that could be used to help get the program established. We recommend that a new full-time position be created for the County's domestic well monitoring program, and that this new position lead the program moving forward. In the event that the project lead leaves the County, a replacement will need to be hired. As the program is implemented and domestic well meter readings are obtained, the estimates for current and projected future water demand should be refined. In addition, the County should work with the community to evaluate whether the demand projections reflect desired future conditions.

1. Introduction

Daniel B. Stephens & Associates, Inc. (DBS&A) and the New Mexico Bureau of Geology and Mineral Resources (NMBGMR) have worked together with Santa Fe County (the County) on the first phase of domestic well monitoring program planning services for the La Cienega and La Cieneguilla area (Figure 1). The project has been focused on documenting current conditions in the La Cienega and La Cieneguilla (LCLC) planning area and summarizing the previous and existing County requirements and procedures for domestic wells.

Santa Fe County has an existing domestic well monitoring program; however, staff resources and well owner engagement have been limited to date. The current project objectives were to document the area's groundwater levels and trends, estimate current and project future water demand, initiate community member involvement in the project, identify the existing requirements that apply to domestic wells in the LCLC planning area, review the existing domestic well management program, and develop recommendations for how to improve the existing domestic well management program. The overarching goal of the project is to develop a functional and efficient process to monitor, conserve, and protect the local groundwater resource. This report discusses the tasks completed and project findings, and provides recommendations for the project's next phase.

2. Hydrogeologic Setting

In 2003, NMBGMR began a hydrogeological investigation of the Española Basin, with a special focus on the wetlands at La Cienega, with the goal of understanding groundwater flow in the area and potential influences on the wetlands. NMBGMR implemented a groundwater monitoring network around La Cienega beginning in 2015. NMBGMR supported DBS&A on this project, and prepared a summary of the hydrogeologic setting for the LCLC planning area (Appendix A). Figure 2 shows the geology of the area.

The study area covers the lower reach of the Santa Fe River, including several of its major tributaries and arroyos, including Arroyo Calabasas, Arroyo de los Chamisos, Arroyo Hondo, Cienega Creek, Guicu Creek, and Alamo Creek. This region is hydrologically unique, with numerous springs, seeps, and wetlands emerging in the valleys and along the river channels. Regional groundwater elevation maps for the area show that groundwater in the southern

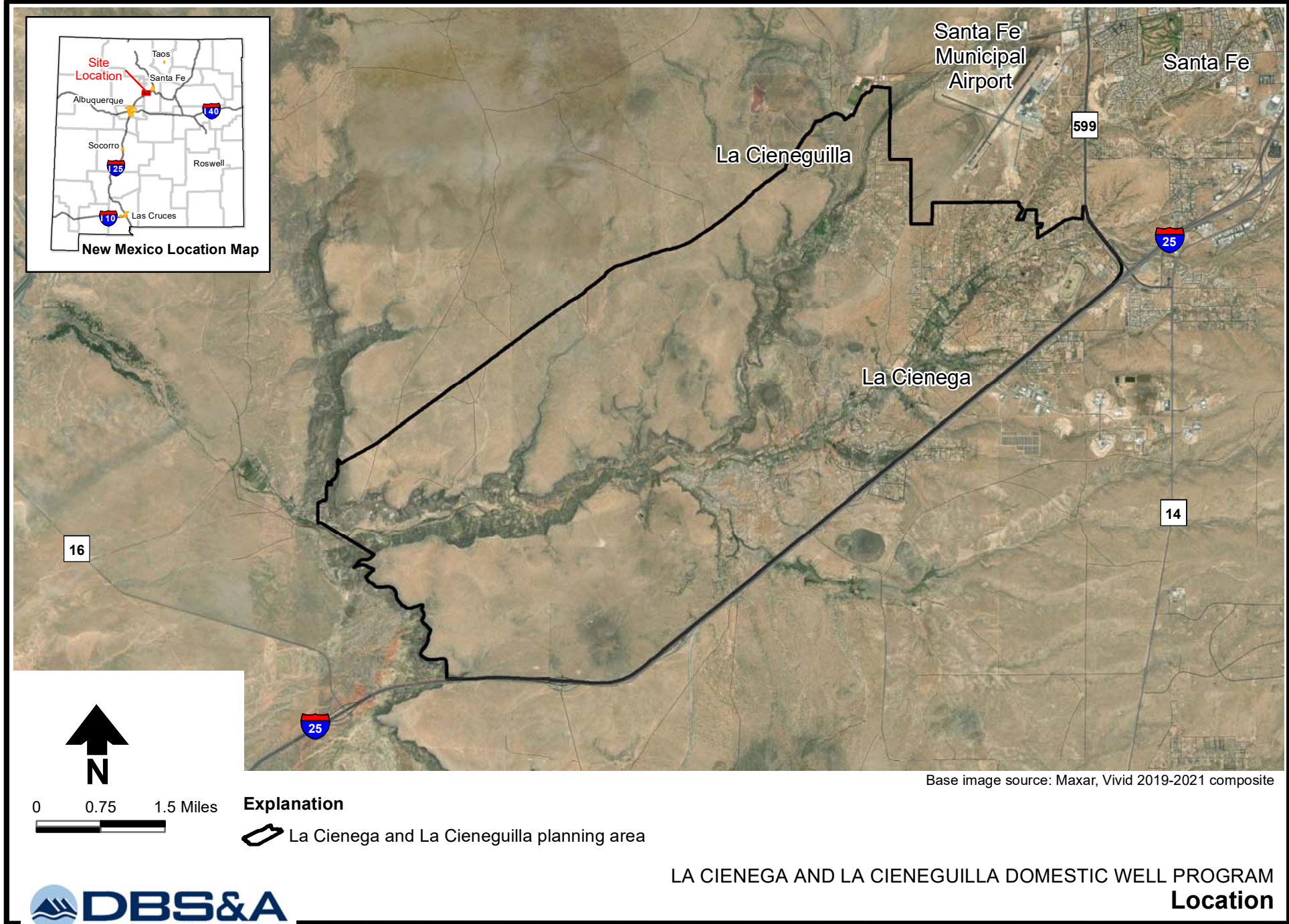













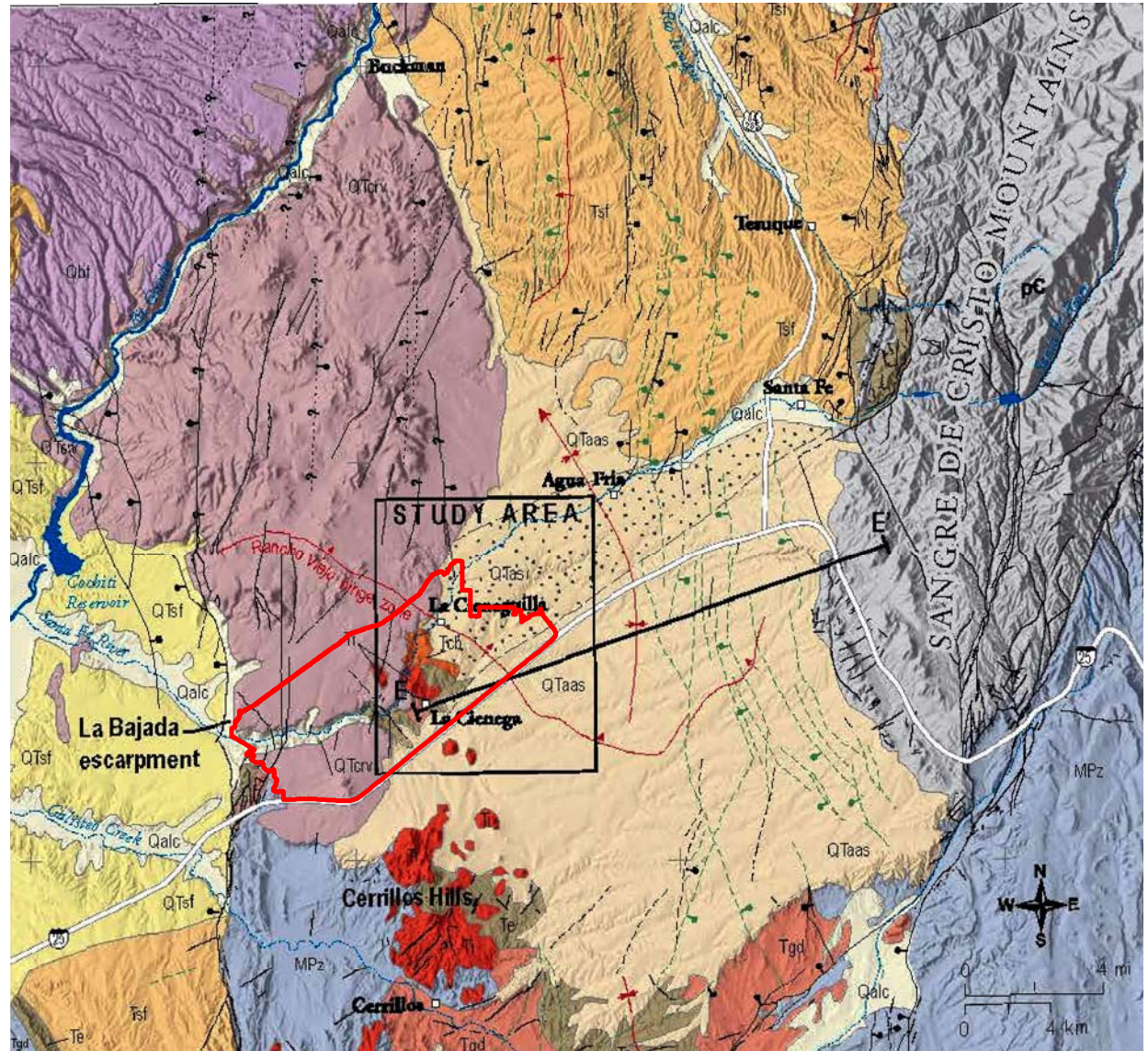


Figure 1

Explanation

-  La Cienega and La Cieneguilla planning area

-  Qalc Quaternary alluvium, landslides, and colluvium
-  Qbt Bandelier Tuff (Pleistocene)
-  QTcrv Cerros del Rio volcanic rocks (Plio-Pleistocene)
-  QTa Ancha Formation, Santa Fe Group (Plio-Pleistocene-includes alluvial slope (QTaas) deposits and ancestral Santa Fe River (QTasr))
-  QTsf Santa Fe Group, undivided (Plio-Pleistocene)
-  Tsf Santa Fe Group, undivided (Oligocene -Miocene)
-  Tcb Cieneguilla basanite (Oligocene)
-  Te Espinazo Formation (Late Eocene-Oligocene)
-  Ti Intrusive rocks (late Eocene-Oligocene)
-  Tgd Galisteo and Diamond Tail Formation (Late Paleocene-Eocene)
-  MPz Undivided Mesozoic and Paleozoic rocks
-  pC Undivided Proterozoic rocks



Adapted from Johnson (2016) et al.

Figure 2

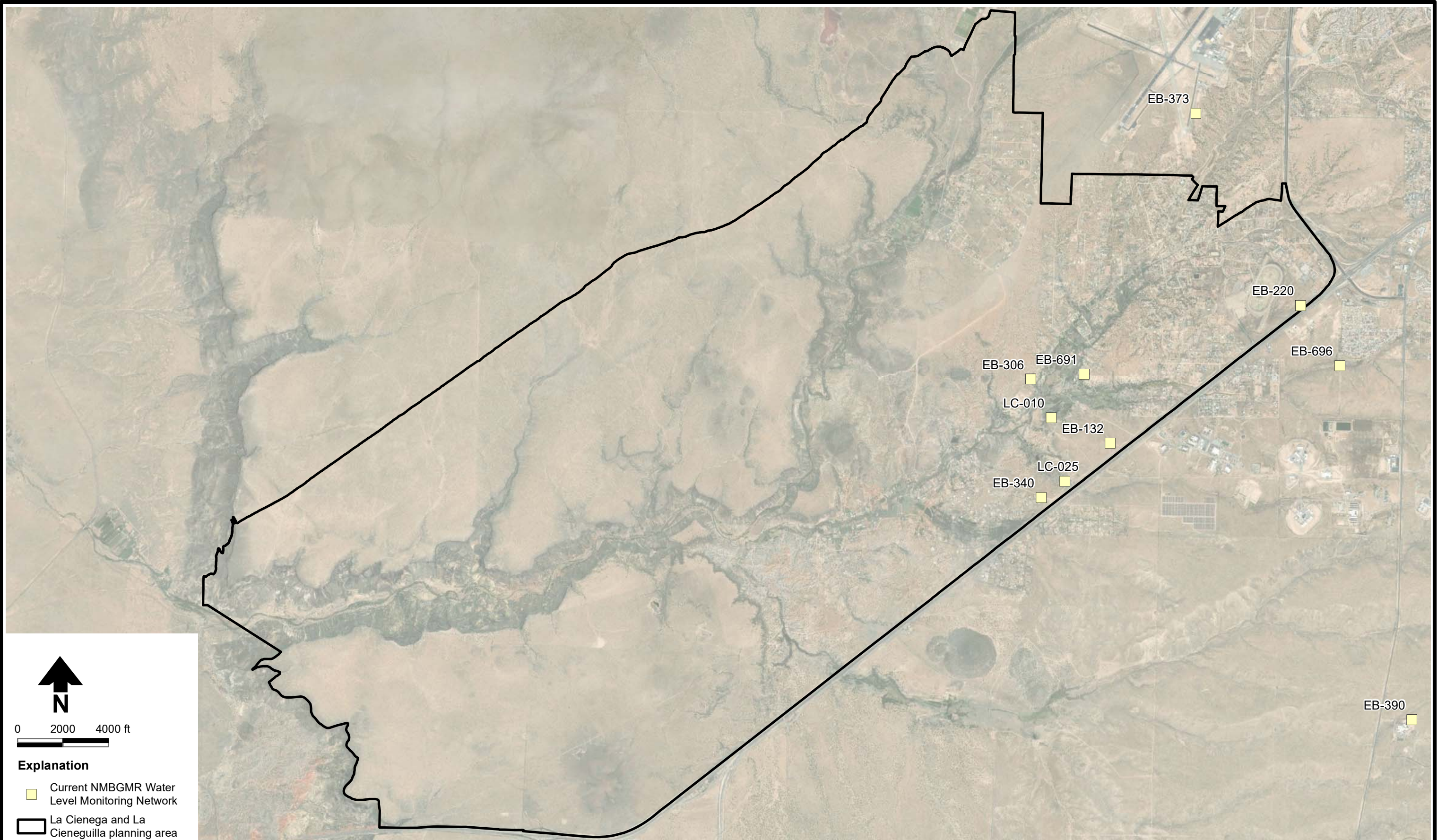
Española Basin flows west-southwest through the Santa Fe Group aquifer from the Sangre de Cristo Mountains in the east. Sources of recharge to the Santa Fe Group aquifer include mountain-front and stream channel recharge near the western border of the Sangre de Cristo Mountains, small amounts of areal recharge through coarse surface materials, and focused recharge in the southern Española Basin via streambed infiltration along ephemeral channels. The groundwater that feeds springs and wetlands in the study area is sourced from the Santa Fe Group aquifer, which is a regional aquifer system of thick alluvial deposits of the Tesuque Formation, overlain by shallow, thin (less than 250 feet), coarse deposits of the Ancha Formation.

The La Cienega area has been the subject of numerous groundwater level studies over the past 60 years; as a result there is a robust dataset of groundwater levels in this area. Repeat measurements of the groundwater levels are important to understand changes in water volume stored in an aquifer. Compiled water level data from previous reports show that water levels in the Ancha aquifer have consistently dropped from the beginning of the records until the early 2010s as a result of long-term groundwater depletion upgradient (east) of the wetlands. A comparison of Ancha water levels in the mid-1970s and 1980s with water levels measured in the same wells between 2004 and 2012 show long-term water table declines up to 8.9 feet. The largest depletions and decline rates have occurred in the Valle Vista area and south of the New Mexico State Penitentiary, near the northern and southern edges of the Ancha zone of saturation.

Repeat groundwater elevation measurements are important for understanding changes in water volume stored in an aquifer. Groundwater level records in the area stretch back more than 50 years for some area wells. These long-term records of water level in the area show consistent declines by as much as 0.3 foot per year. Since 2012, water levels in the La Cienega area have begun to stabilize and, in some cases, even begun to recover. This is likely the result of efforts to connect upgradient water users to the County water utility and to transition to using more surface water and less groundwater. Ongoing monitoring is crucial for continuing to assess the trends in groundwater levels, especially as population increases and drought persists.

The NMBGMR currently monitors water levels in 10 wells in the La Cienega area, 7 of which are located within the LCLC planning area (Figure 3). Of these 10 wells, 5 are equipped with continuous dataloggers, and the data are collected when the sites are visited annually in April. Water levels are measured in the other 5 wells at that time. Table 1 provides recent water level measurements and groundwater elevation data for the wells that are monitored by the NMBGMR. In April 2022, depth to water in the currently monitored wells located within the



\\SS6ABODATA\PROJECTS\DB22.1144_LA_CIENEGA_DOMESTIC_WELLS\GIS\MXD\REPORT\F03_CURRENT_NMBGMR_WATER_LEVEL_MONITORING_NETWORK.MXD



0 2000 4000 ft



Explanation

-  Current NMBGMR Water Level Monitoring Network
-  La Cienega and La Cieneguilla planning area

BASE IMAGE SOURCE: MAXAR, VIVID 2019-2021 COMPOSITE



1/13/2023

DB22.1144

**LA CIENEGA AND LA CIENEGUILLA DOMESTIC WELL PROGRAM
Current NMBGMR Water Level Monitoring Network**

Figure 3

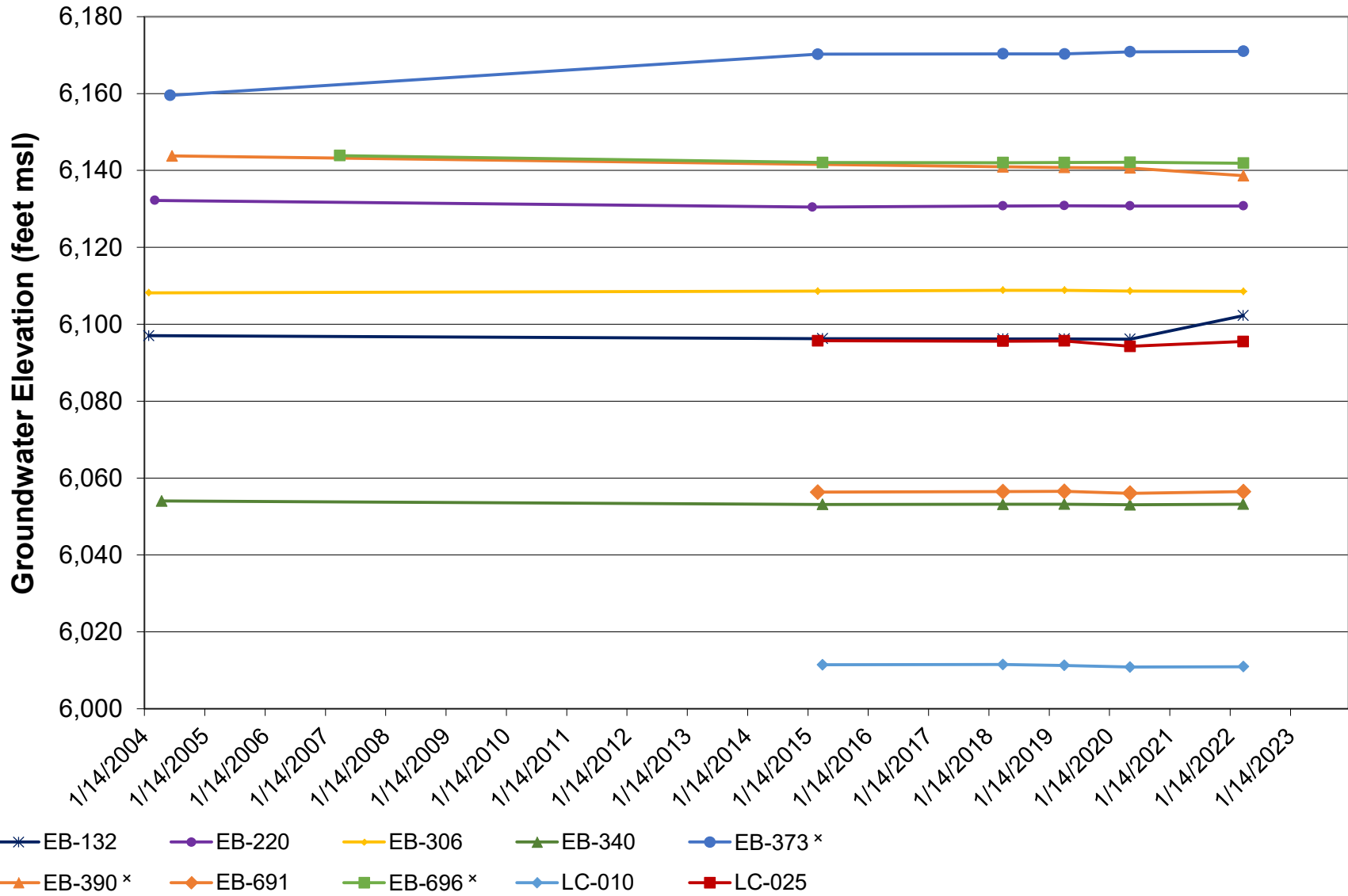
LCLC planning area ranged from less than 10 feet below ground surface (feet bgs) to approximately 130 feet bgs, yielding water level elevations of approximately 6,011 to 6,131 feet above mean sea level (feet msl) (Table 1). NMBGMR previously visited the monitored wells in this network twice per year (before leaf-out in spring, when water levels are the highest, and in late fall after the first freeze, when they are the lowest), but they have found that monitoring once per year in April is most effective. Figure 4 shows the groundwater elevations for the current NMBGMR monitoring network based on measurements collected between 2004 and 2022. The 2023 water level measurements will be collected in April 2023. Appendix A includes a larger table of water levels and groundwater elevations for wells in the area that have previously been monitored by NMBGMR, additional NMBGMR groundwater elevation illustrations, and discussion.

3. Community Planning

The LCLC planning area includes Lower La Cienega, Upper La Cienega, La Cieneguilla, and the surrounding areas (Santa Fe County, 2015). The original LCLC community plan was prepared between 1997 and 2001, and was adopted in 2001. A community plan update was completed in 2015 (Santa Fe County, 2015). The LCLC community plan was completed to (1) develop recommendations to guide zoning and development standards for incorporation into the County's Sustainable Land Development Code (SLDC), (2) identify projects, programs, and strategies that support the community's vision and goals, and (3) provide a community action plan to further the community's vision, solve problems, and develop collaborative relationships between residents, local and state government, public agencies, and community organizations (Griego, 2023).

The community planning process included a community planning committee; the plan identified a common set of concerns, goals to address them, and policies to achieve the goals (Santa Fe County, 2015). The LCLC community plan update calls for preserving the rural character of the area and protecting the agricultural and livestock water uses (Santa Fe County, 2015). The plan update references a diverse community, and says that the community wants decisions to be made jointly "with a realistic understanding of the available resources." The plan calls for controlled and sensible growth, with a focus on quality of life (Santa Fe County, 2015).

The LCLC community plan update cites planning area populations of 1,775 in 1990, 3,007 in 2000, and 3,819 in 2010 (Santa Fe County, 2015). The U.S. Census American Community Survey



* Well outside of the LCLC planning area

LA CIENEGA AND LA CIENEGUILLA DOMESTIC WELL PROGRAM
**Groundwater Elevations for the
 Current NMBGMR Monitoring Network**

Figure 4

2017-2021 demographic and housing estimates give a 2021 population of 4,110 for the La Cienega census-designated place (CDP) (U.S. Census, 2021). This population estimate is approximately 8 percent higher than the 2010 population, 37 percent higher than the 2000 population, and over double the 1990 population, as given in the LCLC community plan update (Santa Fe County, 2015), although the La Cienega CDP area is smaller than the LCLC planning area (Figure 5) and does not include La Cieneguilla. This means that the growth in the LCLC planning area has exceeded these growth rates (growth in the LCLC planning area exceeded 8 percent between 2010 and 2020).

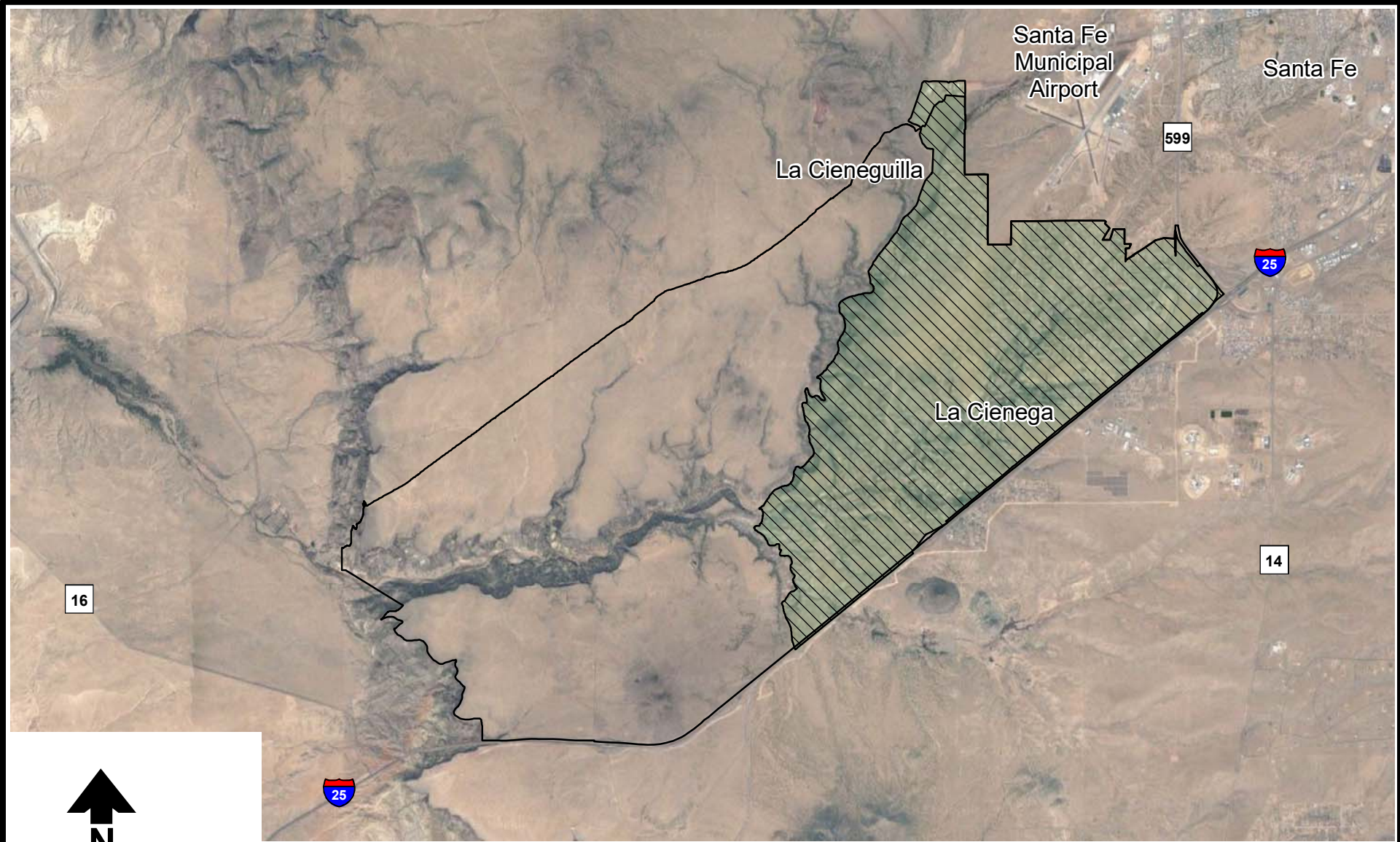
The LCLC planning area includes three acequia associations (La Cienega, El Guicu, and El Molino/La Capilla), and there are four private acequias in the valley (El Canon, La Capilla Vieja, Los Pinos, and Romero ditches). Citing the New Mexico Office of the State Engineer (OSE) 1976 Hydrographic Survey, the LCLC community plan update says that an area of approximately 150 acres is potentially irrigable by the community acequias (Santa Fe County, 2015). The community plan cites conversion of irrigable agricultural land to residential uses, along with declines in available flows in the acequias, as causing the decrease in agricultural production in the area. Acequia water demands are supplemented in the LCLC planning area using supplemental wells (Santa Fe County, 2015).

The LCLC community plan update included a strategy calling for expediting implementation of the La Cienega Watershed Conditions, and sought to have available County water prioritize existing water users over new development. The LCLC community plan update recommended a water connection priority area in the Upper La Cienega area, in close proximity to existing County water utility infrastructure, in order to reduce local groundwater depletions (Santa Fe County, 2015).

4. Current Conditions

4.1 Land Parcels and Existing Wells

DBS&A obtained current parcel data from the Office of the Santa Fe County Assessor web portal on May 9, 2022. Using the LCLC planning area boundary, the parcel data were clipped to include those parcels located partially or entirely within the LCLC planning area. These include 1,341 parcels (Appendix B). DBS&A downloaded information about permitted wells from the OSE New Mexico Water Rights Reporting System (NMWRRS), and clipped these data to include



Base image source: Maxar, Vivid 2019-2021 composite



0 0.75 1.5 Miles

Explanation

-  La Cienega and La Cieneguilla planning area
-  La Cienega CDP

Figure 5

the permitted wells located within the LCLC planning area (Appendix C). The NMWRRS data had been updated on April 5, 2022.

Using data from the OSE NMWRRS, two columns were added to the parcel database (Appendix B) to show whether any wells are located on each parcel and, for those parcels with a well or wells, the number of wells. A column indicating the parcel number where the well(s) are located was added to Appendix C. As discussed below, the older well location data available in the NMWRRS are not as accurate as the location data for newer wells, so there may be errors in the information that was added to Appendices B and C regarding the locations of permitted wells.

Information from NMWRRS indicates that there are a total of 934 permitted wells in the planning area. Table 2 shows the number of permitted wells by type and their permitted diversion volumes. These include 823 domestic wells permitted under NM Stat §72-12-1 (this value is the sum of the permitted 72-12-1 NMSA wells for the domestic and livestock watering, domestic one household, and multiple domestic household well types). Figure 6 shows the land parcels and permitted wells that are located within the LCLC planning area. Wells with no water right (e.g., closed file, exploration, monitor well) and wells where the use is unknown are not shown on Figure 6.

As shown on Table 2, permitted water diversions in the LCLC planning area total 2,682.34 acre-feet per year (ac-ft/yr), including 2,332.00 ac-ft/yr in permitted groundwater diversions. This total includes 1,658.00 ac-ft/yr for 72-12-1 NMSA domestic one-household wells and 292.00 ac-ft/yr for 72-12-1 NMSA domestic multiple-household wells. Table 3 provides more detail from NMWRRS for the irrigation water rights in the LCLC planning area. Permitted irrigation diversions total 482.17 ac-ft/yr, including 350.34 ac-ft/yr for surface declarations and 131.83 ac-ft/yr for permitted groundwater diversions. The focus of this project is on domestic water use; however, the water rights for all uses are presented to allow for estimation of the total permitted water diversions in the LCLC planning area.

The OSE point of diversion (POD) Locations Online Mapping Tool includes a local ordinance area for the City of Santa Fe's domestic well ordinance, but does not include a similar local ordinance area for Santa Fe County. We recommend that the County provide their 2016 SLDC, with specific limitations and requirements, to OSE so that they may add it to the online mapping tool.

Per DBS&A discussions with the OSE's Upper Rio Grande Basin Manager, the number of pre-basin (unpermitted) wells is expected to be low in the La Cienega and La Cieneguilla areas. This

\\SS6ABODATA\PROJECTS\DB22.1144_LA_CIENEGA_DOMESTIC_WELLS\GIS\MXD\REPORT\F06_PERMITTED_WELLS.MXD

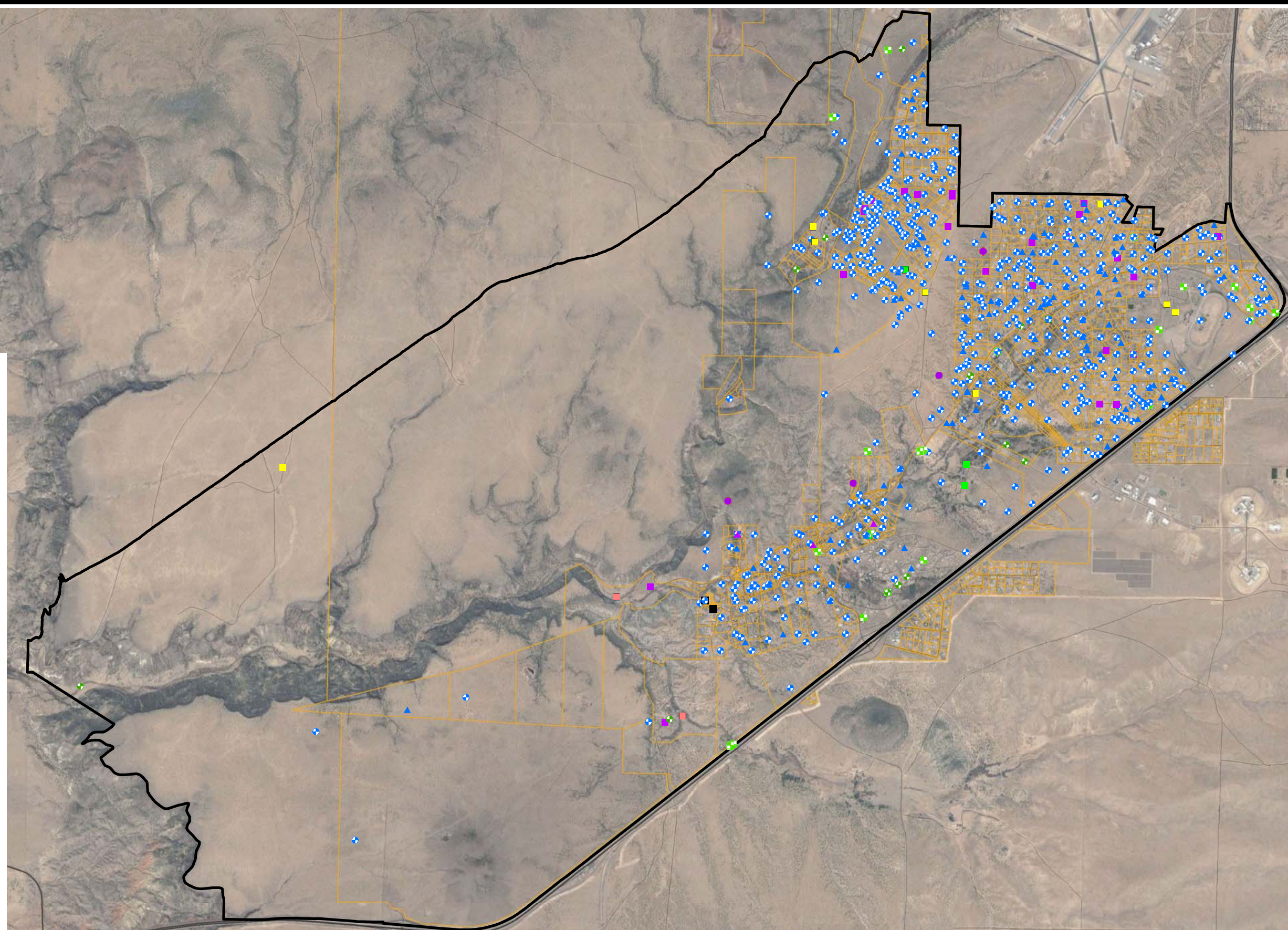


0 2000 4000 ft

Explanation

La Cienega and La Cieneguilla well

- 72-12-1 domestic and livestock watering
- + 72-12-1 domestic one household
- + Irrigation
- Community type use - mdwca, private or commercial supplied
- Mobile home parks
- ▲ 72-12-1 multiple domestic households
- ▲ Non 72-12-1 domestic and livestock watering
- Non 72-12-1 domestic one household
- 72-12-1 Construction of public works
- + 72-12-1 Sanitary in conjunction with a commercial use
- 72-12-1 livestock watering
- La Cienega and La Cieneguilla planning area
- Parcel



WELL DATA: APR 5, 2022, NEW MEXICO OFFICE OF THE STATE ENGINEER
DOWNLOADED MAY 27, 2022

**LA CIENEGA AND LA CIENEGUILLA DOMESTIC WELL PROGRAM
Permitted Wells**



3/9/2023

DB22.1144

Figure 6

area was declared by the OSE as part of the Rio Grande underground water basin (UWB) in November 1956. As such, DBS&A assumes that the online NMWRRS system is complete for the area. The OSE does not have any flow meter reading and/or depth to water measurements for the area (turned in by well owners), but they said that they were familiar with a number of specific studies and publications with these types of information (Garcia, 2022). The NMBGMR was also familiar with these publications.

The OSE Upper Rio Grande Basin Manager said that the older well location data available in the NMWRRS system are not as accurate as the location data for newer wells (Garcia, 2022). This is as would be expected. Before it was common to collect global positioning system (GPS) coordinates for new wells, well locations were notated using the New Mexico Public Land Survey System (PLSS). Locations were recorded using township, range, section, and subsection ($\frac{1}{4}$ $\frac{1}{4}$) information. For older wells, the OSE has used the existing PLSS information to generate location coordinates. This method should yield well locations within the correct quarter, quarter quarter, or quarter quarter quarter section (depending on the location detail recorded for a specific well), but not the well's actual location. Using PLSS location data for wells may cause their locations to plot within the incorrect parcels. Newer wells will have more accurate location coordinates.

The LCLC community plan update indicates that most homes and businesses in the planning area receive water from private domestic wells, and that in the Upper La Cienega area and parts of La Cieneguilla, shared domestic wells are common, with wells shared by two, three, or four homes (Santa Fe County, 2015). The LCLC community plan update also indicates that several households are still supplied by springs. Citing OSE data from July 2011, the LCLC community plan update states that the planning area included approximately 146 one-household domestic wells, 28 multi-household wells, and 30 irrigation/stock/sanitary wells as of that date (Santa Fe County, 2015). DBS&A did not attempt to verify the cited information from 2011; however, these estimates are much lower than the current number of permitted wells in the LCLC planning area, which include nearly 700 domestic one-household and more than 100 domestic multiple-household wells (Table 2).

4.2 Domestic Wells

Domestic well statutes direct the State Engineer to issue permits for certain types of temporary or low volume wells, including wells for household use; domestic wells are the only feasible source of water supply in some rural areas of the state (Utton Center, 2014). As population has increased, domestic wells have become more concentrated near urban areas, increasing

pressure on local water supplies (Utton Center, 2014). Domestic well rights are “inherently conditional on the availability of water” (Utton Center, 2014).

Subdivision development outside of municipalities is governed by local county commissions through their zoning authority and the Subdivision Act, which requires counties to develop rules and procedures for subdivision review and approvals (Utton Center, 2014). The Subdivision Act was amended in 1995 to require that counties develop rules for quantifying subdivision water needs, water availability, and conservation (Utton Center, 2014).

New regulations for the administration of domestic well permits were adopted by the OSE on August 15, 2006 (Utton Center, 2014). Under the 2006 regulations, domestic well permits allow for the use of up to 1.0 ac-ft/yr for a single household, or up to 1.0 ac-ft/yr per household up to a maximum of 3.0 ac-ft/yr for shared wells (Utton Center, 2014). Conditions may be imposed on domestic well permits (e.g., distance from other wells, metering, monitoring, compliance with local ordinances) (Utton Center, 2014).

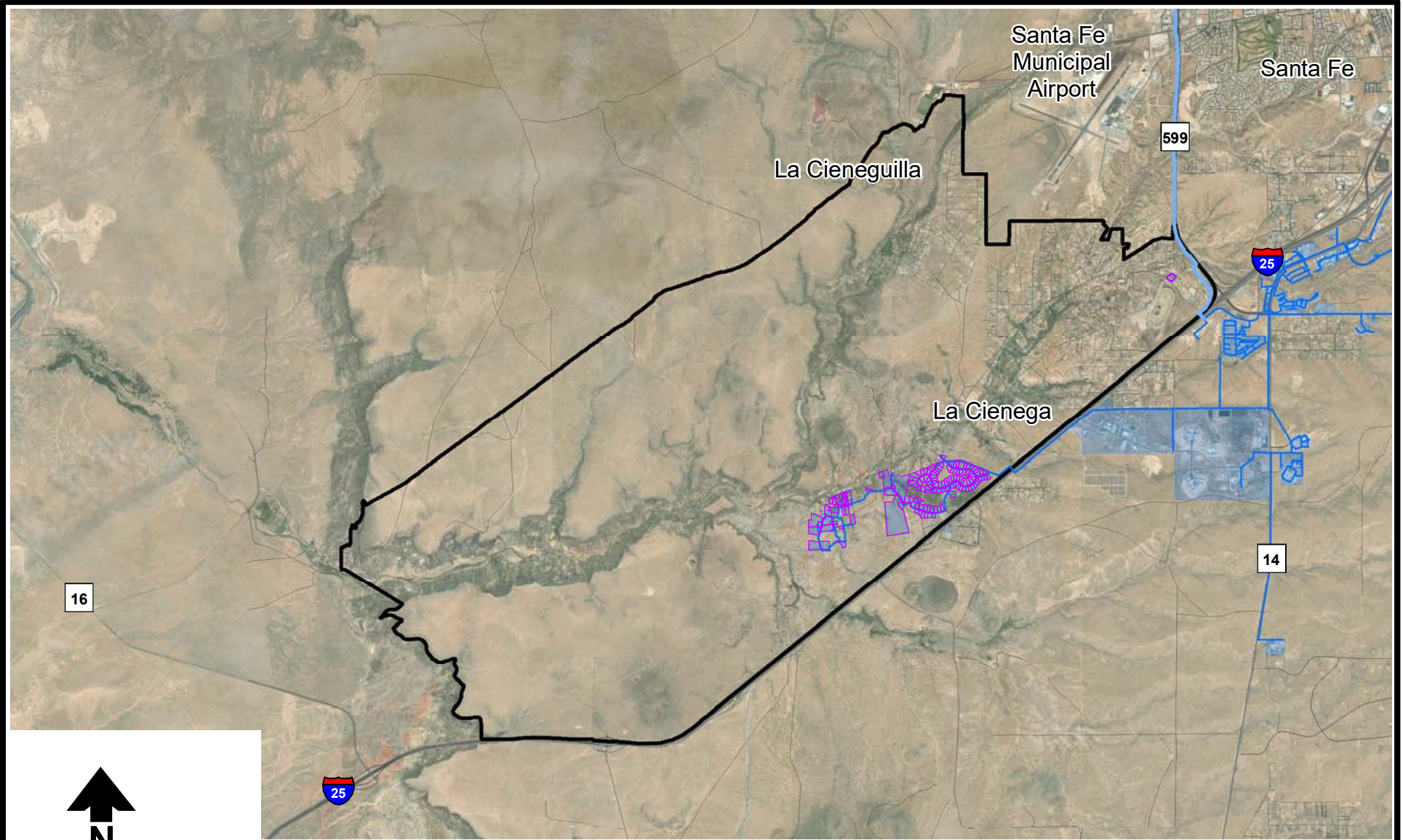
4.3 County Water System

The County water utility’s regional water system has water lines in the vicinity of and within the LCLC planning area, and provides water service to some areas near and within the LCLC planning area (Figure 7). The LCLC community plan update (Santa Fe County, 2015) says that County water service was extended to serve the Las Lagunitas subdivision, Fire Station, and La Cienega Community Center in 1998, and that service was extended further to include the Paseo C de Baca area to La Lomita in 2004. In 2015, the County water utility served approximately 98 connections within the LCLC planning area, with 73 connections in the Las Lagunitas subdivision and 25 connections along Paseo C de Baca (Santa Fe County, 2015).

The LCLC community plan update (Santa Fe County, 2015) says that the County had nearly completed the design of a looped water service line in Lower La Cienega (Camino Loma, La Lomita, and Cielo Del Oeste areas). The project was completed and those areas are now supplied by County water (Hunter, 2022). When well owners are connected to the County water utility, they are required to plug their domestic well, but there is no tracking or enforcement of this requirement (Hunter, 2022).

4.4 Community Water Systems

The LCLC community plan update (Santa Fe County, 2015) includes information about three community water systems: La Cienega Mutual Domestic Water Consumers Association



Base image source: Maxar, Vivid 2019-2021 composite



0 0.75 1.5 Miles

Explanation

- Santa Fe County Buckman Line
- Santa Fe County waterline (updated October/November 2019)

- ▭ La Cienega and La Cieneguilla planning area
- ▭ Santa Fe County water service
- ▭ Parcel connected to county water system

**LA CIENEGA AND LA CIENEGUILLA
DOMESTIC WELL PROGRAM
County Water System**

Figure 7

(MDWCA), La Cienega Water Users Association, and Wild and Wooley Trailer Park. The LCLC community plan update indicates that La Cienega MDWCA provides residential water supply to a large portion of Lower La Cienega and uses approximately 21.7 ac-ft/yr. It also notes that to become a member of the system, groundwater rights must be contributed to the system. The LCLC community plan update indicates that the system served 135 households in 2012, with an average per connection water demand of 0.16 ac-ft/yr (Santa Fe County, 2015).

The LCLC community plan update indicates that the La Cienega Water Users Association is located in Lower La Cienega, at the end of Paseo C de Baca, and is associated with the former Lakeside Mobile Home Park (Santa Fe County, 2015). A water delivery agreement was entered into between the La Cienega Lakeside Mobile Home Park and Santa Fe County that took effect in March 2018. The agreement includes an average diversion volume of 3.45 ac-ft/yr for the system for the previous 16 years. The agreement says that the system's 5.1 ac-ft/yr of water rights were to be transferred to the County, and that the four wells owned by the La Cienega Lakeside Mobile Home Park were to be plugged following connection to the County water utility. The LCLC community plan update indicates that the Wild and Wooley Trailer Park has a 72-12-1 NMSA well with a diversion right of up to 3 ac-ft/yr, that connection to the County water utility is anticipated in the future, and that the system was connected to the County's wastewater system in 2012 (Santa Fe County, 2015).

The OSE publishes a Water Use by Categories report presenting water use data every five years, and the most recent available report presents data for 2015 (Magnuson et al., 2019). These reports include lists of the public water systems in New Mexico by county. There are a number of public water systems located within the LCLC planning area. The largest of these systems is the La Cienega MDWCA, and the OSE Water Use by Categories report indicates that this system served a population of 525, and diverted 16 acre-feet of groundwater in 2015 (Magnuson et al., 2019). This groundwater diversion volume is likely in error, as it yields a per capita use volume of only 27 gallons per day (Magnuson et al., 2019). The La Cienega MDWCA system is connected to the County water utility; however, the connection is used as an emergency connection, and the County water utility does not provide their primary source of water supply (Hunter, 2022).

The LCLC community plan update (Santa Fe County, 2015) indicated that there were plans to connect two community water systems located within the LCLC planning area to the County water utility. Since then, the La Cienega Water Users Association has been connected, which now provides the system's sole source of water supply (Hunter, 2022). The Wild and Wooley

Trailer Park has not yet been connected to the County water utility (Hunter, 2022). The OSE Water Use by Categories report gives the populations served by these two systems in 2015 as 60 and 93 people, respectively (Magnuson et al., 2019). Water use in 2015 by these entities was 28 and 8 acre-feet, respectively (Magnuson et al., 2019). The groundwater diversion volume given for the La Cienega Water Users Association is likely in error, as it yields a per capita use volume of 410 gallons for this system. The estimated 2015 per capita volume for the Wild and Wooley Trailer Park is 80 gallons per day (Magnuson et al., 2019).

5. Estimated Water Demand

5.1 Domestic Well Water Demand

As discussed in Section 4.1, NMWRRS information indicates that there are 934 permitted wells located in the LCLC planning area. These wells include 823 domestic wells permitted under NM Stat §72-12-1 (this value is the sum of the permitted 72-12-1 NMSA wells for domestic and livestock watering, domestic one household, and multiple domestic household well types). There are nearly 700 permitted domestic one-household wells, and more than 100 permitted domestic multiple-household wells (Table 2). Current domestic well water production has been estimated for the LCLC planning area, as discussed in this section.

Total permitted groundwater diversions for the wells in the LCLC planning area total 2,332.00 ac-ft/yr, including 1,658.00 ac-ft/yr for domestic one-household wells and 292.00 ac-ft/yr for domestic multiple-household wells permitted under NM Stat §72-12-1 (Table 2). The per well permitted diversion volumes for domestic one-household wells in the LCLC planning area range from 0 to 3.0 ac-ft/yr, depending on when the well was permitted. As discussed in Section 4.2, current OSE regulations allow up to 1.0 ac-ft/yr for a single household, or up to 1.0 ac-ft/yr per household up to a maximum of 3.0 ac-ft/yr for shared domestic wells. Wells that were permitted prior to the change in OSE regulations have permitted diversion volumes of 3.0 ac-ft/yr. Domestic well water demand is likely less than the permitted diversions.

The County provided all of the domestic well meter reading reports they have on file; Table 4 summarizes the information from these reports. The reports span the 8-year period of 2015 through 2022, and include a total of 43 meter reading reports for 24 wells (for some wells, the owner filed reports in more than one year). Of the 24 wells, 15 were domestic wells serving one residence. Some of the meter reading reports were not for domestic wells that supply residences (instead supplying a private school or various retreat centers), and those data were

not used to estimate domestic water demand. As shown on Table 4, none of these meter reading reports are for wells located within the LCLC planning area. In some cases, the County's meter reading form was filled out and returned; in other cases, one meter reading value was e-mailed to County staff. In the 21 cases where there was enough information, DBS&A calculated annual water demand. Calculated domestic demand ranges from 0.05 to 2.0 ac-ft/yr; however, meter multiplier issues are suspected for the smallest volumes. Notes included with the meter readings for one well indicate that the house supplied is not occupied year-round. Information obtained from the meter reading reports was not used to estimate or project LCLC planning area water demand.

The U.S. Census American Community Survey 2017-2021 demographic and housing estimates give a population of 4,110 for the La Cienega CDP, and an estimated 1,397 households (U.S. Census, 2021). Based on these two values, the average household size was calculated to be approximately 2.94 people. The number of households for the La Cienega CDP was not used to estimate domestic water demand, as the La Cienega CDP covers a smaller area than the LCLC planning area (Figure 5), and because some households are supplied by the County water utility or another community water system.

The OSE uses a per capita volume estimate for rural self-supplied users (residences served by domestic wells) in Santa Fe County of 80 gallons per day (Magnuson et al., 2019). Using an average household size of 2.94 people (calculated based on data for the La Cienega CDP from U.S. Census, 2021), the OSE's per capita volume estimate converts to an estimated household demand of 0.26 ac-ft/yr. The LCLC community plan update states that average domestic use for households supplied by the La Cienega MDWCA was 0.16 ac-ft/yr (Santa Fe County, 2015). The Utton Center estimates that average household water use in New Mexico is approximately 0.25 to 0.33 ac-ft/yr (Utton Center, 2014). As discussed in Section 4.2, the current OSE regulations allow permitted diversions of up to 1.0 ac-ft/yr for domestic wells.

Table 5 presents a range for estimated current domestic water demand in the LCLC planning area based on the per household water demand estimates described above and the estimated total number of households based on the number of permitted domestic wells. The estimated number of households in the LCLC planning area that are supplied by domestic wells ranges from 929 (assuming that each shared domestic well supplies two households) to 1,141 (assuming that each shared domestic well supplies four households). As shown on Table 5, estimated domestic well water demand spans a wide range. Domestic water demand could range anywhere from approximately 150 to 1,100 ac-ft/yr depending on the per-household

demand and number of households served by each shared domestic well. Assuming that per-household demand is 0.16 ac-ft/yr and shared domestic wells supply an average of two households each, domestic demand is estimated to be approximately 150 ac-ft/yr. Assuming that per household demand is 0.33 ac-ft/yr and shared domestic wells supply an average of three households each, domestic demand is estimated to be approximately 350 ac-ft/yr. Assuming that per household demand is 1.0 ac-ft/yr and shared domestic wells supply an average of three households each, domestic demand is estimated to be approximately 1,000 ac-ft/yr.

5.2 Community Water System Demand

Permitted diversion volumes for community water systems total 68.07 ac-ft/yr (Table 2), or 88.47 ac-ft/yr if mobile home parks are included. This is an overestimate of actual water demand, as the La Cienega Water Users Association is now being served by the County water utility.

5.3 Irrigation Water Demand

The LCLC community plan update (Santa Fe County, 2015) says that water from La Acequia de La Cienega is delivered to 98.6 acres of irrigated land, 40 acres of which is currently being farmed, and that a supplemental well has been used since 1998. La Acequia de El Guicu traditionally served 41 irrigated acres, currently irrigates approximately 25 acres, and uses a supplemental well (Santa Fe County, 2015). La Acequia de El Molino (also known as La Acequia de La Capilla) is used to irrigate approximately 15 acres. The LCLC community plan does not estimate irrigation water demands.

As shown on Tables 2 and 3, total permitted irrigation diversions in the LCLC planning area are 482.17 ac-ft/yr. This includes 350.34 ac-ft/yr in surface declarations and 131.83 ac-ft/yr in permitted groundwater diversions.

5.4 Livestock Water Demand

Permitted diversion volumes for livestock wells in the LCLC planning area are low; permitted diversions total 57 ac-ft/yr for 72-12-1 Domestic and livestock watering wells, 15 ac-ft/yr for 72-12-1 livestock watering wells, and 9 ac-ft/yr for Non 72-12-1 Domestic and livestock watering wells (Table 2). Two of the use types include domestic demand, so the total water demand for livestock use is an overestimate.

5.5 Total Estimated Groundwater Demand

The permitted groundwater diversion volumes for each sector and their magnitudes relative to each other are shown on Figure 8. Table 6 presents a range for estimated total groundwater demand in the LCLC planning area assuming that the community water system, irrigation, and livestock demands are equal to the permitted diversions for these sectors (likely an overestimate of actual water demand). As discussed in Section 5.1, there is a range of potential volumes for current domestic water demand (Table 5). Total estimated groundwater demand in the LCLC planning area ranges from approximately 550 to 1,300 ac-ft/yr.

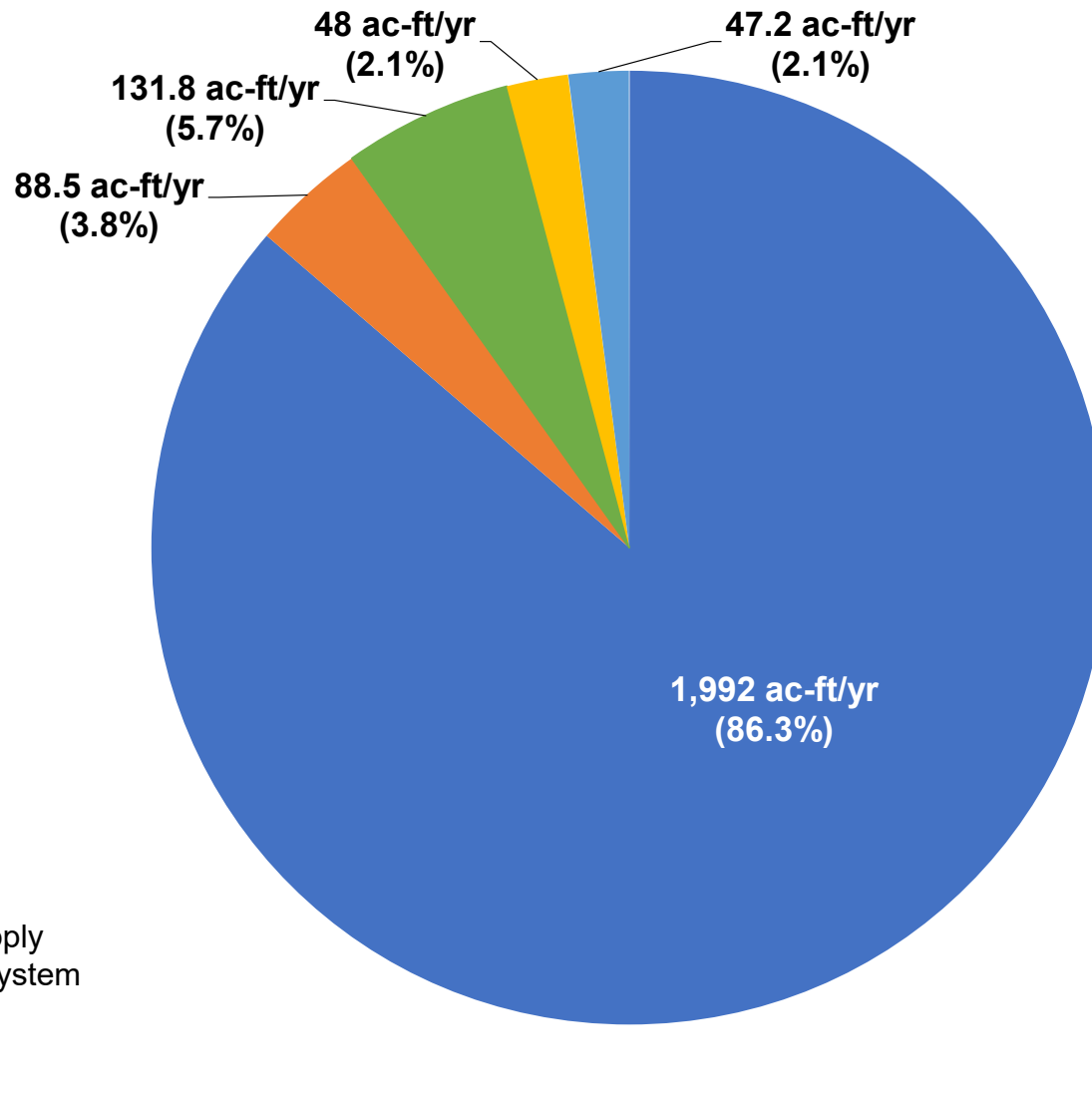
5.6 Groundwater Demand Projections

Future groundwater demand has been projected (Table 7). As for the estimation of current water demand, the community water system, irrigation, and livestock water demands are assumed to be equal to the permitted diversions (likely an overestimate of actual water demand). Domestic water demand would generally be projected using per capita water demand multiplied by population growth estimates. However, because per capita water use is not known, a range of potential domestic water demand volumes have been projected from a range of estimated current domestic water demand volumes (Table 5).

Assuming that current domestic water demand is 250, 500, or 750 ac-ft/yr, and that the LCLC planning area domestic water demands increase by 5, 10, or 15 percent per decade (population growth in the LCLC planning area was more than 8 percent between 2010 and 2020), projected 2060 domestic water demand in the LCLC planning area ranges from approximately 300 ac-ft/yr, projecting from a 2020 demand of 250 ac-ft/yr and assuming growth of 5 percent per decade, to 1,300 ac-ft/yr, projecting from a 2020 demand of 750 ac-ft/yr and assuming growth of 15 percent per decade (Figure 9). Adding in the permitted groundwater diversion volumes for the other sectors (a total of 315.5 ac-ft/yr) yields total projected groundwater demand of approximately 600 to 1,600 ac-ft/yr for the LCLC planning area.

6. Project Public Involvement

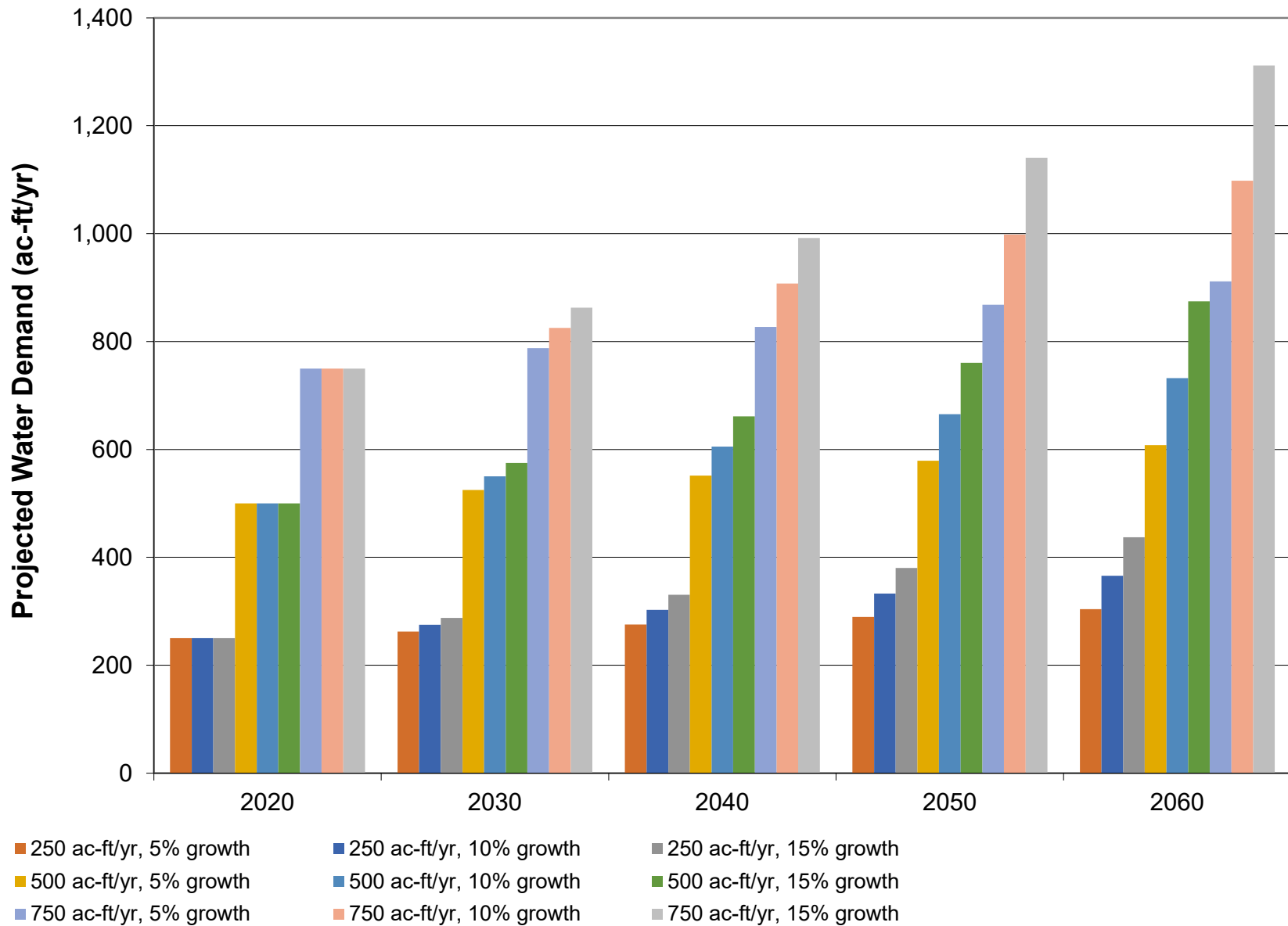
DBS&A discussed the current project's outreach methods and media platforms with County staff, and one project open house was included in the project scope. The purpose of the project open house was to introduce the project and project team, outline the project's objectives, initiate community member involvement in the project, and ask for input on the best methods



See Table 6 for explanation of what is included in each category.

LA CIENEGA AND LA CIENEGUILLA DOMESTIC WELL PROGRAM
**Permitted Groundwater Diversions in the
LCLC Planning Area**

Figure 8



LA CIENEGA AND LA CIENEGUILLA DOMESTIC WELL PROGRAM
Estimated Current and Range in Potential Future
Domestic Groundwater Demand in the LCLC Planning Area

Figure 9

for obtaining water use data. The County also set up a project-specific website to post the open house materials and recording, update participants on the project progress, and announce future project events.

6.1 Open House Announcement

As discussed in Section 4.1, current parcel data were obtained and were clipped to include those parcels located partially or entirely within the LCLC planning area. A project open house announcement was developed (Appendix D), and was posted to the Santa Fe County website on August 23, 2022. This announcement was mailed to the owners of all land parcels located in the LCLC planning area (1,458 mailings) on August 24, 2022. The announcement was also e-mailed to the Water Policy Advisory Committee (WPAC) members by County staff. Based on public comment, the open house announcement was translated into Spanish, and the Spanish version was added to the Santa Fe County website posting. With the focus of the project on domestic wells and domestic water use within the LCLC planning area, the community water systems and acequias were not contacted separately in advance of the open house; however, as landowners in the LCLC planning area, they would have received the project open house announcement in the mail.

6.2 Project Open House

The project open house event was held at the La Cienega Community Center on September 14, 2022; approximately 60 people attended. County staff recorded the event. There was an open house sign-in sheet that was used to develop an e-mail list for updating participants on the project progress and announcing future project events.

The event was opened with a welcome, and the project consultant team (DBS&A and NMBGMR) and County staff in attendance were introduced. Amy Ewing (DBS&A) provided a project overview. Jacqueline Beam (Santa Fe County Sustainability Manager) provided the project's context, and indicated that the project's goal is for the County to work together with planning area residents on the shared concern of limited groundwater supply and a growing community. Jacqueline Beam outlined the goals of the project and open house event, and offered Spanish language translation during the open house.

Posters were displayed on the walls showing the LCLC planning area, geology, parcel outlines and locations of permitted wells, and current extent of the County water utility (water lines and parcels served). Stacy Timmons and Ethan Mamer (NMBGMR) gave a hydrogeologic overview

for the project area, and a well survey was provided as a handout for participants to fill out and return (Appendix E). The remainder of the open house was spent answering participant questions about the project and discussing other water resource concerns and the project's next steps. Public input was solicited from the open house attendees to inform and help define the project's future public outreach methods.

Posters listing six key water resource issues were also displayed at the open house, and each participant was given three stickers to use to vote for their top issues of interest. "Other" was one category, and participants were asked to list their issue of concern when voting for "Other." This category received a total of 7 votes, and the water resource issue that was indicated was retiring septic tank use and reusing treated wastewater. Table 8 shows the results of the water resources issues of interest feedback; as shown, the water resource issue with the most interest (highest priority and total votes) was domestic groundwater supply, followed by water quality and growth management.

Open house participants expressed concern over local water supplies, nearby development (e.g., car washes), the cost of connecting to the County water utility and the subsequent costs for County water utility customers, and water quality (especially due to proximity of septic systems). There was a question about why the LCLC planning area was selected as the pilot area for this project. This area was selected for the pilot project because of the community's interest, as defined by the LCLC community plan. The program may potentially be expanded to other areas throughout the County in the future.

There was a question about whether the County or City of Santa Fe have plans to complete large supply wells in the area (they do not). There was a question of whether the County's wastewater system might be expanded to serve this area (wastewater service expansion to serve this area is not currently planned). Participants said that they felt threatened by the discussion of domestic wells and water restrictions. Issues with shared domestic wells were also raised (Section 6.3). Camilla Bustamante, District 5 County Commissioner elect, suggested that a follow-up community meeting be held to continue the discussion of water issues.

A total of 15 well surveys were turned in at the project open house. Feedback received from the returned well surveys included the following:

- Desire for development to be controlled in this area
- Opposition to any new large water users in the area (e.g., water bottling, dairy operations)

- Interest in involving the New Mexico Environment Department (NMED) Drinking Water Bureau (DWB) and New Mexico Department of Health (NMDOH) in the domestic well monitoring project (for water quality monitoring)
- Concern over the long-term sustainability of the local groundwater resources; concern that there are too many people and too little water
- Concern over acequia water supply due to upstream development
- Interest in having any new development be served by the County water utility
- Suggestion that the domestic well monitoring program be funded and that the County staff the program to allow for actual monitoring (there were questions about how the County will staff this program going forward when it has not been to date)
- Support for metering water use in this area
- There was a response to “keep it up,” with a note that the well owner is open to monitoring
- Desire to protect the historical water uses in the area and to address new development
- Interest to know the potential impact of the City of Santa Fe discontinuing discharge of treated effluent to the Santa Fe River, as proposed
- Concern over the lack of water resources and the continuation of development

The project open house was recorded, and the event’s recording was posted to the County’s project-specific website (https://www.santafecountynm.gov/public_works/utilities/meter_reading), along with the posters that were displayed and the open house handouts. The project-specific website was located under utilities, as water meter readings have historically been submitted through the utilities section of the County’s website (formerly to the County hydrologist). The project-specific website went live on January 3, 2023, and the project was featured in the Santa Fe Sustainability’s January 2023 newsletter. An e-mail was sent to the project e-mail list on February 1, 2023, providing this link and an update on the project. Another e-mail will be sent once the project report has been issued. The project methods, findings, and recommendations will be presented to the BCC on March 28, 2023.

6.3 Public Feedback

DBS&A received phone calls and e-mail messages from well owners in the LCLC planning area, especially in response to the project open house announcement. Feedback that was received

included that project-specific public outreach events should be recorded, and that meeting announcements and handouts should be in English and Spanish.

Well share issues were raised, and there was a request to cover these issues and for the County to offer support at the project open house. This was outside the scope of the current project, but DBS&A provided the OSE's contact information as the best avenue for assistance, at least related to well permitting. The OSE is unlikely to get involved in the well share agreements and conditions, and wells ultimately belong to the landowners of the properties where they are located. DBS&A asked the OSE for any guidance to give landowners about navigating shared well issues (e.g., when the party they share a well with is not cooperative). The OSE said that shared wells are tricky because many of them do not have legal well share documents in place and often just run off of verbal agreements. In addition, OSE stated that well sharing disputes are outside the jurisdiction of the State Engineer and must be resolved elsewhere.

There were comments that suggested commercial water use would be a better focus than domestic use. DBS&A was also contacted about historical context and background regarding mistrust in the planning area between La Cieneguilla and La Cienega.

7. Previous and Existing Requirements

The following subsections summarize the previous and existing Santa Fe County requirements pertaining to domestic wells and water use. The 2016 SLDC supersedes the earlier requirements; however, a summary of the earlier requirements follows to show what requirements have been adopted over time, which may have affected water usage. The earlier requirements also informed the plat notes that were developed for specific properties.

7.1 1980 Land Development Code

The County's original Land Development Code was adopted by Ordinance No. 1980-6 on October 28, 1980, and took effect on January 1, 1981 (Santa Fe County, 1980). The version of the 1980 Land Development Code available online includes amendments adopted by County Ordinance Numbers 1981-2, 1984-3, 1987-1, 1987-3, 1987-7, 1988-8, 1988-9, 1989-3, and 1989-5.

The 1980 Land Development Code purpose is given as

... to implement the policies of the Santa Fe County General Plan and to combine the regulation of various aspects of land development and use of natural resources into a common system of administration and appeals, in order to simplify the application process for the public and conserve personnel resources of County government.

It states that in adopting and enforcing the code, the Board intends to exercise all relevant powers conferred on it by the laws of the State of New Mexico, including NMSA 1978 Sections 3-53-1 through 3-53-5 (Water Use and Water Facilities), as amended. These sections outline municipal authority over domestic wells and the regulation of water use, irrigation, and public acequias.

The 1980 Land Development Code includes the following relevant requirements:

- Article III Zoning Regulations, Submittals, and Reviews, Section 10 Lot Size Requirements
 - ◇ Section 10.1: "The General Plan sets forth the policy that future population growth in the County should be supported by adequate long term water availability and concentrate population growth in Urban and Metropolitan Areas and Traditional Communities," with development being generally served by one or more regional water systems or community water systems.
 - ◇ Section 10.1: Development outside of the Urban and Metropolitan Areas and Traditional Communities using 72-12-1 NMSA domestic wells "should consider estimated long term water availability and protect water resources for existing County residents having domestic wells."
 - ◇ Section 10.1: Development may be permitted if the applicant for a development permit demonstrates that they have water rights, excluding those permitted under 72-12-1 NMSA 1978 or 75-11-1 NMSA 1953, which are approved for transfer to the site of development and that those water rights are sufficient to support the proposed development.
 - ◇ Section 10.1.2 outlines water policies governing lot sizes where developments will not utilize permitted water rights, with minimum lot size calculated as follows for the various zones (with more detail provided in the Land Development Code subsections that follow).

- ▶ For the basin and basin fringe zones, minimum lot size shall be calculated based on groundwater storage, requiring a 100-year water supply without considering recharge.
- ▶ For the homestead and mountain zones, minimum lot size shall be calculated based on groundwater storage (requiring a 100-year water supply) or groundwater recharge (with recharge sufficient to provide a 100-year water supply), but not both.
- ▶ For the basin and basin fringe zones within a metropolitan area shown on Code Maps 12, 14, and 15, the County anticipates regional water systems to be eventually developed to serve this area, so the groundwater storage requirement is 40 years, without considering recharge.
- ▶ For the homestead and mountain zones within a metropolitan area, minimum lot size shall be calculated based on groundwater storage (requiring a 40-year water supply) or groundwater recharge (with recharge sufficient to provide a 40-year water supply), but not both.
- ◇ Article VII Environmental Requirements, Section 6 Water Supply
 - ▶ Section 6.6.2 states that “densities set forth in Section 10 of Article III of the Code are based on an average residential water use of 1.0 acre foot per year per dwelling unit. Residential development involving greater or lesser water use may have these densities varied accordingly. Non-residential development must establish estimates of water use.” This section goes on to outline the water budget requirement for proposed developments.
 - ▶ Section 6.6.2 includes examples of water conservation measures which may be approved as part of a development permit, including “limitation of water use and measurement of the limitation by clustering of dwelling units on a metered well, with the annual meter reading reported to the State Engineer, or hookup to a metered community water system” (Subsection 6.6.2c).
- Article II Administration, Section 4 Special Procedure for Approval of Development on Lots Which Do Not Meet Lot Size Requirements of Code.
 - ◇ Section 4.3 Inheritance and Family Transfer
 - ▶ Section 4.3.4a Density: Lots may be created by inheritance or family transfer that do not meet the lot size requirements of the code provided that no lot shall be smaller than one half of the standard minimum lot size allowed in the particular location or

hydrologic zone, and no lot shall be smaller than $\frac{3}{4}$ acre except as provided in Article III, Sections 10.3.3 and 10.3.4 for lots using both an approved community water and sewer system, with these requirements applying to the parcels retained and transferred.

- ▶ Section 4.3.4b Water Supply: Article VII Environmental Requirements, Section 6 Water Supply addresses water supply restrictions that apply to inheritance and family transfer lots according to the standards of Code, as follows: water restrictive covenants, metering and allocations for the particular hydrologic zone; authorized extension of an existing community water system or the regional water system; or creation of a new community or cluster well water system.

7.2 1996 La Cienega Watershed Conditions

A copy of the 1996 La Cienega Watershed Conditions was obtained, and is provided in Appendix F. The La Cienega Watershed Conditions include the following:

1. Require lot owners to connect to the County water utility when service is available within 200 feet of the property line of land being divided.
2. Encourage shared wells to minimize expenses related to interim water supply.
3. Require that distribution systems be designed and constructed to meet the County's minimum fire flow requirements, when line extensions are being made to connect lots to the County water utility, exclusive of reservoir capacity.
4. Require that lot owners disconnect from any 72-12-1 NMSA domestic wells at the time that connection is made to the County water utility, discontinuing their use except under emergency circumstances.
5. Require a 15-foot utility easement along all property lines for the installation of County water utility infrastructure.
6. Require that wells be installed 50 feet into the Tesuque Formation, and that they include a seal to prevent the mixing of groundwater between the Tesuque and Ancha Formations.

The LCLC community plan (Santa Fe County, 2015) says that all property owners with wells who have requested building or development permits with Santa Fe County since 1996 are required to install water meters on new wells, to record their meter readings on a monthly basis, and turn them in to the County hydrologist annually. This metering requirement was not substantiated, and does not originate from the 1996 La Cienega Watershed Conditions (Appendix F).

7.3 Santa Fe County Ordinance 2002-9

Santa Fe County Ordinance No. 2002-9 amended the Santa Fe County Land Development Code (Ordinance No. 1996-10) Article XIV, Traditional and Contemporary Community Zoning Districts, to add a new section for the La Cienega and La Cieneguilla Traditional Community Planning Area and La Cienega Traditional Community Zoning District. This ordinance was filed on June 27, 2002, and codified many of the water resources strategies identified in the 2001 LCLC community plan, including the La Cienega Watershed Conditions (Santa Fe County, 2015).

This ordinance imposed residential water use restrictions, stating that all new residential land division and subdivisions using groundwater from a domestic well shall limit water consumption to 0.25 ac-ft/yr dwelling unit for domestic consumption (Santa Fe County, 2002). This included all indoor and outdoor household water use, but did not apply to agricultural or private water rights. The ordinance states that applicants for new residential development using domestic wells for water supply could request up to an additional 0.50 ac-ft/yr, for a total demand of 0.75 ac-ft/yr per dwelling unit; however, requests for additional water supply were required to be accompanied by a water budget and proof of a 100-year water supply (Santa Fe County, 2002).

Per Ordinance No. 2002-9, new lots created as part of residential land divisions and subdivisions were required to connect to the County water utility when the water system was extended to within 200 feet of the property line, unless the lot was already connected to a community water system that had the necessary capacity and water taps available to supply it (Santa Fe County, 2002). The ordinance indicated that property zoned commercial at the time of the ordinance's adoption would be permitted; however, no new commercial zoning would be allowed within the La Cienega and La Cieneguilla Traditional Community Planning Area and La Cienega Traditional Community Zoning District (Santa Fe County, 2002). If connection to the County water utility was not possible, water demand was to be limited to 0.35 ac-ft/yr per acre (Santa Fe County, 2002). All new commercial establishments or expansions were required to submit a water resources plan at the time of their application. Any large outdoor recreation or landscaping areas, such as ball fields, were required to use treated effluent for irrigation rather than potable water (Santa Fe County, 2002).

The ordinance required all new wells and buildings being supplied either fully or partially by groundwater from wells located within the planning area to install meters on the wells (Santa Fe County, 2002). All new development using shared wells or community water systems was required to install meters for each dwelling unit or primary structure that is supplied by the well

(Santa Fe County, 2002). Well meter readings were required to be recorded on a monthly basis and provided to the County in an annual report (Santa Fe County, 2002).

Landowners were required to provide documentation supporting water availability and the potential impact on other nearby wells with applications for commercial development and residential subdivision master plans (Santa Fe County, 2002).

Attachment 1 of Ordinance No. 2002-9 lists six conditions that replaced the 1996 La Cienega Watershed Conditions in the area recognized as the LCLC planning area. The conditions are the same as the versions from 1996 (Section 7.2), except the following:

- Condition 3 added the Fire Department's minimum fire flow requirements to this condition.
- Condition 4 added (A) to the NMSA 1978, Section 72-12-1 requirement of this condition, making it NMSA 1978, Section 72-12-1 (A).
- Condition 5 was expanded to say that the required utility easements were for the installation, operation, maintenance, access and egress of County water utility infrastructure; required easement width was at least 15 feet along all property lines, unless shared between two adjacent properties, when a minimum of 10 feet in width on each property was required, and the easement requirement could be waived on one or more property line if it is demonstrated that adequate utility access was provided.

7.4 Santa Fe County Ordinances 2002-13 and 2004-7

Santa Fe County Ordinance 2002-13 updated indoor and outdoor water conservation requirements, and was adopted on December 10, 2002. The ordinance applied to all residential and commercial water users in Santa Fe County, but water use on land designated as farmland or ranchland by the County Assessor was exempt from this ordinance, as was water derived from rainwater catchment or reuse systems and water being used from an acequia or other agricultural irrigation system. The ordinance states that it is imperative that the County's water resources are conserved in order to allow "our children and grandchildren to live in our community." This ordinance includes a schedule for fines for violations of this ordinance, and a listing of the County personnel authorized to issue fines.

The outdoor conservation requirements included restrictions on time of day, watering methods, and plant types (no Kentucky bluegrass was permitted), and included swimming pool restrictions and requirements for repairing leaks. The indoor conservation requirements addressed new and replacement fixture requirements, and required retrofits of plumbing

fixtures by January 1, 2005, although this requirement did not apply to single-family or multi-family residential water users. The ordinance also included water waste and fugitive water provisions.

This ordinance outlined a domestic well use metering program, but says that it applied only to residents of lots where restricted water usage and water meter reporting requirements were voluntarily accepted as a condition of plat approval. This program's requirements included a final inspection field report (to show that a meter was installed) and a meter testing/replacement provision that applied every 10 years.

Ordinance 2002-13 was amended by Santa Fe County Ordinance 2004-7, which was adopted on November 9, 2004. This ordinance states that water resources in Santa Fe County are limited and are vulnerable to depletion by drought, and that the water conservation requirements outlined in Ordinance 2004-7 apply to "all residents of Santa Fe County and all businesses operating in Santa Fe County at all times of the year." The outdoor and indoor conservation, domestic well use metering program (voluntary), water waste, and fugitive water requirements track those included in Ordinance 2002-13, except that the date the indoor conservation requirements require plumbing fixture retrofits by was changed from January 1, 2005 to July 1, 2005. This requirement still did not apply to single family or multi-family residential water users. The schedule of fines was also revised, with the fine for the fourth and subsequent violations being reduced from \$400.00 to \$300.00.

7.5 2016 Sustainable Land Development Code

The Santa Fe County SLDC was adopted by Ordinance No. 2016-9 on December 13, 2016. Its purpose is "to implement and be consistent with the goals, objectives, policies, and strategies of the Sustainable Growth Management Plan (SGMP) through comprehensive, concurrent, consistent, integrated, effective, time limited and concise land development approvals." Specific items it was designed to provide include conservation of water resources, prevention of adverse climate change, and promotion of sustainability. Applicable 2016 SLDC requirements are discussed below.

- Section 7.13 Water Supply, Wastewater and Water Conservation
 - ◇ Section 7.13.1 Water Supply and Distribution
 - ▶ The water supply and distribution system required of any development is dependent on the nature of the development, the Sustainable Development Area (SDA) in which

the development is located, and the proximity of the development to public water and wastewater infrastructure.

- ◇ Section 7.13.2.4 Required Connection to the County Water Utility
 - ▶ Section 7.13.2.4 includes requirements by SDA for new residential dwellings to connect to the County water utility; however, these requirements do not apply to the LCLC planning area, where the Section 9.8 LCLC Community District Overlay requirements apply instead.
- Section 7.13.7 Self-Supplied Water Systems
 - ◇ Section 7.13.7.2 Shared Wells Systems and Individual Wells
 - ▶ A shared well system or an individual well shall provide all water needed for domestic use and fire protection.
 - ▶ A shared well system or an individual well shall be capable of providing the water requirements of the proposed development for up to 99 years respectively.
 - ▶ An applicant proposing to use a shared well system or an individual well shall perform a hydrologic/reconnaissance report that conforms to the requirements of the SLDC. Exemptions to this requirement include applicants proposing to develop a single family residential or accessory dwelling unit on a lot existing prior to the effective date of the SLDC using a domestic well as the water supply, divide land through a land division or exempt subdivision, or create a minor subdivision or no more than five lots. In these cases, the applicant is required to provide a copy of the statutory domestic well permit issued by the Office of the State Engineer.
- Section 7.13.11 Water Conservation
 - ◇ Section 7.13.11.1 General Requirements
 - ▶ All plats and non-residential development shall file signed water restrictions and covenants included in this Section with the plat or site development plan. All applications subject to water restrictions and conservation requirements shall file a declaration with the County Clerk memorializing the restrictions of this Section. These restrictions shall run with the land and any violations shall be enforceable by the County pursuant to 2016 SLDC Section 14.3.
 - ▶ Total water use shall not exceed that specified in the development order, plat note, or the SLDC.

- ▶ Except for water harvested using rainwater catchment systems and gray water, the annual water use for domestic purposes for new residential dwellings constructed on any lot created after the effective date of this Ordinance shall not exceed 0.25 ac-ft/yr or such lower amount as may be established in the development order approving the land division.
- ◇ Section 7.13.11.2 Outdoor Conservation: Except as otherwise provided in specific subsections, this Section is applicable to all property within the County, regardless of when the lot was created (e.g., new sod or grass seed that contains Kentucky bluegrass is not permitted. Lawns of non-native grasses shall not exceed 800 square feet and shall only be watered with harvested water or grey water).
- ◇ Section 7.13.11.3 Indoor Conservation: Except as otherwise provided in specific subsections below, this Section is applicable to all property within the County, regardless of when the lot was created (e.g., fixture and appliance requirements when replaced).
- ◇ Section 7.13.11.5 Domestic Well Use Metering Program
 - ▶ All development using a well shall participate in the well use metering program.
 - ▶ Santa Fe County-approved meters are required to be installed on wells for any development subject to the SLDC. The meter shall be read by the property owner annually and meter readings shall be provided to the Administrator no later than April 30 of the same calendar year. Submissions shall include name and address of well owner, location of well, OSE well permit number, meter reading, date of meter reading, number of residences served by the well, make and model of meter and photograph of the meter. If a property is required to submit meter readings to the OSE, these readings may be sent to the Administrator in lieu of the above requirement.
 - ▶ All properties that are required to report water meter readings as a condition of plat approval shall have the name and address of the property owner entered into the database when the building permit is issued.
 - ▶ All properties that are required to have water meters shall also be required to test their water meter for reading accuracy every 10 years and replace if necessary.
 - ▶ Failure to submit the meter reading will result in the same penalties as outlined in 2016 SLDC Section 14.4.

- ▶ When water is used in excess of the amount allocated to the property, the first year a letter with educational/informational materials on how to reduce water use will be sent to the water user and they will be required to submit water meter readings every six months to track their progress. All subsequent water usage violations will result in the same penalties as outlined in 2016 SLDC Section 14.4.
- ◇ Section 7.13.12 County Permit Required to Drill New Domestic Well Within County Utility Service Area
 - ▶ A County domestic well permit is required in order to drill a new domestic well within the service area of the County water utility after the effective date of this Ordinance. A County permit is not required if the well owner will be replacing, supplementing, or deepening an existing domestic well.
 - ▶ The County may not issue a permit to drill a new domestic well if connection to the County water utility is required under 2016 SLDC Section 7.13 and applicable law.
- ◇ Section 9.8 LCLC Community District Overlay - The 2016 SLDC includes a La Cienega and La Cieneguilla Community District Overlay that is intended to implement the land use goals, objectives, policies, and strategies of the LCLC community plan (2015), and the SGMP. The requirements of the 2016 SLDC's Section 7 apply to the LCLC planning area, with the following exceptions (where the requirements of Section 9.8 apply instead).
 - ▶ Section 9.8.2.1.1 Residential Connection to County Utility Water System
 - All new lots created as part of residential land divisions and subdivisions shall be required to connect to the County water utility when the system is extended to within 200 feet of the property line of a lot, unless that lot has previously connected to a community water system, provided that adequate capacity exists in the system and that water taps are available. This requirement has a number of conditions:
 - i. If the water system is already in place and capable of providing service or if the County can provide an estimated time of completion of six months or less, connection to the system will be required immediately upon the time of service capability within the system.
 - ii. If the County cannot provide an estimated time for waterline completion and capacity for service of six months or less, the new land division will be granted a 2-year grace period from the time the water line is actually installed

and taps are available before the agreement to connect to the system will be effective.

- iii. If connection to a county or community water system is not possible at the time of land division for new residential development of two or more lots of 2.5 acres or less, all lots will be required to use shared wells where new lots are adjoining, providing adequate water is available for both lots. The requirement to connect to the County or community water system will still be in effect and the property owners will be granted a 2-year grace period from the time the water line is actually installed and has adequate capacity, before the connection to the system will be required.
 - In all cases, the requirement for connection shall be duly noted on the survey plat prior to final approval.
- ▶ Section 9.8.2.1.2 Non-Residential Connection to County Utility Water System
- All new non-residential development shall be required to connect to the County water utility when said system is extended to within 200 feet of the property line, unless that lot has previously connected to a community water system, provided that adequate capacity exists in the system and that water taps are available. If connection to the County water utility is not possible, the development must limit water consumption to 0.35 acre-feet per year. This requirement also includes conditions i and ii discussed under the Section 9.8.2.1.1 Residential Connection requirements above.

The 2016 SLDC includes sections addressing water waste, fugitive water, and water harvesting (2016 SLDC Sections 7.13.11.6 and 7.13.11.7) that have not been summarized here.

7.6 Summary of Existing Requirements

Plat notes and the SLDC both govern new development on the lots with well restrictions under the La Cienega Watershed Conditions. If the plat notes are stricter than the SLDC or require a connection to the County water utility sooner than the SLDC, and the notes have never been vacated by the BCC, the plat notes control the requirements for a specific property. If the SLDC is stricter or requires a connection to County water utility sooner than the plat notes, then the SLDC will control the requirements for a specific property. Some lots may be subject to restrictive covenants that are stricter than the SLDC; however, the County does not enforce restrictive covenants. Development of lots with restrictive covenants is governed by the SLDC.

Per the 2016 SLDC adopted on December 13, 2016:

- The Section 7.13.2.4 requirements for new residential dwellings to connect to the County water utility by SDA do not apply to the LCLC planning area, in favor of the Section 9.8 LCLC Community District Overlay requirements.
- A shared well system or an individual well shall be capable of providing the water requirements of the proposed development for up to 99 years (2016 SLDC Section 7.13.7.2).
- All plats and non-residential development shall file signed water restrictions and covenants with the plat or site development plan. Total water use shall not exceed that specified in the development order, plat note, or the SLDC (2016 SLDC Section 7.13.11.1).
- The annual water use for domestic purposes for new residential dwellings constructed on any lot created after the effective date of this Ordinance shall not exceed 0.25 ac-ft/yr or such lower amount as may be established in the development order approving the land division (2016 SLDC Section 7.13.11.1).
- The Outdoor Conservation and Indoor Conservation sections are applicable to all property within the County, regardless of when the lot was created (2016 Sections 7.13.11.2 and 7.13.11.3).
- All development using a well shall participate in the well use metering program. Santa Fe County-approved meters are required to be installed on wells for any development subject to the SLDC. The meter shall be read by the property owner and meter readings shall be provided annually (2016 SLDC Section 7.13.11.5).
- All properties that are required to report water meter readings as a condition of plat approval shall have the name and address of the property owner entered into the database when the building permit is issued (2016 SLDC Section 7.13.11.5).
- All properties that are required to have water meters shall also be required to test their water meter for reading accuracy every ten years and replace it if necessary (2016 SLDC Section 7.13.11.5).
- A County domestic well permit is required in order to drill a new domestic well within the service area of the County water utility after the effective date of this Ordinance. A County permit is not required if the well owner will be replacing, supplementing, or deepening an existing domestic well (2016 SLDC Section 7.13.12).

- In the LCLC Community District Overlay area, all new lots created as part of residential land divisions and subdivisions shall be required to connect to the County water utility when the system is extended to within 200 feet of the property line of a lot, unless that lot has previously connected to a community water system, provided that adequate capacity exists in the system and that water taps are available (2016 SLDC Section 9.8.2.1.1).
- In the LCLC Community District Overlay area, all new non-residential development shall be required to connect to the County water utility when the system is extended to within 200 feet of the property line, unless that lot has previously connected to a community water system, provided that adequate capacity exists in the system and that water taps are available (2016 SLDC Section 9.8.2.1.2).

7.7 Review of Example Plats and Covenants

DBS&A reviewed 141 plat documents that were provided electronically; this subset of electronic files had been saved to the County computer network. These plats recorded lot splits, and the date range covered by these documents was August 4, 1994 to December 27, 2005. The La Cienega Watershed Conditions were printed on all but 4 of these documents, and all but 11 of the plats reference covenants that restrict water well withdrawals. The references give the book, pages, and document number for where the covenants were recorded, and do not provide the actual covenants that restrict water well withdrawals.

DBS&A met with County staff to look through a box of hardcopy documents from the previous domestic well monitoring program's activities. The box included copies of many plats. These were not reviewed, as they would include references to where applicable covenants were recorded, but not actual water well withdrawal limitations. It was not clear why these plats had been copied and kept. Other documents that were included in the box and were reviewed are discussed below and in Section 8. This includes examples of actual covenants and water restrictions dated January 2007, July 2004, March 2010, November 2010, and September 2018.

An amended declaration of covenants and water restrictions for 20 lots totaling over 450 acres, recorded on January 3, 2007, was reviewed. The covenants cite requirements of the Santa Fe County Land Development Code and Ordinance 2002-13, and they state that the provisions shall run and bind with the land (applying to the owners, heirs, successors, etc.). The water use restrictions that are listed on this document include the following:

- Maximum 0.5 ac-ft/yr for each lot *as required by the SLDC* (*italicized text per the covenant document*; this volume limitation does not match the SLDC)

- Water conserving appliances and fixtures as outlined in Ordinance 2002-13 must be used when installing/replacing appliances/fixtures. The covenants also list maximum water use for toilets, urinals, and faucets.
- Require insulation of hot water pipes
- Require evaporative cooler recirculation of bleed-off water
- Limit the number of dish and clothes washing machines that are allowed, and the water use of these appliances
- States that water leaks must be fixed within 15 days of knowledge of the leak (and proof of repair is required, if requested)
 - ◇ Low water using landscaping is required; drip irrigation and mulching recommended.
 - ◇ Prohibits the planting of Kentucky bluegrass. Limits the area allowed for other grasses, and states that those areas must be watered using rainwater and/or graywater.
 - ◇ Prohibits new swimming pools, and gives specifications for small wading pools that are allowed. Requires that existing swimming pools, hot tubs, and spas be covered when not in use, and limits swimming pools to being drained once per year.
 - ◇ Requires that all wells be metered using a Santa Fe County approved totalizing meter, and that annual meter readings be recorded and submitted to the County. States that proof of meter installation is required with a Santa Fe County Development Permit application, and that failure to meter water use may be grounds for fines and denial of future land use development permits.

The covenants prohibit outdoor irrigation between 11:00 a.m. and 7:00 p.m. for May through September each year, with listed exemptions from this requirement (e.g., plants being irrigated for retail or wholesale transactions, manual watering by landscaping personnel, water from an acequia, rainwater or graywater).

The other example declaration of covenants and water restrictions that were reviewed are similar to those outlined in the January 2007 example, except for the domestic water use restriction volumes. In the July 2004 example, the limitation is 1.0 ac-ft/yr for each lot. In the March 2010 example, it is 0.25 ac-ft/yr for each lot. In the November 2010 example, the limitation is for 0.25 ac-ft/yr for each lot, and it requires water conserving appliances and fixtures “as outlined in Ordinance 2002-13.” A document including water restrictive covenants dated September 25, 2018 and with the Santa Fe County Sustainability Division identified as the author was also

reviewed. These covenants were not part of a legal document like the other examples. The document lists a domestic water use restriction of 0.25 acre-feet per year per lot “as required by the Santa Fe County Land Development Code,” and water conserving appliances and fixtures “as outlined in Ordinance 2002-13.”

In summary, DBS&A reviewed five example covenants documents that listed the domestic water use restrictions applicable to specific parcels, and the volume limitations included were as follows:

- July 2004: 1.0 ac-ft/yr for each lot
- January 2007: 0.5 ac-ft/yr for each lot
- March 2010: 0.25 ac-ft/yr for each lot
- November 2010: 0.25 ac-ft/yr for each lot
- September 2018: 0.25 ac-ft/yr for each lot

County Ordinance 2002-9 was filed on June 27, 2002 and required that domestic wells limit water consumption to 0.25 ac-ft/yr per dwelling unit for domestic consumption. Following this requirement, the July 2004 and January 2007 domestic water use limitations on the example covenants discussed above should have been 0.25 ac-ft/yr instead of 1.0 and 0.5 ac-ft/yr, respectively.

Per a legal opinion received from the County regarding existing requirements, the County does not enforce restrictive covenants, and development of lots with restrictive covenants is governed by the SLDC. The 2016 SLDC was adopted on December 13, 2016, and states that the annual water use for domestic purposes for new residential dwellings constructed on any lot created after the effective date of the SLDC shall not exceed 0.25 ac-ft/yr, or such lower amount as may be established in the development order approving the land division.

8. Existing Domestic Well Program

DBS&A obtained information about the existing domestic well monitoring program and its activities from County staff; the program’s history and the current program are discussed in this section. Much of this information came from materials in a box of hardcopy documents, as discussed in Section 7.7.

In a document dated October 2017, County staff summarized the history of the domestic well monitoring program, citing various County ordinances that required water use restrictions for specific development permit applications, and outlined options for monitoring domestic well use and complying with other water conservation related SLDC requirements. It says that between 2006 and 2009, the County increased their efforts to track and verify water use in the La Cienega area. This document says that staff was dedicated to the program during 2005 to 2011, and the land use department sent every permit with water use restrictions to this staff person. The Water Meter Tracks database was created, and domestic well meter reading data were solicited from County residents. Postcards were sent to residents soliciting domestic well meter readings; however, half of the notices that were sent were returned to sender. Of the total number of postcards that were sent, approximately 10 percent reported water use; however, approximately 60 percent of the reported readings could not be used because the numbers were either too high, too low, or lower than the previous reading.

The October 2017 document cites 2,044 entries in the Water Meter Tracks database, but says that some of them are for land parcels without a well. This is consistent with DBS&A's review of the Water Meter Tracks database. The Water Meter Tracks database includes worksheets for Owner, Meters, and Readings. The Owners tab includes 2,046 rows of parcel data, and a column of water restriction volumes is included. Those range between 0 and 12 ac-ft/yr, with the bulk of the parcels having water restrictions of 0 (545 records), 0.25 (752 records), or 1.0 (435) ac-ft/yr entered into this column. The Meter worksheet includes 2,044 rows of data, and columns for meter type (this appears to be the meter size), meter serial number, initial meter reading and date. The Readings tab includes 196 meter reading entries, with read dates ranging between December 28, 2004 and January 17, 2012. Of the 196 entries, 71 show zero usage; 22 entries say that there is no well located on the property and, in some cases, the entry says that the property is served by a water system.

It appears that the Water Meter Track Spreadsheet Readings entries resulted from the County's mailing to parcel owners asking for meter readings to be submitted. The Readings worksheet has 196 entries. Comparing this to the total number of parcels in the Owners spreadsheet (2,046) indicates an approximately 10 percent response rate on the requests for meter readings. A few of the Water Meter Track Spreadsheet Readings entries say that the properties are supplied by the Eldorado Area Water and Sanitation District, suggesting that these properties are not located within the LCLC planning area. For 9 entries, the spreadsheet says that there is no meter installed. There are a few well owners with multiple meter readings for different years (2, 3, and 7 years). Some of the entries say that the property is vacant land, or that there is no

one living there. The spreadsheet includes some duplicate entries, either with the same owner, read date, and volume listed (a true duplicate), or with different volumes for the same owner and date, suggesting that more than one meter was read. It would be useful to add meter numbers to any meter reading database going forward to allow for differentiation between different meters. DBS&A did not use the Water Meter Track spreadsheet information due to its age, the quality of the data, and the parcels that were included (a larger number of parcels than the LCLC planning area includes).

The October 2017 document states that a process was established between permitting review and the metering program where relevant development permit applications (those with water restrictions) were copied and provided to the metering program for review. It says that in 2010, approximately 65 permit applications were flagged and sent to the metering program, but that these permit applications were not added to the database. The staff person responsible for the database and metering program left the County around 2010. Assuming that 2010 was an average year, the document estimates that approximately 500 additional properties would have had water restrictions added between 2010 and 2017, when this document was prepared.

A County domestic well meter program status report memorandum was issued on February 16, 2012 outlining the program's background, current status, and constraints. In April 2011, the domestic well monitoring project was assigned to the Public Works Department, and in 2012, the County's water conservation specialist position was moved into the Energy Efficiency program and responsibilities were transferred to staff in that department. The program status report memorandum says that County Ordinance 2002-13 established a program that required reporting of domestic well water usage, and reproduces part of that ordinance. This includes the requirement that all properties required to report water meter readings as a condition of plat approval will be entered into a database when the building permit is issued, and that water meter installation is required in order to receive final inspection approval.

DBS&A and County staff spoke to Karen Torres, former Santa Fe County hydrologist, about work she did that related to the LCLC planning area. Karen Torres left the County sometime between 2014 and 2016 (Torres, 2022). Karen Torres said that working together with staff from the land use department, electronic plats and deeds were pulled and reviewed for the La Cienega area, and these data were used to identify which land parcels were required to connect to the County water utility. GIS coverage was made to reflect the findings. The GIS data show 385 parcels as being required to connect to County water as of July 2012. Parcel groundwater diversion limitations were not evaluated as part of this analysis (Torres, 2022). Karen Torres said that at

the time of this analysis, the County was focused on identifying which water users could be connected to the County water utility (Torres, 2022).

The box of hardcopy domestic well monitoring program documents includes a letter from Carl Dickens, President of the La Cienega Valley Association, dated June 15, 2017. The letter references the adoption of Ordinance 2002-9 and the lack of enforcement, specifically the water use and metering (Section 6.15) and water meter recording and auditing (Section 6.15.2) requirements. It states that Ordinance 2002-9 required all new wells (in the LCLC planning area) that supply groundwater for partial or total water supply to have water meters installed. The letter says that the ordinance required monthly meter readings, and for these readings to be submitted to the County hydrologist on an annual basis. The letter expresses concern that the ordinance requirements are not being complied with. It references the declining water table, drying up springs, and population growth in the area. The letter formally requests that the County enforce Ordinance 2002-9 by reading all water meters as provided in Section 6.15.2, requiring meters be installed on wells for all new developments that have been built since the ordinance was adopted, and that meter readings be submitted to the County. The 2016 SLDC adopted on December 13, 2016 supersedes the previous requirements (e.g., Ordinance 2002-9), so it is the 2016 SLDC requirements that apply; however, the SLDC includes well metering, meter reading, and pumping limitations for new development.

The domestic well monitoring and meter reading reporting program moved to the Sustainability Division in 2017, when Claudia Borchert became the Sustainability Manager. She was formerly the Utilities Division Director, and had been assigned as the project lead because of her background as a hydrologist (the County did not have another full-time hydrologist at that time). In 2017, approximately 6 boxes of paper files were reviewed by staff, and the well reporting records from 2012 to 2017 were entered into the database. The County received two public inquiries regarding the program; as of the date of the October 2017 document, it says that the County was receiving about 6 to 10 water use reports annually.

The October 2017 document cites Section 7.13.11 of the SLDC, and states that the SLDC expanded the definition from 0.25 ac-ft/yr per property to 0.25 ac-ft/yr per dwelling unit. Section 7.13.11.5 (the Domestic Well Use Metering Program) is attached to the memorandum, and states that while the SLDC included water conservation requirements (Section 7.13.11) and identified enforcement penalties (Section 14.4), there is no process for following up post-construction to see whether the requirements have been followed. This document questions whether the program includes any internal recording, verification process, or County follow-up.

County staff developed a proposal to monitor domestic well use restrictions, manage utility water use restrictions, and comply with other water conservation-oriented ordinance requirements in October 2017. This proposal outlines the County's desired outcomes, which include decreasing water use in Santa Fe County, continuing policies that promote water conservation, reducing impacts to sensitive aquifers in the County, enforcing the land use code with requirements dating back to the 1980s, and providing more certainty for water resource management and planning. This proposal includes four parts:

1. Pilot groundwater well monitoring in focused groundwater areas (specifically 6 townships), education, outreach, and training, collection of data, and outlining next steps.
2. Require radio-read meters where meters are required going forward, allowing meter readings to be collected remotely.
3. Enforce water use restrictions for County utility customers.
4. Education and enforcement, creating a new FTE position.

In an e-mail dated April 19, 2018 discussing the County's domestic well metering program, the Sustainability Division's proposed La Cienega-La Cieneguilla pilot project is mentioned. The e-mail says that the pilot project would be used to develop an understanding of how closely reported water use tracks with the allocations, and that the pilot program findings would be used to inform and possibly modify County-wide regulations. The e-mail mentions that a request for proposals was under development, and requested feedback on it from other County staff. The e-mail includes text on the task of developing a web-based reporting portal where parcel owners could set up a profile and report water use.

In 2018, a summer intern was dedicated to work on the domestic well monitoring project. The summer intern spent 8 weeks working on the project and, as part of this effort, a new meter reading reporting form was developed and 2018 well reporting records were entered into the database. This task included obtaining 2018 data from the County Assessor, and removing vacant land, public lands, and mobile homes from the database, leaving 1,121 parcels for review. The 2018 analysis found that 290 parcels had water restriction information via Clerk Track and 13 showed no water restrictions. A total of 604 properties had book and page citations, but the information was not available through Clerk Track. A total of 226 properties did not have any plat or deed record information. Meetings were held with other departments as part of this effort, but there was no follow-up after the 8-week period of work.

The box of hardcopy domestic well monitoring program documents includes a Santa Fe County Sustainability handout dated September 25, 2018 (example Water Restrictive Covenants [Section 7.7] are also part of this document) that presents information about totalizing meters (e.g., how to read a water meter, water meter accuracy decreases with age, the County requires meters to be calibrated every 10 years, how to calculate your water use). The document gives an example of the text that has been included on plats for over 25 years, directing the reader to the book and page for water use restrictions specific to the lot.

In 2019, County materials indicate that the 2019 well reporting records were entered into the database, and that domestic well development permits were requested from Growth Management but were not received. Part-time staffing was available for the program at this time. In 2020, County materials indicate that the 2020 well reporting records were entered into the database, and a work plan for domestic well monitoring was prepared.

The County's previous and existing requirements pertaining to domestic wells and their monitoring are discussed in Section 7. All new wells and buildings using groundwater drawn from wells located in the LCLC planning area must install a County-approved water meter on their wells and, where meters are required, meter readings must be collected on a monthly basis and submitted annually to the County hydrologist. The County has an existing Domestic Well Report Form (Appendix G); however, very few well owners submit this information. As shown on Table 4, County staff receive very few meter reading reports from well owners each year. As discussed in Section 5.1, the County provided all of the domestic well meter reading reports that they have, and none of these are for wells located within the LCLC planning area. All properties that are required to have water meters are also required to test their water meter for reading accuracy every 10 years and replace it if necessary. This requirement is not enforced. All properties that are required to report water meter readings as a condition of plat approval are to have the name and address of the property owner entered into the database when the building permit is issued; however, this is not done.

The available water level data are discussed in Section 2 and Appendix A. Current water level monitoring is conducted annually by the NMBGMR monitoring 10 locations in the LCLC planning area.

9. Current Growth Management Process

The current Growth Management process involves first verifying that the applicant is allowed to subdivide the subject property (Quintana, K., 2023). Growth Management staff also verify water supply for the proposed development by requiring that the applicant has a valid well permit from OSE (Quintana, K., 2023). The OSE permit indicates whether the permit is for an individual or shared domestic well (Quintana, K., 2023).

Each development permit application is assigned a code for the applicable development permit type (Quintana, K., 2023). These development permit types are discussed further in Section 10. Development permit applications are routed to other departments for review, including the County Fire Department and Public Works Department (roads), as required; there is no coordination with the water and wastewater utilities unless connection to the County water utility is proposed or required (Quintana, K., 2023). In the case of large subdivisions, Growth Management also coordinates with NMED (Quintana, K., 2023).

The County has a Technical Advisory Committee (TAC) made up of members from many departments, including the water and wastewater utilities. The 2016 SLDC Section 4.4.3 requires a pre-application meeting with the County prior to submitting a non-residential or multi-family permit application, in order to allow the County to assess compliance with the SLDC. Residential and family transfer applications do not go before the TAC (Quintana, K., 2023).

Growth Management attach the applicable water withdrawal limitations to every development permit (0.25 ac-ft/yr dwelling unit), as required by the 2016 SLDC, and the plats and water restrictive covenants are filed (Quintana, K., 2023). The current water restriction and conservation covenants that are used are provided in Appendix H (Quintana, K., 2023).

The 2016 SLDC requires that all properties that are required to report water meter readings as a condition of plat approval have the name and address of the property owner entered into the database when the building permit is issued (2016 SLDC Section 7.13.11.5) (Section 7.5). This is not done; however, Growth Management does have a development permit tracking system that includes the permit number and whether the parcel is supplied by a domestic well or community water system (Quintana, K., 2023). A column could be added to this existing development permit tracking system for the applicable water withdrawal limitations. It would be useful to also have the required database of well owners required to submit meter readings, and for Growth Management to provide this information to the domestic well monitoring program staff on a routine basis.

Ordinance 2002-13 outlined a domestic well use metering program, which only applied to residents of lots where restricted water usage and water meter reporting requirements were voluntarily accepted as a condition of plat approval (Section 7.4). This program's requirements included a final inspection field report to show that well meters have been installed. The current development permit process does not include any type of field inspection to verify that meters have been installed on domestic wells (Quintana, K., 2023).

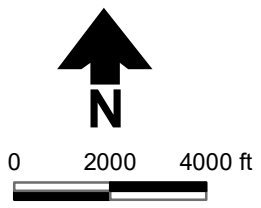
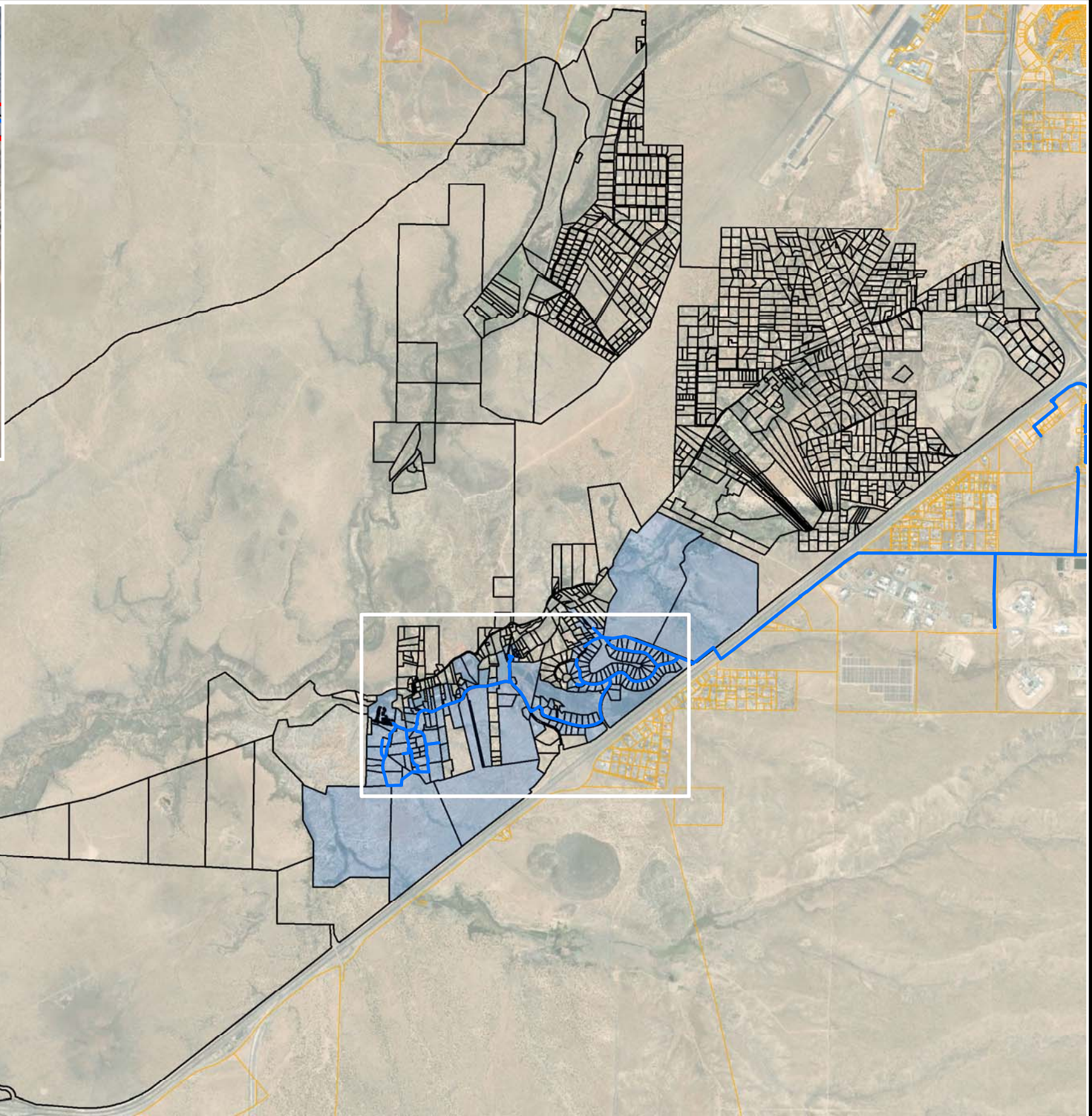
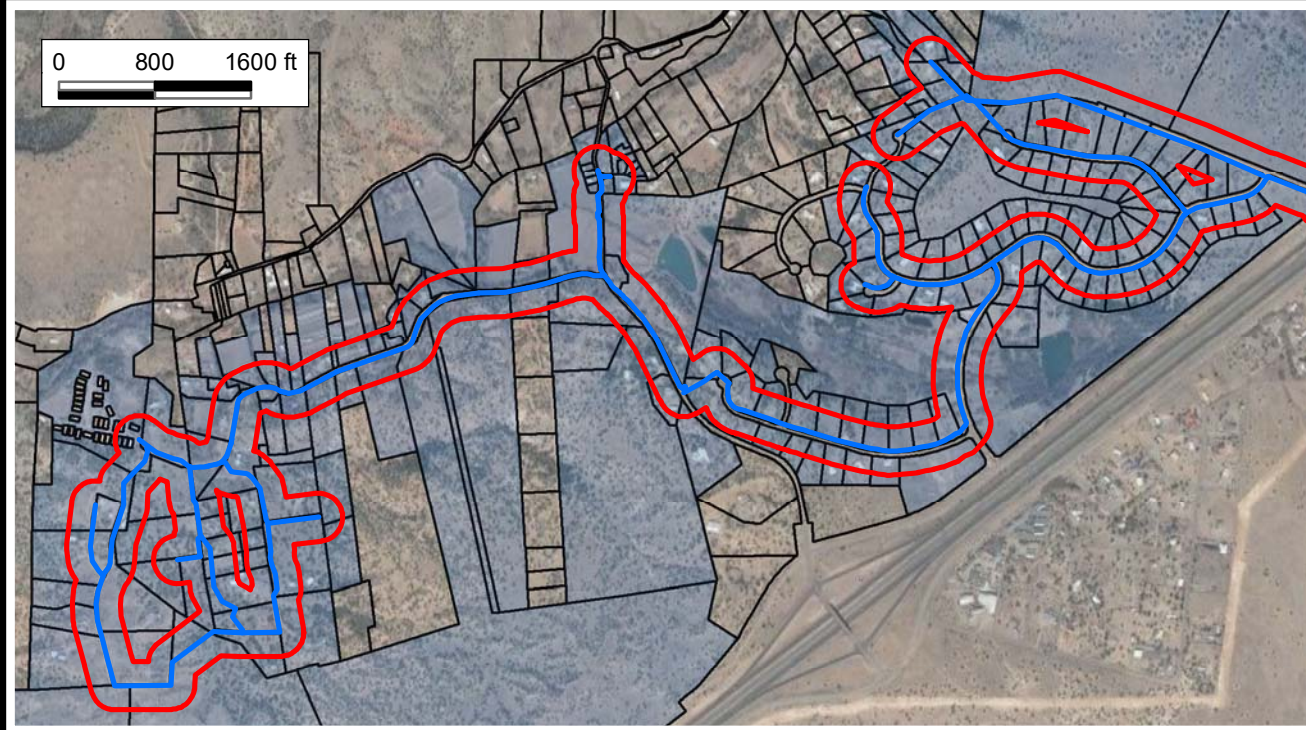
10. Estimate of Where Existing Requirements Apply

As discussed in Section 7.6, the 1996 La Cienega Watershed Conditions required lot owners to connect to the County water utility when service was available within 200 feet of the property line of land being divided. Ordinance 2002-9 required new lots created as part of residential land divisions and subdivisions to connect to the County water utility when the water system was extended to within 200 feet of the property line, unless the lot was already connected to a community water system. In the LCLC Community District Overlay area, the 2016 SLDC requires all new lots created as part of residential land divisions and subdivisions to connect to the County water utility when the system is extended to within 200 feet of the property line of a lot, unless that lot has previously connected to a community water system.






As discussed in Section 7.6, plat notes and the SLDC both govern new development on the lots with well restrictions under the La Cienega Watershed Conditions. If the plat notes are stricter than the SLDC or require a connection to the County water utility sooner than the SLDC, and the notes have never been vacated by the BCC, the plat notes control the requirements for a specific property. If the SLDC is stricter or requires a connection to County water utility sooner than the plat notes, then the SLDC will control the requirements for a specific property. Specific requirements cannot be identified by property without reviewing the applicable plat notes; however, at a minimum, the 2016 SLDC requirements apply to all new development and properties being divided since it was adopted on December 13, 2016.

Figure 10 shows the parcels that are located within 200 feet of existing County water utility water lines based on the GIS coverage for the County water utility that was last updated in October/November 2019; Appendix I lists the parcel information for these parcels. Figure 10 does not differentiate between parcels that have and have not had development permit activity since 1996, and DBS&A does not know which parcels are connected to community water systems. Development permits and permit types issued in the LCLC planning area since the La

\\SS6ABODATA\PROJECTS\DB22.1144_LA_CIENEGA_DOMESTIC_WELL\GIS\MXD\REPORT\F10_PARCELS_LOCATED_WITHIN_200_FEET_OF_A_COUNTY_WATER_LINE.MXD



Explanation

-  Santa Fe County waterline (updated October/November 2019)
-  Parcel within 200 feet of Santa Fe County waterline
-  Parcel in the LCLC planning area
-  Parcel outside the LCLC planning area
-  200 foot buffer from Santa Fe County waterline

BASE IMAGE SOURCE: MAXAR, VIVID 2019-2021 COMPOSITE



3/9/2023

DB22.1144

LA CIENEGA AND LA CIENEGUILLA DOMESTIC WELL PROGRAM
Parcels Located Within 200 feet of a County Water Line

Figure 10

Cienega Watershed Conditions were adopted in 1996, which can be used to further narrow down which parcels may be required to connect to the County water utility as a result of the plat notes for specific properties, are discussed further below.

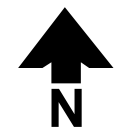
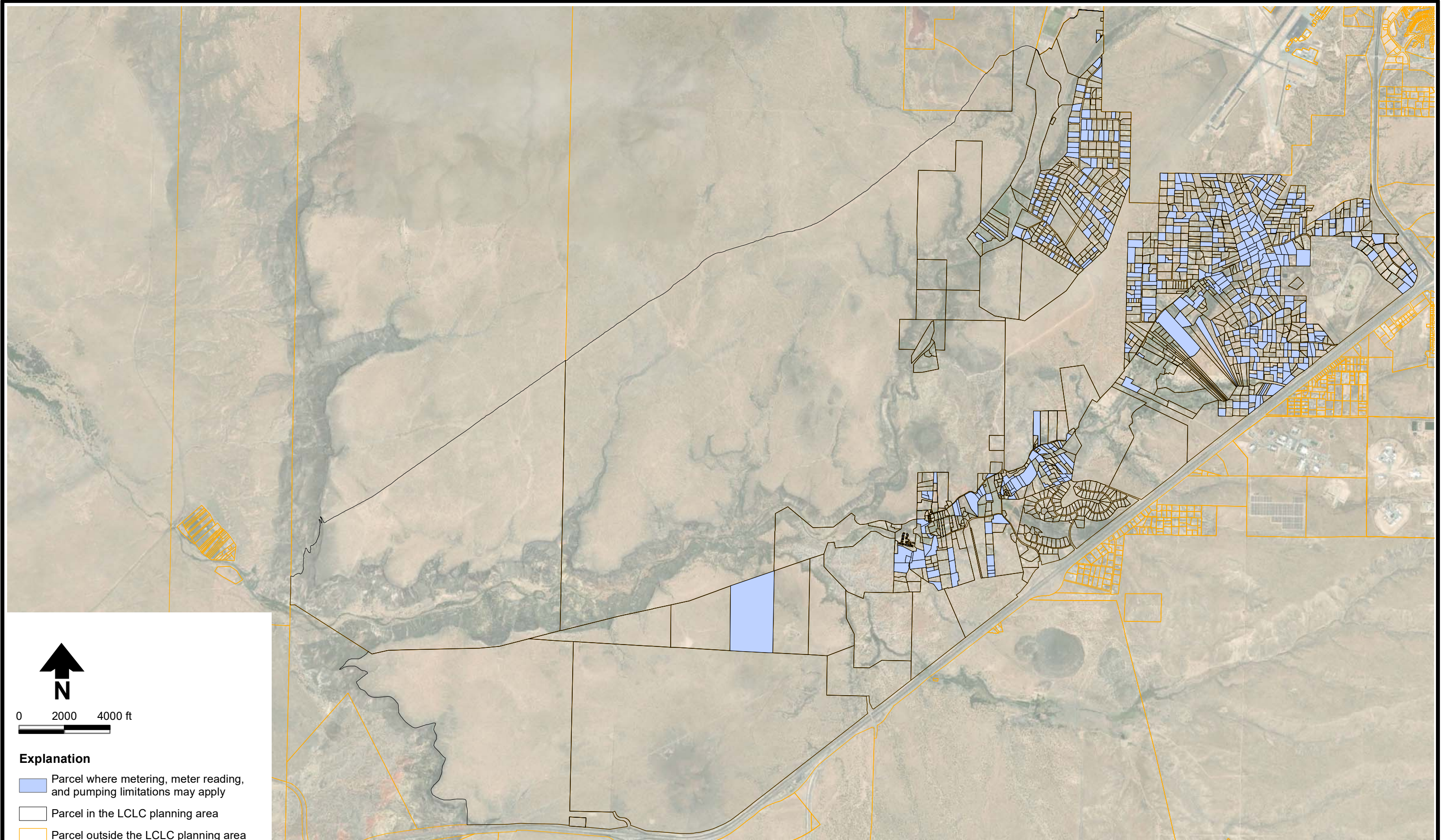
DBS&A provided a table listing all parcels in the LCLC planning area to the County (Appendix B), and County Information Technology (IT) staff ran a query for all activity for these parcels for 2002 through 2022. The results of the query are provided in Appendix J. As shown in Table 9, there were a total of 918 development permits in the LCLC planning area in 2002 through 2022, or between 26 and 71 per year. Table 10 includes the complete list of development permit types for this period (55 development permit types), and the number of permits by type in the LCLC planning area for 2002 through 2022.

Prior to adoption of the SLDC in 2016, Ordinance 2002-9 applied to all new development. The results of the IT query were used to estimate the number of parcels in the LCLC planning area that were subject to the Ordinance 2002-9 requirements, which took effect on June 27, 2002, as well as those parcels that are subject to the 2016 SLDC requirements. Ordinance 2002-9 included metering, meter reading, and pumping limitation requirements; the 2016 SLDC includes the same metering, meter reading, and pumping limitation requirements as Ordinance 2002-9. Table 10 includes a column estimating which development permit types these requirements may apply to (16 development permit types). Summing the number of development permits for these development permit types yields an estimate of 488 development permits for parcels in the LCLC planning area for 2002 through 2022 where the Ordinance 2002-9 requirements may have applied and where the 2016 SLDC requirements may apply. We recommend that the County review the development permit types, assessing whether the requirements apply to these development permit types.




The 488 identified development permits for the period of 2002 through 2022 are associated with 396 parcels (some parcels have had multiple development permits associated with them over this time frame). The parcels in the LCLC planning area that are associated with development permit activity since 2002 for the 16 development permit types where the Ordinance 2002-9 requirements may have applied and 2016 SLDC requirements may apply are shown on Figure 11.

County IT staff ran a second query for all activity for the LCLC planning area parcels for 1996 through 2021 to capture the rest of the develop permit activity where the 1996 La Cienega Watershed Condition requirements (including the requirement to connect to the County water utility) may have applied. The results of the query are provided in Appendix K. As shown in

\\SS6ABODATA\PROJECTS\DB22.1144_LA_CIENEGA_DOMESTIC_WELLS\GIS\MXD\REPORT\F11_ESTIMATION_OF_PARCELS_WHERE_METERING_METER_READING_AND_PUMPING_LIMITATIONS_MAY_APPLY.MXD



0 2000 4000 ft

- Explanation**
-  Parcel where metering, meter reading, and pumping limitations may apply
 -  Parcel in the LCLC planning area
 -  Parcel outside the LCLC planning area

BASE IMAGE SOURCE: MAXAR, VIVID 2019-2021 COMPOSITE



3/9/2023

DB22.1144

LA CIENEGA AND LA CIENEGUILLA DOMESTIC WELL PROGRAM
Estimation of Parcels Where Metering, Meter Reading, and Pumping Limitations May Apply

Figure 11

Table 11, there were a total of 420 development permits in the LCLC planning area in 1996 through 2001, or between 51 and 91 per year. Table 12 includes the complete list of development permit types for this period (28 development permit types) and the number of permits by type in the LCLC planning area for 1996 through 2001.

The 1996 La Cienega Watershed Conditions applied to land being divided, and required lot owners to connect to the County water utility when service was available within 200 feet of the property line. Table 12 includes a column estimating which development permit types the 1996 La Cienega Watershed Conditions requirements may have applied to (4 development permit types during this time frame). Summing the number of development permits for these development permit types yields an estimate of 37 development permits for parcels in the LCLC planning area for 1996 through 2001 where the 1996 La Cienega Watershed Conditions requirements may apply. These requirements may still apply, per plat notes for specific properties that have not been vacated by the BCC. Table 13 presents the development permit types where the 1996 La Cienega Watershed Conditions requirements may apply for both time periods. Adding the development permits from 2002 through 2022 where the 1996 La Cienega Watershed Conditions requirements are estimated to apply to the 1996 through 2001 subtotal gives a total of 81 development permits for 1996 through 2022.

As discussed in Section 7.7, DBS&A reviewed 141 plat documents that recorded lot splits, covering the date range of August 4, 1994 to December 27, 2005. This subset of plats is unlikely to be complete for this date range. The number of development permits identified where the 1996 La Cienega Watershed Conditions requirements may apply for the complete date range of 1996 to 2022 based on the IT queries totals 81 development permits (Table 13). Considering the number of plat documents that were reviewed that reflected lot splits for a smaller date range (141 plat documents), the number of development permits identified on Table 13 is an underestimate for the number of development permits where the La Cienega Watershed Conditions may apply.

11. Well Management Program Examples

Examples of other well management programs are discussed in the following subsections.

11.1 City of Santa Fe

The City of Santa Fe Municipal Charter and Code of Ordinances includes regulations that address the drilling of new domestic water wells. Installation of new domestic wells within the municipal boundaries is prohibited, unless a domestic well permit has been issued by the City's water division director (City of Santa Fe, 2022). Domestic well permit applications are denied if the applicant's property is located within the city's municipal boundaries, and if the nearest property boundary is located within 300 feet of an existing water distribution line (City of Santa Fe, 2022). If the nearest property boundary is located within 300 feet of an existing water distribution line, the City must provide water service within 90 days. If the City is unable to provide water service within 90 days, the domestic well permit will be approved.

If the applicant's total cost of connection to the water system (not including utility expansion charges) exceeds the cost of drilling a new domestic well, the domestic water well permit application will be approved regardless of the property's distance from the city water distribution lines. The applicant is responsible for demonstrating the costs, and after completion of a well, a sworn affidavit showing the actual well installation costs from the well driller is required. If the actual cost of drilling the well exceeds the total cost of connection to the City water system, the well must be abandoned and connection to the City system is required, with all applicable fees and costs of connection the applicant's responsibility.

For domestic well permits that are issued for wells located within the municipal boundaries, the following is required:

- Well metering to City specifications, with monthly meter readings reported to the City's water division on an annual basis.
- In certain areas, the City will require that the well be drilled a minimum of 50 feet into the Tesuque Formation, and that a seal be constructed to prevent the mixing of groundwater between the Tesuque and Ancha Formations.
- The well must be constructed to City standards and be drilled by well driller licensed in the State of New Mexico.
- The well owner is required to dedicate a 10- to 20-foot-wide easement delineated by the City's water division along the necessary property lines for the installation of future infrastructure.

- The well owner is subject to all City ordinances and penalties governing the usage of water from domestic wells.
- The well owner is subject to subsection 14-8.12F(3) SFCC 1987, requiring the well owner to demonstrate that the water demand created by the use of the structures for which the domestic water well is used will be entirely offset in accordance with the annual water budget procedures and subsection 14-8.13F prior to use of the well.
- The City may impose further conditions, as necessary.

As discussed with former City staff in 2022, the City has fewer than 100 domestic well permits, and receives very few meter readings from domestic well owners (Erdmann, 2022).

11.2 Bernalillo County

Bernalillo County has a water level monitoring program focused on the East Mountains and North Albuquerque Acres areas, where domestic wells provide the source of water supply and that are experiencing rapid water level declines (Bernalillo County, 2022a). The water level monitoring program is voluntary, and Bernalillo County is conducting this project in order to be able to advise area residents about changes in water levels (Bernalillo County, 2022a). The Bernalillo County water level measurement program is funded primarily through the County's general revenue stream, generated from property and sales tax (McGregor, 2023). Bernalillo County also has a 1/8-cent environmental gross receipts tax, which serves as a limited but additional funding source (McGregor, 2023). The environmental gross receipts tax funds may only be used for construction, acquisition, and operation and maintenance of water and wastewater facilities, and in Bernalillo County's experience, some of their water level measurement program expenses have met these criteria (McGregor, 2023).

The Bernalillo County water level measurement program was started in 2008; water levels are measured on a quarterly basis in almost 350 wells (McGregor, 2023). Most of the monitored wells are domestic wells, but a few are wells that supply County facilities (e.g., irrigation, fire house wells) (McGregor, 2023). Bernalillo County has a water level monitoring project application and participation agreement available for download on their website. This form asks for the OSE permit number, well construction details, well location, and owner's information, and outlines the conditions and requirements of the program (Bernalillo County, 2022a). The program is larger than County staff can keep up with, and the County plans to transition to an index well monitoring program in the near future (rather than continuing to monitor all of the wells), likely continuing to monitor some of the other wells on a rotating basis (McGregor, 2023).

The Bernalillo County Code of Ordinances were reviewed, specifically the Subdivision ordinance (Article IX Development Standards, Sections 74-96 and 74-97), as well as requirements for Water Wells (Article IV Environmental Health Code, Division 11). Section 74-96 of the Subdivision ordinance addresses the water availability assessment requirements for all Type 1, Type 2, and Type 4 subdivisions, and all Type 3 and Type 5 subdivisions containing six or more parcels. For subdivisions where the source of water will be individual domestic wells or shared wells permitted pursuant to §72-12-1 NMSA 1978 or new community wells, the subdivider is required to demonstrate a 70-year water supply, and to submit a geohydrologic report in accordance with the requirements outlined in the Subdivision ordinance (Bernalillo County, 2022b). These requirements include presenting hydrologic information for the area from past studies, drilling sufficient exploratory wells to characterize the aquifer, providing a calculated schedule of effects on surface water resources (e.g., acequias, springs, and streams) and other wells, and calculating the lowest practical pumping water level of the new well by one of the methods outlined in the ordinance (Bernalillo County, 2022b).

Section 74-97 of the Subdivision ordinance addresses the water availability assessment requirements for Type 3 and Type 5 subdivisions containing fewer than six parcels. If the subdivider proposes that the source of water supply will be individual domestic wells or multiple household wells pursuant to §72-12-1 NMSA 1978, the subdivider is required to submit a water availability assessment containing (1) at least one well log from an on-site well or from an existing well located within 1 mile of the property boundary completed in geologic conditions representative of the conditions within the proposed subdivision, (2) a description of the water-bearing formation including a statement of the maximum and minimum depths to water in the subdivision and the basis for these statements, and (3) a statement of the estimated yield of wells in gallons per minute based on well logs from existing nearby wells (Bernalillo County, 2022b). Where certain groundwater conditions exist, a water supply plan and geohydrologic report may also be required (Bernalillo County, 2022b).

Bernalillo County's requirements for water wells (Article IV Environmental Health Code, Division 11) apply to all wells in the unincorporated areas of Bernalillo County, and the County may order that wells be abandoned if they do not comply with the requirements (Bernalillo County, 2022b). A well permit must be obtained from the County for individual or multiple household wells (Bernalillo County, 2022b).

Bernalillo County has well construction requirements, which address well building materials, drilling equipment, site grading for stormwater, the well's concrete pad and sanitary seal, and

sealing off of any contributing zones with undesirable water quality. Water quality sampling is required for any new or modified well, and the sampling results must meet applicable water quality standards before final approval will be granted (Bernalillo County, 2022b). Parameters required for testing include total coliform bacteria, total Kjeldahl nitrogen (TKN), ammonia, nitrate, nitrite, sodium, potassium, calcium, magnesium, chlorine, bicarbonate, total dissolved solids (TDS), pH, and sulfate; additional water sampling parameters may be required based on site conditions. Water sample collection, analysis, and analytical costs are the responsibility of the owner (Bernalillo County, 2022b).

Multiple household wells may not have more than five connections, and a totalizing meter is required on all multiple-household wells (Bernalillo County, 2022b). The owner of a multiple-household well is required to submit annual microbiological sampling results to the County, and the County may require the abandonment of a well, at the owner's expense, if the annual microbiological sampling results are not submitted (Bernalillo County, 2022b). Multiple household wells and all associated water lines are required to be placed within an easement granting access to the well (Bernalillo County, 2022b).

Bernalillo County will not issue a business license, building permit, zoning permit, wastewater permit, or grant any other approval associated with any lot that necessitates the use of a well, unless the County has determined that the well meets all of the applicable requirements (Bernalillo County, 2022b). No certificate of occupancy will be issued to a structure that will be served by a well that is regulated under these requirements or the NMED unless that well has received final approval from the County or NMED (Bernalillo County, 2022b).

All existing wells on properties proposed to be subdivided or replatted must meet all applicable requirements before the subdivision or replat will be approved by Bernalillo County, and wells that cannot meet the requirements will be abandoned (Bernalillo County, 2022b). Wells that are no longer capable of producing sufficient water for the intended use or wells that do not have sufficient water quality must be abandoned unless the well is included in a water level or water quality monitor program, and wells that will be used in this type of program must obtain a monitor well permit (Bernalillo County, 2022b).

Bernalillo County may require well casing inspections of existing wells and abandonment of any well with a deteriorating casing that is not repaired within the time period ordered by the County (Bernalillo County, 2022b). If an existing well or borehole is found to be a threat to public health, safety or water quality, the owner is required to repair and/or abandon the well immediately. Issues that meet these criteria include if (1) the annular space around well casing is

open at or near the land surface, (2) there is subsidence or caving around the well casing, (3) there is significant deterioration of the well casing, (4) there is inadequate covering and drainage protection, and (5) there is contaminated water (Bernalillo County, 2022b). Wells and boreholes are required to be abandoned in accordance with the technical guidance provided by the Bernalillo County Office of Environmental Health (Bernalillo County, 2022b).

Any newly constructed or modified well must receive a final inspection and be granted final approval by Bernalillo County prior to use (Bernalillo County, 2022b). Items inspected during final inspection include (1) a copy of the well record submitted to the OSE, (2) documentation of well disinfection, (3) receipts showing materials used for grouting and construction, (4) a copy of a valid electrical permit from Bernalillo County for the well system, if required, (5) submission of the required water quality results, (6) inspection of the wellhead area, concrete pad, and other wellhead protection measures, (7) verification that setback requirements are met, and (8) compliance with any well permit conditions. Wells are subject to inspection at any time during or after construction by Bernalillo County with reasonable notice to the owner, and the County may issue a corrective action notice if any deficiencies are identified (Bernalillo County, 2022b). The County is required to maintain a file of all documents pertaining to well installation, modification, inspection, and approval.

If the County establishes that a violation of the requirements has occurred, the County will serve notice to the owner of the property where the well is located, and will order the property owner to make proper corrections within a specified timeframe (Bernalillo County, 2022b). The County may also refer the violation to the OSE, NMED, or another regulatory agency, as appropriate. Any well driller who has constructed or modified a well that is in violation of the County's requirements may have their Bernalillo County business license revoked until such time as the violation is resolved (Bernalillo County, 2022b). Any person who violates any provision of the requirements will be punished by a fine not exceeding \$300.00, imprisonment for a term not exceeding 90 days, or both, with each day the violation exists considered a separate violation.

Bernalillo County is currently in the process of updating their Subdivision ordinance (McGregor, 2023). The separate Water Well requirements will also be updated this year, to bring them in line with the updated Subdivision ordinance (McGregor, 2023).

11.3 NMBGMR Aquifer Mapping

The NMBGMR Aquifer Mapping Program conducts hydrogeologic studies of New Mexico's aquifers in cooperation with state, federal, and local water agencies and using funding from a

variety of sources; project partners are project specific (NMBGMR, 2023a). Data are collected to support the development of groundwater flow models in aquifers around the state in order to provide information about groundwater in New Mexico (NMBGMR, 2023a). Aquifer Mapping Program research areas include groundwater level monitoring, water data management and compilation, water quality characterization, groundwater/surface water interactions, groundwater movement and recharge, assessment of brackish water resources, and outreach and communication (NMBGMR, 2023a).

Using funding from the Healy Foundation, the NMBGMR Aquifer Mapping Program monitors the statewide Healy Collaborative Groundwater Monitoring Network (NMBGMR, 2023b). This network was created in 2016 to supplement the existing U.S. Geological Survey and OSE groundwater level monitoring programs, and is focused on rural and under-monitored regions (NMBGMR, 2023b). The NMBGMR and their project partners collect groundwater level data from over 140 locations on an annual basis, and makes these data available to the public to be used by small water systems, domestic well owners, and water managers to support informed decision making (NMBGMR, 2023b). The 10 wells that are currently monitored by the NMBGMR in the LCLC planning area and the surrounding region are part of the Healy Collaborative Groundwater Monitoring Network (current water level measurements for these wells are supported by funding from the Healy Foundation) (Timmons, 2023).

The NMBGMR monitors water levels in about 90 wells in the Clovis, New Mexico area once per year, compiles the data, and updates maps showing the changes in saturated thickness of the aquifer (Timmons, 2023). Working with the Ogallala Land & Water Conservancy, the NMBGMR will be monitoring a number of irrigation wells located in a paleochannel near Clovis, New Mexico over a 5-year period, with measurements to be collected starting in 2023 (Timmons, 2023). The Ogallala Land & Water Conservancy has leased the water rights in these wells, and they will not be pumped over the 5-year period (Timmons, 2023). The NMBGMR will monitor water levels once per year, and will remap the saturated thickness of the remaining aquifer following each water level event (Timmons, 2023).

11.4 Pecos Valley Artesian Conservancy District

The Pecos Valley Artesian Conservancy District (PVACD), located in Roswell, New Mexico, was created in 1932 by the district court, as authorized by the New Mexico legislature, with the authority to levy taxes within its boundaries (Balok, 2023). The PVACD was adjudicated in 1966, with a final decree in 1969, and was required to install meters on all irrigation points of diversion by January 1, 1967. The OSE District II water master reads the PVACD meters, usually once per

month, and does the water rights accounting (Balok, 2023). The PVACD installs, owns, and maintains all meters, and reimburses the OSE for the water master expenses (Balok, 2023). Meters are installed on approximately 1,600 irrigation wells (Balok, 2023).

The PVACD has 10 monitor wells and they manually measure water levels in these wells three times per month (Balok, 2023). The monitor wells were recently equipped with transducers with a cellular connection, and water level measurements will be recorded twice per day and sent once per day going forward (Balok, 2023). The program works due to the PVACD's taxing authority, which provides the funding mechanism for the program, in addition to the requirement that all wells be metered (Balok, 2023).

11.5 City of Rio Rancho

The City of Rio Rancho requires property owners to connect to the City water system at the property owner's expense if there is an existing City water distribution line located within 200 feet of the property (City of Rio Rancho, 2022). If there are no water distribution lines located within 200 feet of the property, the property owner may apply for a City domestic well permit after receiving a domestic well permit from OSE (City of Rio Rancho, 2022). The City has a City well permit application form, which indicates that a field inspection is required, and that the well meter must pass final inspection before the certificate of occupancy will be released (City of Rio Rancho, 2022).

11.6 State of Colorado

The Colorado Department of Water Resources has a groundwater monitoring program that involves the collection of water level measurements in a number of designated basins (Donegan, 2023). The programs are continuations of several monitoring programs that were inherited from the U.S. Geological Survey and Colorado State University. In most cases, the wells being monitored are irrigation wells, but some domestic wells are monitored, especially in the Denver Basin (Donegan, 2023).

The wells that are monitored are selected based on whether there are historical data available; in many cases, monitoring began in the 1960s (Donegan, 2023). The monitoring program focus is on areas with human impacts due to development pressure, potential impacts to wildlife, or water resource management (e.g., areas experiencing decreases in water levels, where recharge projects are being implemented). The number of wells that are monitored differs by basin, with the number of monitored wells often ranging between approximately 40 and 70 wells each,

although Colorado's North High Plains (Ogallala) aquifer monitoring program includes over 700 wells (Donegan, 2023). Water levels are typically measured once per year in the spring (before the start of irrigation season); however, Colorado is moving toward collection of continuous measurements (using pressure transducers) and data collection by cellular read (Donegan, 2023).

Water rights are not required for domestic wells in Colorado, and it is assumed that their pumping is offset by return flows from the associated septic systems (Donegan, 2023). Although there are some exceptions, in most cases, if a household is connected to a wastewater treatment system (rather than a septic system), they cannot have a domestic well (Donegan, 2023). Domestic well usage is limited to 15 gallons per minute in Colorado. The State requires that pump installation reports be turned in to the Colorado Department of Water Resources, and pumps with capacity exceeding 15 gallons per minute may not be installed (Donegan, 2023). Colorado also has statewide requirements for well construction, and they collect this information via well completion reports that are filed for new wells (Donegan, 2023).

Domestic well permits say that well owners are to collect and keep meter readings, turning them in to the State if asked, but the State does not ask for these records (Donegan, 2023). Separate from the Colorado Department of Water Resources groundwater level monitoring program, there is a program that evaluates meter readings for wells, but this is done to assess whether water right permit volumes are exceeded, not to track water use (Donegan, 2023). Meter readings are not collected for domestic wells. The Colorado Department of Water Resources does not monitor water quality, but some water quality monitoring is conducted by other departments (Donegan, 2023).

11.7 State of California

In response to climate-driven severe drought conditions, the California Department of Water Resources is providing tools and resources for domestic well owners to help them understand local groundwater conditions, and prepare for potential well outages and other drought impacts (California DWR, 2022). The California DWR has a Dry Well Reporting System, which notifies county officials and local water agencies when domestic well owners report water supply issues within their jurisdictions (California DWR, 2022). Together with the California State Water Resources Control Board, the California DWR has also launched a Dry Well Susceptibility Tool that may be used by domestic well owners to help forecast water supply problems in specific areas before they occur (California DWR, 2022). California groundwater condition data, including current water level data, seasonal groundwater level changes, groundwater level

trends, and information about drought conditions and available assistance are also available online (California DWR, 2022). These tools and resources have been developed and made available in order to plan ahead, track the impacts of drought, and work with local entities to identify and implement solutions (California DWR, 2022).

The groundwater level data available on the California Groundwater Live's Domestic Well dashboard originates from well completion reports filed by well drillers with the California Department of Water Resources, and users may search the posted data by county or groundwater basin (Springhorn, 2023). Groundwater monitoring efforts are more robust in some groundwater basins, especially for irrigated areas; however, the State does not have a good inventory of the number and locations of domestic wells statewide, and California does not have an active domestic well monitoring program (Springhorn, 2023). The Dry Well Susceptibility Tool uses total well depth and water level data from well completion reports to project where wells are susceptible to going dry, and the available data are used to extrapolate to other areas (Springhorn, 2023).

California defines domestic wells that use less than 2 ac-ft/yr as de minimis wells, and well owners are not required to report their water use to the State; however, the State's Sustainable Groundwater Management Act (SGMA) requires groundwater basins to take domestic wells into account, and to work with domestic well owners to manage their collective demands (Springhorn, 2023). California's SGMA was passed in 2014 (California DWR, 2023), and sets forth a statewide framework to protect groundwater resources, focusing on local groundwater management. Local agencies are required to form groundwater sustainability agencies (GSAs) in high and medium priority groundwater basins, and to develop and implement groundwater sustainability plans (GSPs).

The GSPs were reviewed for two California groundwater subbasins with high numbers of domestic wells (Sonoma Valley and Santa Rosa Plain), to see how the GSAs are approaching domestic well management in these areas. The goal of the Sonoma Valley and Santa Rosa Plain GSPs is to adaptively and sustainably manage the groundwater resource, allowing for reasonable and managed growth, by monitoring groundwater conditions, coordinating with other entities and agencies, and implementing projects and management actions that support the sustainability indicators that are identified by the plans (Sonoma Water, 2021a and Sonoma Water, 2021b). The Sonoma Valley GSP estimates that there are between 900 and 1,250 domestic wells within the groundwater subbasin (Sonoma Water, 2021a). The Santa Rosa

Plain GSP estimates that there are between 4,000 and 5,500 domestic wells within the groundwater subbasin (Sonoma Water, 2021b).

The Santa Rosa Plain GSP says that the GSP planning process included a campaign targeted to informing domestic well owners, including website posting, social media messaging, newspaper advertisements, and lawn signs, and that a survey was mailed to all domestic well owners in the subbasin, in English and Spanish, to assess their priorities regarding groundwater sustainability and to identify key issues related to groundwater resources (Sonoma Water, 2021b). Both plans state that County government has an important role in representing the unincorporated areas, in particular domestic well owners, and that rural domestic well owners should be represented and participate in the planning process, due to the large number of domestic wells and their significant groundwater use (Sonoma Water, 2021a and Sonoma Water, 2021b).

Both plans outline their proposed monitoring networks, and say that dedicated monitor wells are the preferred well type for monitoring, with the lowest preference for well type for monitoring given to any type of active supply wells (e.g., domestic, irrigation, municipal). In the event that supply wells are used for monitoring, the plans stress the importance of taking special precautions to ensure that representative measurements are collected (Sonoma Water, 2021a and 2021b).

The plans outline specific projects and management actions to be undertaken to help communities achieve groundwater sustainability, based on current and projected future groundwater conditions (Sonoma Water, 2021a and 2021b). The list of management actions identified in the Santa Rosa Plain GSP includes a potential policy option of implementing a domestic well mitigation program should stronger demand management actions need to be adopted in the future, but says that this is not considered to be needed in the near-term based on current conditions (Sonoma Water, 2021b). The only specific domestic well monitoring discussed in the Santa Rosa Plain GSP is for water quality (e.g., sampling for nitrate and total dissolved solids) in areas near existing dairies (Sonoma Water, 2021b).

In response to a comment calling for a domestic well mitigation plan, the Sonoma Valley GSP states that the major focus of the first five years of plan implementation will be to gather data to improve the understanding of potential impacts associated with groundwater conditions to sensitive beneficial users, primarily shallow domestic well users (Sonoma Water, 2021a). The plan states that the data collected will be used to inform any necessary revisions to the plan, and that for the initial implementation period, the focus will be on projects that will raise

groundwater levels, benefitting these users (e.g., water-use efficiency and alternate water source projects and aquifer storage and recovery) (Sonoma Water, 2021a).

11.8 Thornburg Foundation

The Thornburg Foundation, located in Santa Fe, invests in solutions to help solve problems; they have a number of strategic initiatives, including education, food and agriculture, good government reforms, and water. One of their goals is to develop robust water research, data, monitoring, and decision-support systems to support water resources planning and management (Thornburg Foundation, 2022).

The Thornburg Foundation has been working to identify what groundwater monitoring is being done and where more monitoring is needed within New Mexico, and is focused on areas that are not currently being monitored and that have significant irrigation demands (Timmons, 2023). The current project includes 10 priority regions, and will span a period of one year (Timmons, 2023). After the monitoring evaluations have been done, the project partners will work to identify funding to build the recommended monitoring networks (Timmons, 2023). The monitoring networks will likely include completing new monitor wells, and installing instrumentation to allow for the collection of real-time data (Chudnoff, 2022). The Santa Fe area is not included in the project's current priority area monitoring evaluation, due to the existing monitoring efforts in the area; however, the project could be expanded to evaluate additional areas in the future (Timmons, 2023).

12. Summary and Recommendations

DBS&A and the NMBGMR have worked together with the County on the first phase of domestic well monitoring program planning services for the LCLC planning area. The project objectives were as follows:

- Document the area's groundwater levels and trends (Section 2)
- Estimate current use and project future water demand (Section 5)
- Identify the existing requirements that apply to domestic wells in the LCLC planning area (Section 7)
- Hold a project open house and initiate public outreach (Section 6)
- Develop recommendations for how to improve the existing well management program

The program recommendations follow in this section.

12.1 Existing Program

The existing domestic well and water use requirements that apply to the LCLC planning area (Section 7) include the following:

- All plats and non-residential development shall file signed water restrictions and covenants with the plat or site development plan; total water use shall not exceed that specified in the development order, plat note, or the SLDC (SLDC, December 13, 2016).
- The annual water use for domestic purposes for new residential dwellings constructed on any lot created after the effective date of the 2016 SLDC shall not exceed 0.25 ac-ft/yr, or such lower amount as may be established in the development order approving the land division (SLDC, December 13, 2016)
- All development using a well shall participate in the well use metering program; Santa Fe County-approved meters are required to be installed on wells for any development subject to the SLDC; meters shall be read by the property owner and meter readings shall be provided annually (SLDC, December 13, 2016).
- All properties that are required to have water meters are also required to test their water meter for reading accuracy every 10 years and replace it if necessary (SLDC, December 13, 2016).
- All new lots created as part of residential land divisions and subdivisions, and all new non-residential development, are required to connect to the County water utility when the system is extended to within 200 feet of the property line of a lot, unless that lot has previously connected to a community water system (SLDC, December 13, 2016).

The County's existing domestic well monitoring program has been implemented intermittently as staff resources have been available. The program has been moved between different County departments, and has not had consistent staffing or support. Compliance with the existing requirements is not being tracked or enforced, and the program currently receives very few meter reading reports from well owners each year (Section 8). The County does not send out reminders asking for meter readings to be turned in and, with past mailings, there have been large numbers that were returned to sender. The County recently posted a project-specific website (Section 6), and this will be a good place to post future project updates.

12.2 Growth Management Process Recommendations

The current Growth Management development permit process (Section 9) includes verifying that the applicant has a valid well permit from OSE. For non-residential and multi-family permit applications, a pre-application meeting with the County TAC is required, and that committee includes water and wastewater utilities representation; however, residential and family transfer applications do not go before the TAC. There is typically little or no current coordination between Growth Management and the water and wastewater utilities for individual lot divisions or small-scale divisions that do not involve interconnection to utility infrastructure.

The 2016 SLDC requires that all properties required to report water meter readings as a condition of plat approval have the name and address of the property owner entered into the database when the building permit is issued (Section 7.5). It is unclear how frequently this is done. We recommend that this information be required to be entered and tracked for future development permits, and that the tracking form include the parcel's applicable water withdrawal limitation, with Growth Management providing this information to the domestic well monitoring program staff on a routine basis.

Ordinance 2002-13 outlined a domestic well use metering program, which only applied to residents of lots where restricted water usage and water meter reporting requirements were voluntarily accepted as a condition of plat approval (Section 7.4). This program's requirements included a final inspection field report to show that well meters have been installed. The current development permit process does not include any type of field inspection to verify that meters have been installed on domestic wells. We recommend that field inspection be added to each permit prior to final approval.

Growth Management staff said that they frequently have well owners say that the County cannot limit their water use, and that they believe they can withdraw groundwater up to the OSE well permit volume. We recommend that the County coordinate with OSE regarding language to be added to future well permits, stating that local restrictions apply to new domestic wells.

Better tracking of the water metering, meter reading, and pumping limitation requirements are needed going forward. This will involve coordination between Growth Management in its role of permit review and processing, along with the County office and/or staff working on the domestic well monitoring program.

12.3 New Mexico Water Task Force Recommendations

The State of New Mexico convened a water policy and infrastructure task force made up of water and natural resources experts, senior state agency staff, and stakeholders to discuss New Mexico's water management and governance challenges/opportunities and make recommendations. The task force met between June and November 2022, and issued a report in December 2022 (NM Water Task Force, 2022). The New Mexico Water Task Force broke into three work groups, focusing on (1) community drinking water, wastewater, and stormwater infrastructure capacity and finance, (2) water resources management and planning, and (3) river, aquifer, and watershed health (NM Water Task Force, 2022). The report includes recommendations made by each of the work groups, including some items to be undertaken during the 2023 legislative session and others to be implemented over the next several years (NM Water Task Force, 2022).

The problems identified by the water resources management and planning work group include the need for increased monitoring, including metering wells, and a clear understanding of the volume of groundwater in aquifers (NM Water Task Force, 2022). The water resources management and planning work group recommended that state agencies and regional/local water planning entities set clear goals for reductions in water use over the coming decades (NM Water Task Force, 2022). One of the long-term opportunities that was identified by this effort is to fund community-led initiatives to create plans for periods of severe drought, and then require and fund water-use measuring or metering to inform and implement agreements (NM Water Task Force, 2022). The goals and objectives of the County's domestic well monitoring program are in line with the New Mexico Water Task Force's findings and recommendations.

12.4 Recommended Domestic Well Monitoring Program

Based on the information that was available for review, the volume of groundwater produced from the LCLC planning area is not well constrained. As discussed in Section 5.1, DBS&A estimates that domestic well water demand in the LCLC planning area ranges between approximately 150 and 1,100 ac-ft/yr. Adding in the permitted groundwater diversion volumes for other sectors, total estimated groundwater demand ranges between approximately 550 and 1,300 ac-ft/yr (Section 5.5). Projected future domestic well water demand ranges between approximately 300 and 1,300 ac-ft/yr, and total projected groundwater demand ranges between approximately 600 and 1,600 ac-ft/yr for the LCLC planning area (Section 5.6).

DBS&A understands that the County's goals for the domestic well monitoring program are to monitor, conserve, and protect the local groundwater resource, ensuring the sustainability of the local water supply. The recommended domestic well monitoring program is outlined in the following subsections.

12.4.1 Water Level Monitoring

Water level monitoring allows well owners to track water level trends in their wells over time. Increasing depth to water measurements indicate that the resource is being mined (more water is being pumped than recharges). Water level data can provide warning before the water level in a well goes below the pump intake, allowing well owners to plan ahead should they need to lower the pump and/or replace the well. Evaluated on a larger scale, water level data provide information about the local groundwater resource, and the effects of both local and upgradient management decisions.

NMBGMR currently monitors water levels in 10 wells in and in the vicinity of the LCLC planning area on an annual basis (Section 2). We recommend that the existing water level measurement program be expanded to include a total of 50 locations, to be measured once per year, within and upgradient (northeast) of the LCLC planning area. This will allow for better assessment of trends in the groundwater elevations over time, especially as conditions are projected to become warmer and drier in the future. It is important to include monitoring of upgradient wells, as groundwater conditions in these areas affect the LCLC planning area.

We recommend monitoring wells where the NMBGMR has historical data, as long-term data are necessary to be able to evaluate trends. It would also be helpful to resume monitoring of wells where the NMBGMR has relationships with the existing well owners; however, new wells and/or well owners could be added to the program, as necessary. Wells that are candidates for the expanded monitoring network include about 12 wells in the LCLC planning area that were included in the 2015 to 2020 NMBGMR monitoring network that are no longer being monitored, more than 50 wells in the LCLC planning area where water levels have been previously measured by NMBGMR, and more than 60 wells upgradient of the LCLC planning area where water levels have been previously measured by NMBGMR. In particular, NMBGMR recommends that wells in the La Cieneguilla area be added to the monitoring network, in addition to wells located between the Santa Fe River and Cienega Creek. This region will be important to monitor when and if the City of Santa Fe's effluent discharges to the Santa Fe River are eliminated, as proposed.

Another option would be to install a monitor well network owned by the County. New wells would not have the benefit of having historical data, but long-term access for collecting water level measurements would be ensured. The number of new monitor wells that could be installed would be limited by the available funding, but new County-owned monitor wells could be installed to supplement the existing monitor well network (monitoring the new wells in addition to existing, privately owned wells).

Funding for the expansion of the water level monitoring network would need to be identified (Section 12.4.8), and we envision the water level monitoring task being coordinated by the County's domestic well monitoring program project lead. In the event that the water level measurement program is expanded to other areas outside of the LCLC planning area, the County may want to consider developing their own capacity for collecting water level measurements (if the water level monitoring program is expanded to include hundreds of wells, it may be more cost effective to have County staff support the program).

12.4.2 Domestic Well Metering and Meter Reading

DBS&A recommends that the County subject matter experts (e.g., County hydrologist or Public Works Department staff) work with domestic well owners in the LCLC planning area to implement a domestic well metering and meter reading program in order to collect the data necessary to estimate current local groundwater demand. The County provided the domestic well metering reports that they have but, as discussed in Section 5.1, these reports do not provide very much information.

We recommend that a volunteer well metering program be implemented during the next phase of the domestic well monitoring program, with well owners installing new meters for the participating wells. Well owner participation in the program would likely be higher if some or part of the cost of the meter purchase and installation could be covered. We recommend that the County research possible resources to direct well owners for assistance with such costs. DBS&A spoke to the County water utility's Infrastructure Manager, who said that the connections to County water utility infrastructure use Neptune MACH10 water meters and drive-by data collection using a MRX collector, but the meters have advanced metering infrastructure (AMI) capability and will evolve to AMI (Alvarado, 2023). The County water utility recommended that well owners install new meters rather than calibrating or testing any existing meters (Alvarado, 2023). Some domestic wells have existing meters; however, it will be less expensive to replace the existing meters than to test and calibrate the existing meters. In addition, the existing meters would likely need to be manually read (on private property). As an example, the

County water utility said that approximately 70 connections in Chupadero were recently upgraded to MACH10 meters by the Chupadero Mutual Domestic Water Consumers Association (CMDWCA) for another project, and that an MRX collector was purchased for data collection for that project, which worked well (Alvarado, 2023).

The County water utility is short staffed, and will not be able to install new meters or collect meter readings for the domestic well monitoring program at the start; however, meter reading for this program could potentially be taken over by the County water utility at a later time (Alvarado, 2023). We recommend that an MRX collector be purchased to allow for data collection, and that County domestic well monitoring program staff or a contractor collect the meter readings on a monthly basis. We recommend that 50 to 100 new meters be installed during the initial phase of the project, and that data be collected for these meters on a monthly basis going forward. Additional meters could be installed during a subsequent project phase. As discussed in Section 4.1, there are 823 domestic wells permitted under NM Stat §72-12-1 located in the LCLC planning area. Installing 50 well meters would allow for data collection for approximately 6 percent of the domestic wells in the LCLC planning area. Installing 100 well meters would allow for data collection for approximately 12 percent of the domestic wells in the LCLC planning area.

Resources to direct well owners to for assistance with the costs of purchase and installation of new meters will need to be identified, and we envision this work being coordinated by the County's domestic well monitoring program project lead. In addition, the County will need to determine who will collect meter readings on a monthly basis.

We recommend that all new domestic wells in the LCLC planning area be required to install meters and participate in the domestic well monitoring program going forward. Additional domestic well meters should be installed each year, increasing the number of wells that are monitored and the amount of groundwater diversion data collected for this area. We recommend that the initial focus of the project be on collecting meter readings to assess the current water demands.

The La Cienega Valley Association's letter to the County dated June 15, 2017 formally requested that the County enforce Ordinance 2002-9 by "reading all water meters (in the LCLC planning area), requiring meters be installed on wells for all new developments that have been built since the ordinance was adopted, and that meter readings be submitted." Growth Management staff indicated that there is not a current enforcement mechanism for the existing requirements (Ellis-Green, 2022). In light of the current limitations, we recommend that the County implement a

volunteer well metering program during the next phase of the domestic well monitoring program, with County staff collecting the meter readings on a monthly basis. We also recommend that the County add a field inspection requirement for all new domestic wells in order to verify that meters have been installed, and that all new domestic wells be added to the domestic well monitoring program following their field inspections. The methods for the subsequent phases of the project should be reassessed based on the level of volunteer participation achieved during the initial phase of domestic well monitoring program implementation.

12.4.3 Connection to the County Water Utility

We recommend that the County review which parcels in the LCLC planning area are connected to the County water utility, evaluate the possibility of connecting additional parcels using existing infrastructure, and potentially extend the water lines to connect additional parcels. This would reduce the number of domestic wells being used as the source of water supply in the LCLC planning area, and would help to conserve the local groundwater resource. As discussed in Section 4.1, there are 823 domestic wells permitted under NM Stat §72-12-1 in the LCLC planning area. DBS&A recommends that the County identify opportunities to consolidate and regionalize the water supply in this area, to the extent that is practical.

Figure 10 shows the LCLC planning area parcels that are located within 200 feet of an existing County water utility water line, based on the current GIS water line coverage (updated in October/November 2019). Properties that are located within 200 feet of an existing County water utility water line are required to connect if the property has been divided since 1996, when the La Cienega Watershed Conditions went into effect. We do not have enough information to say which properties are required to connect to the County water utility.

There are 238 parcels located within 200 feet of an existing water line (Appendix I). The County should identify which of these parcels are already connected to the County water utility, and should consider approaching the owners of the other parcels about connecting to the regional water system, whether or not connection is required. The County might also consider offering funding to help domestic well owners connect to the County water utility (paying all or part of the cost for connection).

DBS&A recommends that the County update the GIS coverage for the County water utility's water lines, if the water system has been extended since October/November 2019. Whenever

the GIS coverage is updated, the list of parcels located within the LCLC planning area that are located within 200 feet of existing County water utility water lines should be updated.

The La Cienega MDWCA is the largest community water system in the planning area. It has an emergency connection with the County water utility, but obtains its water supply from wells located in the LCLC planning area. This water system serves over 500 people, and if the County water utility were to serve this water system, that would reduce local groundwater demand. The water system's wells are not domestic wells, but rather have private water rights. DBS&A received a number of calls about the location of the La Cienega MDWCA's well in La Cieneguilla. There is local concern over the location of this well, and the potential impacts of its pumping on local domestic wells. Another community water system that could be connected to the County water utility is the Wild and Wooley Trailer Park. Connection of this system was discussed in the LCLC community plan update (Santa Fe County, 2015). This system serves approximately 100 people.

12.4.4 Water Quality Monitoring

There were questions about water quality and whether water quality monitoring is a component of the current domestic well monitoring project at the project open house (it is not). Well owners also asked about what parameters they should be monitoring for. DBS&A gave contact information for the NMDOH private wells epidemiologist to a few project open house attendees, for them to contact about conducting their own domestic well water quality monitoring. The NMDOH can provide recommendations for the parameters to monitor (e.g., nitrate, arsenic, total coliform bacteria), and then well owners would coordinate directly with an analytical laboratory for analysis of the samples they collect.

DBS&A recommends that the County include water quality in their future outreach to County domestic well owners, potentially distributing educational materials that give recommendations for the parameters that should be monitored and options for where samples can be analyzed. County staff is already working with the NMED Drinking Water Bureau to hold a water fair in the area. This will allow well owners to bring samples of their water in for analysis by NMED.

As discussed in Section 11.2, Bernalillo County requires water quality sampling for new or modified domestic wells for a specific list of analytes, and the sampling results must meet applicable water quality standards before final approval (Bernalillo County, 2022b). Bernalillo County also requires annual bacteriological (total coliform) sampling in multiple household wells and submission of the results. Water sample collection, analysis, and analytical costs are the

responsibility of the well owner (Bernalillo County, 2022b). The County could consider implementing similar requirements, or could provide the resources discussed above to local domestic well owners to assist in accessing available services from other agencies.

12.4.5 Water Conservation

As outlined in the 2016 SLDC, the County's existing water conservation requirements are comprehensive, and no new water conservation requirements are recommended. The County could consider making and distributing public outreach materials to educate residents on the existing water conservation requirements. DBS&A recommends that the County review educational and outreach materials for the following other water conservation programs as example materials: Albuquerque Bernalillo County Water Utility Authority, City of Santa Fe, Tucson Water (Arizona), and San Antonio Water System (Texas). The County could offer conservation rebates, if desired. Indoor water use is not the best target for rebates, because low-water-use appliances and fixtures are already required, and higher-water-use appliances and fixtures are being phased out and are not available for purchase. As such, there is no real need to incentivize their selection. Outdoor water conservation rebates are generally associated with turf removal and rainwater catchment. Developing a water conservation rebate program is not recommended, as it is likely not the best use of the County's resources.

12.4.6 Public Outreach

DBS&A recommends that the next phase of this project includes a series of public outreach events, and that the events include an outside mediator/facilitator. Based on the attendance at the project open house and public interest in the project, the venue for future public outreach events will likely need to be larger than the La Cienega Community Center.

12.4.7 Program Staffing

In order for the program to be successful, County staff resources and program funding will need to be dedicated to the program. Domestic well owners will need to be identified to participate, and County staff will need to coordinate with these well owners, as well as collect and review the data that are collected. We recommend that a new full-time position be created for this purpose. No new ordinances are currently recommended; rather, the County should take steps to implement the existing program before identifying and/or adding additional requirements.

We recommend that the program begin with volunteer participation, collecting additional water level data and installing new meters on domestic wells located in the LCLC planning area, with

County staff collecting meter readings on a monthly basis. Depending on the level of participation and the amount of data the County is able to collect, the means and options for enforcement of the existing requirements should be determined.

12.4.8 Potential Funding Sources

DBS&A and the NMBGMR are not aware of any grant programs that will support annual recurring costs for the proposed domestic well monitoring program, but there are some potential funding sources that could be used to help get the program established. As discussed in Section 11.2, the Bernalillo County water level measurement program is funded primarily through the County's general revenue stream, generated from property and sales tax, with some limited but additional funding from their $\frac{1}{8}$ -cent environmental gross receipts tax (McGregor, 2023). A similar funding scheme will likely be needed for this program.

One potential source of funding for the LCLC domestic well monitoring program would be a WaterSMART grant from the U.S. Bureau of Reclamation (USBR). There are two categories of WaterSMART grants that might be applicable: Water and Energy Efficiency and Small-Scale Water Efficiency Project Grants. WaterSMART grants have a non-federal cost share of at least 50 percent of the total project cost (USBR, 2023). Water and Energy Efficiency Grants are primarily for projects that will result in quantifiable and sustained water savings (USBR, 2023). Projects that promote sustainability and address the impacts of climate change are given priority (USBR, 2023). Water and Energy Efficiency Grants may request up to \$500,000 for projects to be completed within 2 years, or up to \$5 million for longer term projects (USBR, 2023). Small-Scale Water Efficiency Project grants are awarded to projects that conserve, improve management, or increase the efficient use of water supplies. Small-Scale Water Efficiency Project grant applicants may request up to \$100,000 in federal funding for projects with total project costs of up to \$225,000, and these grants have more simplified criteria and a more streamlined application compared to the other WaterSMART grant categories (USBR, 2023). The federal fiscal year 2022 WaterSMART grant funding opportunity was posted on May 2, 2022, with applications due by July 28, 2022 and selections to be announced in spring 2023 (USBR, 2023). The fiscal year 2023 WaterSMART funding opportunity is expected in spring 2023 (USBR, 2023).

Pursuant to the Water Project Finance Act, the New Mexico Finance Authority (NMFA) provides administrative support to the 16-member Water Trust Board and manages the Water Project Fund on its behalf (NMFA, 2023). NMFA makes loans and grants for projects recommended by the Water Trust Board and authorized by the legislature, and Water Trust Board awards are a combination of grants and loans, based upon the financial capacity of the applicants (NMFA,

2023). Under the Water Project Finance Act, five project types eligible for financial assistance: (1) water conservation or recycling, treatment or water reuse projects, (2) flood prevention projects, (3) Endangered Species Act (ESA) collaborative projects, (4) water storage, conveyance, or delivery projects, and (5) watershed restoration and management projects (NMFA, 2023). The proposed domestic well monitoring program will not be eligible for Water Trust Board funding from NMFA because domestic wells are privately owned and this funding source is for political subdivisions (Quintana, A., 2023). If the wells to be monitored or metered were owned by the County, the project would be eligible for this funding source (Quintana, A., 2023). As discussed in Section 12.4.1, the County could consider drilling a monitor well network, with the wells being owned by the County, instead of (or in addition to) monitoring privately owned wells. These wells could be used for water level and/or water quality monitoring. Installation of new County owned wells would be eligible for Water Trust Board funding.

12.5 Next Steps

At the project open house, there was vocal concern about the County monitoring groundwater use in the LCLC planning area, but there was also support for monitoring. In addition to the comments made in support of monitoring during the project open house, a number of the well surveys that were collected expressed support for monitoring, as well as the desire for the program to be staffed and funded to ensure its success.

In order to implement the proposed domestic well monitoring program, the County needs to identify who will spearhead the effort. We recommend a new position be created within the Public Works Department to serve as the lead for the program's implementation. We recommend that the person hired for this role have experience with the subject matter (e.g., hydrogeology). The lack of past implementation of the existing domestic well and water use requirements has largely been due to not having adequate staff resources or County support for the efforts. Conditions are projected to become warmer and drier in the future, and the area is experiencing significant growth (over 8 percent growth between 2010 and 2020). We recommend that the County do the following:

- Implement the domestic well monitoring program, expanding the water level monitoring network to allow for the evaluation of water level elevation trends over time, installing new meters, and beginning to collect domestic well meter readings. Metering data will be necessary in order to assess current and project future groundwater demands.

- Contract with NMBGMR to expand the water level monitoring network, before the April 2023 monitoring event if possible. This would require contacting well owners and obtaining permission to monitor their wells before the field event, so it should be done as soon as possible.

As discussed in Section 4.1, the OSE POD Locations Online Mapping Tool includes a local ordinance area for the City of Santa Fe domestic well ordinance, but does not include a similar local ordinance area for Santa Fe County. The County should provide the OSE with information about the 2016 SLDC, and the specific domestic well limitations and requirements, so that it may be added to the OSE's online mapping tool. The County should coordinate with the OSE regarding the existing County requirements, and ask the OSE to include metering and meter reading reporting requirements and County water withdrawal limitations in their conditions of approval for any new domestic well permits in the LCLC planning area.

We recommend that the County coordinate with local groups, such as the La Cienega Valley Association, for assistance with outreach, and soliciting volunteers to participate in the water level monitoring and domestic well metering projects. For further project outreach, we recommend that the project-specific website link be posted on the County's social media page, and that project related information be sent to the WPAC and City/County Water Conservation Committee members, posted to the project-specific website, e-mailed to the project e-mail list, and sent to local groups.

We recommend that a cooperative six-month work planning project be undertaken between Public Works, Growth Management, and Sustainability to outline the project's next steps and responsibilities, with a subject matter expert acting as the project lead. Rather than serving as the project lead, we recommend that the Sustainability Division's role be to focus on supporting water conservation education and project outreach. We recommend that this report and the cooperative work plan to be developed be made available to the WPAC, La Cienega Valley Association, City/County Water Conservation Committee, and the public for review.

As the domestic well monitoring program is implemented and domestic well meter readings are obtained, the estimates for current water demand and projected future water demand for the LCLC planning area should be refined. In addition, the County should work with the community to evaluate whether the demand projections reflect desired future conditions.

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Tables

Table 1. Water Level Elevations, Current NMBGMR Monitoring Network

Point ID	Coordinates (NAD 83 UTM 13 N)		Date Measured	Depth to Water (feet)	Groundwater Elevation (feet msl)
	Easting	Northing			
LC-025	400000	3936280	4/4/2022	8.05	6,095.51
LC-010	399811	3937131	4/5/2022	16.59	6,010.95
EB-306	399537	3937647	4/5/2022	19.02	6,108.55
EB-691	400249	3937717	4/5/2022	23.1	6,056.46
EB-340 ^a	399686	3936057	4/4/2022	52.35	6,053.21
EB-132 ^a	400609	3936794	4/4/2022	62.31	6,102.27
EB-696 ^b	403679	3937857	4/5/2022	91.72	6,141.88
EB-373 ^b	401729	3941231	4/5/2022	115.62	6,170.99
EB-220	403153	3938661	4/5/2022	132.83	6,130.77
EB-390 ^{a,b}	404686	3933111	4/5/2022	162.98	6,138.63

^a Well measured manually once per year

^b Well outside of the LCLC planning area

msl = Above mean sea level

Table 2. Number of Permitted Wells and Permitted Diversions in the LCLC Planning Area

OSE Use Code	Use Description	Number of Wells	Permitted Diversions (ac-ft/yr)
DOL	72-12-1 Domestic and livestock watering	24	57
DOM	72-12-1 Domestic one household	693	1,658
MUL	72-12-1 Multiple domestic households	106	292
STK	72-12-1 Livestock watering	5	15
IRR	Irrigation ^a	15	482.17
MDW	Community type use - MDWCA, private or commercial supplied	4	68.07
MOB	Mobile home parks	4	20.4
PDL	Non 72-12-1 Domestic and livestock watering	3	9
PDM	Non 72-12-1 Domestic one household	3	9
PUB	72-12-1 Construction of public works	2	0
SAN	72-12-1 Sanitary in conjunction with a commercial use	12	47.2
BPW	Brine production well	3	0
CLS	Closed file	1	0
EXP	Exploration	6	0
MON	Monitoring	2	0
NOT	No use of right or POD	1	0
TBD	To be determined	1	0.5
	Unknown	49	24
	Total	934	2,682.34
Total permitted groundwater diversions			2,332.00

Source: OSE NMWRRS, 2022a

^a Includes surface water declarations totaling 350.34 acre-feet per year (ac-ft/yr)

Table 3. Irrigation Water Rights in the LCLC Planning Area

POD	Status	Use	Total Diversion (ac-ft/yr)	Ditch Name	Sub-File	Owner Name
RG-00590 ^a	ADJ	IRR	0.00		58.1	Public Service Company of New Mexico
RG-32048	DCL	IRR	12.48		SUMP 42, MAP 13 TRACT 42.1	Raymond Ulibarri, Delfina Ulibarri
RG-70212	DCL	IRR	5.70			Bill Schenck
RG-70213	ADJ	IRR	1.20		36A.1	Bill Schenck
SD-02125	DCL	IRR	70.89	Los Tanques		Lalo Enriquez, Henry Gonzales, Y.A. Paloheimo
RG-31961	DCL	IRR	20.22		TRACT 42.43.45.1	Herman Pino
RG-31961-SUMP 42	DCL	IRR				Raymond Ulibarri
RG-31961-SUMP 43	DCL	IRR				Facudono Pino
RG-07767-H	DCL	IRR	0.75			Maurice R. McDonald
RG-29242 ^b	LIC	IRR	28.60			Frank Mancuso, Kimberly Mancuso
SD-06667	OOJ	IRR	6.00		SF HYDRO SURVEY MAP 13, TRACT 35.1	William C. Schenck
SD-00869	PMT	IRR	273.45	Acequia de La Cienega	6.2829 & 11.28.18B	Acequia de la Cienega
RG-88082	DCL	IRR	46.47		12-13-14.1	Jesusita P. Larranaga, Edward J. Sceery
RG-90070	ADJ	IRR	4.50		9.A1	Toribio Lopez, Nellie Lopez
RG-94801	PMT	IRR	11.91		41.1	Gable S Corporation
Total permitted diversion (ac-ft/yr)			482.17			
Total permitted groundwater diversion (ac-ft/yr)			131.83			

Source: OSE NMWRRS, 2022a

^a NMWRSS lists 2 PODs (RG-00590 and RG-00590 POD1)

^b NMWRSS lists 3 PODs (RG-29242, RG-29242-S, and RG-61187 POD1)

ac-ft/yr = Acre-feet per year

POD = Point of diversion

IRR = Irrigation

ADJ = Adjudicated

DCL = Declared

LIC = License

OOJ = Offer of judgment

PMT = Permit

RG = Rio Grande

SD = Surface declaration

Table 4. Santa Fe County Meter Reading Report Summary

Year	Number of Wells for which Reports Received	Number within the LCLC Planning Area	Number that are Domestic Wells	Calculated Annual Water Use (acre-feet)
2015	1	0	0	— ^a
2016	3	0	1	2.0
2017	4	0	2	1.0, — ^b
2018	3	0	1	— ^b
2019	11	0	10 ^c	0.05, 0.09, 0.14, 0.20, 0.26, 0.29, 0.30, 0.52, — ^d
2020	9	0	5 ^c	0.06, 0.10, 0.17, 0.30, 0.35, — ^b
2021	6	0	5	0.06, 0.30, 0.32, 0.34, — ^b
2022	6	0	3	0.06, 0.30, — ^b

^a Demand not calculated (well not for domestic use)

^b Only one meter reading was provided for a well, so volume was not calculated.

^c Two meter readings received for one well (the two residences this well serves are separately metered).

^d Three wells had only one meter reading, so volumes were not calculated.

Table 5. Estimated Domestic Well Water Demand in the LCLC Planning Area

Total Water Demand	Total Demand at Specified Per-Household Demand (ac-ft/yr)					Comments
	0.16	0.25	0.26	0.33	1.0 (current OSE regulation volume)	
929 households	148.6	232.3	241.5	306.6	929.0	Number of households estimated by summing the number of permitted 72-12-1 Domestic and livestock watering (24), Domestic one household (693), and Multiple domestic household (106) wells, assuming that each shared domestic well supplies two households.
1,035 households	165.6	258.8	269.1	341.6	1,035.0	Number of households estimated as above, except for the assumption that each shared domestic well supplies three households.
1,141 households	182.56	285.25	296.66	376.53	1,141.0	Number of households estimated as above, except for the assumption that each shared domestic well supplies four households.

ac-ft/yr = Acre-feet per year

Table 6. Estimated Current Groundwater Demand

Sector	Permitted Groundwater Diversion (ac-ft/yr) ^a	Estimated Current Groundwater Demand (ac-ft/yr)
Domestic water supply ^b	1,992.00	250–1,000
Community water system ^c	88.47	— ^e
Irrigation ^d	131.83	— ^e
Livestock	48	— ^e
Commercial	47.2	— ^e
Total	2,307.50	566–1,316

^a Permitted groundwater diversions from Table 2. Permitted diversions for combined well types (e.g., domestic and livestock watering) were split between the two sectors.

^b See Table 4 for the range in potential domestic demands and the associated assumptions.

^c Including mobile home park permitted diversions.

^d Does not include 350.34 acre-feet per year (ac-ft/yr) in surface declarations.

^e Assumed to be equal to permitted groundwater diversions (no data on actual demand).

Table 7. Projected Domestic Groundwater Demand

Decadal Increase	Projected Demand (ac-ft/yr)				
	2020	2030	2040	2050	2060
<i>Low Estimate</i>					
5 percent	250	262.5	275.6	289.4	303.9
10 percent	250	275.0	302.5	332.8	366.0
15 percent	250	287.5	330.6	380.2	437.3
<i>Middle Estimate</i>					
5 percent	500	525.0	551.3	578.8	607.8
10 percent	500	550.0	605.0	665.5	732.1
15 percent	500	575.0	661.3	760.4	874.5
<i>High Estimate</i>					
5 percent	750	787.5	826.9	868.2	911.6
10 percent	750	825.0	907.5	998.3	1,098.1
15 percent	750	862.5	991.9	1,140.7	1,311.8

ac-ft/yr = Acre-feet per year

Table 8. Water Resource Issues of Interest

Water Resource Issue	Priority 1	Priority 2	Priority 3	Total
Domestic groundwater supply	15	3	2	20
Irrigation groundwater supply	3	0	1	4
Water quality	3	4	9	16
Growth management	1	10	4	15
Well metering and requirement enforcement	0	5	2	7
Other (retiring septic tank use and reusing treated wastewater)	3	2	2	7

Feedback gathered at project open house on September 14, 2022.

Table 9. Number of Development Permits in LCLC Planning Area by Year, 2002–2022

Year	Number of Permits
2002	41
2003	71
2004	62
2005	71
2006	56
2007	48
2008	38
2009	27
2010	26
2011	30
2012	41
2013	31
2014	30
2015	36
2016	62
2017	37
2018	42
2019	53
2020	51
2021	38
2022	27
Total	918

Table 10. Number of Development Permits in LCLC Planning Area by Permit Type, 2002–2022, Page 1 of 2

Type	Type Description	Number of Permits	Ordinance 2002-9 Requirements Applicable?
SPAD	Accessory Dwelling	20	Yes
APP	Appeal	2	Unknown
PCBS	Boundary Survey	2	No
BPCS	Building Permit, Comm Serv Facility	1	No
BPCX	Building Permit, Comm/Ind Access Struct	1	No
BPCR	Building Permit, Comm/Ind Renv/Remodel	1	No
BPOD	Building Permit, Other Development	5	No
BPRX	Building Permit, Res. Access Structure	89	Yes
BPRA	Building Permit, Res. Addition	103	No
BPRR	Building Permit, Res. Renv/Repair	7	No
BPRS	Building Permit, Res. Single Family Home	86	Yes
ABBL	Business License	6	No
DDEM	Demolition	1	No
DCOM	Development Plan Commercial	1	Yes
DNCU	Development Plan Non-Conforming Use	1	Yes
LDDL	Division of Land	1	Yes
PCES	Easement Survey	2	No
PCEV	Easement Vacation	2	No
EXFT	Family Transfer	15	Yes
EXFY	Five Year Exemption	3	Unknown
AHBL	Home Occupation Business License	30	No
SIVP	Itinerate Vendor Permit	1	No
PCLC	Lot Consolidation	3	No
PCLA	Lot Line Adjustments	59	No
MIS	Miscellaneous	20	Unknown
DMHP	Mobile Home Placement	111	Yes
PCPA	Plat Amendment	2	No
DROC	Road Construction/Grading	29	No
DSIG	Sign Permit	1	No
SCUP	SLDC Conditional Use Permit	1	Unknown
SDPP	SLDC Demolition Permit	4	No

Table 10. Number of Development Permits in LCLC Planning Area by Permit Type, 2002-2022, Page 2 of 2

Type	Type Description	Number of Permits	Ordinance 2002-9 Requirements Applicable?
SPNA	SLDC Dev Permit Non-Res/Multi/Mu-Ad	2	Unknown
SGSF	SLDC Grading Clearing-Single	9	No
SHOL	SLDC Home Occupation Low Impact	4	No
SHON	SLDC Home Occupation No Impact	16	No
SPMH	SLDC Manufactured Home	64	Yes
SLMS	SLDC Minor Subdivision	4	Yes
SPVS	SLDC PV Solar - Private	39	No
SPAS	SLDC Residential Assessory Structure	53	Yes
SPRA	SLDC Residential Remodel/Addition	34	No
SRDC	SLDC Road or Driveway Cut Permit	4	No
SPSR	SLDC Single Family Residence	19	Yes
SSDP	SLDC Site Development Permitted Use	1	Yes
SVAR	SLDC Variance	2	Unknown
SZCS	SLDC Zoning / Condominium Statement	1	Unknown
LDFT	Small Lot Family Transfer	19	Yes
ASE	Special Event	2	No
SRES	Subdivision, Residential	3	Yes
SRS	Subdivision, Summary Review Sub-Division	1	Yes
DUAC	Utility Authorization (Commercial)	1	Unknown
DUAR	Utility Authorization (Residential)	6	Unknown
DUAW	Utility Authorization (Well)	9	Unknown
VAR	Variance	13	Unknown
ZCOM	Zoning, Commercial	1	Unknown
ZOD	Zoning, Other Development	1	Unknown
Total		918	

Table 11. Number of Development Permits in LCLC Planning Area by Year, 1996-2001

Year	Number of Permits
1996	66
1997	51
1998	70
1999	91
2000	61
2001	81
Total	420

Table 12. Number of Development Permits in LCLC Planning Area by Permit Type, 1996–2001

Type	Type Description	Number of Permits	La Cienega Watershed Conditions Requirements Applicable?
ABBL	Business License	2	No
AHBL	Home Occupation Business License	27	No
APP	Appeal	3	No
BPOD	Building Permit, Other Development	16	No
BPRA	Building Permit, Res. Addition	40	No
BPRR	Building Permit, Res. Renv/Repair	1	No
BPRS	Building Permit, Res. Single Family Home	58	Unknown
BPRX	Building Permit, Res. Access Structure	57	No
DBLA	Blasting	1	No
DCOM	Development Plan Commercial	1	No
DMHP	Mobile Home Placement	130	No
DOD	Development Plan Other Development	1	No
DRCU	Road Cut Permit	7	No
DROC	Road Construction/Grading	10	No
DUAR	Utility Authorization (Residential)	6	No
DUAW	Utility Authorization (Well)	6	No
EXFT	Family Transfer	10	Yes
LAND	Land Divisions, Multiple	2	Yes
LDDL	Division of Land	8	Yes
LDFT	Small Lot Family Transfer	17	Yes
MIS	Miscellaneous	3	No
PCBS	Boundary Survey	2	No
PCLA	Lot Line Adjustments	7	Unknown
SVAR	SLDC Variance	1	Unknown
TUPO	Temporary Use Permit, Other	1	No
ZCOM	Zoning, Commercial	1	Unknown
ZOD	Zoning, Other Development	1	Unknown
ZVAR	Zoning, Variance	1	No
Total		420	

Table 13. Estimated Number of Development Permits in LCLC Planning Area Where the La Cienega Watershed Conditions Requirements May Apply, 1996–2022

Type	Type Description	1996-2001 Development Permits	2002-2022 Development Permits	Total
EXFT	Family Transfer	10	15	25
LAND	Land Divisions, Multiple	2	0	2
LDDL	Division of Land	8	1	9
LDFT	Small Lot Family Transfer	17	19	36
SLMS	SLDC Minor Subdivision	0	4	4
SRES	Subdivision, Residential	0	3	3
SRS	Subdivision, Summary Review Sub-Division	0	1	1
SSDP	SLDC Site Development Permitted Use	0	1	1
			Total	81

Appendix A

Hydrogeologic Setting

Introduction

The study area for the pilot project covers the lower reach of the Santa Fe River, including several of its major tributaries and arroyos; Arroyo Calabazas, Arroyo de los Chamisos, Arroyo Hondo, Cienega Creek, Guicu Creek and Alamo Creek. This region is hydrologically unique with numerous springs, seeps and wetlands emerging in the valleys and along the river channels. The study area stretches southwest, following the Santa Fe River as it flows through La Cieneguilla, southwest of the Santa Fe Airport, to the edge of the La Bajada Escarpment (Figure 1). There have been numerous detailed hydrologic studies that have characterized this unique groundwater discharge region. This review will draw upon these previous works to briefly describe the geologic setting, how it controls the complex hydrologic system, and the long-term groundwater trends observed in the region.

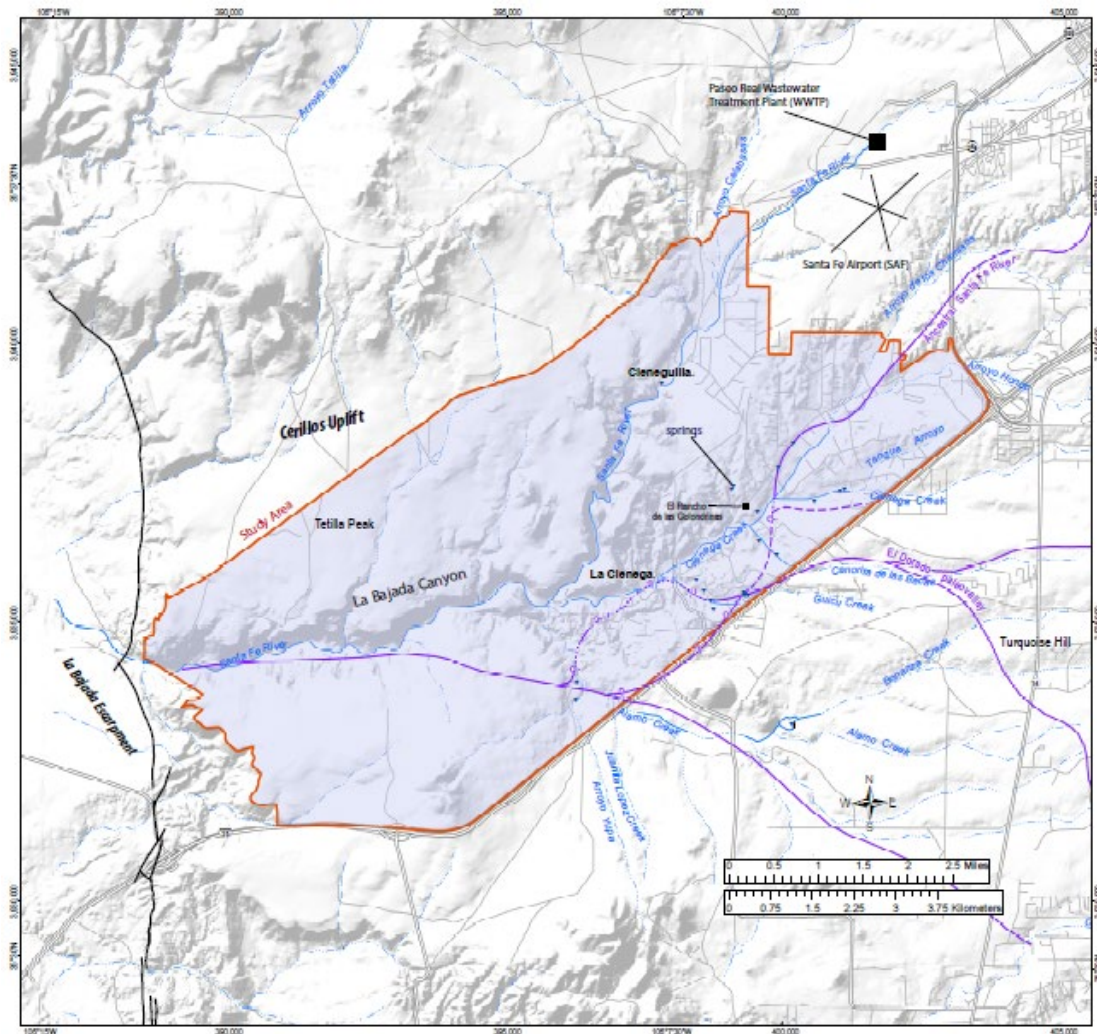


Figure 1. Study area roughly follows the Santa Fe River and includes the surrounding communities of La Cienega and La Cieneguilla.

Geology and hydrologic units

Located within the Rio Grande Rift, the Santa Fe River flows over a bedrock structural high separating two structural basins formed by rift-related faulting; the southern Española Basin and the northern Santo Domingo Basin. This block is called the Cerrillos Uplift (Sawyer and Minor, 2006), which is bounded on the west by the La Bajada fault and its surficial expression, the La Bajada Escarpment. The western boundary of this project's study area is the La Bajada Escarpment of the Cerrillos Uplift. The Cerrillos Uplift is considered a 'rift-flank' uplift with the Española block being lifted while the Santo Domingo block drops down along the La Bajada Escarpment (Sawyer and Minor, 2006). For reference, this feature is structurally similar to the Sandia Mountains uplift bounding the northeast side of the Albuquerque basin, but has much lower structural relief. To the east of the Cerrillos Uplift is a structural ramp that dips northwards towards the Española Basin (Figure 2).

In the Cerrillos Uplift, older, pre-rift sedimentary units that underlie the southern Española basin are exposed: the Galisteo and Espinaso Formations (Sawyer and Minor, 2006). The Galisteo Formation (Eocene) is composed of sandstone and pebbly sandstone channel fills, interbedded with mudstone-rich floodplain deposits (Sun and Baldwin, 1958; Spiegel and Baldwin, 1963; Koning and Hallett, 2002). Overlying the Galisteo Formation, the Espinaso Formation (Oligocene) mostly consists of well-cemented, alluvial fan deposits of volcanic-derived conglomerates and sandstones (Sun and Baldwin, 1958; Sawyer et al., 2002; Koning and Hallett, 2002). These older Eocene and Oligocene sediments have low hydraulic conductivity owing to their cementation and are generally considered barriers to groundwater flow (Johnson et al., 2016).

Within the Española Basin and the study area, the primary water bearing units are the Tesuque and Ancha Formations, which are within the Santa Fe Group (SFG). The Tesuque Formation consists of alluvial sediments that were eroded from the Cerrillos Uplift to the west and the Sangre de Cristo Mountains to the east. In the Santa Fe area, the Tesuque Formation (upper Oligocene to upper Miocene) consists of silty-clayey sand and sand, with minor gravel, silt, and clay (Spiegel and Baldwin, 1963; Koning and Read, 2010). The Tesuque Formation exhibits significant lateral and spatial heterogeneity, in part because it was deposited by different-sized paleo-drainages with distinctive sources of sediment. As a reflection of this heterogeneity, the Tesuque has been subdivided into interfingering units called lithosomes (Cavazza, 1986; Koning and Read, 2010) that correspond to deposits of different regional paleo-drainage systems and have distinct properties such as color and

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clast composition. For a more detailed description of the lithosomes found in the area, please refer to Koning and Read, 2010.

The Ancha Formation unconformably overlies the Tesuque and older formations. Prior to the deposition of the Ancha Formation, the area underwent a period of significant erosion in the late Miocene-Pliocene that left a network of eroded paleo-valleys carved into the surface of the exposed Tesuque, Espinaso, and Galisteo Formations (Johnson and Koning, 2012). During the deposition of the Ancha Formation (Pliocene to lower Pleistocene), these paleo-valleys were filled with gravel-rich, highly transmissive aquifer material. This network of transmissive aquifer channels scoured into the older, less permeable underlying formations help direct groundwater flow westward through the Española Basin to the La Cienega Wetlands (Spiegel, 1975; Johnson et al., 2016). The Ancha Formation deposits contain abundant, laterally extensive, thick, sandy pebble-cobble channel-fills interspersed with fine-grained floodplain sediments of clayey-silty sand. In general, Ancha sediments are coarser, less consolidated, and more permeable than underlying strata (Johnson and Koning, 2012). Thin Ancha deposits are mapped on top of the Cerrillos uplift and below more recent Pleistocene basalt flows. This indicates the ancestral Santa Fe River deposited a wide lobe of gravelly sediment here before incision occurred, subsequent to the emplacement of the basalts (~2.5mya). The incision, known as the La Bajada Canyon, may have been a response to higher slip rates along the La Bajada fault in the early to middle Pleistocene (Daniel Koning, pers. commun., June 2022). The Ancha Formation forms a locally important, shallow aquifer for the Santa Fe area, especially in the region of this study.

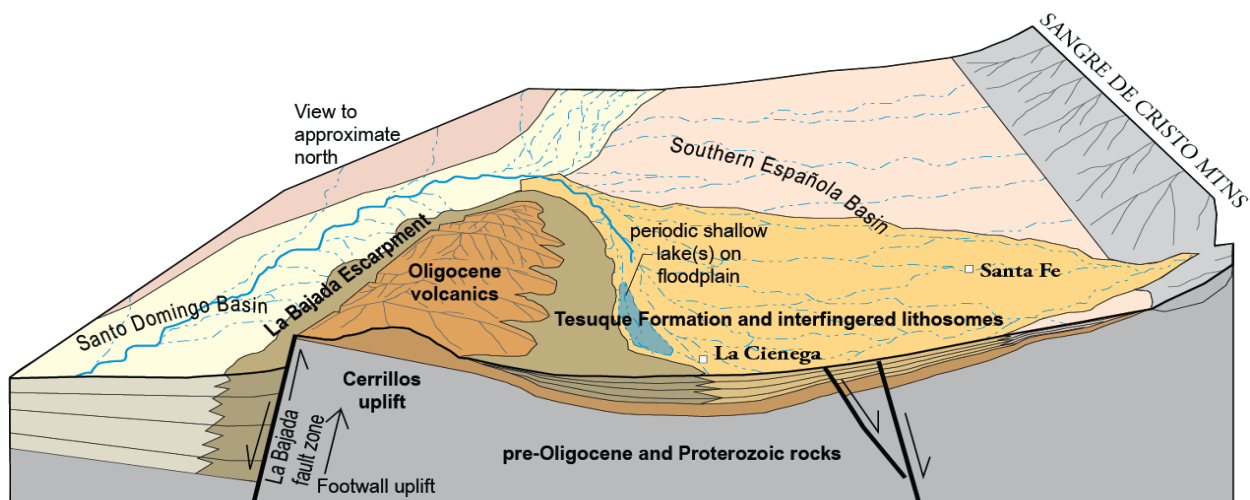


Figure 2. Conceptual block diagram showing the stratigraphy, Tesuque Formation, paleo-geography, and the depositional setting of the Española Basin 15 to 25 million years ago.

Conceptual groundwater flow model

Regional groundwater-level maps for the area (Spiegel and Baldwin, 1963; Mourant, 1980; Johnson, 2009; Johnson et al., 2016) show that groundwater in the southern Española Basin flows west-southwest through the Santa Fe Group aquifer from the Sangre de Cristo Mountains in the east. Sources of recharge to the Santa Fe Group (SFG) aquifer include mountain-front and stream channel recharge near the western border of the Sangre de Cristo Mountains, small amounts of areal recharge through coarse surface materials, and focused recharge in the southern Española Basin via streambed infiltration along ephemeral channels (Wasiolek, 1995). Focused recharge has been demonstrated by various methods and noted in studies that include the Santa Fe River, Arroyo Hondo, and Cañada Ancha (Johnson et al., 2013; Manning, 2009; Moore, 2007; Thomas et al., 2000). Focused recharge beneath losing reaches of the Santa Fe River create a groundwater mound that extends west from Agua Fria toward the Santa Fe WWTP. This groundwater high—a product of recharge from streambed infiltration—has been a persistent feature in historic groundwater maps representing 1952 conditions (Spiegel and Baldwin, 1963), 1977 conditions (Mourant, 1980), and 2000–2005 conditions (Johnson, 2009). The modern shape and extent of the recharge mound may be affected by discharge from the WWTP, which has been functioning since the early 1960s. Spiegel and Baldwin (1963) proposed that surface drainage from the river probably provides some recharge to the La Cieneguilla groundwater unit. The groundwater map of Johnson (2009) supports a similar interpretation.

The effluent that is discharged from the WWTP has a unique chemical signature. By performing chemical analysis on the springs and wells in the La Cienega area, Johnson et al. (2016) was able to demonstrate that the wetlands in the La Cienega were not chemically influenced by discharge from the WWTP. Johnson et al. (2016) also found that the saturated Ancha Formation that is present downstream of the WWTP, in the La Cieneguilla, is hydrologically separated from the La Cienega Wetlands by a subsurface high of lower permeability Tesuque Formation. Ancha Formation sediments that overlie the high Tesuque surface are entirely above the water table and the coarser deposits are unsaturated. While effluent from the WWTP and the springs that discharge to La Cienega are not chemically linked, the groundwater recharge mound downstream of the WWTP supports a higher water table that likely helps maintain the springs discharging to the west of the La Cienega wetlands (Figure 3).

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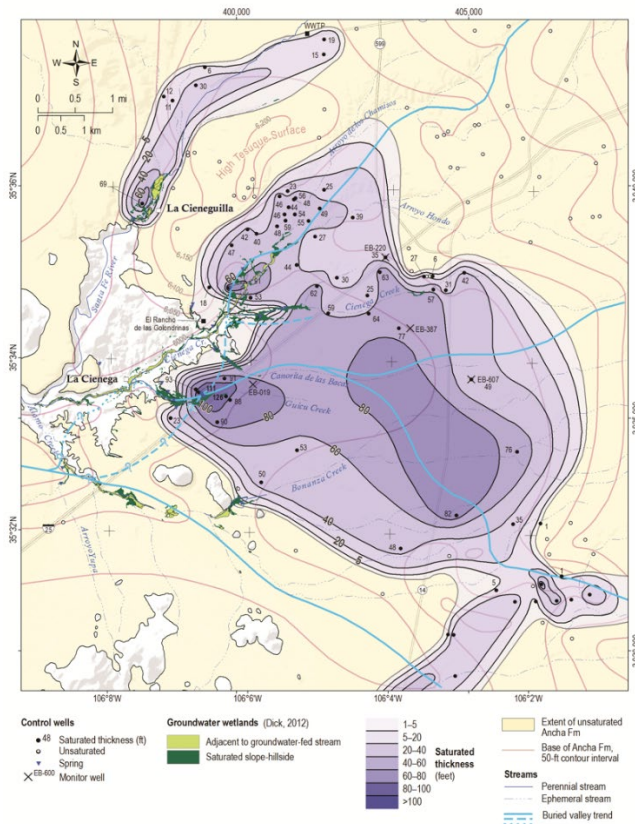


Figure 3. Saturated thickness map of the Ancha Formation, in feet and approximate locations of paleo- valleys (modified from Johnson and Koning, 2012).

The groundwater that feeds springs and wetlands in the study area is sourced from the SFG aquifer, which is a regional aquifer system of thick alluvial deposits of the Tesuque Formation, overlain by shallow, thin (<250 ft), coarse deposits of the Ancha Formation (Johnson et al., 2016). Near the southwestern margin of the Española Basin, the Tesuque and Ancha aquifers pinch out westwards near the eastern boundary of the Cerrillos Uplift, where they are underlain by the less permeable Galisteo and Espinazo Formations (Figure 4). At this contact, groundwater discharges via springs, wetlands and gaining reaches in rivers. Thinning of the aquifer forces groundwater to the surface where it emerges from buried valleys in the Ancha Formation to discharge via springs, seeps, and gaining reaches in rivers that support the wetlands (Johnson et al., 2016). Groundwater stored in the Ancha Formation is the primary source of water for the wetlands. The accretion and storage of groundwater in the Ancha Formation depends on local recharge, upflow of deep groundwater to the east of the pinchout zone, permeability contrasts between the Ancha and underlying formations, and the buried valleys at the base of the formation that direct groundwater flow and control wetland location (Johnson et al., 2016).

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It is important to emphasize how the aforementioned paleo-valleys at the base of the Ancha aquifer act as a sort of “hydrogeologic French drain” which gather groundwater from the surrounding aquifer, concentrate flow, and direct discharge to the springs and wetlands. These sinuous, narrow aquifers are important sources of groundwater, but are subject to large and unusual drawdown responses to pumping. A pumping well in or adjacent to a buried valley will extract most of its water directly from the buried valley and concentrate large water-level drawdowns along the valley’s axis (Johnson et al., 2016).

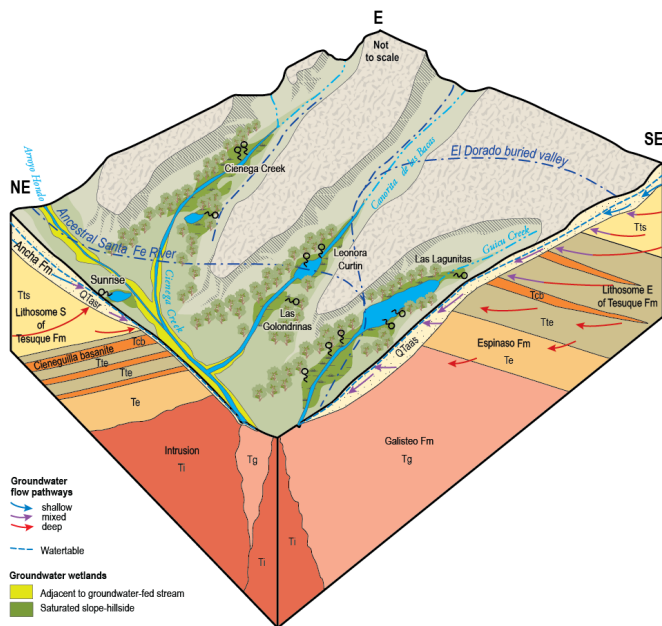


Figure 4. Perspective block diagram of groundwater-fed wetlands at La Cienega illustrating the hydrogeologic setting of the aquifer (modified from Johnson et al., 2016).

Lower Santa Fe River and La Cienega Wetland hydrology

The Santa Fe River historically flowed 74 km from its headwaters to its confluence with the Rio Grande. Currently, however, flows from the lower Santa Fe River to its confluence with the Rio Grande are intermittent; its termination (drying out) often occurs after the La Bajada Escarpment, where it eventually runs dry before reaching the river (Mann, 2020). The City of Santa Fe relies heavily on the Santa Fe River for its potable drinking water supply, accounting for 32% or 2,800 ac-ft/yr of the City’s drinking water (annual average from 2013-2019) (santafenm.gov/where_does_our_water_come_from). As result, the Upper Santa Fe River typically runs dry before it reaches the Lower Santa Fe River reach. At present, city water treated at the Paseo Real Wastewater Treatment Plant (WWTP) is discharged back

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into the lower Santa Fe River as effluent (however, this may soon change as the City has plans to reuse this water as a non-potable water source (Carollo Engineers, Inc., 2016).

In addition to the discharge provided from the WWTP, surface water in the area is supported by numerous groundwater-fed springs and wetlands that emerge in the valleys cut deep in the alluvium. Near La Cienega where the SFG aquifer thins and the water table rises to land surface, as previously described, the incised drainages contain perennial streams that flow continuously throughout the year. Perennial stream-flow in Cienega Creek and its tributaries (Arroyo Hondo, Cañorita de las Bacas, Guicu Creek, and Alamo Creek) is sustained by groundwater emerging as springs along the valley slopes and channel bottoms (Johnson et al., 2016).

Several recent studies have attempted to quantify groundwater discharge to the stream networks by stream gauging. These studies have identified gaining and losing reaches along the Santa Fe River and its tributaries. A study by NM Hydrologic, LLC and the New Mexico Office of the State Engineer (2012a, b) provides estimates of stream gains and losses by stream reach along the Santa Fe River, Cienega Creek and its tributaries (Figure 5). Additionally, a master's thesis performed similar stream gauging along the lower Santa Fe River, extending through the La Bajada Canyon and into the Santo Domingo Basin (Mann, 2020). Both studies identified similar gaining and losing reaches. Between the WWTP and La Cieneguilla the river is losing water to streambed infiltration. Between La Cieneguilla and the mouth of the La Bajada Canyon, the Santa Fe River gains flow from the La Cienega wetlands, other tributaries, and upwelling groundwater discharge (Figure 5). The river is fairly neutral as it flows through the La Bajada Canyon, shifting to losing during the summer months. The majority of the water lost from the Santa Fe River occurs at the margin of the Santo Domingo basin, immediately west of the La Bajada Escarpment, where the river flows over thick Rio Grande sediments on the down dropped block of the La Bajada fault (Mann, 2020).

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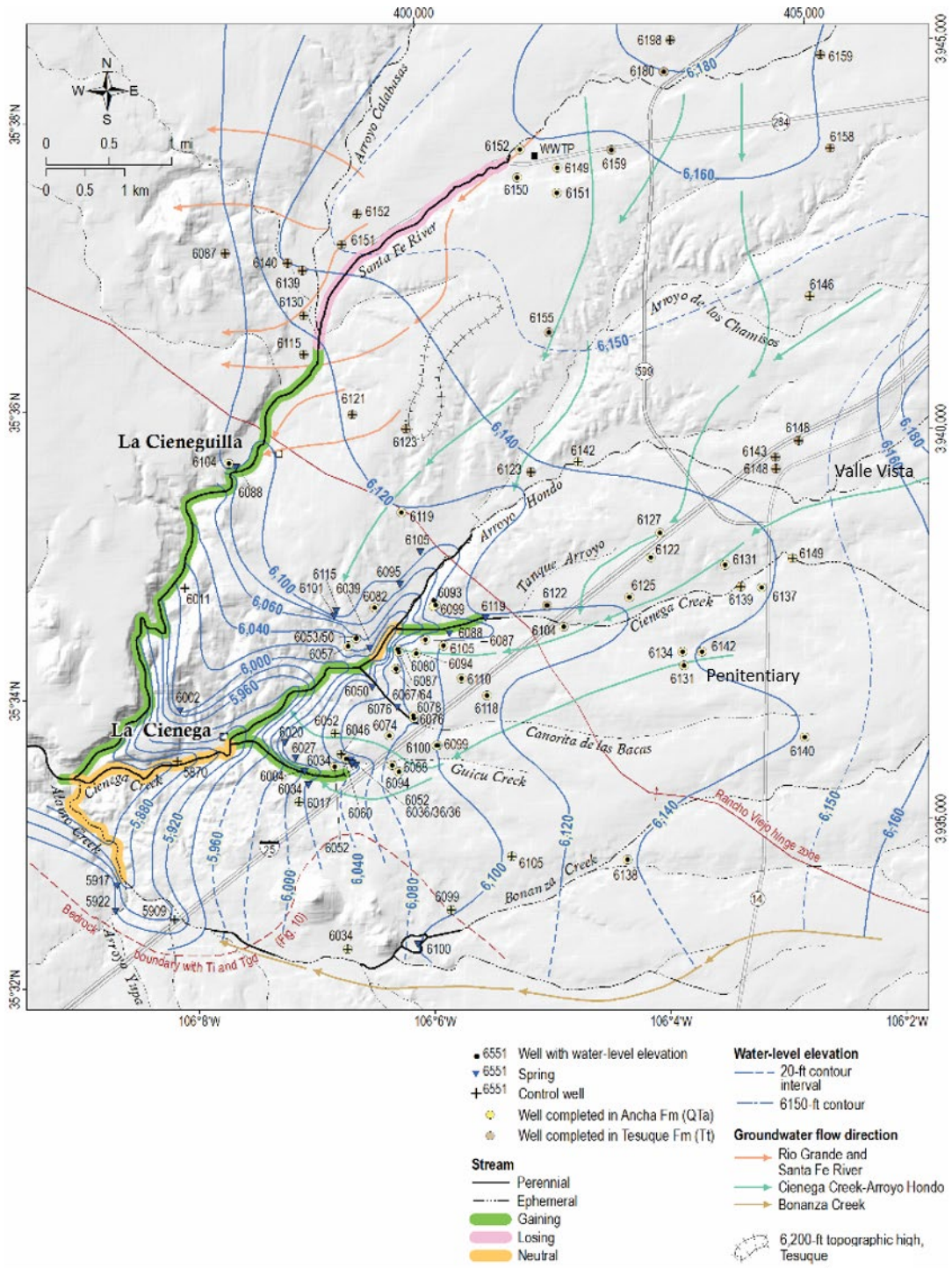


Figure 5. Groundwater map showing water table and groundwater flow paths. Gaining, neutral and losing stream reaches are delineated from data in NM Hydrologic, LLC and NMOSE (2012a, b).

Long-term water level fluctuation and current conditions

The La Cienega area has been the subject of numerous groundwater-level studies over the past 60 years, and as a result there is a robust dataset of groundwater levels in this area. Repeat measurements of the groundwater level are important to understand changes in water volume stored in an aquifer. Compiled water level data from previous reports (Spiegel and Baldwin, 1963; Mourant, 1980; Johnson, 2009; Johnson et al., 2016) show water levels in the Ancha aquifer have dropped from the beginning of the records consistently until the early 2010s as a result of long-term groundwater depletion up-gradient (east) of the wetlands. A comparison of Ancha water levels in the mid-1970s and 1980s with levels measured in the same wells between 2004 and 2012 show long-term water-table declines up to 8.9 ft. The largest depletions and decline rates have occurred in the Valle Vista area and south of the New Mexico State Penitentiary, near the northern and southern edges of the Ancha zone of saturation (Johnson et al., 2016).

Following the completion of research published by Johnson et al. (2016), the New Mexico Bureau of Geology implemented a long-term groundwater-level monitoring network and conducted groundwater-level monitoring in wells in the area with funding from El Rancho de Las Golondrinas. Results from this monitoring found that between 2010 and 2013 there was a reversal in groundwater-level trends in most wells in the La Cienega area. Groundwater-levels in most of the wells in the La Cienega monitoring network have stabilized, and in some cases, have begun to recover (Figure 6) (Mamer, 2020).

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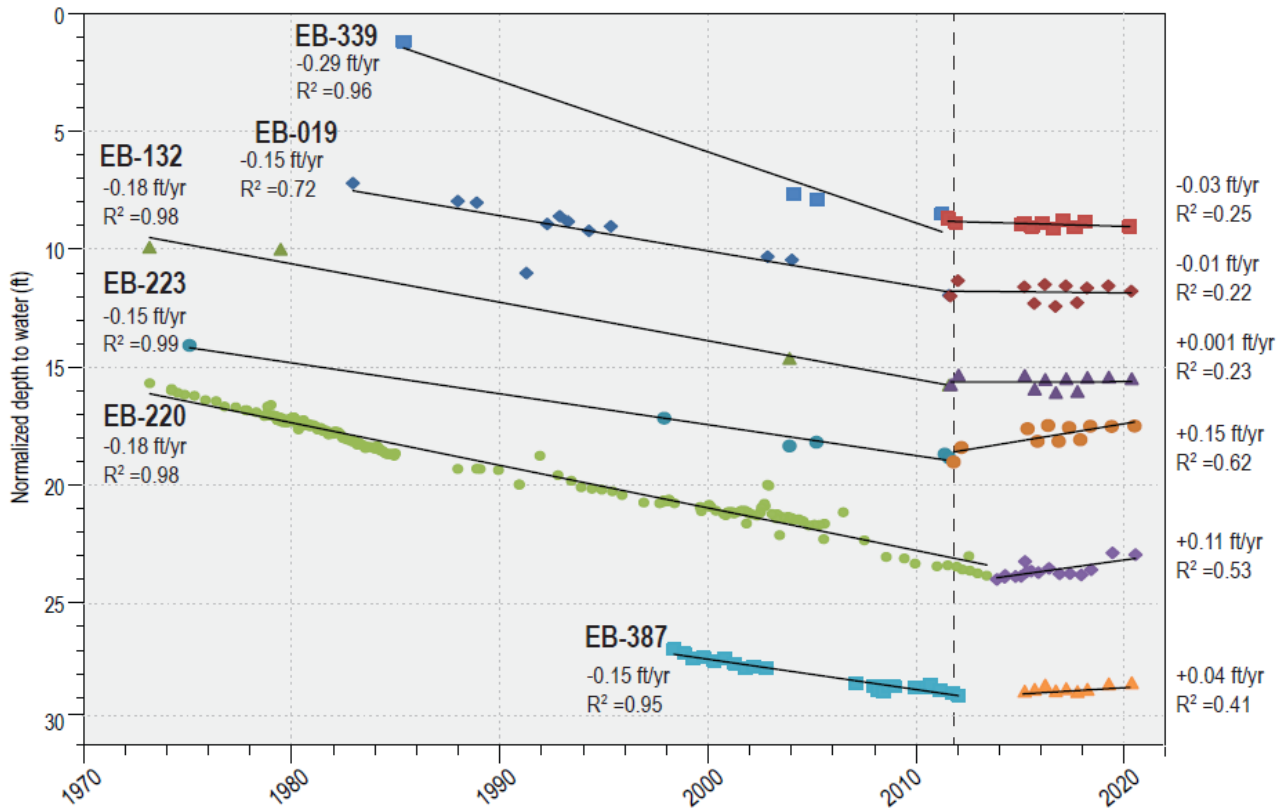


Figure 6. Groundwater hydrographs from six wells in the study area that show significant decline for several decades through 2011. In 2012 the rate of decline seen in the same wells was significantly reduced, or began to recover.

Using groundwater levels collected during the late 2010s, an updated groundwater table map was contoured (Figure 7). Using such a groundwater table map, groundwater flow paths can be drawn by tracing lines perpendicular to the groundwater contours. The groundwater flow paths show the direction of groundwater flow within an aquifer. The groundwater flow paths delineated in the area indicate that La Cienega is located at the termination of several flowpaths, at least some of which correspond to buried paleo-valleys. These flowpaths originate from both the city of Santa Fe to the northeast and the Eldorado region to the east (Figure 7). Land and/or water use changes in the region up gradient likely affect groundwater-level changes observed in the wells around La Cienega (Mamer, 2020).

One of the most significant upgradient changes that has occurred in the area was the City of Santa Fe transitioning away from pumping groundwater within the city limits. Instead, relying on San

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Juan/Chama water and the Buckman Well field in 2011. Additionally, in 2013 the National Guard, State Penitentiary, and the Turquoise Trail Elementary school were connected to the Santa Fe County water pipeline, allowing them to stop pumping their wells up gradient of La Cienega.

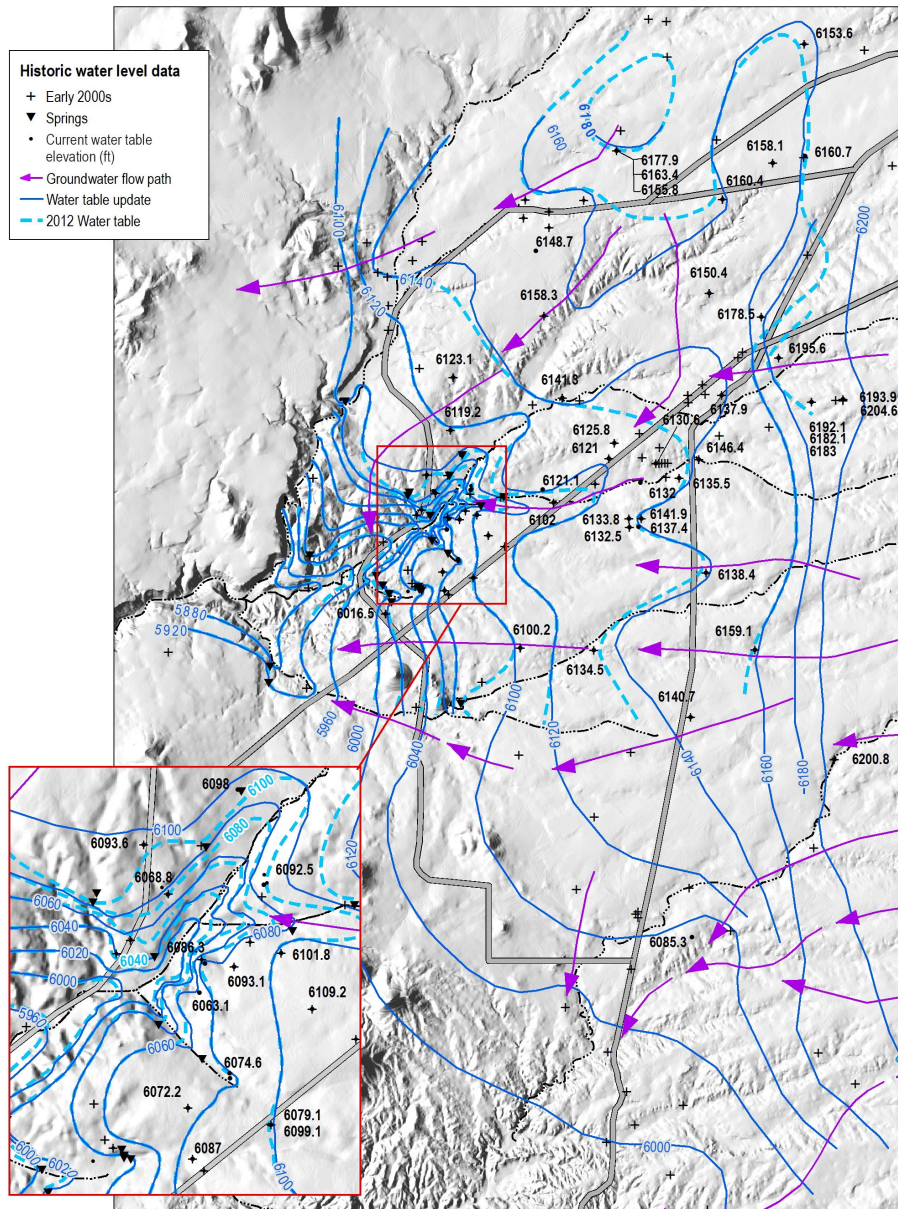


Figure 7. Updated water table map from Mamer (2020), constructed using water levels collected between 2015 and 2019, showing the change from the Johnson et al. (2016) water table map. The contours were modified to show change from the Johnson et al. (2016) water table, which used water level data collected from 2006 to 2012.

Summary of hydrologic setting

The wetland system southwest of Santa Fe, New Mexico is supported by a unique hydrogeologic system that controls groundwater discharge to the area. The primary aquifer that supports the wetlands in La Cienega is the Ancha Formation, which is overlying and connected to the Tesuque Formation. The eroded upper surface of the Tesuque Formation has a network of paleo-valleys that were incised by ancestral rivers. The Ancha Formation aquifer fills these valleys with coarse sediments that are highly transmissive. The wetlands are positioned on the southwestern edge of the Española Basin where the Tesuque and Ancha aquifers thin and pinch-out over older, low-permeability rock units. The thinning of the aquifer forces groundwater to the surface, where it discharges at springs and seeps that support the wetlands and creeks.

The majority of the flow in the Santa Fe River is currently made up of effluent discharged at the Paseo Real Wastewater Treatment Plant. Upwelling groundwater discharge to the wetlands also helps support flow in the river. The Lower Santa Fe River in the study area is a gaining river between La Cieneguilla, until it flows into La Bajada Canyon. The river is fairly neutral to slightly losing as it flows through the canyon. Once the river flows out of the canyon, it flows over the porous Rio Grande Rift sediments, where the majority of the flow infiltrates into the stream bed.

Repeat measurements of the groundwater level are important to understand changes in water volume stored in an aquifer. Groundwater level records in the area stretch back more than 50 years in some wells in the area. These long-term records of water level in the area show consistent declines by as much as 0.3 ft/year. Since 2012 water levels in the La Cienega area have begun to stabilize and, in some cases, even begun to recover. This is likely the result of conservation efforts to connect upgradient water users to the Santa Fe County water supply, and to use more surface water. However, as population and demand for water grows, and worsening drought conditions persist, it will be crucial to continue monitoring this unique groundwater system.

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Appendix A2. Water Level Elevations, NMBGMR's Previously Monitored Wells

Point ID	Easting Northing		Measuring Point Elevation (ft msl)	2004-2007			2015			2018			2019			2020			2022		
				Date Measured	Depth to Water (ft)	GW Elevation (ft msl)	Date Measured	Depth to Water (ft)	GW Elevation (ft msl)	Date Measured	Depth to Water (ft)	GW Elevation (ft msl)	Date Measured	Depth to Water (ft)	GW Elevation (ft msl)	Date Measured	Depth to Water (ft)	GW Elevation (ft msl)	Date Measured	Depth to Water (ft)	GW Elevation (ft msl)
EB-001	398529	3935208	6,046.55	1/9/2004	48.41	5,998.14	4/14/2015	48.03	5,998.52	4/9/2018	48.03	5,998.52	4/17/2019	48.02	5,998.53	5/19/2020	48.35	5,998.20			
EB-016	406470	3940387	6,428.96	3/24/2004	228.06	6,200.90	2/11/2015	228.04	6,200.92												
EB-019	400304	3935932	6,109.56	3/23/2004	43.34	6,066.22	4/14/2015	44.46	6,065.10	4/10/2018	44.51	6,065.05	4/17/2019	44.42	6,065.14	5/19/2020	44.64	6,064.92			
EB-102	402734	3934466	6,195.57	3/31/2004	60.35	6,135.22	2/18/2015	62.07	6,133.50												
EB-115	405319	3939633	6,356.30	3/14/2006	215.06	6,141.24	2/11/2015	215.77	6,140.53												
EB-132	400609	3936794	6,164.58	2/10/2004	67.56	6,097.02	4/14/2015	68.30	6,096.28	4/10/2018	68.39	6,096.19	4/17/2019	68.37	6,096.21	5/19/2020	68.44	6,096.14	4/4/2022	62.31	6,102.27
EB-171	406350	3944331	6,505.49	3/31/2005	347.26	6,158.23	2/20/2015	344.53	6,160.96												
EB-172	405330	3943594	6,463.66	3/31/2005	305.00	6,158.66				4/11/2018	303.10	6,160.56	4/30/2019	300.22	6,163.44	5/19/2020	300.09	6,163.57			
EB-218	406118	3941215	6,406.07	3/25/2004	264.03	6,142.04	2/11/2015	232.12	6,173.95												
EB-220	403153	3938661	6,263.60	3/18/2004	131.39	6,132.21	2/11/2015	133.15	6,130.45	4/9/2018	132.85	6,130.75	4/17/2019	132.79	6,130.81	5/19/2020	132.86	6,130.74	4/5/2022	132.83	6,130.77
EB-222	404457	3937957	6,263.53	2/11/2004	131.32	6,132.21	2/11/2015	132.10	6,131.43												
EB-223	399840	3938918	6,175.58	2/11/2004	46.31	6,129.27	4/14/2015	45.42	6,130.16	4/9/2018	45.31	6,130.27	4/18/2019	45.32	6,130.26	5/19/2020	45.3	6,130.28			
EB-240	406983	3946736	6,591.72	5/12/2005	435.49	6,156.23	2/17/2015	437.12	6,154.60												
EB-305	400377	3937211	6,076.56	1/9/2004	22.17	6,054.39	4/13/2015	22.78	6,053.78	4/9/2018	22.78	6,053.78	4/17/2019	22.81	6,053.75	5/19/2020	22.98	6,053.58			
EB-306	399537	3937647	6,127.57	2/10/2004	19.40	6,108.17	3/16/2015	18.97	6,108.60	4/9/2018	18.72	6,108.85	4/18/2019	18.74	6,108.83	5/19/2020	18.94	6,108.63	4/5/2022	19.02	6,108.55
EB-308	399358	3938016	6,172.58	2/11/2004	52.54	6,120.04	4/16/2015	52.22	6,120.36	4/9/2018	51.97	6,120.61	4/16/2019	51.95	6,120.63	5/19/2020	51.96	6,120.62			
EB-309	399896	3939990	6,253.60	2/11/2004	106.50	6,147.10	4/16/2015	104.76	6,148.84				4/16/2019	104.48	6,149.12	5/19/2020	104.53	6,149.07			
EB-310	402100	3939571	6,234.60	2/11/2004	38.07	6,196.53	4/16/2015	37.49	6,197.11	4/9/2018	37.27	6,197.33	4/30/2019	37.24	6,197.36	5/19/2020	37.42	6,197.18			
EB-315	400028	3937110	6,110.26	2/10/2004	19.91	6,090.35	4/14/2015	20.47	6,089.79												
EB-321	403986	3938251	6,292.61	2/20/2004	132.89	6,159.72	4/13/2015	132.17	6,160.44	4/10/2018	132.10	6,160.51	4/16/2019	132.02	6,160.59	5/19/2020	132.2	6,160.41			
EB-332	399720	3935678	6,107.56	2/21/2004	30.00	6,077.56	4/14/2015	8.83	6,098.73	4/10/2018	8.75	6,098.81	4/17/2019	8.62	6,098.94	5/19/2020	9	6,098.56			
EB-334	401921	3937456	6,167.58	2/27/2004	38.42	6,129.16	4/13/2015	39.65	6,127.93	4/10/2018	39.63	6,127.95	4/17/2019	39.61	6,127.97	5/19/2020	39.74	6,127.84			
EB-336	403199	3944575	6,357.89	5/14/2004	209.57	6,148.32	3/23/2015	208.83	6,149.06												
EB-337	403199	3944575	6,357.89	5/14/2004	203.87	6,154.02	3/23/2015	201.21	6,156.68												
EB-338	403199	3944575	6,357.89	5/14/2004	185.47	6,172.42	3/23/2015	186.77	6,171.12												
EB-339	403035	3938347	6,240.60	4/29/2004	136.53	6,104.07	4/14/2015	137.72	6,102.88	4/9/2018	137.60	6,103.00				6/2/2020	137.8	6,102.80			
EB-340	399686	3936057	6,105.56	4/29/2004	51.53	6,054.03	4/14/2015	52.41	6,053.15	4/9/2018	52.40	6,053.16	4/16/2019	52.34	6,053.22	5/19/2020	52.52	6,053.04	4/4/2022	52.35	6,053.21
EB-346	407590	3932255	6,371.63	6/3/2004	151.77	6,219.86				5/4/2018	132.37	6,239.26	4/16/2019	132.83	6,238.80						
EB-352	405988	3934482	6,321.62	7/14/2004	138.10	6,183.52	4/13/2015	141.58	6,180.04	5/4/2018	140.76	6,180.86	4/16/2019	141.54	6,180.08						
EB-373	401729	3941231	6,286.61	6/18/2004	127.10	6,159.51	3/16/2015	116.38	6,170.23	4/10/2018	116.30	6,170.31	4/18/2019	116.31	6,170.30	5/19/2020	115.75	6,170.86	4/5/2022	115.62	6,170.99
EB-379	401253	3934512	6,204.59	6/24/2004	101.77	6,102.82	4/13/2015	103.15	6,101.44	4/11/2018	103.33	6,101.26	4/17/2019	103.34	6,101.25	5/19/2020	103.43	6,101.16			
EB-387	403690	3937134	6,254.60	4/12/2007	98.47	6,156.13	4/13/2015	98.95	6,155.65	4/9/2018	98.87	6,155.73	4/16/2019	98.64	6,155.96	5/19/2020	98.59	6,156.01			
EB-388	403442	3937136	6,238.60	4/12/2007	88.95	6,149.65	4/13/2015	88.99	6,149.61	4/9/2018	88.92	6,149.68	4/16/2019	88.81	6,149.79	5/19/2020	88.75	6,149.85			
EB-389	403458	3936959	6,220.59	4/12/2007	107.94	6,112.65	4/13/2015	108.39	6,112.20	4/9/2018	108.31	6,112.28	4/16/2019	108.10	6,112.49	5/19/2020	108.04	6,112.55			
EB-390	404686	3933111	6,301.61	7/1/2004	157.85	6,143.76				4/10/2018	160.70	6,140.91	4/17/2019	160.86	6,140.75	5/19/2020	161	6,140.61	4/5/2022	162.98	6,138.63
EB-392	404853	3938331	6,284.61	7/15/2004	125.21	6,159.40	4/13/2015	125.26	6,159.35	4/9/2018	125.21	6,159.40	4/16/2019	125.23	6,159.38	5/19/2020	125.07	6,159.54			
EB-407	405069	3941697	6,390.64	3/23/2004	217.60	6,173.04	4/14/2015	214.98	6,175.66	4/10/2018	213.57	6,177.07	4/18/2019	213.17	6,177.47	5/19/2020	212.29	6,178.35			
EB-607	405006	3936039	6,347.05	3/28/2006	198.65	6,148.40	3/26/2015	200.18	6,146.87												
EB-661	407765	3939546	6,461.65	8/24/2006	291.45	6,170.20	4/13/2015	292.07	6,169.58	5/4/2018	292.56	6,169.09	4/16/2019	292.53	6,169.12						
EB-662	407765	3939546	6,461.65	8/24/2006	290.70	6,170.95	4/13/2015	290.58	6,171.07	5/4/2018	290.78	6,170.87									
EB-663	407765	3939546	6,461.65	8/24/2006	286.71	6,174.94	4/13/2015	282.67	6,178.98	5/4/2018	280.05	6,181.60									
EB-666	407135	3939493	6,443.65	8/24/2006	231.53	6,212.12	4/13/2015	237.62	6,206.03	5/4/2018	235.21	6,208.44	4/16/2019	244.62	6,199.03						
EB-667	407135	3939493	6,443.65	8/24/2006	246.62	6,197.03	4/13/2015	245.20	6,198.45	5/4/2018	245.55	6,198.10									
EB-691	400249	3937717	6,079.56				3/16/2015	23.21	6,056.35	4/10/2018	23.10	6,056.46	4/17/2019	23.02	6,056.54	5/19/2020	23.53	6,056.03	4/5/2022	23.1	6,056.46
EB-695	403641	3936964	6,228.60				4/13/2015	110.54	6,118.06	4/9/2018	110.43	6,118.17	4/16/2019	110.17	6,118.43	5/19/2020	110.13	6,118.47			
EB-696	403679	3937857	6,233.60	4/12/2007	89.75	6,143.85	4/13/2015	91.55	6,142.05	4/9/2018	91.57	6,142.03	4/16/2019	91.56	6,142.04	5/19/2020	91.47	6,142.13	4/5/2022	91.72	6,141.88
LC-009	399771	3936914	6,064.55				4/14/2015	15.79	6,048.76	4/9/2018	16.07	6,048.48	4/16/2019	14.42	6,050.13	5/19/2020	15.49	6,049.06			
LC-010	399811	3937131	6,027.54				4/14/2015	16.10	6,011.44	4/9/2018	16.05	6,011.49	4/16/2019	16.28	6,011.26	5/19/2020	16.68	6,010.86	4/5/2022	16.59	6,010.95
LC-025	400000	3936280	6,103.56				3/16/2015	7.87	6,095.69	4/9/2018	7.97	6,095.59	4/17/2019	7.90	6,095.66	5/19/2020	9.32	6,094.24	4/4/2022	8.05	6,095.51
LC-026	399995	3936316	6,102.56				3/16/2015	8.02	6,094.54	4/9/2018	6.44	6,096.12	4/17/2019	6.48	6,096.08	5/19/2020	6.66	6,095.90			
LC-027	401705	3937727	6,165.58							4/10/2018	40.57	6,125.01	4/17/2019	40.50	6,125.08	5/19/2020	40.74	6,124.84			
LC-036	400055	3938426	6,128.57				4/14/2015	11.24	6,117.33	4/9/2018	11.44	6,117.13	4/18/2019	11.60	6,116.97	5/19/2020	11.28	6,117.29			
LC-038	401562	3942555	6,325.62							4/9/2018	171.18	6,154.44	4/18/2019	171.93	6,153.69	5/19/2020	171.45	6,154.17			
LC-039	404716	3928667	6,226.59					</													

Appendix B

Parcel Data

**This appendix is provided electronically on the
report flash drive.**

Appendix C

Permitted Wells

**This appendix is provided electronically on the
report flash drive.**

Appendix D
Project Open House
Announcement



La Cienega Domestic Well Program Planning Project Introduction and Open House

Date: Wednesday, September 14, 2022

Time: 5:30 to 7:00 p.m.

Location: La Cienega Community Center
136 Camino San Jose, Santa Fe, NM 87507

Purpose:

- Introduce La Cienega Domestic Well Program Planning Project
- Meet the team
- Gather feedback to inform the project's future phases and public outreach methods



DBS&A
Daniel B. Stephens & Associates, Inc.
a Geo-Logic Company



La Cienega Domestic Well Program Planning Project Introduction and Open House

Join Us!

You are invited to a La Cienega Domestic Well Program Planning project introduction and open house, to be held from 5:30 to 7:00 p.m. on Wednesday, September 14, 2022 at the La Cienega Community Center (136 Camino San Jose, Santa Fe, NM 87507).

At this open house, Daniel B. Stephens & Associates, Inc. (DBS&A), the New Mexico Bureau of Geology and Mineral Resources (NMBGMR), and staff from the Santa Fe County Sustainability Office will introduce ourselves and the project. Feedback received in response to this event will be used to inform the project's future phases and public outreach methods.

Project Background

Santa Fe County has an existing domestic well management program; however, staff resources and well owner engagement have been limited to date. The objectives of the current project are to understand the area's groundwater levels and trends, identify the existing requirements that apply to different wells in the planning area, estimate current and project future water demand, solicit community member involvement in the project and input on the best methods for obtaining water use data, and develop recommendations for how to improve the existing well management program.

What's Next?

Initial project tasks include preparing a map showing the land parcels and existing wells located within the La Cienega and La Cieneguilla planning area, summarizing the area's hydrogeologic setting, reviewing Santa Fe County ordinance 2002-9 and the 2016 Sustainable Land Development Code (SLDC) to identify which plats their respective requirements apply to, and gathering available water level and metered pumping data for existing domestic wells in the area.

As the domestic well monitoring program is developed and domestic well information are obtained, water demand projections for the planning area will be refined. The County will work with the community to evaluate whether the projections reflect desired future conditions. Depending on the current project's findings, water conservation goals, enforcement of existing requirements, new ordinances, and/or other programs may be recommended.

We hope to see you at this event!

Please contact Amy Ewing with DBS&A (505-822-9400; aewing@geo-logic.com) or Jacqueline Beam with Santa Fe County (505-992-9832; jybeam@santafecountynm.gov) with any questions.



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Planificación del Programa de Pozos Domésticos la Ciénega Proyecto Introducción y Jornada de Puertas Abiertas

Date: miércoles 14 de septiembre de 2022

Time: 5:30 a 7:00 p.m.

Localidad: el Centro Comunitario La Ciénega
136 Camino San José, Santa Fe, NM 87507

Objetivos:

- Presentarán al proyecto
- Introducción el personal
- Solicitar la participación de los miembros de la comunidad en el proyecto y contribución sobre los mejores métodos



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Daniel B. Stephens & Associates, Inc.
a Geo-Logic Company



Planificación del Programa de Pozos Domésticos la Ciénega Proyecto Introducción y Jornada de Puertas Abiertas

Únete a nosotros

Usted está invitado a una introducción y jornada de puertas abiertas al proyecto de Planificación del Programa de Pozos Domésticos la Ciénega, que se llevará a cabo de 5:30 a 7:00 p.m. el miércoles 14 de septiembre de 2022 en el Centro Comunitario La Ciénega (136 Camino San José, Santa Fe, NM 87507). En esta jornada de puertas abiertas, Daniel B. Stephens & Associates, Inc. (DBS&A), la Oficina de Geología y Recursos Minerales de Nuevo México (NMBGMR) y el personal de la Oficina de Sostenibilidad del Condado de Santa Fe nos presentarán a nosotros mismos y al proyecto. El comentario recibido en respuesta a este evento se utilizará para informar las fases futuras del proyecto y los métodos del compromiso al la comunidad.

Antecedentes del proyecto

El Condado de Santa Fe tiene un programa nacional de manejo de pozos existente; sin embargo, los recursos de personal y la participación de los propietarios de pozos han sido limitados hasta la fecha. Los objetivos del proyecto actual son comprender los niveles y tendencias de las aguas subterráneas del área, identificar los requisitos existentes que se aplican a los diferentes pozos en el área de planificación, estimar la demanda de agua actual y la del futuro, solicitar la participación de los miembros de la comunidad en el proyecto y contribución sobre los mejores métodos para obtener datos del uso del agua, y desarrollar recomendaciones sobre cómo mejorar el programa de gestión de pozos.

¿Y ahora qué?

Las tareas iniciales del proyecto incluyen la preparación de un mapa que muestre las parcelas de tierra y los pozos existentes ubicados dentro del área de planificación de La Ciénega y La Cieneguilla, el resumen del entorno hidrogeológico del área, la revisión de la ordenanza del Condado de Santa Fe 2002-9 y el Código de Desarrollo Sostenible de la Tierra (SLDC) de 2016 para identificar a qué placas se aplican sus respectivos requisitos, y la recopilación del nivel de agua disponible y los datos de bombeo medido para los pozos domésticos existentes en el área.

A medida que se desarrolle el programa de vigilancia de pozos nacionales y se obtenga información sobre los pozos nacionales, se perfeccionarán las proyecciones de demanda para el área de planificación. El Condado trabajará con la comunidad para evaluar si las proyecciones reflejan las condiciones futuras deseadas. Dependiendo de los hallazgos del proyecto actual, se pueden recomendar objetivos de conservación, cumplimiento de los requisitos existentes, nuevas ordenanzas y / u otros programas.

¡Esperamos verte en este evento!

Comuníquese con Amy Ewing con DBS&A (505-822-9400; aewing@geo-logic.com) o Jacqueline Beam con el condado de Santa Fe (505-992-9832; jybeam@santafecountynm.gov) con cualquier pregunta.



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Appendix E

Well Survey

La Cienega Domestic Well Program Planning Project

Survey

Name: _____

Address: _____

Phone: _____

Email: _____

1. Do you live within the La Cienega and La Cieneguilla community planning area?

2. If so, are there any wells on your property?

3. If yes:

a. How many?

b. Are they active/used?

c. Are they permitted with the New Mexico Office of the State Engineer (and if so, what are the file numbers)?

d. What are they used for (e.g., irrigation, domestic use)? If domestic use, does the well supply one household or multiple households?

e. Is the groundwater pumping metered?

f. Do you collect depth to water measurements?

4. Is your property connected to County water?

5. What are your thoughts on future water use in this area?

6. What are your suggestions for the County's domestic well management program?

7. What is the best way to contact you with domestic well program project updates?

Encuesta del Proyecto de Planificación del Programa de Pozos Domésticos en La Ciénega

Nombre: _____

Dirección: _____

Teléfono: _____

Correo electrónico: _____

1. ¿Vive Usted dentro del área de planificación comunitaria de La Ciénega y La Cieneguilla?

2. Si es así, ¿hay algún pozo en su propiedad?

3. En caso afirmativo,

a. How many?

b. ¿Están activos/utilizados?

c. ¿Tienen permisos obtenidos de la Oficina de Ingeniería del Estado de Nuevo México (y si es así, cuáles son los números de archivo)?

d. ¿Para qué se utilizan (por ejemplo, riego, uso doméstico)? Si es de uso doméstico, ¿el pozo sirve a un hogar o a varios hogares?

e. ¿Se mide el bombeo de agua subterránea?

f. ¿Recolectan mediciones de profundidad al agua?

4. ¿Su propiedad está conectada al agua del Condado?

5. ¿Qué opina sobre el uso futuro del agua en esta área?

6. ¿Cuáles son sus sugerencias para el programa nacional de manejo de pozos del Condado?

7. ¿Cuál es la mejor manera de contactarlo con actualizaciones de proyectos de programas de pozos nacionales?

Appendix F
1996 La Cienega
Watershed Conditions

LA CIENEGA WATERSHED CONDITIONS

- 1) **CONNECTION TO COUNTY WATER UTILITY** LOT OWNERS, THEIR SUCCESSORS AND ASSIGNEES SHALL AGREE TO CONNECT TO THE COUNTY WATER UTILITY WHEN SERVICE IS AVAILABLE WITHIN 200 FEET OF THE PROPERTY LINE OF THE LAND BEING DIVIDED, WHICH 200 FEET SHALL BE MEASURED ALONG PLATTED EASEMENTS TO THE NEAREST PROPERTY LINE. THE LANDOWNERS, SUCCESSORS, AND ASSIGNEES AGREE NOT TO OPPOSE THE CREATION OF AN IMPROVEMENT DISTRICT PURSUANT TO SECTION 4-55A-1 ET. SEQ. NMSA 1978 (1997 REPL. PAMP.), AS THOSE SECTIONS MAY BE APPROPRIATE. ALTERNATIVELY, THIS CONDITION DOES NOT PRECLUDE ANY OTHER MEANS OF FINANCING THAN THE IMPROVEMENT DISTRICT METHOD. THE LINE EXTENSION WITHIN SAID 200 FEET SHALL BE DONE IN ACCORDANCE WITH THE APPLICABLE RULES AND REGULATIONS AND TARIFFS OF THE SANTA FE COUNTY WATER COMPANY.
- 2) **ENCOURAGEMENT FOR SHARED WELLS** TO THE GREATEST EXTENT FEASIBLE, LOT OWNERS SHOULD USE SHARED WELLS TO MINIMIZE EXPENSES RELATED TO THE INTERIM WATER SUPPLIES.
- 3) **DESIGN AND CONSTRUCTION** AT THE TIME A LINE EXTENSION IS MADE PURSUANT TO PARAGRAPH 1 ABOVE. THE DISTRIBUTION SYSTEM WITHIN THE LAND DIVIDED SHALL BE DESIGNED TO MEET THE MINIMUM FIRE FLOW REQUIREMENTS OF THE SANTA FE COUNTY WATER UTILITY, EXCLUSIVE OF ANY RESERVOIR CAPACITY.
- 4) **DISCONNECTION FROM DOMESTIC WELLS** AT THE TIME THE CONNECTION IS MADE TO THE SANTA FE WATER UTILITY, LOT OWNERS, THEIR HEIRS, SUCCESSORS, AND ASSIGNEES, AGREE TO DISCONNECT ANY DOMESTIC WELLS CREATED UNDER NMSA SECTION 72-12-1 NMSA 1978 (1997 REPL. PAMP.) AND TO DISCONTINUE USE OF SAID WELLS EXCEPT IN EMERGENCY CIRCUMSTANCES.
- 5) **EASEMENTS** LOT OWNERS SHALL DEDICATE A 15 FOOT WIDE UTILITY EASEMENT ALONG ALL PROPERTY LINES FOR THE INSTALLATION OF INFRASTRUCTURE AND WATER DISTRIBUTION LINES FOR THE COUNTY UTILITY SYSTEM.
- 6) **WELL DESIGN** A GOOD FAITH EFFORT SHALL BE MADE TO DRILL ALL WELLS 50 FEET INTO THE TESUQUE FORMATION AND TO CONNECT A SEAL TO PREVENT MIXING OF WATERS BETWEEN THE TESUQUE AND ANCHA FORMATIONS. A SUGGESTED WELL DESIGN IS AVAILABLE FROM THE COUNTY LAND USE DEPARTMENT.

Appendix G

Existing Santa Fe County
Domestic Well
Report Form

**SANTA FE COUNTY
TOTALIZING METER REPORT**

Due to the limited nature of water resources in Santa Fe County (SFCo), the vulnerability to depletion by drought, and to provide a sustainable resource for future generations, the Board of County Commissioners adopted SFCo Ordinance 2004-7 to address water conservation for all residential and commercial uses of water within SFCo. Ordinance 2004-7 requires residents of SFCo living or operating businesses on lots where restricted water usage and water meter reporting requirements apply, submit well metering data on an annual basis.

Year-end data must be submitted to SFCo Utilities on or before January 15th immediately following the reporting year.

1. CUSTOMER INFORMATION

Name: _____ Work Phone: _____
Home/Cell Phone: _____
Address: _____
City: _____ State: _____ Zip: _____
Email Address _____

2. WELL INFORMATION (Please attach a copy of your well permit and plat if not previously submitted.)

Office of the State Engineer Well Number: _____
Latitude: _____ Longitude: _____

Use the following link to Google Maps to find Latitude and Longitude by inputting your street address:
<http://www.mapcoordinates.net/en>

3. TOTALIZING METER INFORMATION

Serial Number: _____ Make: _____
Model: _____ Multiplier: _____
Units: () cubic-feet () gallons

4. METER READINGS

Previous reading _____

(Reading of the meter totalizer should be recorded once each month on or near the same date)

Month	Reading Date	Meter Reading	Month	Reading Date	Meter Reading
January	_____	_____	July	_____	_____
February	_____	_____	August	_____	_____
March	_____	_____	September	_____	_____
April	_____	_____	October	_____	_____
May	_____	_____	November	_____	_____
June	_____	_____	December	_____	_____

5. PHOTOGRAPH OF METER

Please Attach

6. CALCULATE USAGE

See back for calculation sheet

7. ADDITIONAL STATEMENTS OR EXPLANATIONS:

(Please include any pertinent information concerning repair of meter, dates out of service, etc.)

Submitted by: _____

Date: _____

Return Form to: Via Regular Mail -

Santa Fe County Utilities Department
424 NM Hwy 599 Frontage Road Santa
Fe, New Mexico 87507

Electronically -

tybeam@santafecountynm.gov

If you have any questions call Jacqueline Beam at: 992-9832

Revision Date: March 8, 2021

Water Use Calculation Worksheet

A. Average Daily Water Use (for use with meter that reads in cubic feet):

1. Meter Readings:

<u>Reading #2</u>	<u>Reading #1</u>	
Date: _____	Date: _____	_____ # of days between readings
Odometer Reading: _____	- Odometer Reading: _____	= _____ Cubic feet used

2. Water Use (convert to gallons):

Cubic feet used: _____ x 7.48 gallons
= _____ (Gallons used)

3. Average Daily Water Use:

Gallons used: _____
÷ _____ (# of days between readings)
= (Average gallons per day)

B. Average Daily Water Use (for use with meter that reads in gallons):

1. Meter Readings:

<u>Reading #2</u>	<u>Reading #1</u>	
Date: _____	Date: _____	_____ # of days between readings
Odometer Reading: _____	- Odometer Reading: _____	= _____ Gallons used

2. Average Daily Water Use:

Gallons used: _____
÷ _____ (# of days between readings)
= (Average gallons per day)

C. Total Annual Usage

Average gallons per day _____ x 350* = _____ Total gallons/year used

*reduced total number of days to account for 14 day vacation

How to Read Your Water Meter

STEP 1: Locate Your Meter



Figure 1

Your water meter is generally located near the curb in front of your home although in some areas it may be inside your home, usually in the basement. Outside meters are typically housed in a concrete box marked "water" (as shown in Figure 1) or in a meter pit with a cast iron lid. Carefully remove the lid by using a tool such as a large screwdriver or pliers and visually examine the area around the meter to make sure there are no harmful insects or other animals.

STEP 2: Read Your Water Meter

Water meters in Santa Fe County (SFCo) measure volume in gallons or cubic feet (one cubic foot = 7.48 gallons and 100 cubic feet = 748 gallons). Water charges are typically based on 100 cubic feet or on 1000 gallon units. There is one type of water meter used throughout SFCo, the digital-reading meter which resembles the meter in Figure 2.

In the meter shown in Figure 2 and 3, the reading is taken directly from the display. The meter reads the total number of gallons of water recorded since the meter was installed. Open lid to expose face of meter in order to read the meter.



Figure 2

INTRODUCING YOUR NEW NEPTUNE WATER METER

Learn about its features and how to read your meter.

LIGHT SENSOR

Recessed small hole (next to flashlight icon).
Supplies the power for the LCD panel (light activated).

On your LCD screen you may see the following icons.



FLOW INDICATOR

Shows the direction of flow through the meter.

- ON Water in use
- OFF Water not in use
- Flashing Water is running slowly
- (-) Reverse flow
- (+) Forward flow



LEAK INDICATOR

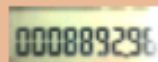
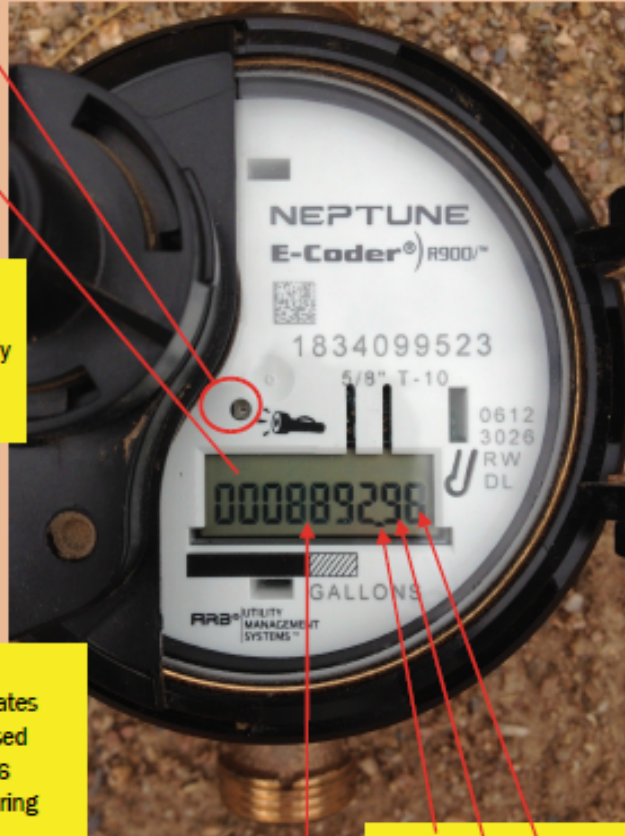
Displays a possible leak.

- OFF No leak indicated
- Flashing Intermittent leak indicates that water has been used for at least 50 of the 96 15-minute intervals during a 24-hour period
- On Continuously Indicates water use for all 96 15-minute intervals during a 24-hour period

RATE

RATE OF FLOW

Average flow rate is displayed every 6 seconds on LCD display.



LCD DISPLAY

Nine digit LCD displays the meter reading in billing units of gallons.

Read is followed by a decimal point

Then a number that is 10 ths of a gallon

Then a number that is 100 ths of a gallon

How to read your meter

The read in the photo is 8,892.96 gallons

Figure 3

Appendix H
Current Water
Restriction and
Conservation
Covenants

each calendar year. Meter readings shall be provided to the Administrator no later than April 30 of the same calendar year. SLDC, Chapter 7, Section 7.13.11.5.2

Outdoor/Indoor Conservation
SLDC Chapter, 7, Section 7.13.11.2 and 7.13.11.3

1. Low water use landscaping techniques or xeriscaping shall be utilized for all development. Drip irrigation and landscape mulching shall be provided.
2. Only low water use grasses, shrubs and trees that are appropriate to the New Mexico climate shall be used. Sod or grass seed that contains Kentucky bluegrass is not permitted.
3. Lawns of non-native grasses shall not exceed 800 square feet and shall only be watered with harvested water or grey water.
4. Landscaping may be watered as needed during the first and second years of growth to become established; thereafter landscaping may be watered as is needed to maintain viability.
5. Watering or irrigation shall be provided through a timed drip irrigation system that ensures that landscaping is not watered between the hours of 11 a.m. and 7 p.m. between the months of May and November. Irrigation systems shall be equipped with a rain sensor so that the irrigation system does not operate when it is raining or has recently rained. Such approved systems include but are not limited to evapotranspiration-based controllers. This paragraph does not apply to gardens or agricultural uses.
6. Outdoor watering or irrigation is prohibited between 11 a.m. and 7 p.m. from May to September of each year, except for the following:
 - a. Plants being prepared for sale;
 - b. Manual watering by landscape maintenance and contracting personnel;
 - c. Water derived from rainwater catchment systems or a grey water re-use system; and
 - d. Water derived from an acequia or other agricultural irrigation.
7. Vehicle washing is only allowed with the use of a shut-off hose nozzle.
8. An outdoor irrigation system may not be operated if leaking.
9. Water leaks shall be repaired promptly and in no event more than ten (10) days from the beginning of the leak. Proof of repair shall be provided upon request.
10. Water saving fixtures shall be installed in all new construction, remodels and in all remodels and renovations when a fixture is being replaced.
 - a. All toilets and flush urinals shall be EPA WaterSense certified or equivalent standard.
 - b. All lavatory faucets shall be EPA WaterSense certified or equivalent standard.
 - c. All showerheads shall be EPA WaterSense certified or equivalent standard.
11. Water conserving appliances shall be installed in all new construction and in all remodels or renovations when an appliance is being replaced.
 - a. Residential dishwashers shall be EPA Energy Star certified or equivalent.
 - b. Residential clothes washers shall be EPA Energy Star certified or equivalent.
12. Water conserving fixtures shall be installed in strict accordance with the manufacturer's instructions to maintain their rated performance.
13. Hot water systems shall ensure that hot water is delivered within five seconds of a tap being opened. This requirement can be achieved through the use, either alone or in combination, of the following devices or designs: (i) an on demand circulation system; (ii) a centrally located water heater; (iii) a point-of-use water heater; (iv) short hot water pipe runs; (v) small diameter piping; (vi) "instant hot" hot water fixtures; or (vii) super insulation methods.
14. A certificate of compliance by a licensed mechanical contractor or plumber that new construction meets the requirements of the SLDC shall be provided.
15. Evaporative coolers shall circulate bleed-off water.
16. Greywater recycling, if provided, shall reduce the annual amount of water needed for the use, by the amount of the anticipated greywater recycling.
17. All permanent swimming pools, and any temporary pools with a fill capacity over 3,000 gallons, shall be prohibited in accordance with Section 7.24 of the SLDC.
18. All swimming pools, hot tubs and spas must be covered to prevent evaporation when not in use. Swimming pools may only be emptied once per year.

ARTICLE III

Appendix I
Parcels Located within
200 feet of
Existing County
Water Lines

**This appendix is provided electronically on the
report flash drive.**

Appendix J
Development Permit
Activity for
2002 through 2022

**This appendix is provided electronically on the
report flash drive.**

Appendix K
Development Permit
Activity for
1996 through 2001

**This appendix is provided electronically on the
report flash drive.**