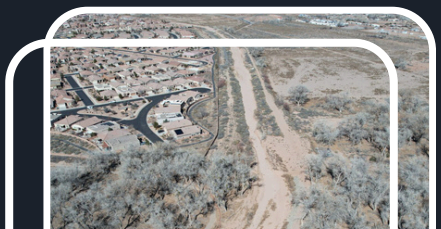
THE SOUTHERN SANDOVAL COUNTY FLOOD CONTROL AUTHORITY (SSCAFCA)

2025 HAZARD MITIGATION PLAN



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Professional planning services were provided by:

SYNERGY DISASTER RECOVERY

Upper Bosque de Bernalillo (Source: SSCAFCA)

2 Executive Summary

The Southern Sandoval County Arroyo Flood Control Authority ("SSCAFCA" or "the Authority) Hazard Mitigation Plan (HMP) is a plan designed to reduce risks from natural hazards—such as floods and erosion- before disasters strike.

What Is Hazard Mitigation?

Hazard mitigation simply means taking action to prevent or lessen the long-term impact of disasters on people, property, and the community as a whole. These actions protect lives and property, save money in the long run, and help communities bounce back faster after disaster events.

Why Plan Ahead?

Disaster recovery is expensive. Studies show that every dollar invested in mitigation returns six dollars in savings by preventing damage. Planning ahead means safer neighborhoods, less property damage, faster recovery, and greater peace of mind for the Authority and its neighboring communities.

How Does the Plan Help?

- Makes SSCAFCA eligible for federal funding to support mitigation projects
- Raises public awareness about local risks and ways to reduce them
- Helps ensure community goals and future development are compatible with hazard reduction
- Encourages partnerships among residents, businesses, and emergency agencies
- Guides the prioritization and implementation of projects that protect lives and property

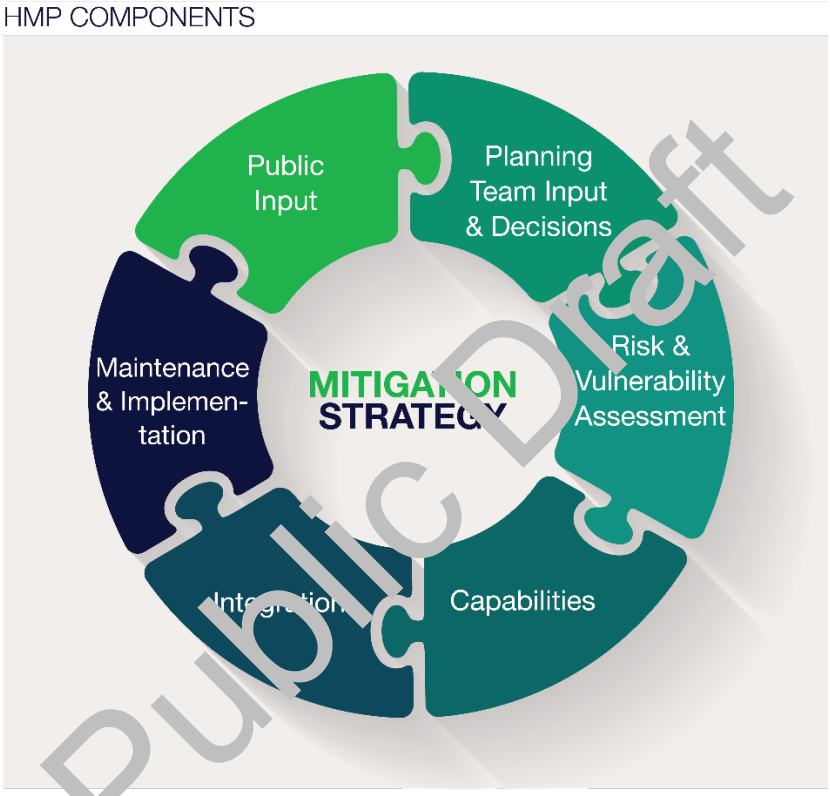
By working together and investing in hazard mitigation, SSCAFCA helps build a community that is safer, stronger, and better prepared for whatever comes next. This plan is a blueprint for a resilient future—protecting what matters most and ensuring a quick recovery when nature challenges us.

> Hazard Mitigation is a sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects.

3 Mitigation Strategy

SSCAFCA's 2025 HMP was developed to identify a mitigation strategy for implementation over the next five years. While this document begins by focusing on this mitigation strategy, it is important to acknowledge the various components that contributed to the planning process. FIGURE 1 summarizes those inputs that are covered in detail across this plan.

Figure 1 Mitigation Strategy Components



3.1 Mitigation Goals

The Planning Team and Stakeholders that contributed to this planning process identified the following hazard mitigation goals as the overarching framework for the Authority's hazard mitigation strategy. These broad goals express the Authority's overall, long-term vision for mitigating natural hazards.

- Goal 1: Reduce the number of injuries, fatalities, and property damage, both public and private, due to natural hazards.
- Goal 2: Shorten recovery times after natural hazard events
- Goal 3: Improve mitigation-related communication, collaboration, and integration among district, local, and tribal emergency management agencies.

- Goal 4: Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.
- Goal 5: Promote hazard-resilient future development.

3.2 2025 Mitigation Actions

A mitigation action is a measure, project, plan, or activity proposed to reduce or eliminate current and future vulnerabilities to hazards. These actions help achieve the HMP's goals and are a key outcome of the planning process.

The Planning Team has identified an updated list of mitigation actions (i.e., projects) to work towards accomplishing over the HMP's subsequent five-year lifespan. Over the course of the HMP's development, the Planning Team was informed of the comprehensive range of mitigation action types to consider. These actions can include the protection of natural systems and nature-based solutions, education and awareness programs, structural and infrastructure projects, and local plans and regulations.

Planning Team workshops included discussions of various mitigation ideas identified during the planning process. Attention was directed toward ideas aimed at reducing the impacts and vulnerabilities identified in the risk assessment, enhancing current capabilities, or addressing any capability gaps. Emphasis was placed on identifying actions that would help mitigate the vulnerabilities of new and existing structures and infrastructure. Additional resources, including FEMA'S MITIGATION BEST PRACTICES PORTFOLIO, were also referenced.

Following the identification of the 2025 mitigation actions, the Planning Team prioritized the actions. According to the Federal Emergency Management Agency (FEMA) mitigation planning requirements, any prioritization system should emphasize the extent to which benefits are maximized. This requires a planning-level assessment of whether the costs are reasonable compared to the probable benefits of an action/project (positive cost-benefit). Benefits may include preventing damage to structures and infrastructure, saving lives, reducing injuries, improving quality of life, and protecting ecosystems.

The Planning Team reviewed both FEMA's suggested prioritization methodology and others to determine those that the Authority would utilize. Ultimately, it was decided that the following criteria would be considered when prioritizing mitigation efforts:

- Positive cost-benefit
  - Do the benefits outweigh the costs?
- Life and Safety
  - What impact will the project have on businesses, residences, and properties in the planning area?
  - Will the project proactively reduce natural hazard risk?
- Administrative/Technical Assistance

    - Is there sufficient staff to implement the project?
    - Is training required for the staff to implement the project?
    - Is there political support for the project?
    - Does the Authority have the legal authority to do the project
- Project Cost and Economic Factors
    - What is the cost of the project?
    - Does the Authority have the funds for the project on the whole or the local match?
- Support for Authority Objectives
    - Does the action advance other objectives or plans related to capital improvement, economic development, environmental quality, or open space preservation?

During the planning process, the Planning Team decided that it would prioritize mitigation actions using a three-tiered qualitative methodology: High, Moderate, or Low.

- High Priority: These are critical and urgent actions that address a significant and imminent threat to life safety and critical infrastructure. They are cost-effective, technically feasible, and have strong public support. These projects are considered essential for the community's immediate safety and well-being.
- Moderate Priority: These actions are important for reducing risk and protecting property but may address a less immediate or severe threat than high-priority items. They are generally cost-effective and feasible, but may have a longer implementation timeframe or require further study.
- Low Priority: These actions are desirable for further risk reduction but are not considered urgent. They may have a lower benefit-cost ratio, address a less significant hazard, or face implementation challenges such as funding constraints or a lack of political support. These projects are often considered for implementation as resources become available.

To ensure this updated HMP meets FEMA policy, at least one mitigation action has been identified per profiled natural hazard. **TABLE 1** includes the full details of all new mitigation actions in this updated 2025 HMP. It should be noted that for potential funding source(s), reference to a "Local" includes staff time.

Table 1 2025 Mitigation Actions

Mitigation Action Title	Local Govt. Lead	Partnering Organization(s) – If Applicable	Primary Hazard Mitigated	Relevant Goal(s)	Action Details / Benefits	Priority	Est. Time-frame	Potential Funding Source(s)
2025-1 Thermopylae Diversion Project - Phase 1	Design Services Director	Sandoval County, City of Rio Rancho	Flood	1, 2, 5	Construct stormwater ponds and channel to divert two tributaries of the Calabacillas Arroyo into the main stem prior to impacting Southern Blvd, housing, and two natural gas transmission mains	High	2026	HMGP/ Local
2025-2 Lisbon Channel Bank Stabilization	Facility Operations Director	City of Rio Rancho	Soil Erosion	1, 2, 5	Construct grade control and bank protection along the Lisbon Channel between Southern Blvd and the pedestrian bridge to protect adjacent commercial development from erosion.	High	2026	HMGP/ Local
2025-3 Honduras Flood	Design Services Director	City of Rio Rancho	Flood / Soil Erosion	1, 2, 5	Design and construct detention basins, storm drain pipes,	High	2027	HMGP/ Local

Mitigation Action Title	Local Govt. Lead	Partnering Organization(s) – If Applicable	Primary Hazard Mitigated	Relevant Goal(s)	Action Details / Benefits	Priority	Est. Time-frame	Potential Funding Source(s)
Mitigation Project					inlets, channel improvements, and roadway improvements			
2025-4 Sportplex Dam Outlet rehabilitation	Design Services Director		Flood / Soil Erosion	1, 2, 5	Design and construct repairs to the outlet structure of Sportsplex Dam in Rio Rancho, NM	High	2027	Water Trust Board/ Local
2025-5 Montoyas Reach Stabilization Broadmoor to Sportsplex	Design Services Director	City of Rio Rancho	Soil Erosion	1, 2, 5	Plan, design, and construct bank stabilization and grade control to protect utilities, development, and other infrastructure in this arroyo segment	Medium	2028	HMGP/ Local
2025-6 Arid environment rainfall pattern study - 5%	Executive Engineer	National Weather Service	Flood / Soil Erosion	1, 2, 5	Study rainfall patterns specific to SSCAFCA's jurisdictional area and determine if better hydrologic modelling methods and design storms to	Medium	2027	HMGP/ Local

Mitigation Action Title	Local Govt. Lead	Partnering Organization(s) – If Applicable	Primary Hazard Mitigated	Relevant Goal(s)	Action Details / Benefits	Priority	Est. Time-frame	Potential Funding Source(s)
					be used in mitigation planning and design activities.			
2025-7 North Hills Stormwater diversion facility	Design Services Director	City of Rio Rancho	Flood	1, 2, 5	Design and construct stormwater detention facility to reduce downstream flooding and the Village of Corrales	High	2028	HMGP/ Local
2025-8 Nightglow Avenue Area Flood Mitigation	Facility Operations Director	Sandoval County, City of Rio Rancho	Flood	1, 2, 5	Construct ponds, stormdrains, inlets, curb, and gutter in the Nightglow Avenue Flood Mitigation area.	Medium	2029	HMGP/ Local
2025-9 Montoyas Arroyo Reach Stabilization - Northern - Broadmoor	Design Services Director	City of Rio Rancho	Soil Erosion	1, 2, 5	Plan, design, and construct bank stabilization and grade control to protect utilities, development, and other infrastructure in this arroyo segment	High	2026	HMGP/ Local

Mitigation Action Title	Local Govt. Lead	Partnering Organization(s) – If Applicable	Primary Hazard Mitigated	Relevant Goal(s)	Action Details / Benefits	Priority	Est. Time-frame	Potential Funding Source(s)
2025-10 Erosion and Grade Control Improvements, jurisdiction wide	Facility Operations Director	Sandoval County, City of Rio Rancho	Flood / Soil Erosion	1, 2, 5	Plan design and construct erosion and grade control facilities throughout SSCAFCA jurisdiction	Medium	Ongoing	HMGP/ Capital Outlay (State)/ Local
2025-11 Continue updates to Watershed Management Plans	Executive Engineer	Sandoval County, City of Rio Rancho, Town of Bernalillo, Village of Corrales	Flood / Soil Erosion	1, 3, 4 ,5	Continue to update, every six years, each of the watershed management plans (WMP) for the six main arroyo systems SSCAFCA manages. Review hydrologic and hydraulic models associated with each WMP to identify any deficiencies in SSCAFCA's drainage system	Medium	Ongoing	Local
2025-12 Corrales Heights Dam Planning / Preliminary Engineering	Design Services Director	City of Rio Rancho, Village of Corrales, Office of State Engineer	Dam Incident	1, 2, 3, 5	Update the Emergency Action Plan for the Corrales Heights Dam, utilizing updated hydrology modeling. Conduct	Low	2028	Local/ FEMA HHPD

Mitigation Action Title	Local Govt. Lead	Partnering Organization(s) – If Applicable	Primary Hazard Mitigated	Relevant Goal(s)	Action Details / Benefits	Priority	Est. Time-frame	Potential Funding Source(s)
					tabletop exercises following updates.			
2025-13 Public Drought Mitigation Education Campaign	Facility Operations Director	Sandoval County, City of Rio Rancho, Town of Bernalillo, Village of Corrales, UNM, Stormwater Quality Team	Drought	1, 3, 4	Enhance the existing Watershed Stewards Program with the addition of educational drought mitigation materials. These materials will be disseminated regularly at public events the Authority participates in, along with public events such as the County Fair and Harvest Festival, which is held each September in Corrales. This will be an ongoing campaign.	Medium	2030	Local
2025-14 Dam Inspections and Formalized Program	Facility Operations Director	Office of State Engineer (for Jurisdictional Dams)	Earthquake	1, 3	Conduct annual dam surveying and inspections. Formalize a post-seismic event inspection program.	Low	2030	Local

Mitigation Action Title	Local Govt. Lead	Partnering Organization(s) – If Applicable	Primary Hazard Mitigated	Relevant Goal(s)	Action Details / Benefits	Priority	Est. Time-frame	Potential Funding Source(s)
2025-15 Infrastructure Inspections	Facility Operations Director		Land Subsidence	1, 3	Conduct annual infrastructure inspections to identify necessary land subsidence mitigation projects.	Low	2030	Local
2025-16 Public Wildfire Mitigation Education Campaign	Facility Operations Director	Sandoval County, EMNRD Forestry Division	Wildfire	1, 3, 4, 5	Enhance the existing Watershed Stewards program with the addition of educational wildfire mitigation materials. These materials will be disseminated regularly at public events the Authority participates in, along with public events such as the County Fair and Harvest Festival that is held each September in Corrales. This will be an ongoing campaign.	Low	2029	Local

Mitigation Action Title	Local Govt. Lead	Partnering Organization(s) – If Applicable	Primary Hazard Mitigated	Relevant Goal(s)	Action Details / Benefits	Priority	Est. Time-frame	Potential Funding Source(s)
2025-17 Digitization of Dam Inundation Areas	Design Services Director		Dam Incident	3, 5	Digitization of dam inundation areas for future analysis and planning efforts.	High	2026	Local
2025-18 Sediment Transport and Reach Stabilization Planning	Design Services Director		Erosion	1, 2, 5	The project involves studying sediment transport and planning for reach stabilization, which aims to maintain or improve the ability of arroyos and channels to convey stormwater and reduce erosion impacts. A rainfall pattern study, funded by FEMA's HMGP, will contribute to these efforts.	Medium	2027	HMGP/ Capital Outlay (State)/ Local

3.3 2019 & Other Past Mitigation Actions

As part of the planning process, the Authority reviewed and reported on the status of all mitigation actions (i.e., projects) identified in the 2019 Sandoval County HMP, in addition to actions identified in other Authority planning documents. FIGURE 2 provides a summary of the implementation status of each. TABLE 2 provides more details on the progress made towards making the Authority more resilient to the impacts of hazards.

As crucial as acknowledging projects that have been accomplished (completed), on-going mitigation actions are often overlooked as examples of the positive implementation of the mitigation strategy. Examples include continuing education and outreach efforts, maintenance activities, work on updating plans, and organizational coordination and improvement processes.

Figure 2 Past Action Status Reporting Summary

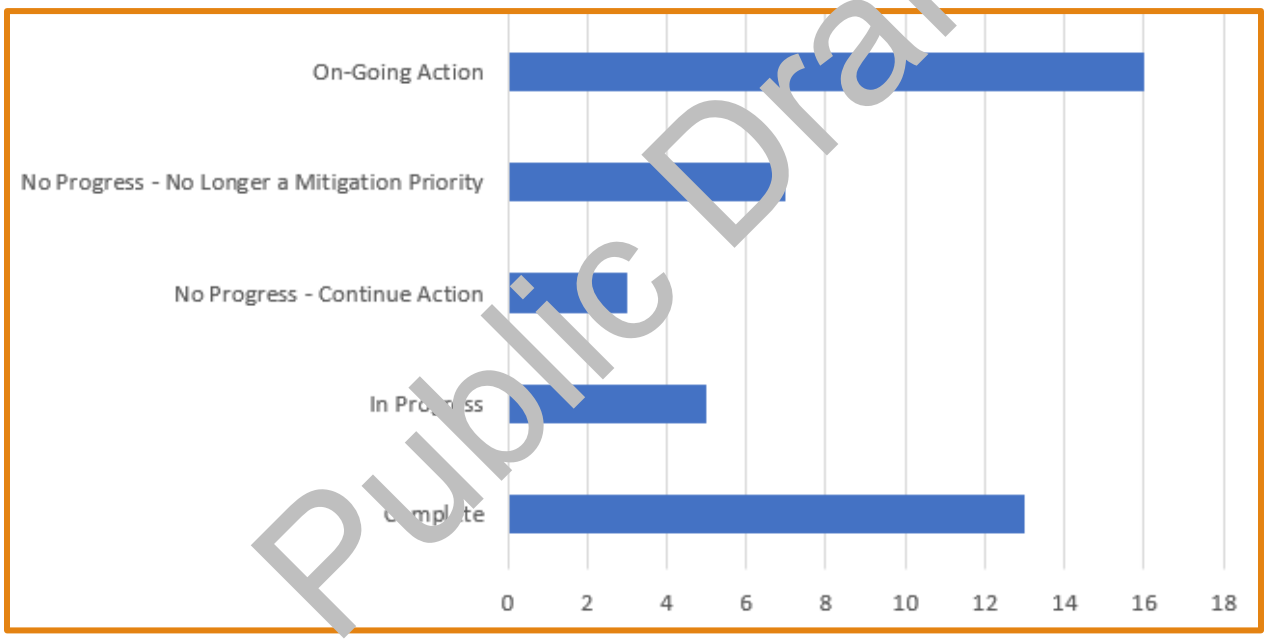


Table 2 Previously Identified Mitigation Actions

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
Other-1	2025	Thermopylae Diversion Project - Phase 1	Flood	Construct stormwater ponds and channels to divert two tributaries of the Calabacillas Arroyo into the main stem prior to impacting Southern Blvd, housing, and two natural gas transmission mains	Complete	Funds received from FEMA to design this project. Hazard Mitigation grant application for construction has been submitted.
Other-2	2025	SSCAFCA Lisbon Channel Bank Stabilization	Erosion	Construct grade control and bank protection along the Lisbon channel between Southern Blvd and the pedestrian bridge to protect adjacent commercial development from erosion.	In Progress	FEMA HMGP grant received for the construction of the project
Other-3	2025	SSCAFCA Honduras Flood Mitigation Project	Flood/Erosion	Design and construct detention basins, storm drainpipes, inlets, channel improvements, and roadway improvements	In Progress	FEMA HMGP grant received to design this project. Hazard Mitigation grant application for construction will be submitted after design completion.
Other-4	2025	SSCAFCA Montoyas Reach Stabilization	Erosion	Plan, design, and construct bank stabilization and grade control to protect utilities,	No Progress -	Phased FEMA HMGP application has been submitted

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ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
		Broadmoor to Sportsplex		development, and other infrastructure in this arroyo segment	Continue Action	
Other-5	2025	SSCAFCA Stormwater Study - 5%	Flood/Erosion	Study rainfall patterns specific to SSCAFCA's jurisdictional area and determine if better hydrologic modelling methods and design storms to be used in mitigation planning and design activities.	No Progress - Continue Action	Phased FEMA HMGP application has been submitted
Other-6	2025	North hills Stormwater diversion facility	Flood	Design and construct stormwater detention facility to reduce downstream flooding and the Village of Corrales	No Progress - Continue Action	Risk assessment study is in process (9/2025). Phased project.
Other-7	2025	Nightglow Avenue Area Flood Mitigation	Flood	Construct ponds, stormdrains, inlets, curb, and gutter in the Nightglow Avenue Flood Mitigation area.	Complete	FEMA PDM grant received to design this project. Hazard Mitigation grant application for construction will be submitted.
Other-9	2025	SSCAFCA Montoyas Arroyo Reach Stabilization - Northern -Broadmoor	Erosion	Plan, design, and construct bank stabilization and grade control to protect utilities, development, and other infrastructure in this arroyo segment	In Progress	FEMA HMGP grant received to design this project. Hazard Mitigation grant application for construction will be

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
						submitted after design completion.
Other-10	2025	SSCAFCA Riperia - Advanced Assistance	Flood	Design a project to reduce flooding potential for Unser Blvd and downstream development. Project is complete and being constructed with other funding sources.	Complete	FEMA PDM grant received to design this project. Under construction with projected project completion 8/2025.
Other-11	2025	Lower Montoyas Arroyo Bank Stabilization Flood Mitigation	Erosion	Design and construct arroyo improvements along the Montoyas arroyo to eliminate lateral and vertical erosion and protect existing infrastructure and development. Project Complete	Complete	FEMA PDM grant received to design this project. Construction completed in 2023.
G.1	2019	Sugar Dam Outlet Structure	Dam Failure, Flood	Project cancelled.	No Progress - No Longer a Mitigation Priority	After further study, project was deemed not necessary.
G.2	2019	Erosion and Grade Control Improvements, jurisdiction wide	Flood/Erosion	When areas of concern are identified, design and construct bank stabilization and grade control structures to reduce erosion and flood risk to	On-Going Action	Several hazard mitigation projects have been applied for under this project category.

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
				adjacent development and infrastructure		
G.3	2019	Lisbon Detention Facility and Channel	Flood	Design and construct a detention basin and channel improvements to mitigate flooding risk to the Lisbon Channel area between Tulip Rd. and Tarpon Rd. Project complete.	Complete	FEMA HMGP grant received to design and construct this project. Completed in 2023.
G.4	2019	Willow Creek Drainage Improvements	Flood	Construct non-erosive protection around existing sanitary sewer abutting and within arroyo	No Progress - No Longer a Mitigation Priority	
G.5	2019	Saratoga Detention Project (aka Lomitas Negras Phase 2)	Dam Failure, Flood	Design and construct water quality detention facility to reduce downstream flooding and protect public elementary school	Complete	FEMA HMGP grant received to design and construct this project.
G.6	2019	Tributary A Dam	Dam Failure, Flood	Acquire ROW, design dam, construct dam	Complete	Funded with state and local funds.
G.7	2019	Guadalajara Drainage Improvements	Flood	Design and construct a detention basin, storm drainpipes, inlets, and roadway improvements	No Progress - No Longer a	

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
					Mitigation Priority	
G.8	2019	Paseo Del Volcan (PDV) Dam	Flood	ROW acquisition, design, and construct flood control dam	No Progress - No Longer a Mitigation Priority	
G.9	2019	19th Avenue Dam	Dam Failure, Flood	The project name was changed and is captured in Action Other-10.		See Action Other-10.
G.10	2019	Venada Arroyo Channel Stabilization	Flood	Design and construct bank stabilization structures between Lincoln and NM 528 in Rio Rancho, and between NM 528 and the Rio Grande in Bernalillo.	Complete	Funded with state and local funds.
G.11	2019	Industrial Park Water Quality Facility	Flood	Permit, design, construct, water quality detention basin to treat storm water drainage from industrial park	In Progress	Funded with USACE, state, and local funds.
G.12	2019	North hills Stormwater diversion facility	Flood	The project name was changed and is captured in Action Other-6.		See Action Other-6.

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
G.13	2019	Arroyo Bank Stabilization Slope Control	Flood	The project name was changed and is captured in Action G.3		See Action G.3.
G.14	2019	Venada Arroyo Dam (aka Upper Venada Flood management facility)	Flood	Design and construct flood protection facility	In Progress	Funded with USACE, state, and local funds.
G.15	2019	Unser Dam	Flood	Design and construct flood protection facility	No Progress - No Longer a Mitigation Priority	
G.16	2019	Badger Dam	Flood	Plan, design, construct detention facility on the Barrancas Arroyo upstream of Idalia	No Progress - No Longer a Mitigation Priority	
G.17	2019	Landfill Pond	Flood	Complete environmental studies, plan, design, and construct detention pond at Idalia and Iris	No Progress - No Longer a Mitigation Priority	

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
G.18	2019	Corrales Heights Dam Improvements	Flood	Design and construct improvements to jurisdictional dam outfall and slope	Complete	Funded with local funds.
G.19	2019	Emphasize Arid Low Impact Development	Drought	During actual implementation as part of the project, use techniques that emphasize infiltration of stormwater into groundwater during all SSCAFCA-led projects. Participate in the Arid Low Impact Development Coalition, a group dedicated to outreach and education regarding the use of low-impact development techniques suitable for our arid environment.	On-Going Action	
G.20	2019	Removal of High Water Use Plants	Drought	Remove Russian Olive and Salt Cedar plant life from all SSCAFCA-owned facilities.	On-Going Action	
Pub-1	2019	River Exchange Program	Flood	Conduct 22 classes per year for various age groups within Bernalillo, Corrales, and Rio Rancho, wherein flood hazards within arroyos are communicated.	On-Going Action	

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
Pub-2	2019	Arroyo Safety Program	Flood	Develop and distribute educational materials regarding Arroyo Safety to the general population of the jurisdiction.	On-Going Action	
Pub-3	2019	Watershed Stewards Program	Flood	Deliver educational programming to Senior Centers and other adult programming opportunities on the importance of healthy watershed to prevent both flooding and improve stormwater quality.	On-Going Action	
Pub-4	2019	Partnerships with "Keep Rio Rancho Beautiful" and the City of Rio Rancho	Flood	Conduct a public program to remove trash from the arroyos 4 times a year.	On-Going Action	
Pub-5	2019	Water Quality Education Events and Fairs	Multi	Facilitate educational events for potential point source polluters, veterinarians, and commercial sites twice a year.	On-Going Action	
Pub-6	2019	Neighborhood Association and Community Organization Public Outreach	Flood	Meet with various groups before and after the monsoon season to conduct arroyo flood hazard education, 2 to 4 times a year.	On-Going Action	

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
Pub-7	2019	SSCAFCA Board Agenda	Multi	Present and seek public comment on the hazard mitigation plan before the SSCAFCA Board in the spring and fall.	On-Going Action	
Pub-8	2019	Children's Water Festival	Flood	Facilitate a booth to educate the public about the hazards of arroyo flooding and pollution.	On-Going Action	
Pub-9	2019	Website Updates	Multi	Update the website in the spring and fall to reflect the latest hazard mitigation news and Plan status	On-Going Action	
Pub-10	2019	Know your Arroyos Campaign	Flood	SSCAFCA developed the Know Your Arroyos Safety Campaign to help educate students about the hazards of arroyos. The Know Your Arroyos literature is available on SSCAFCA's website.	On-Going Action	
Pub-11	2019	Lateral Erosion Envelope	Erosion	SSCAFCA developed and distributed literature on the Lateral Erosion Envelope (LEE) concept. The LEE literature is available on SSCAFCA's website.	On-Going Action	

ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
Pub-12	2025	Social Media presence	Multi	SSCAFCA has increased its social media presence, giving the agency a larger reach for information dissemination	On-Going Action	
Pub-13	2025	SSCAFCA Live Rainfall and arroyo flow monitoring network	Flood	SSCAFCA has established a field network of rain and flow gauges within its jurisdiction, complemented by a live web interface for viewing current conditions. In the summer of 2025, SSCAFCA will be standing up an SMS text feature that will text people who sign up when intense rainfall events or flow conditions in arroyos occur.	On-Going Action	
2	2014	Unit 17 Drainage Improvements	Flood	The Alberta Watershed Improvements, Phase 2 has been completed.	Complete	
3	2014	Dulcelina Curtis Channel Inlet Upgrade	Flood	The Lomitas Negras Improvements, Phase 2, was completed in 2014 to include the inlet for the Dulcelina Curtis Channel.	Complete	
5	2014	La Barranca City Center Drainage / Dam Sites	Flood	Land acquisition for the Paseo del Volcan Dam has been completed. Preliminary design	Complete	

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ID	Year	Title	Hazard	Description	2025 Status	2025 Comments
				has been completed. Upstream development has not necessitated the construction of this facility, but planning has been completed.		
7	2014	Montoyas Arroyo Bank Stabilization Project	Flood	One element of this project has been completed upstream of Sportsplex Dam. Stabilization of other reaches of the Montoyas Arroyo has been identified and is in planning or funding acquisition.	Complete	

3.4 Mitigation Capabilities

The mitigation capability assessment evaluates the Authority's capacity to implement and manage the comprehensive mitigation strategy outlined in this HMP. Strengths, gaps, and resources are identified here to evaluate and maintain effective and appropriate management of the Authority's hazard mitigation program.

Mitigation capabilities are classified into the following types:

- Planning & Regulatory
  - Plans
  - Building Code, Permitting, & Inspection
  - Land Use Planning & Ordinances
- Administrative & Technical
  - Administration
  - Staff
  - Technical
- Financial
  - Funding Resources
- Education & Outreach
  - Programs & Organizations

The Authority currently utilizes or has implemented many of these types of capabilities, as shown in TABLE 3.

Table 3 Mitigation Capabilities

Capability Type	Tool	Description
Planning & Regulatory	Codes & Ordinances	NMSA, Article 19, SSCAFCA Enabling Legislation
Planning & Regulatory	Codes & Ordinances	Development Process Manual
Planning & Regulatory	Codes & Ordinances	SSCAFCA Drainage Policy, Rev 1
Planning & Regulatory	Plans, Manuals & Guidelines	Comprehensive Management Strategy for Arroyo Corridors
Planning & Regulatory	Plans, Manuals & Guidelines	Rainwater Harvesting Guide.
Planning & Regulatory	Plans, Manuals & Guidelines	Montoyas Watershed Management Plan (WMP) Version 04/2021 - Report
Planning & Regulatory	Plans, Manuals & Guidelines	Montoyas WMP Version 04/2021 - Appendices

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Capability Type	Tool	Description
Planning & Regulatory	Plans, Manuals & Guidelines	Black WMP Version 03/2021
Planning & Regulatory	Plans, Manuals & Guidelines	Barranca WMP Version 08/2022 - Report
Planning & Regulatory	Plans, Manuals & Guidelines	Barranca WMP Version 08/2022 - Figures
Planning & Regulatory	Plans, Manuals & Guidelines	Venada WMP Version 03/2025
Planning & Regulatory	Plans, Manuals & Guidelines	Coronado Arroyo WMP Version 05/2023
Planning & Regulatory	Plans, Manuals & Guidelines	Rainbow Tributary Discharge Management Plan
Planning & Regulatory	Plans, Manuals & Guidelines	Willow Creek WMP Version 02/2013
Planning & Regulatory	Plans, Manuals & Guidelines	Willow Creek WMP Version 02/2013 Appendices
Planning & Regulatory	Plans, Manuals & Guidelines	Calabacillas WMP Version 08/2024
Planning & Regulatory	Plans, Manuals & Guidelines	Calabacillas WMP Version 08/2024 Appendices
Planning & Regulatory	Plans, Manuals & Guidelines	Zia Watershed Master Plan 12/2020
Planning & Regulatory	Plans, Manuals & Guidelines	SSCAFCA Criteria Manual, Volume 1 - Hydrology
Planning & Regulatory	Plans, Manuals & Guidelines	SSCAFCA Criteria Manual, Volume 2 - Hydraulics
Planning & Regulatory	Studies	Sierra Vista West Facility Plan
Planning & Regulatory	Studies	Edinburgh Facility Plan
Planning & Regulatory	Studies	Edinburgh Facility Plan Appendices
Planning & Regulatory	Studies	Edinburgh Drainage Implementation Plan
Planning & Regulatory	Studies	Dos Amigos Facility Plan
Planning & Regulatory	Studies	Dos Amigos Facility Plan - Plate 1

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Capability Type	Tool	Description
Planning & Regulatory	Studies	City Center Facility Plan
Planning & Regulatory	Studies	NorthWest 17 Facility Plan
Planning & Regulatory	Studies	Sierra Vista East Facility Plan
Planning & Regulatory	Studies	Industrial Park Facility Plan
Planning & Regulatory	Studies	Corrales Heights Dam EAP
Planning & Regulatory	Studies	Enchanted Hills Dam 1 EAP
Planning & Regulatory	Studies	Montoyas Arroyo Sportsplex Dam EAP
Administrative & Technical	Planner(s) or engineer(s) with knowledge of land development and land management practices	4-Professional Engineers, 1-Engineering Intern
Administrative & Technical	Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	4-Professional Engineers, 1-Engineering Intern
Administrative & Technical	Planner(s) or engineer(s) with an understanding of natural and/or human-caused hazards	4-Professional Engineers
Administrative & Technical	Floodplain Manager	1- City of Rio Rancho provides Floodplain Management
Administrative & Technical	Surveyors	4-On-call surveyors
Administrative & Technical	Staff with education or expertise to assess the community's vulnerability to hazards	Contract
Administrative & Technical	Personnel skilled in GIS and/or HAZUS;	2-Professional Engineers, 1-Engineering Intern

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Capability Type	Tool	Description
	AutoCAD-Civil 3D; ArcGIS	
Administrative & Technical	Scientists familiar with the hazards of the community	2-Professional Engineers, 1-Engineering Intern
Administrative & Technical	Emergency manager	1-Professional Engineer
Administrative & Technical	Grant writer(s)	No
Financial	FEMA HMA Program	Yes, have utilized HMGP, BRIC, & PDM
Financial	Community Development Block Grants	No
Financial	Capital Improvements Project funding	Yes
Financial	Authority to levy taxes for specific purposes	No
Financial	Fees for water, sewer, gas, or electric service	No
Financial	Impact fees for home buyers or new developments/homes	No
Financial	Incur debt through general obligation bonds	Yes
Financial	Incur debt through special tax bonds	Yes
Financial	Other	USACE Environmental Infrastructure funding
Financial	Other	State Capital Funding programs
Education & Outreach	Public hazard education classes	Yes - see Past Action reporting for details.

Capability Type	Tool	Description
Education & Outreach	Educational programming and materials	Yes - see Past Action reporting for details.
Education & Outreach	Public events	Yes - see Past Action reporting for details.

The Authority utilized this assessment to identify capabilities it wants to expand and improve upon to enhance implementation efforts toward the Authority's mitigation strategy. The ability to do so is dictated by elected leadership, management, and available funding and staffing. Grant funding opportunities are also available to improve these capabilities. The Authority identified two capabilities to focus on enhancing over the next five years. The first relates to the Authority's High Hazard Potential Dams and the lack of available digital inundation mapping. To address this deficiency, the Authority plans to digitize the current hardcopy maps in the coming year. A second capability to enhance is the development of written manuals for the Authority's facilities. TABLE 1 also includes several mitigation actions that enhance the Authority's mitigation capabilities.

In regards to FEMA's Compliance with Floodplain Requirements of an HMP, the Authority does not regulate floodplains as an entity and is not permitted to be a participant in the National Flood Insurance Program (NFIP). Floodplain management within SSCAFCA's boundaries are managed by Sandoval County and the respective incorporated municipalities.

3.5 Plan Monitoring and Maintenance

The Authority and Planning Team agreed upon the following HMP maintenance procedures. It was determined that the Executive Engineer would serve as the primary point of contact for these maintenance tasks. This individual will coordinate all efforts to monitor, assess, and update the HMP.

Throughout the year, the Executive Engineer will monitor events that may require revisions to sections of the HMP. Reasons for these updates may include, but are not limited to: disaster events (impacting the Authority or other communities nationwide); changes in hazard risk or vulnerability due to population change, development, or climate change impacts; changes in available funding resources; updated hazard studies or information; changes in governmental organizational structure; or public input/concerns.

The Executive Engineer will track hazard events that do not require an immediate update to the HMP for integration into the five-year update.

Annually, in the Spring of each year, the Executive Engineer will coordinate reporting on the status of all mitigation actions identified in this HMP. Responses will be compiled into a report,

which will be presented to the Authority's Board of Directors at a public meeting. An evaluation of the HMP's effectiveness will be measured directly from these annual progress reports.

Starting in the third year of the HMP's five-year lifespan, the Executive Engineer will begin efforts to secure funding and resources for the next update process. At this time, it will be determined who will lead this effort and if outside organizations or consultants will be utilized.

3.6 Planning Integration

Plan integration benefits the Authority by ensuring that there are no strategic conflicts across planning documents. The following list shows how the Authority successfully integrated the 2019 Sandoval County HMP into other planning efforts.

- Willow Creek Watershed Park Management Plan – The 2019 HMP helped to inform the risk assessment and development of mitigation projects included in this plan.
- Infrastructure Capital Investment Plan (ICIP) – The 2019 HMP mitigation strategy informed the projects included in the ICIP Infrastructure Capital Investment Plan.
- Grants – The 2019 HMP hazard profiles and vulnerability assessment information were utilized for numerous mitigation grant applications.

Integrating the HMP into future planning mechanisms is essential to implement the HMP's mitigation strategy effectively. The Authority relies heavily on the HMP to inform the vulnerability assessment and mitigation projects contained within future watershed park management plans. Additionally, the Authority will continue to utilize the HMP's hazard profiles and vulnerability assessment for future mitigation grant applications and during capital planning efforts.

3.7 Continued Public Engagement

Continuing public engagement over the HMP's next five-year lifespan is crucial to maintaining community momentum in implementing the mitigation strategy. These efforts will be tied to the HMP maintenance process through the annual reporting of mitigation progress presented at public board meetings. Additionally, the Authority will integrate public education on hazard mitigation through ongoing public education efforts, including the Arroyo Safety Program, Watershed Stewards Program, Water Quality Education Events and Fairs, Children's Water Festival, Know Your Arroyos Campaign, and through postings on the Authority's website and social media.

3.8 Changes in Community Priorities

The Authority's priorities are constantly evolving over the course of an HMP's five-year lifespan. This can result in shifts in priorities related to hazard mitigation. Factors that impact these priorities include recent disaster events; changes in resources, needs, or capabilities; new state

or federal policies and funding resources; newly identified hazard impacts from updated risk assessments; or changes in growth and development.

Since development of the 2019 Sandoval County HMP, the Authority has acknowledged mitigation priorities have increased attention to the hazard of fluvial erosion.

Cholla Pond (Source: SSCAFCA)

4 Planning Process

This HMP has been adopted by the Authority, as authorized by the State of New Mexico. This HMP was developed following current state and federal rules and regulations governing local HMPs and shall be monitored and updated on a routine basis to maintain compliance with the following legislation and guidance:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C., Section 322, Mitigation Planning, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390) and by FEMA's Interim Final Rule published in the Federal Register on February 26, 2002, at 44 CFR Part 201

The following FEMA guides and reference documents were used to prepare this document:

- FEMA. Local Mitigation Planning Policy Guide. April 11, 2025
- FEMA. Local Mitigation Planning Handbook. June 2025

4.1 Background

The 2025 SSCAFCA HMP is a brand-new single jurisdiction plan. Previously, the Authority had been a formal planning participant in the 2019 Sandoval County multi-jurisdictional HMP. This HMP must be updated and approved by FEMA every five years to keep it current and to maintain eligibility for FEMA Hazard Mitigation Assistance (HMA) Program Grants.

4.2 Methodology

The planning process was initiated in May 2025 with the Authority hiring a consultant to help guide the HMP's development. Initial efforts included the identification of the Planning Team and Stakeholder roster shown in TABLE 16. These individuals and organizations were invited to participate via email announcements at other meetings and events, and through in-person interactions. The roster highlights those individuals who participated in the planning workshops and also details those community sectors that each individual represents.

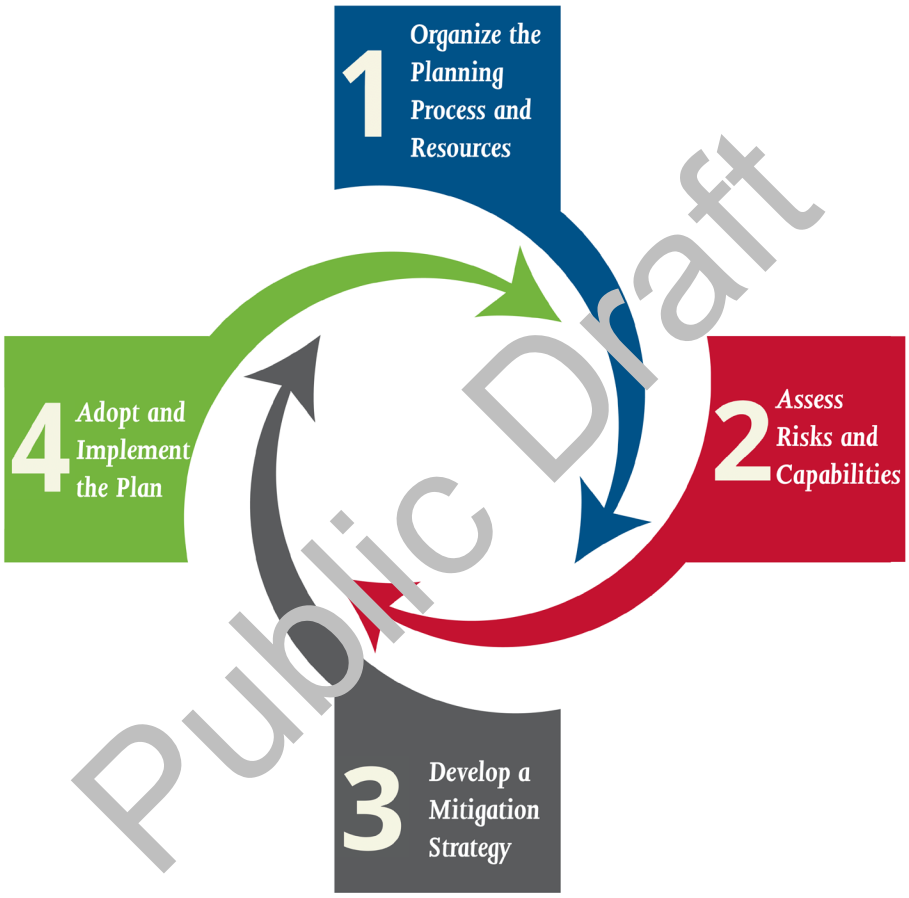
A summary of those sectors invited to the planning process included:

- Hazard Mitigation (Emergency Management, Public Works, Floodplain Admin., GIS)
- Regulating Development (Zoning, Planning, Community/Economic Development, Building Officials, Planning Commissions, Elected Officials)
- Neighboring Communities
- Businesses, Academia, Other Private Interests (Utilities, Chambers of Commerce, Dam Owners, Educational Centers, Major Lifeline Employers)
- Nonprofit & Community-Based Orgs. (Faith-based, Disability, NGO, Rural Support, Health & Human/Social Services, Housing Agencies)

- State Dam Safety Agency
- Public

A total of three Planning Team and Stakeholder workshops were held between July and September 2025. Summaries from these workshops are provided in a following section. The Authority followed FEMA's recommended four-step mitigation planning process, as shown in FIGURE 3.

Figure 3 Mitigation Planning Process



4.2.1 Incorporation of Existing Plans and Information

All HMP-relevant existing plans, studies, reports, and technical information were reviewed during the planning process. The following list provides an overview of how these resources were incorporated into the 2025 HMP.

- Watershed Park Management Plans - The Authority relies heavily on these watershed park management plans to inform the HMP. These plans drive the HMP's mitigation strategy and serve as the primary tools to identify mitigation actions. Similarly, this HMP document will help to inform development of future watershed plans.
    - Barranca Watershed

  - Black Watershed
  - Calabacillas Watershed
  - Coronodo Watershed
  - Montoyas Watershed
  - Willow Creek Watershed
  - Zia Watershed
- Sandoval County Hazard Mitigation Plan (2019 & 2026 draft), Sandoval County Community Wildfire Protection Plan (2025), and State of New Mexico Hazard Mitigation Plan (2023): These plans helped to inform the hazard profiles and mitigation strategy.
- FEMA Base Level Engineering: This data was used in the flood profile.
- Dam Emergency Action Plans: This data was used in the dam incident profile.
- The New Mexico Office of the Governor, FEMA, and the United States Department of Agriculture (USDA): These sources were used to identify historical disaster declarations.
- NCEI Storm Events Database: This database was used to inform the hazard profiles.

4.3 Planning Activities

The following sections detail those meetings and workshops conducted as part of the HMP planning process. Significant points of discussion and decisions made are provided.

4.3.1 Pre-Kickoff Meeting

A pre-kickoff meeting was held with SSCAFCA leadership on 6/5/2025. The meeting covered topics such as the urgency and timeline for plan completion, changes in FEMA requirements, eligibility for the High Hazard Potential Dam (HHPD) program, project scheduling, roles and responsibilities, public engagement strategies, coordination with county planning efforts, relevant data sources, and the identification and profiling of hazards specific to the district.

Key decisions included pursuing eligibility for the HHPD program, the need to coordinate with Sandoval County as they are in the process of updating their countywide HMP (to avoid public engagement confusion), focusing the plan on district-specific hazards (with an emphasis on stormwater-driven soil erosion), and keeping the mitigation plan separate from other district planning efforts.

4.3.2 Planning Team & Stakeholder Kickoff Meeting

A kickoff meeting was held with the Planning Team and Stakeholders on 7/9/2025. The meeting covered several topics, including the rationale for creating a separate plan from the county, recent hazard events, and the need to align with updated FEMA requirements. The group also reviewed the scope of the HMP, public engagement strategies, the list of hazards to be profiled, and a listing of completed and ongoing mitigation actions. There was also discussion about ongoing and completed mitigation actions, the integration of dam inundation mapping, and the process for public input and plan adoption.

The group decided to proceed with a separate, expedited hazard mitigation plan for SCCAFCA to ensure continued eligibility for current and future grants. They agreed to use social media, the website, and newspaper ads for public engagement. Consensus was also reached on those hazards to profile in this HMP.

4.3.3 Planning Team & Stakeholder Risk Assessment Workshop

A second workshop was held with the Planning Team and Stakeholders on 8/29/2025. The meeting focused on presenting the results of the risk and vulnerability assessment. Key topics included defining the authority's assets and a discussion focused on historical hazard events, vulnerabilities, and future probabilities for each hazard. The group also reviewed mapping and data limitations, risk rankings, and the mitigation goals.

The group determined it would evaluate future probability using a qualitative ranking. "Annually" is defined as expected to occur every year. "Highly likely" is defined as occurring every 1 to 10 years. "Likely" every 10 to 50 years, and "Unlikely" indicates intervals of over 50 years. Future climate conditions were factored into these qualitative rankings.

The group agreed not to include the National Risk Index maps in the plan as they do not accurately portray local risk and confirmed that mitigation goals were sufficiently broad to cover future projects.

4.3.4 Planning Team & Stakeholder Mitigation Strategy Workshop

The final mitigation strategy workshop was held with the Planning Team and Stakeholders on 9/17/2025. Participants reviewed the Authority's progress on completed and ongoing mitigation projects and discussed the prioritization and identification of new mitigation actions. The HMP's mitigation goals and maintenance process were also defined, as were future HMP integration opportunities and continued public engagement.

4.4 Public Engagement

Public engagement was essential to ensuring that all individuals within SSCAFCA's boundaries were aware of how they could inform and contribute to the planning process. The public engagement strategy was discussed early in the process with the Planning Team and Stakeholders to generate ideas for effectively providing information to the public and capturing public input to incorporate into the plan.

With Sandoval County also in the process of updating the county's HMP, concern was expressed about public confusion with the two similar but differing plans. To address this concern, the Authority decided to utilize its social media (Facebook and LinkedIn), website, and local newspaper to educate and inform the public about this project (see the following Figures for examples).

The two-week public review and comment period was held in September 2025 and was widely communicated through the identified messaging tools. Individuals had the opportunity to submit comments via an online survey. A total of xyz….comments were incorporated

Figure 4 Project Website

Figure 5 Sample Social Media Post

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5 About SSCAFCA

The Southern Sandoval County Arroyo Flood Control Authority is an independent corporate political body with an elected board entrusted with flood and stormwater control.

The Authority's mission is to "Protect citizens and property by implementing proven flood control solutions that:

- Manage our watersheds prudently for future generations
- Enhance the quality of life
- Create the most appealing multi-use facilities
- Set an example of quality, integrity, leadership, and professionalism
- Educate the public concerning flood hazards
- Administer public funds prudently"

The Authority acquires, improves, maintains, and operates flood and stormwater control facilities on streams and watersheds that enter, originate in, or cross our area of authority. The boundaries of the Authority are as follows: a portion of southern Sandoval county bounded on the east by the Rio Grande River, on the south by the Bernalillo and Sandoval County lines, on the west by the top of the Rio Puerco drainage and on the north by the top of the drainage that lies on the southern boundary of the Zia Indian reservation, the Santa Ana Indian reservation and state highway 550 (see FIGURE 6).

Lower Venada Arroyo as it enters the bosque near the Rio Grande (Source: SSCAFCA)

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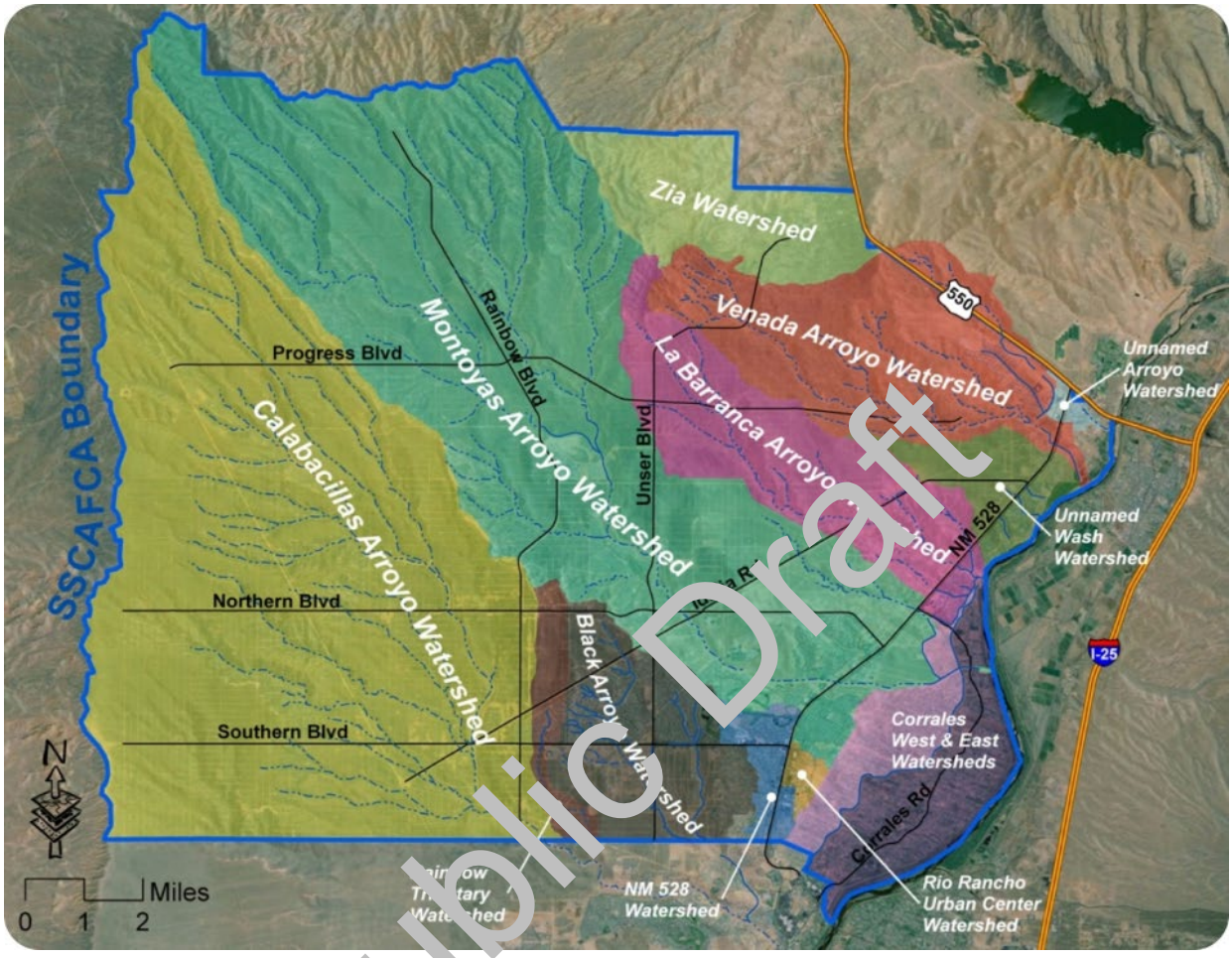
Figure 6 Watersheds within SSCAFCA's Boundary



The Southern Sandoval County Flood Control Authority (SSCAFCA) serves the City of Rio Rancho, the Village of Corrales, the Town of Bernalillo, and portions of unincorporated Sandoval County, New Mexico. An overview map is provided in FIGURE 7.

5.1 Authority Assets

This plan assesses the risk to the Authority's assets. These include the entire watershed as a whole and additional assets, including:

- Flood detention, attenuation, and conveyance structures: dams, ponds, channels (concrete-lined and natural), all designed for the 1% annual chance flood event (i.e. – 100-year flood)
- SSCAFCA's office, vehicles, and 13 staff members (field maintenance, administration, and engineering)
- Right-of-way land parcels

Other assets not under the Authority's control but considered when planning mitigation projects include the surrounding communities and their populations, infrastructure, and structures.

5.2 Land Ownership

As part of mitigation planning, it is important to recognize all landowners across the Authority (see FIGURE 8). Coordination with these entities is crucial to successfully implementing mitigation projects.

5.3 Development Trends

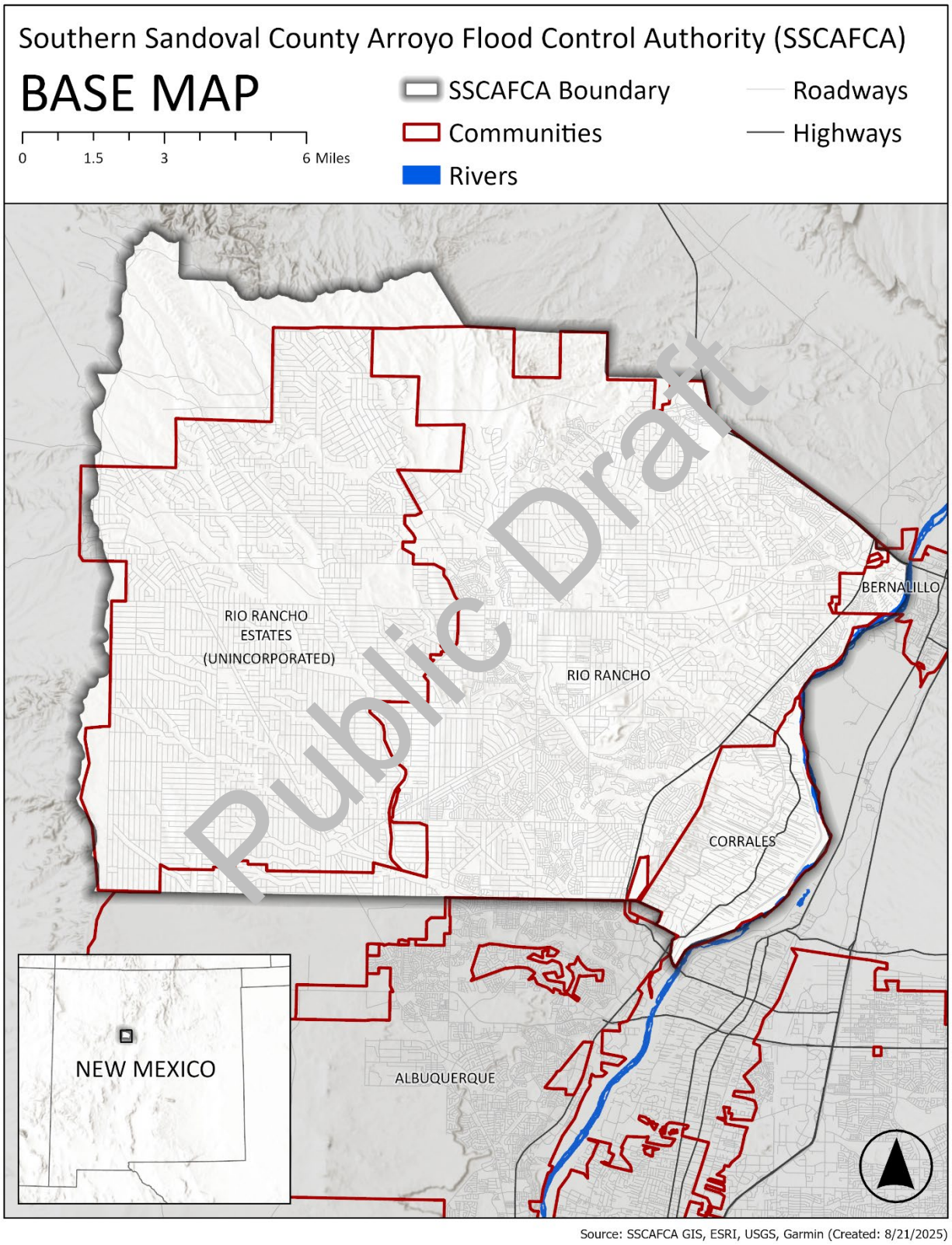
Over the past five years, all Authority "development" has been related to the construction of flood detention, attenuation, and conveyance structures. All of this infrastructure is intentionally built in floodplains to protect surrounding areas. Looking forward, all expected future development will involve similar construction projects.

No future construction is expected to increase the Authority's vulnerability to any hazard profiled within this plan. With that said, any new construction will increase the Authority's overall exposure to hazard events. But this increased exposure is not expected to increase the Authority's overall hazard vulnerability.

The Authority coordinates closely with all municipalities within its boundaries to identify and mitigate future residential and commercial development. This coordination intends to ensure that each municipality's vulnerability to natural hazards does not increase. Instead, the Authority aims to reduce local vulnerability through the implementation of future mitigation projects.

Lisbon Pond (Source: SSCAFCA)

Figure 7 SSCAFCA Overview



Source: SSCAFCA GIS, ESRI, USGS, Garmin (Created: 8/21/2025)

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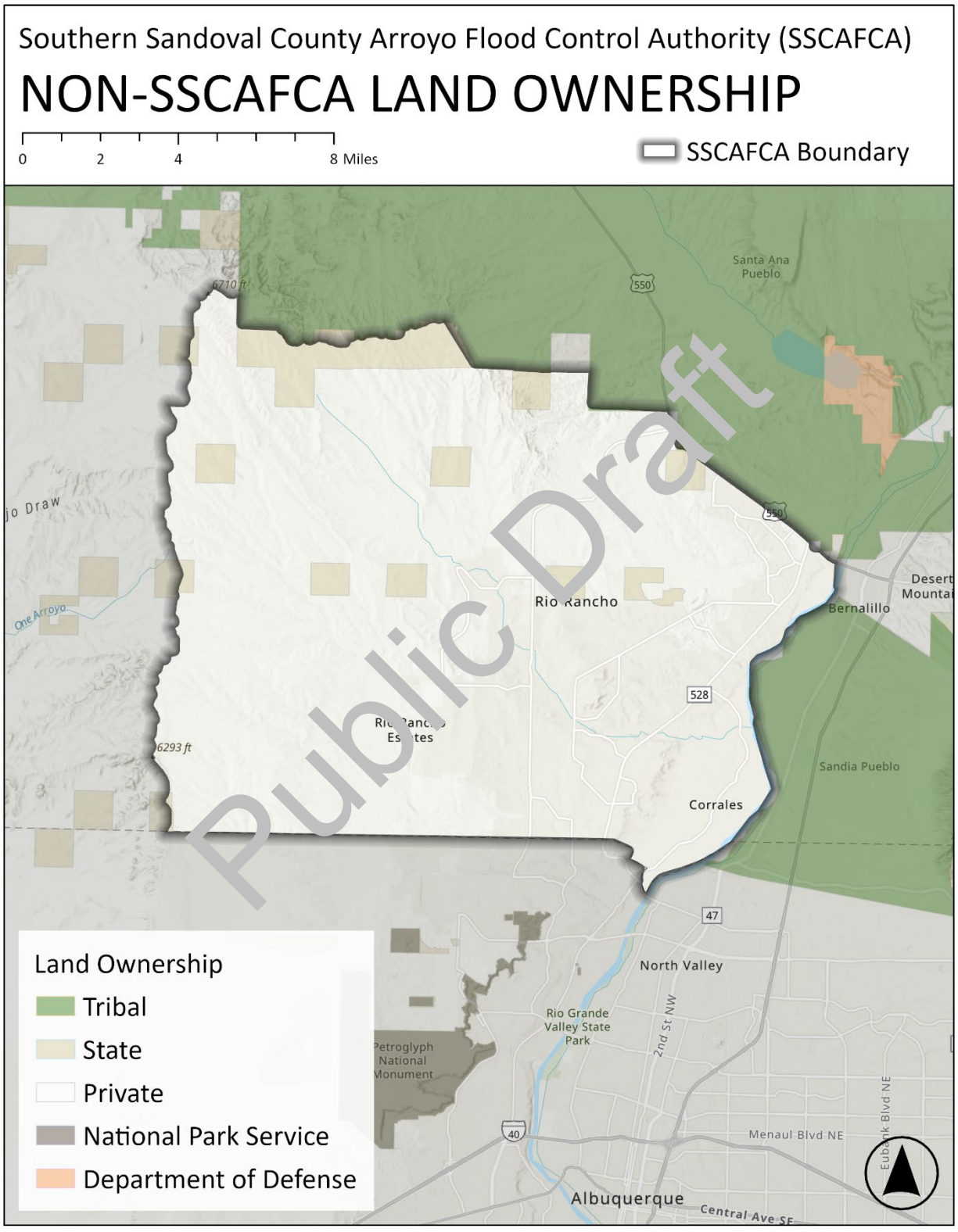
Figure 8 Land Ownership



Source: Bureau of Land Management (BLM), SSCAFCA GIS, ESRI, USGS, Garmin (Created: 8/21/2025)

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6 Hazard Identification and Risk Assessment

6.1 Risk Assessment Overview

6.1.1 Introduction

The Hazard Identification and Risk Assessment (HIRA) identifies those natural hazards that impact SSCAFCA's areas of authority. It then assesses the risks hazards pose to the Authority's assets (structures, infrastructure, property, staff) and the watersheds that the Authority is designated to manage and protect. The HIRA serves as a critical input into the mitigation strategy, providing a collaborative assessment that considers the Authority's risk.

6.1.2 Identified Hazard of Concern

For the development of this HMP, the Planning Team examined the full range of hazards that could affect the Authority and identified those that pose the most significant concern. The process included a review of the 2023 State of New Mexico State Hazard Mitigation Plan (NM SHMP) and the current Sandoval County HMP (separately being updated as of this plan's writing), along with information on the frequency, magnitude, and costs associated with hazards that have affected or could affect the planning area. Additionally, anecdotal information regarding natural hazards and the perceived vulnerability of the assets within the planning area was considered. Based on this evaluation, this plan profiles the following hazards of concern:

- Dam Incident
- Drought
- Earthquake
- Flood/Flash Flood
- Land Subsidence
- Soil Erosion
- Wildfire

All other natural hazards profiled in the 2023 NM SHMP were reviewed for inclusion in this HMP. Those natural hazards not profiled in this plan are listed below and are not a mitigation priority.

- Extreme Heat: Hazard effects do not currently present an immediate or impactful risk to the Authority's assets. There is a lack of any significant historical events and related reported damages.
- Expansive Soils: Hazard effects do not currently present an immediate or impactful risk to the Authority's assets. There is a lack of any significant historical events and related reported damages.

- High Wind: Hazard effects do not currently present an immediate or impactful risk to the Authority's assets. There is a lack of any significant historical events and related reported damages.
- Landslide: Hazard effects do not currently present an immediate or impactful risk to the Authority's assets. There is a lack of any significant historical events and related reported damages.
- Severe Winter Storms: Hazard effects do not currently present an immediate or impactful risk to the Authority's assets. There is a lack of any significant historical events and related reported damages.
- Thunderstorms (Lightning/Hail): Hazard effects do not currently present an immediate or impactful risk to the Authority's assets. There is a lack of any significant historical events and related reported damages.
- Tornadoes: Hazard effects do not currently present an immediate or impactful risk to the Authority's assets. There is a lack of any significant historical events and related reported damages.
- Volcanoes: There is a lack of any significant historical events and related reported damages. No perceived risk.

6.1.3 Hazard Risk Ranking

The Planning Team performed a risk ranking for the hazards profiled in this plan. This risk ranking assessed the probability of each hazard's occurrence and its likely impact on the Authority's assets. Hazards were evaluated utilizing a four-category qualitative scale. For the probability of the hazard, the options included "unlikely (1)," "possible (2)," "probable (3)," and "likely (4)." For the impact of the hazard, the scale included "minor (1)", "limited (2), "critical (3)", and "catastrophic (4)". A quantitative hazard risk was then calculated by multiplying the impact score with the probability score, which then correlated to the ultimate "high," "moderate," and "low" risk rankings (see FIGURE 9).

Figure 9 Hazard Risk Ranking

Hazard	Probability x	Impact on Authority's Assets	= Relevant Risk	Risk Rank
Dam Incident	1	2	**2**	Low
Drought	4	3	**12**	Mod
Earthquake	2	3	**6**	Low
Flood/Flash Floods	4	4	**6**	High
Land Subsidence	2	3	**6**	Low
Soil Erosion	4	4	**16**	High
Wildfire	3	3	**9**	Mod

6.1.4 Hazard Profiles

This chapter provides detailed hazard profile sections for each of the seven hazards assessed in this plan. Each profile follows the same outline and addresses the following topics:

- General background
- Past events
- Location
- Severity
- Secondary hazards
- Exposure and vulnerability
- Probability of future occurrences
- Climate change impacts

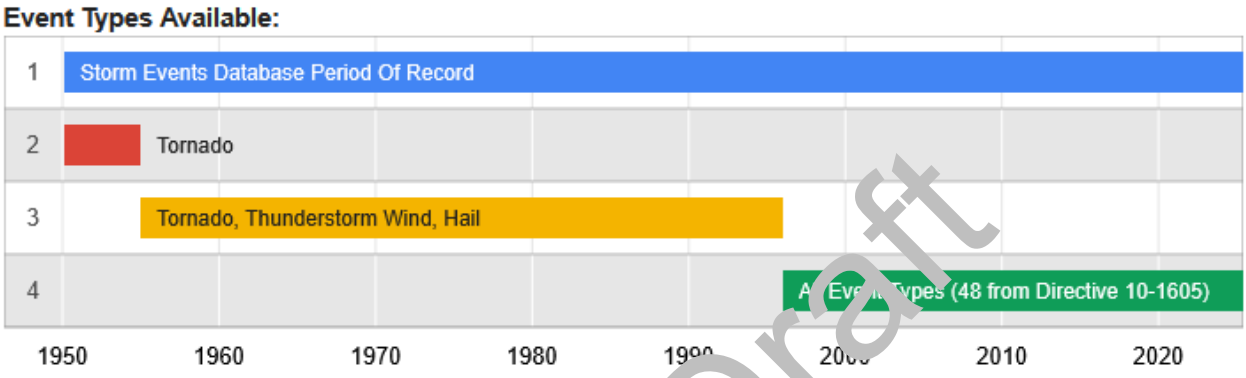
Past Events Data Disclaimer:

The most current and robust past hazard event data source is the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI) "Storm Events Database". This resource contains data from 1950 to May 2025, as detailed in FIGURE 10. Event reporting varies as to its locational precision. This results in a mix of reported

event locations at the following scales: county, municipality, and NOAA's National Weather Service (NWS) Forecast Zones.

SSCAFCA is entirely contained in the Middle Rio Grande Valley/Albuquerque Metro Area Forecast Zone (formerly named simply as the Albuquerque Metro Area). Additionally, any events that have impacted the municipalities of Rio Rancho or Corrales are assumed to have also impacted SSCAFCA, as their boundaries entirely overlap.

Figure 10 Storm Events Database Period of Record



Sources for state and federally declared events in this HMP include: SSCAFCA, Sandoval County, the NM SHMP, the Office of the Governor, the Federal Emergency Management Agency (FEMA), and the United States Department of Agriculture (USDA).

Non-declared hazard event details presented across this HMP were sourced from: the Planning Team and Stakeholders, local jurisdictions, the Sandoval County HMP, the NM SHMP, the NCEI Storm Events Database, and the 2023 Sandoval County Community Wildfire Protection Plan (CWPP).

6.2 Dam Incident

6.2.1 General Background

Dam incidents occur when a dam fails or operates in an unsafe manner, potentially causing flooding. These incidents primarily include dam failures, where the structure breaks and releases water due to issues such as poor maintenance or adverse weather conditions, and dam overflows, where excessive water exceeds the dam's capacity and floods downstream if not properly controlled.

6.2.2 Past Events

There are no documented events relating to dam incidents that have impacted the Authority.

6.2.3 Location

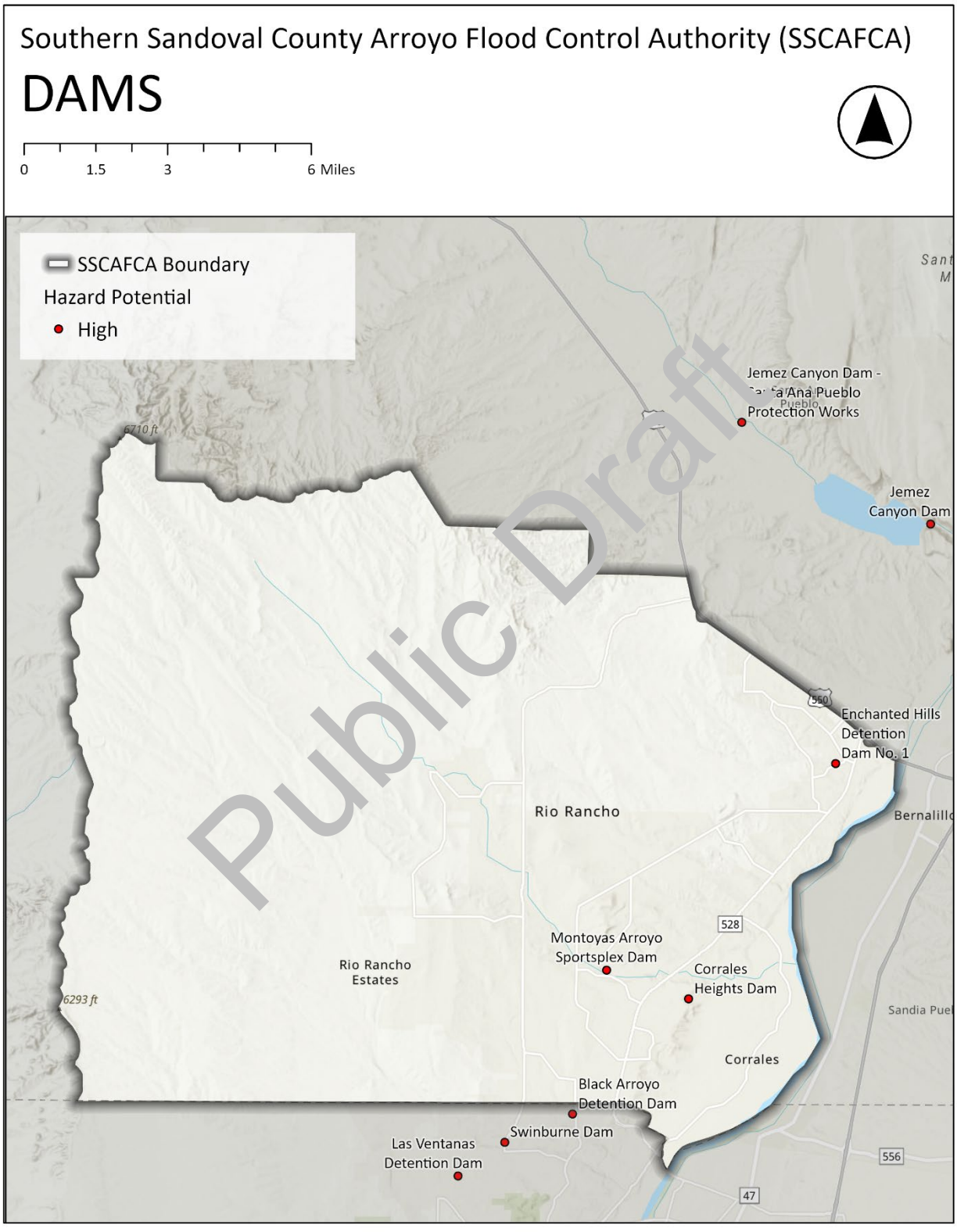
TABLE 4 documents those dams within the Authority that are included in the National Inventory of Dams database. The following figures then present the location of dams within and surrounding the Authority. Two dams outside of the Authority's boundary also present a slight risk from a dam incident, including the Jemez Canyon and Cochiti Dams. Both of these dams flow into the Rio Grande River, which is the Authority's eastern boundary.

Table 4 Dams within the Authority

ID	Name	Owner	Last Inspected	Hazard Potential	Condition
NM00362	Corrales Heights Dam	SSCAFCA	2023-12-18	High	Satisfactory
NM00621	Enchanted Hills Detention Dam No. 1	SSCAFCA	2023-12-18	High	Satisfactory
NM00663	Montoya Arroyo Sportsplex Dam	SSCAFCA	2023-12-18	High	Satisfactory

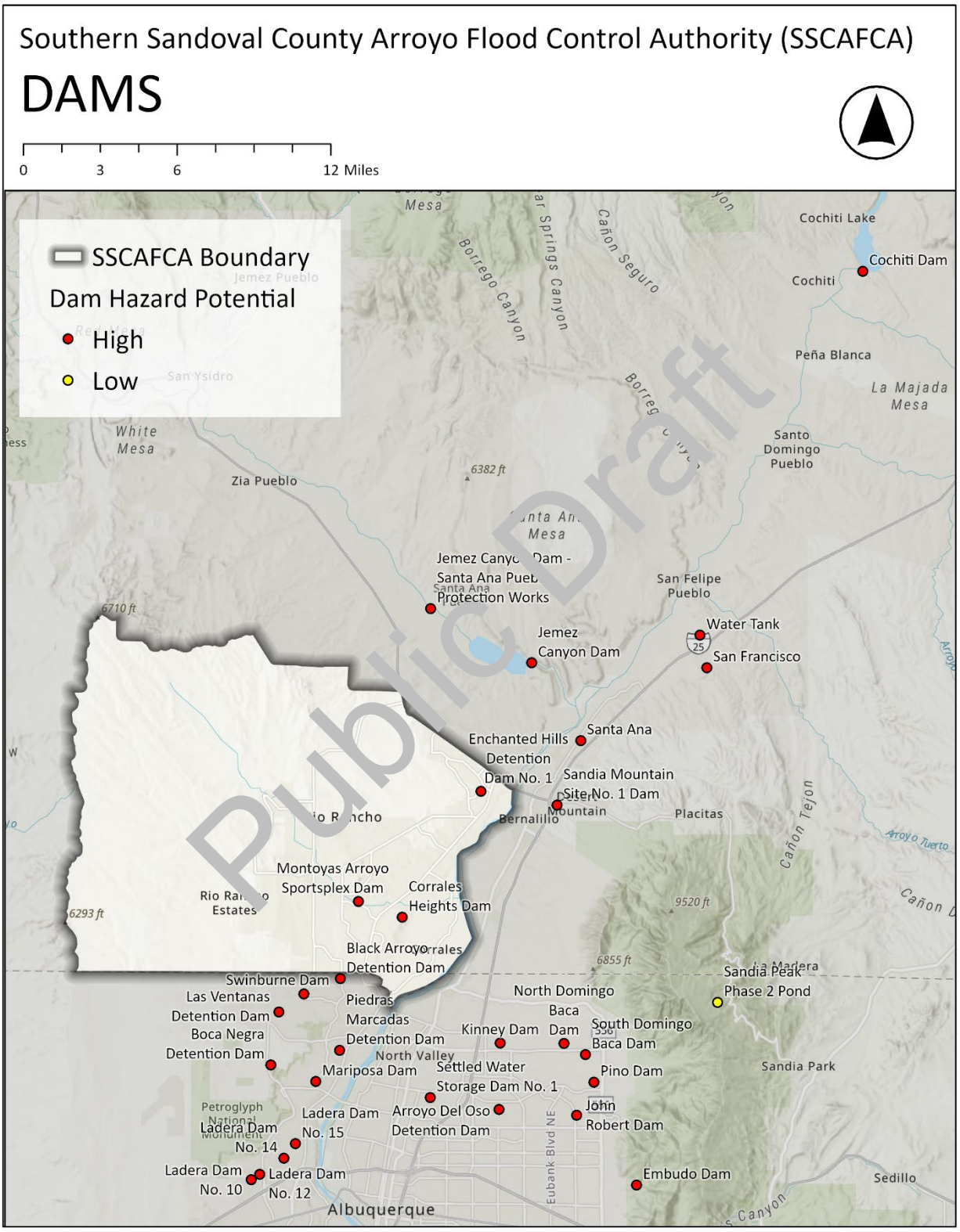
Source: National Inventory of Dams / NM Office of the State Engineer

Figure 11 Dams Within and Surrounding the Authority



Source: USACE NID, SSCAFCA GIS, ESRI, USGS, Garmin (Created: 8/14/2025)

Figure 12 Dams in the Region



Source: USACE National Inventory of Dams (NID), SSCAFCA GIS, ESRI, USGS, Garmin (Created: 8/22/2025)

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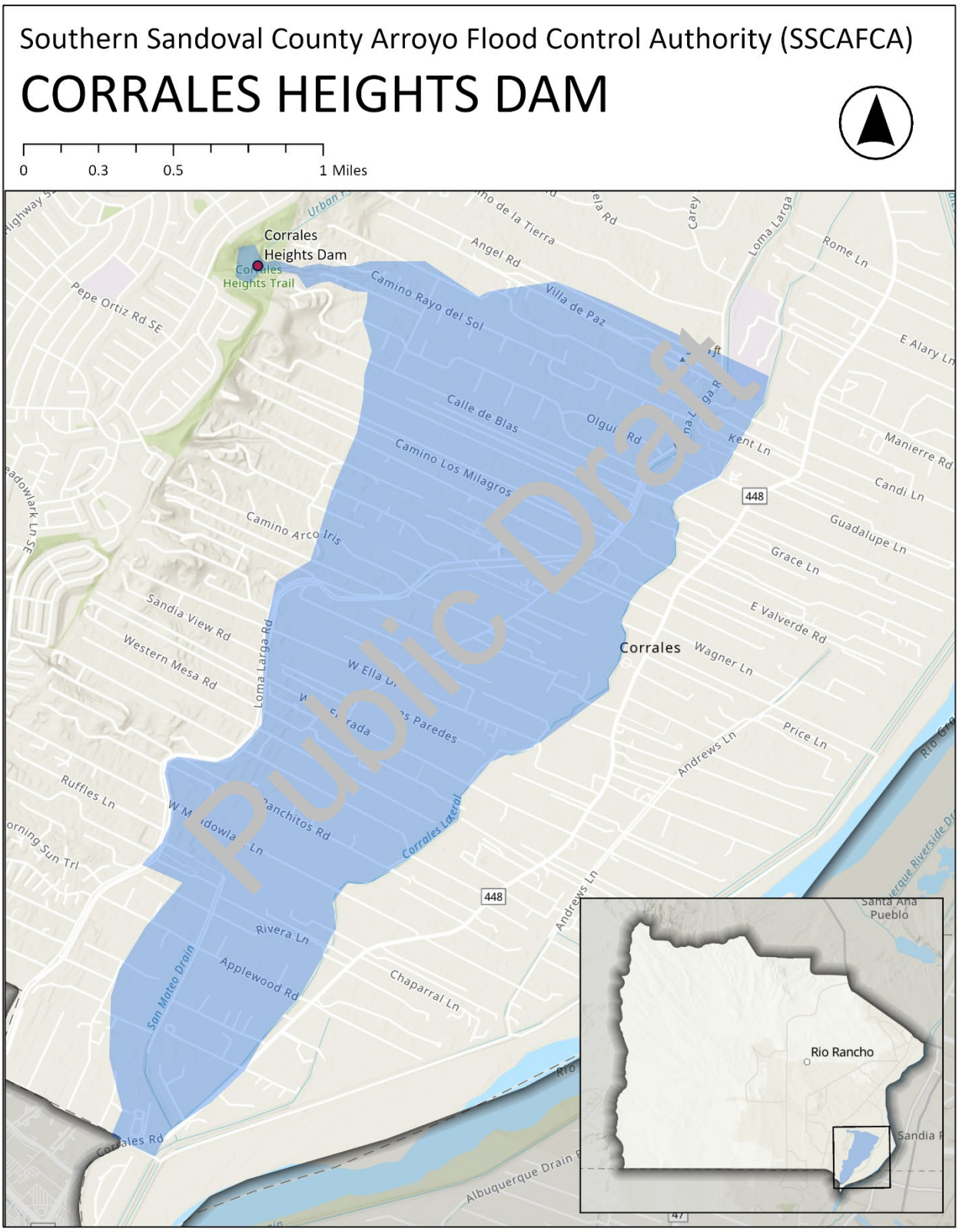
6.2.4 Severity

A dam's hazard potential indicates the severity of the potential impacts if it were to fail. There are three high-hazard potential dams within SSCAFCA's jurisdiction, meaning that the failure of any of these dams would likely result in loss of human life, as well as economic and environmental damages.

The magnitude of a dam failure is typically estimated based on discharge and can vary significantly from one dam to another. The magnitude of impacts due to dam failure is generally summarized in a dam's emergency action plan (EAP), wherein downstream inundation limits are mapped based on an assumed dam failure scenario. Inundation mapping for the Authority's three dams was sourced from each dam's EAP and is provided in the following Figures.

Figure 13 Corrales Heights Dam Inundation Mapping



Source: USACE National Inventory of Dams (NID), SSCAFCA GIS, ESRI, USGS, Garmin (Created: 8/22/2025)

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Figure 14 Enchanted Hills Dam Inundation Mapping

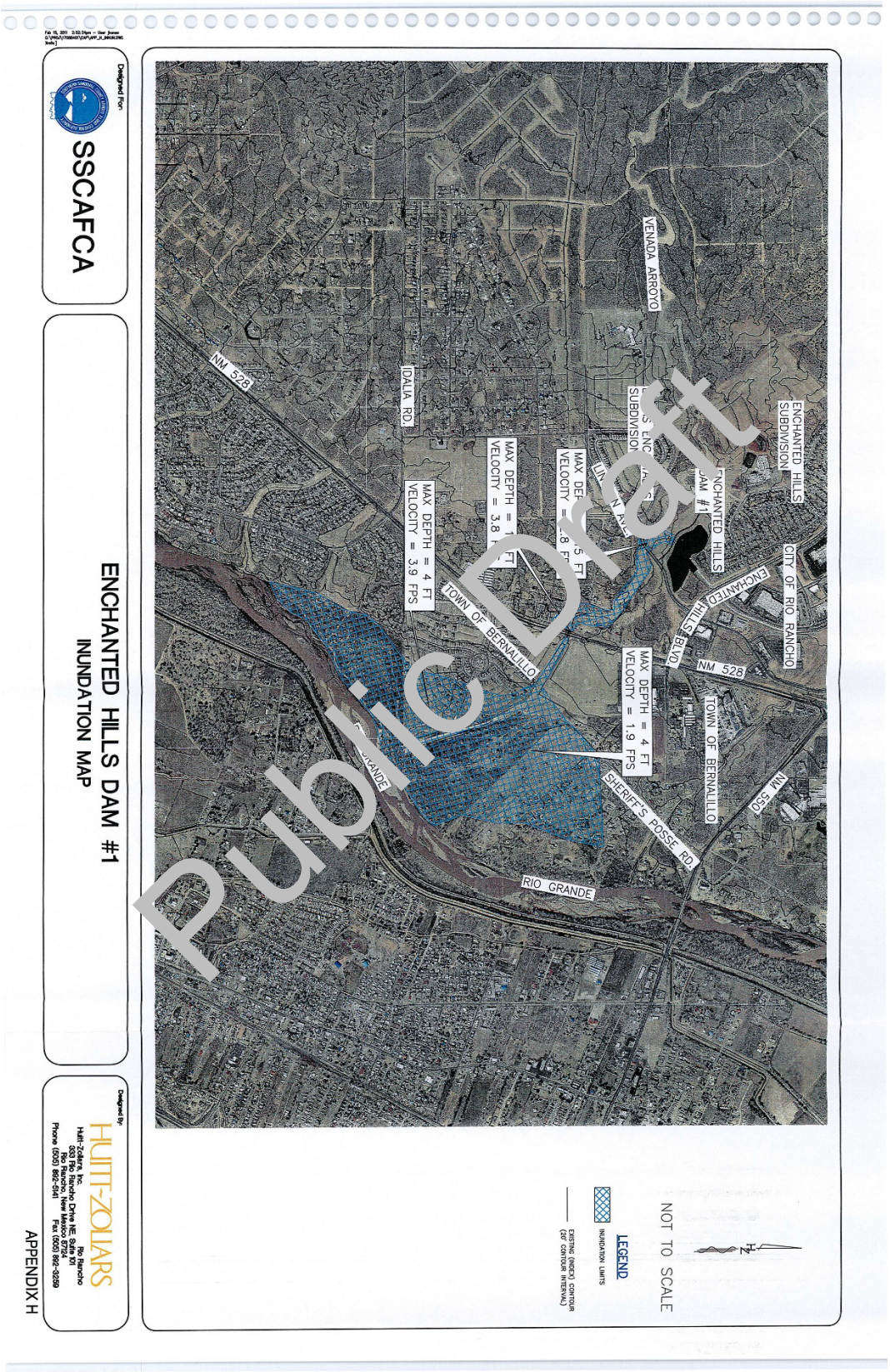

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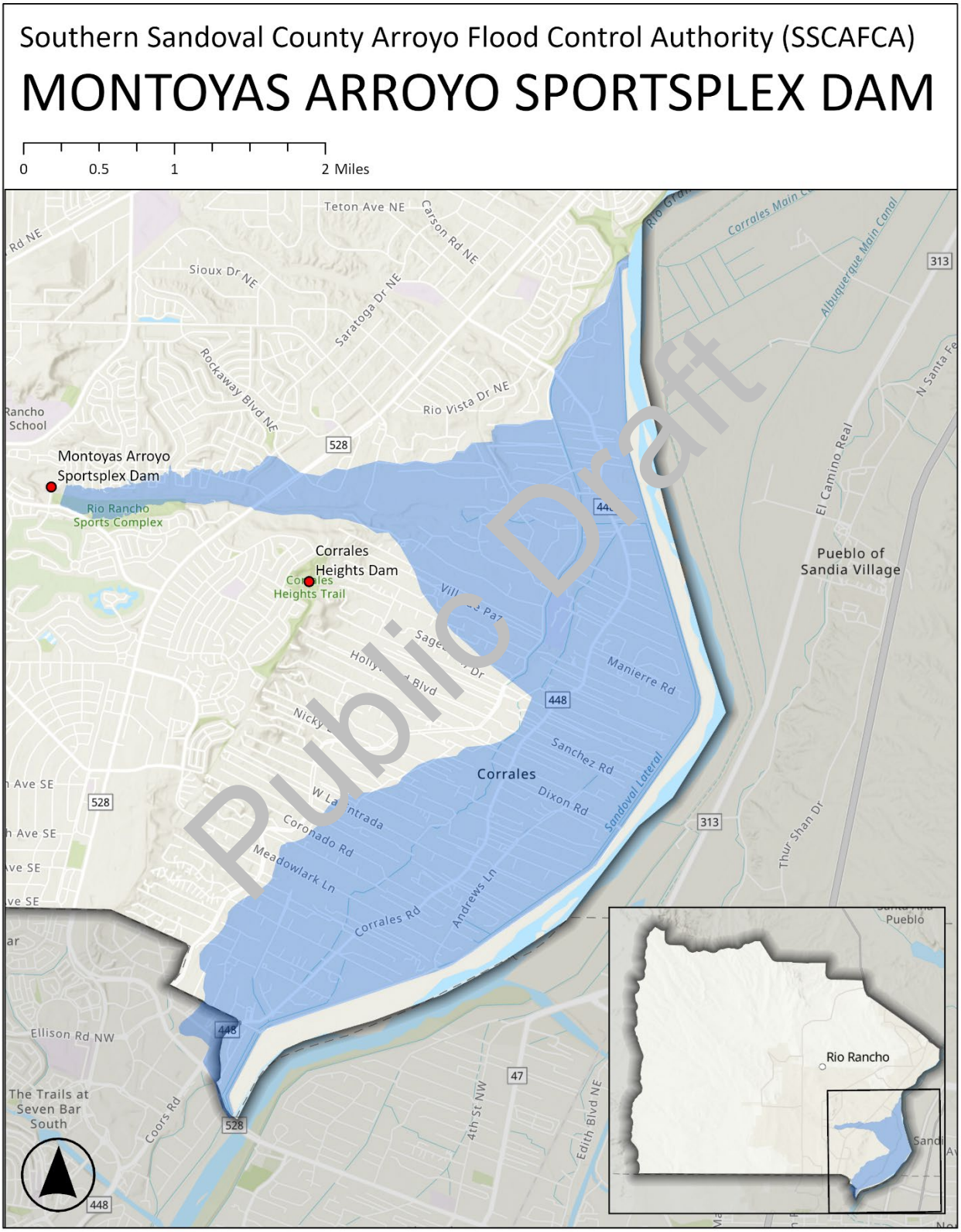
Figure 15 Montoyas Arroyo Sportsplex Dam Inundation Mapping



Source: USACE National Inventory of Dams (NID), SSCAFCA GIS, ESRI, USGS, Garmin (Created: 8/22/2025)

6.2.5 Secondary Hazards

Dam failures can cause secondary hazards such as flood/flash flood and soil erosion.

6.2.6 Exposure and Vulnerability

The Authority's top concerns about potential dam failures are the impacts on municipal facilities and infrastructure. Other potential Authority-specific concerns include:

- Corrales Heights Dam: The Authority's stormwater conveyance pipeline leading from the dam could be compromised.
- Enchanted Hills Dam: The Authority's stormwater conveyance pipeline leading from the dam could be compromised and impacts could occur to the downstream channel and a sediment removal facility currently being constructed.
- Montoya Arroyo Sportsplex Dam: The Authority's Harvey Jones Channel capacity could be overwhelmed.

The two dams outside of the Authority's boundary that could cause potential impacts include the Jemez Canyon and Cochiti Dams. Both of these flood control dams flow into the Rio Grande River, which is the Authority's eastern boundary. Levees (not owned by the Authority) are present along most of this boundary, so impacts would only be experienced if the levees were to breach during a dam incident.

6.2.7 Probability of Future Occurrences

Although there have been no historical dam incidents, this does not equate to a zero probability of future incidents. With that stated, the maintenance and operation of SSCAFCA-owned dams and ponds are integral to SSCAFCA's mandate and form an essential part of the organization's mitigation strategy. The Planning Team identified the future probability of a dam incident to be "Unlikely", not expected to occur over the next 50 years.

6.2.8 Climate Change Impacts

It is important to note that only historic weather patterns were considered in existing dam designs. The increasing frequency and severity of heavy rainfall events can compromise safety and increase the risk of dam failure, as these conditions weren't accounted for in the original design. Earthen dams are also vulnerable to the impacts of the increased drought conditions being experienced, which are expected to continue in the future.

6.3 Drought

6.3.1 General Background

Drought, the prolonged absence of precipitation, is a regular feature of the area's climate, marked by insufficient water to meet needs. It can be assessed through precipitation, soil moisture, and streamflow deficits, measured over months to years.

Hydrologic conditions for drought vary by location and water user type. To define their conditions, water providers may use criteria such as rainfall, runoff, stored water, or wholesaler supply. Drought complexity is furthered by the management of water rights, which is governed by different legal doctrines.

Typically, a single dry year does not constitute a drought. Drought is a gradual phenomenon that develops over a prolonged period. Although often characterized as emergencies, droughts make it difficult to quantify when one begins and ends. Drought can usually be defined regionally based on its effects:

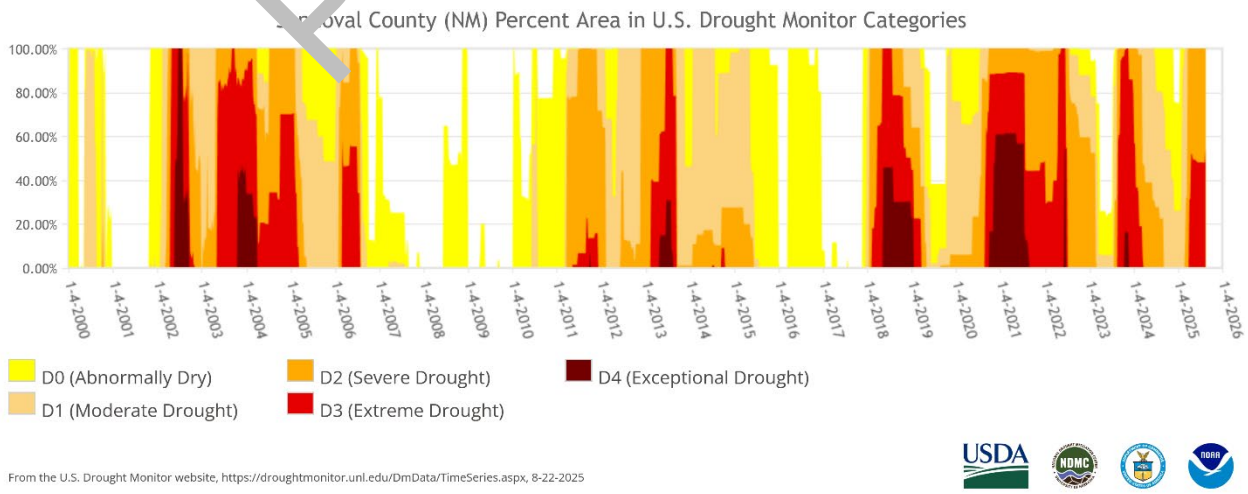
- Meteorological drought is usually defined as a period of below-average precipitation.
- Agricultural drought occurs when there is an inadequate water supply to meet the needs of the region's agricultural operations.
- Hydrological drought is defined as a deficiency in surface and subsurface water supplies. It is generally measured in terms of stream flow, lake levels, reservoir levels, and groundwater levels.
- Socioeconomic drought occurs when a drought impacts health, well-being, and quality of life or when a drought starts to have an adverse economic impact on a region.

6.3.2 Past Events

There have been 55 drought events recorded in the NCEI "Storm Events Database" since 2018 that have impacted the Middle Rio Grande Valley/Albuquerque Metro Area Forecast Zone. There were no damages reported for any of these specific events.

The U.S. Drought Monitor also reports periods of drought in Sandoval County. FIGURE 16 illustrates these periods of drought including their duration and the scale of impact on the county.

Figure 16 Periods of Drought in Sandoval County



State of New Mexico Executive Orders for Drought

There have been several statewide executive orders issued by the Office of the Governor for drought since 2018, as detailed in TABLE 5.

Table 5 State Executive Orders for Drought Including Sandoval County

Executive Order	Date Issued	Event Description
#2020-040	6/15/2020	An EO was issued for drought and severe fire conditions throughout the state of New Mexico. The EO urged counties and municipalities to enact firework bans.
#2020-084	12/9/2020	An EO was issued to declare a drought. Around 85% of the state was experiencing severe drought conditions or worse.
#2021-028	6/14/2021	An EO was issued for drought and severe fire conditions. The EO urged counties and municipalities to enact firework bans. Around 88% of the state was experiencing severe drought conditions.
#2022-022	4/25/2022	An EO was issued for severe drought and fire conditions. The EO urged counties and municipalities to enact firework bans. Around 93% of the state was experiencing severe drought conditions or worse.
#2023-060	5/17/2023	An EO was issued for drought and severe fire conditions. The EO urged counties and municipalities to enact firework bans. Around 55% of the state was experiencing drought conditions.
#2024-016	5/17/2024	An EO was issued for drought and severe fire conditions. The EO urged counties and municipalities to enact firework bans. Around 97% of the state was experiencing drought conditions.

Source: State of New Mexico - HTTPS://WWW.GOVERNOR.STATE.NM.US/ABOUT-THE-GOVERNOR/EXECUTIVE-ORDERS/

Federal Disaster Declarations

Federal disaster declarations are issued at the county level for hazard events that cause more damage than state and local governments can handle without assistance from the federal government. A federal disaster declaration initiates recovery programs to assist disaster victims, businesses, and public entities. Declarations for Sandoval County relating to drought are listed in TABLE 6.

Table 6 Drought - Federal Disaster Declarations

Year	Declaration Number	Declaration Type	Declaration Title
1977	EM-3034-NM	Emergency Declaration	Drought

Source: OpenFEMA

United States Department of Agriculture (USDA) Disaster Designations

The U.S. Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency (EM) loans available to producers suffering losses in those counties and counties that are contiguous to a designated county. In addition to EM loan eligibility, other emergency assistance programs, such as the Farm Service Agency (FSA) disaster assistance programs, have historically used disaster designations as a trigger for eligibility. A USDA disaster declaration designates counties that have experienced at least a 30% loss in one or more crops or livestock due to a natural hazard event.

TABLE 7 presents these disaster declarations since 2018, which have occurred at least annually each year except 2021. (Note: The NM SHMP mentions exceptional drought statewide in 2021 and a USDA drought designation, but this entry was missing from the USDA database, suggesting a possible data error.)

Table 7 USDA Disaster Designations Including Sandoval County

Crop Year	Designation Number
2018	S4316
2019	S4469
2020	S4651
2020	S4779
2020	S4790
2020	S4800
2022	S5154
2023	S5378
2023	S5557
2023	S5585
2024	S5678

Source: USDA

6.3.3 Location

Drought is a significant hazard that has the potential to affect the entire district, either directly or indirectly. No area is exempt from experiencing drought conditions. The following figures from the U.S. Drought Monitor illustrate how drought conditions evolve over time, comparing August 2018 to August 2025.

Figure 17 2018 Drought Monitor

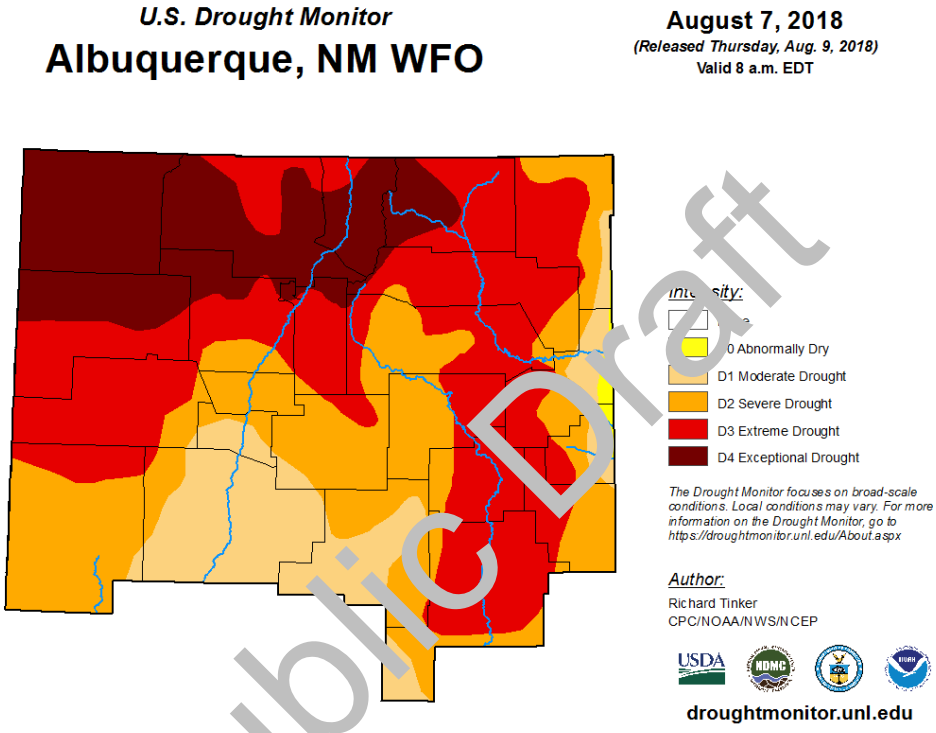
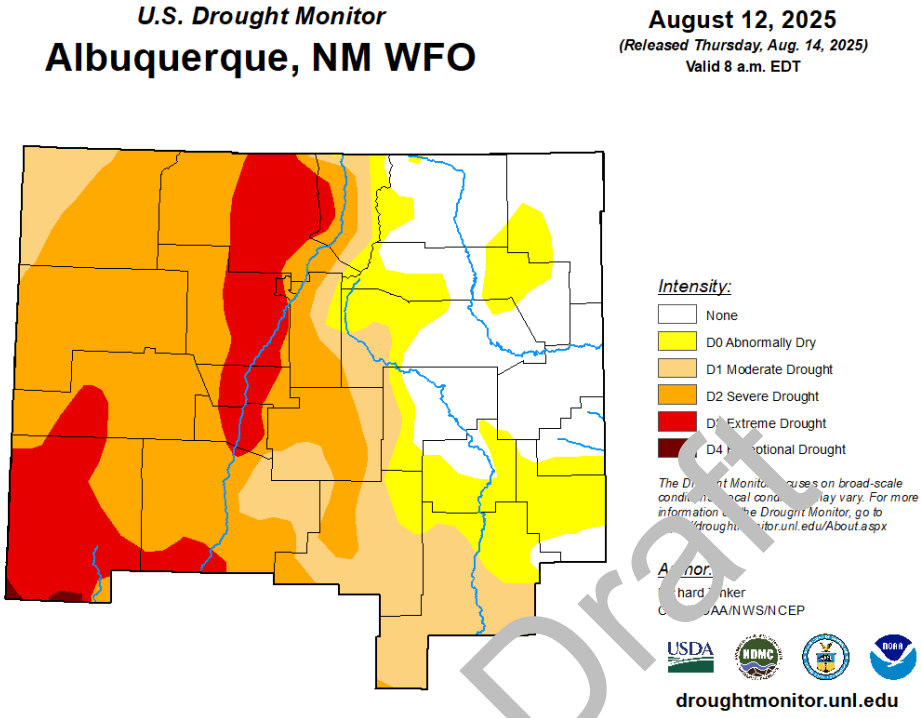


Figure 18 2025 Drought Monitor



6.3.4 Severity

Drought severity depends on the degree of moisture deficiency, its duration, and the size of the affected area. Severity categories are based on possible impacts and are shown in FIGURE 19.

Figure 19 Drought Categories and Possible Impacts

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

Source: National Drought Mitigation Center

6.3.5 Secondary Hazards

Drought conditions can cause secondary hazards such as land subsidence (through soil compaction), which can increase susceptibility to flash flooding. Vegetation die-off due to drought can lead to increased sediment transport and erosion. Drought also accelerates the drying of dead and fallen trees, making them more effective fuel sources for wildfires.

6.3.6 Exposure and Vulnerability

The Authority's top concern regarding drought is vegetation die-off anywhere across the watershed, which would lead to secondary hazards of increased sediment transport and erosion. These increases would result in the need for expanded maintenance of flood control structures.

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6.3.7 Probability of Future Occurrences

The probability of future drought occurrences in the Authority is significant and is likely to occur annually. This pattern is reinforced by the consistent USDA disaster declarations issued, indicating that droughts of sufficient severity to require aid are likely to continue in the future. The Planning Team identified the future probability of a drought to be "Highly Likely", expected to occur every decade at a minimum, if not more frequently.

6.3.8 Climate Change Impacts

Climate change threatens to alter the timing and distribution of precipitation in the state, and warmer temperatures will impact runoff, streamflow, evaporation, and soil moisture. With a warmer climate, droughts could become more frequent, severe, and longer lasting. While projections of future precipitation changes do not agree on whether annual precipitation will increase or decrease, future warming — shown in all projections – will reduce the runoff produced for a given amount of rainfall.

6.4 Earthquake

6.4.1 General Background

An earthquake is caused by the sudden release of energy in the Earth's crust, typically due to the movement of tectonic plates. This release generates seismic waves felt as ground tremors. Earthquakes range from minor shakes to significant events that damage infrastructure and cause loss of life. They mainly occur along fault lines, but can also happen away from these boundaries due to fault reactivation or human activities, such as mining.

6.4.2 Past Events

According to the United States Geological Survey (USGS), there have been 38 earthquake events with epicenters within 50 miles of the Authority from 1893 to 2025. Each of these events had a recorded magnitude greater than 2.5. A total of 14 of these events have occurred since 2018. Those events with a magnitude of 3.5 or greater are summarized in TABLE 8.

Table 8 Largest Historical Earthquakes within 50 Miles

Year	Magnitude	Location
1893	5.2	Near Belen, New Mexico
1970	4.5	4 km ENE of Albuquerque, New Mexico
1971	4.7	4 km ENE of Albuquerque, New Mexico
1990	3.7	5 km SE of McIntosh, New Mexico
2012	3.5	4 km WNW of Belen, New Mexico
2016	3.5	3 km NNW of Seboyeta, New Mexico
2023	3.8	8 km ENE of San Mateo, New Mexico

Year	Magnitude	Location
2023	3.5	9 km E of Cuba, New Mexico
2024	3.5	7 km WNW of Paradise Hills, New Mexico

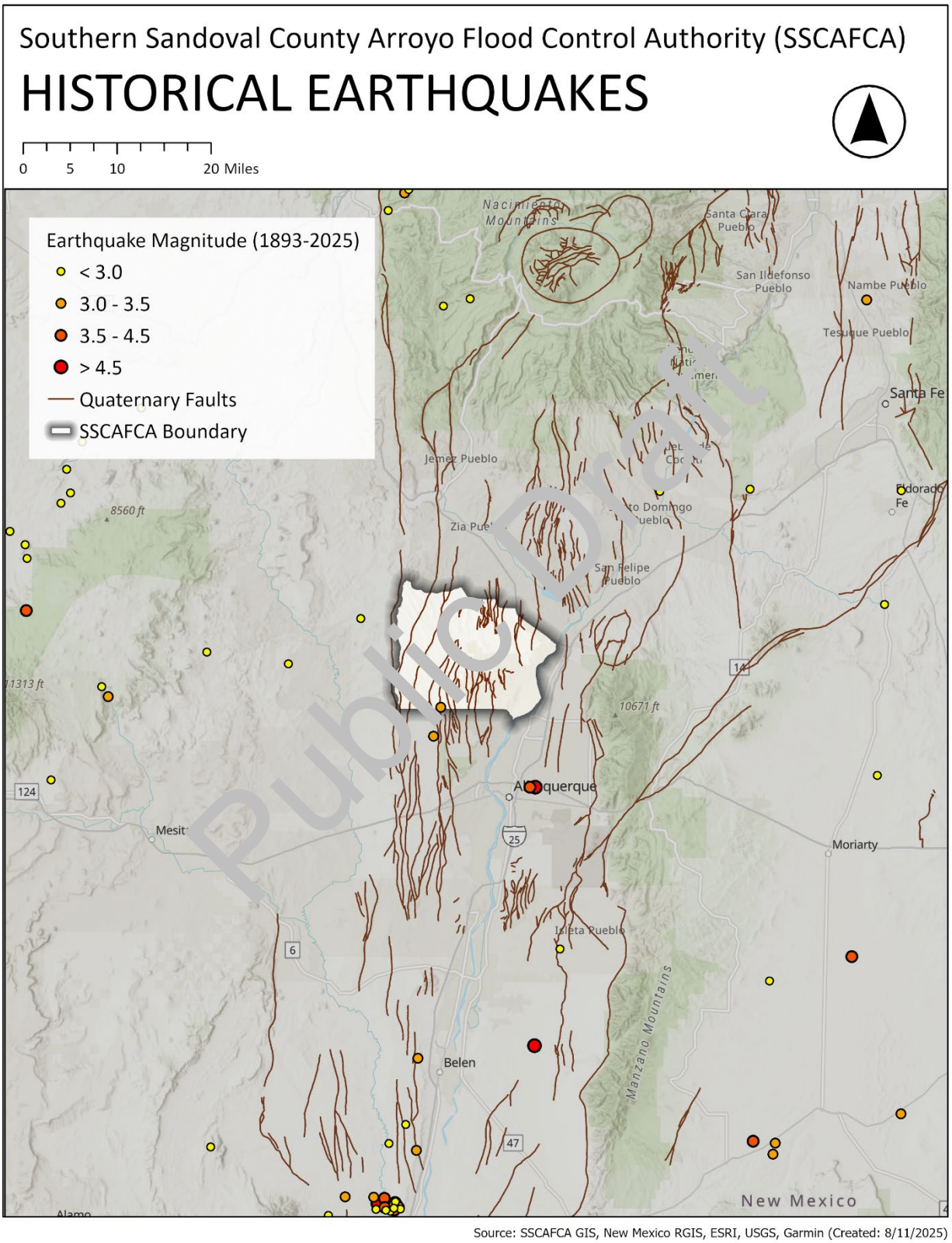
Source: USGS

6.4.3 Location

It is important to recognize that earthquakes with epicenters outside of the Authority can still impact the area, as seismic waves from large earthquakes can travel significant distances. FIGURE 20 displays historical earthquakes that have occurred in the region, along with the locations of known faults.

Peak ground acceleration (PGA) refers to the measure of the maximum acceleration experienced by the ground during an earthquake. It is a key indicator used to assess the intensity of seismic shaking at a specific location and is useful to evaluate the potential impact on buildings, infrastructure, and natural features. FIGURE 21 presents this information at a regional scale.

Figure 20 Historical Epicenters and Faults



Source: SSCAFCA GIS, New Mexico RGIS, ESRI, USGS, Garmin (Created: 8/11/2025)

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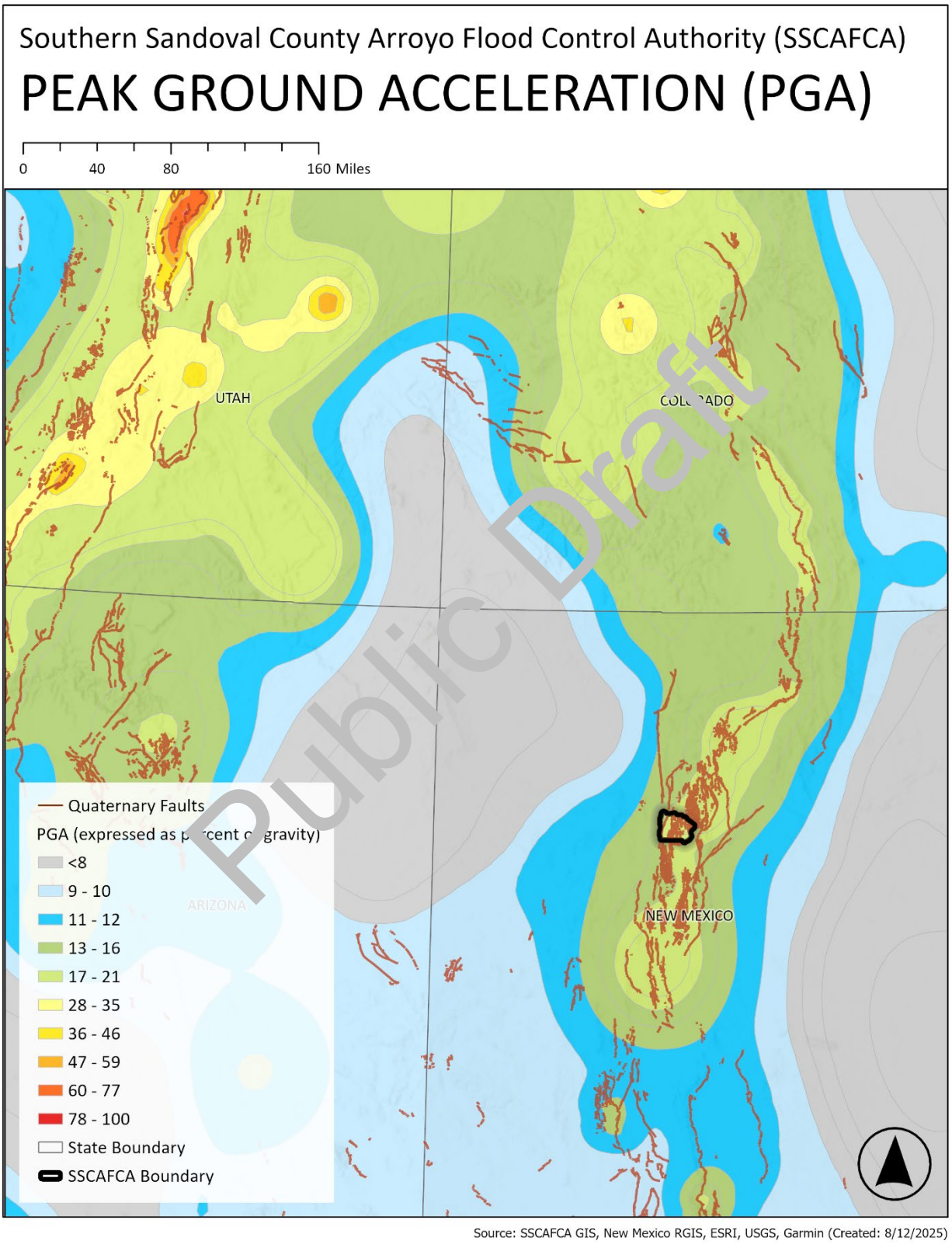
Figure 21 Modeled Peak Ground Acceleration



Source: SSCAFCA GIS, New Mexico RGIS, ESRI, USGS, Garmin (Created: 8/12/2025)

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6.4.4 Severity

Earthquakes range from minor tremors undetectable by humans to major events impacting extensive areas. TABLE 9 shows the magnitude and impacts of an earthquake.

Table 9 Earthquake Magnitude and Intensity Scale

Scale	Intensity	Description of Effects	Richter Scale Magnitude
I	Not Felt	Detected only on seismographs.	
II	Weak	Some people feel it.	< 4.2
III	Weak	Felt by people resting; like a truck rumbling by.	
IV	Light	Felt by people walking.	
V	Moderate	Sleepers awake; church bells ring.	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	Very strong	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	Severe	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	Violent	Some houses collapse, ground cracks; and pipes break open.	< 6.9
X	Extreme	Ground cracks profusely; many buildings are destroyed; liquefaction and landslides are widespread.	< 7.3
XI	Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables are destroyed; general triggering of other hazards.	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: USGS

6.4.5 Secondary Hazards

Earthquake shaking can weaken dams, leading to failures. Shaking and fault movements can also destabilize the ground, causing sudden land subsidence.

6.4.6 Exposure and Vulnerability

The Authority's top concern regarding earthquake is the potential damages to dam embankments (resulting in dam failure) and concrete conveyances and pipelines. There are no concerns with the Authority's natural channels.

6.4.7 Probability of Future Occurrences

According to the USGS, the region around the Authority has experienced 38 earthquakes with a magnitude of 2.5 or greater since 1893, indicating a 29% annual probability. The Planning Team identified the future probability of a damaging earthquake to be "Unlikely", not expected to occur over the next 50 years.

6.4.8 Climate Change Impacts

Earthquakes result from the movement of tectonic plates, which are not affected by surface-level weather or climate patterns. Consequently, changes in climate are unlikely to influence the frequency, location, or severity of future earthquake events.

6.5 Flood/Flash Flood

6.5.1 General Background

Floods in the county include riverine, sheet, alluvial fan, and local area flooding. Riverine flooding occurs along established watercourses when the bankfull capacity is exceeded by storm runoff or snowmelt, resulting in inundation of overbank areas. Sheet flooding occurs in low-lying regions with minimal topographic relief, resulting in floodplains that span wide areas. Alluvial fan flooding typically affects foothills near mountain bases, where multiple unstable flow paths may change rapidly during flood events. Local area flooding often stems from development that alters natural flow paths, such as channelization and blocking or disconnecting them from their natural floodplains, leading to ponding and conveyance issues.

Flash flooding is a sudden and intense flood event that develops rapidly, often within minutes to a few hours of heavy rainfall, dam failure, or the sudden release of water. These floods are typically characterized by swift-moving water that can inundate low-lying areas, posing significant hazards due to their speed and unpredictability. Flash floods are particularly dangerous because they provide little warning.

Erosion frequently accompanies flooding and flash flooding, particularly in natural arroyos draining lower elevation regions of the county. In many cases, erosion is a more significant consequence of flooding than the inundation itself. See the ***Soil Erosion*** profile for additional details.

6.5.2 Past Events

There have been numerous flood events recorded in the NCEI "Storm Events Database" that have impacted the Authority, as detailed in TABLE 10.

Table 10 Past Flooding Events

Local Governments Impacts	Event Date	Damages	Injuries / Fatalities
Rio Rancho, SSCAFCA	8/5/1997	$5,000	N/A
Rio Rancho, SSCAFCA	7/29/1999	$100,000	N/A
Rio Rancho, SSCAFCA	8/2/1999	$600,000	N/A
Corrales, Rio Rancho, SSCAFCA	6/27/2006	N/A	N/A
Rio Rancho, SSCAFCA	7/8/2006	$700,000	N/A
Corrales, Rio Rancho, SSCAFCA	8/6/2006	N/A	N/A
Corrales, Rio Rancho, SSCAFCA	10/11/2008	$40,000	N/A
Rio Rancho, SSCAFCA	8/23/2010	$40,000	N/A
Corrales, SSCAFCA	7/26/2013	$50,000	N/A
Corrales, Rio Rancho, SSCAFCA	9/13/2013	$80,000	N/A
Rio Rancho, SSCAFCA	7/14/2014	$20,000	N/A
Rio Rancho, SSCAFCA	7/27/2014	$10,000	N/A
Corrales, SSCAFCA	10/8/2014	$250,000	N/A
Rio Rancho, SSCAFCA	9/21/2017	$50,000	N/A
Rio Rancho, SSCAFCA	8/21/2018	$10,000	N/A
Jemez Springs, Unincorporated Sandoval County, Rio Rancho, SSCAFCA	8/6/2019	$65,000	N/A
Rio Rancho, SSCAFCA	7/30/2022	$1,500	N/A
Rio Rancho, SSCAFCA	8/1/2022	N/A	N/A

Source: NCEI

The Planning Team identified a recent flooding event on July 3, 2025 that impacted the Black Arroyo Watershed. This sub-watershed rain event was estimated to be a 100-year flood with the storm dropping close to 2 inches of rain in less than an hour. This event produced surface runoff that did impact SSCAFCA facilities.

State of New Mexico Executive Orders for Flood

There have been several executive orders issued by the Office of the Governor for floods in Sandoval County since 2018, as detailed in Table 11.

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Table 11 State Executive Orders for Flood Including Sandoval County

Executive Order	Date Issued	Event Description
#2019-014	6/17/2019	An EO was issued in response to heavy rainfall, hail damage, and mudslides which overwhelmed the drainage systems of communities, causing extensive damage to homes, vehicles, livestock, structures, and infrastructure.
#2023-040	4/18/2023	An EO was issued in response to flooding which impacted the Village of Jemez Spring's wastewater treatment plan.

Source: NM SHMP

Federal Disaster Declarations

Federal disaster declarations are issued at the county level for hazard events that cause more damage than state and local governments can handle without assistance from the federal government. A federal disaster declaration initiates recovery programs to assist disaster victims, businesses, and public entities. Declarations for Sandoval County relating to flooding are listed in TABLE 12.

Table 12 Flood - Federal Disaster Declarations

Year	Declaration Number	Declaration Type	Declaration Title
1955	DR-38-NM	Major Disaster	FLOOD
1955	DR-2[illegible]NM	Major Disaster	FLOOD
1973	DR-38[illegible]NM	Major Disaster	SEVERE STORMS, SNOW MELT & FLOODING
1999	DR-1301-NM	Major Disaster	SEVERE ICE STORMS, FLOODING AND HEAVY RAINS
2006	DR-1659-NM	Major Disaster	SEVERE STORMS AND FLOODING
2012	DR-4079-NM	Major Disaster	FLOODING
2012	DR-4047-NM	Major Disaster	FLOODING
2013	DR-4148-NM	Major Disaster	SEVERE STORMS AND FLOODING
2014	DR-4152-NM	Major Disaster	SEVERE STORMS, FLOODING, AND MUDSLIDES

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Year	Declaration Number	Declaration Type	Declaration Title
2015	DR-4197-NM	Major Disaster	SEVERE STORMS AND FLOODING

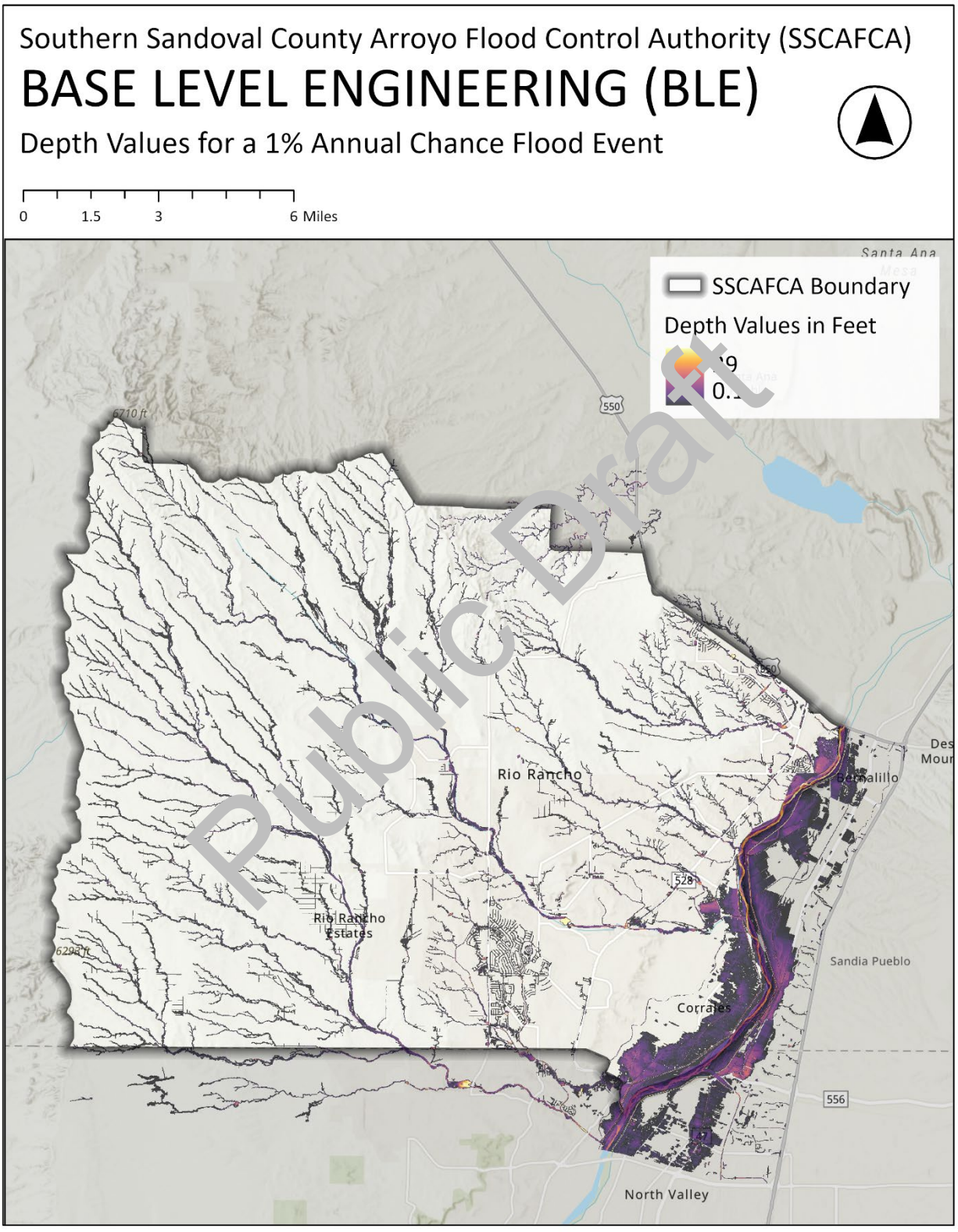
Source: OpenFEMA

6.5.3 Location

Floodplain mapping has recently been completed through FEMA's RiskMap program. The 1% annual chance floodplains shown in FIGURE 22 are the best available data and were produced utilizing Base Level Engineering (BLE) analysis.

Alberta Watershed Drainage Improvements – Phase 2 (Source: SSCAFCA)

Figure 22 Floodplains



Source: SSCAFCA GIS, ESRI, USGS, Garmin (Created: 8/13/2025)

6.5.4 Severity

The severity of a flood event depends on various factors, including the extent of the inundated areas, the duration of the event, the depth of the water, and the impacts on people and property. Flood events can range from minor, affecting only low-lying areas and causing minimal disruption, to catastrophic, resulting in widespread destruction, loss of life, and requiring long-term recovery efforts.

The 1% annual chance flood event (i.e. – "100-year-flood") is the standard national measurement for flood mitigation actions and insurance and refers to a flood of great magnitude. The 100-year floodplain has a 1% annual chance of being equaled or exceeded in any given year; however, this measurement is a statistical probability and does not imply that a flood only occurs every 100 years. A 0.2% annual chance flood event (i.e. – "500-year flood") has a 0.2% annual chance of being equaled or exceeded in any given year and refers to an even more rare and severe flood event.

6.5.5 Secondary Hazards

Flooding can cause secondary hazards such as dam incidents and soil erosion. Post-wildfire flooding can result in debris flows.

6.5.6 Exposure and Vulnerability

All of the Authority's infrastructure is intentionally built in floodplains to protect surrounding areas, making flooding a significant concern. All Authority structures are built to withstand the 1% annual chance flood event. To prepare for future conditions, the Authority is currently conducting a FEMA-funded study to determine if updated design standards should be considered for future projects.

6.5.6.1 Future Assets / Changes in Development

Future structures developed by SSCAFCA will be designed specifically to mitigate flood hazards and are anticipated to reduce vulnerability for the surrounding municipalities.

6.5.7 Probability of Future Occurrences

The Planning Team identified the future probability of a flood at the sub-watershed level to be "Highly Likely", expected to occur every decade at a minimum.

6.5.8 Climate Change Impacts

Climate change increases the frequency and severity of flood hazards. Extreme weather patterns and altered hydrological cycles will lead to more heavy rainfall. Rising temperatures and shifting precipitation make these events more unpredictable and severe.

6.6 Land Subsidence

6.6.1 General Background

Land subsidence refers to the loss of ground surface elevation. It has several causes, including underground fluid withdrawal, collapse of subsurface caverns, collapse of underground mines, hydrocompaction of collapsible soils, or compaction of organic soils. Subsidence may occur abruptly or over many years. It can occur uniformly over large areas or as localized sinkholes.

6.6.2 Past Events

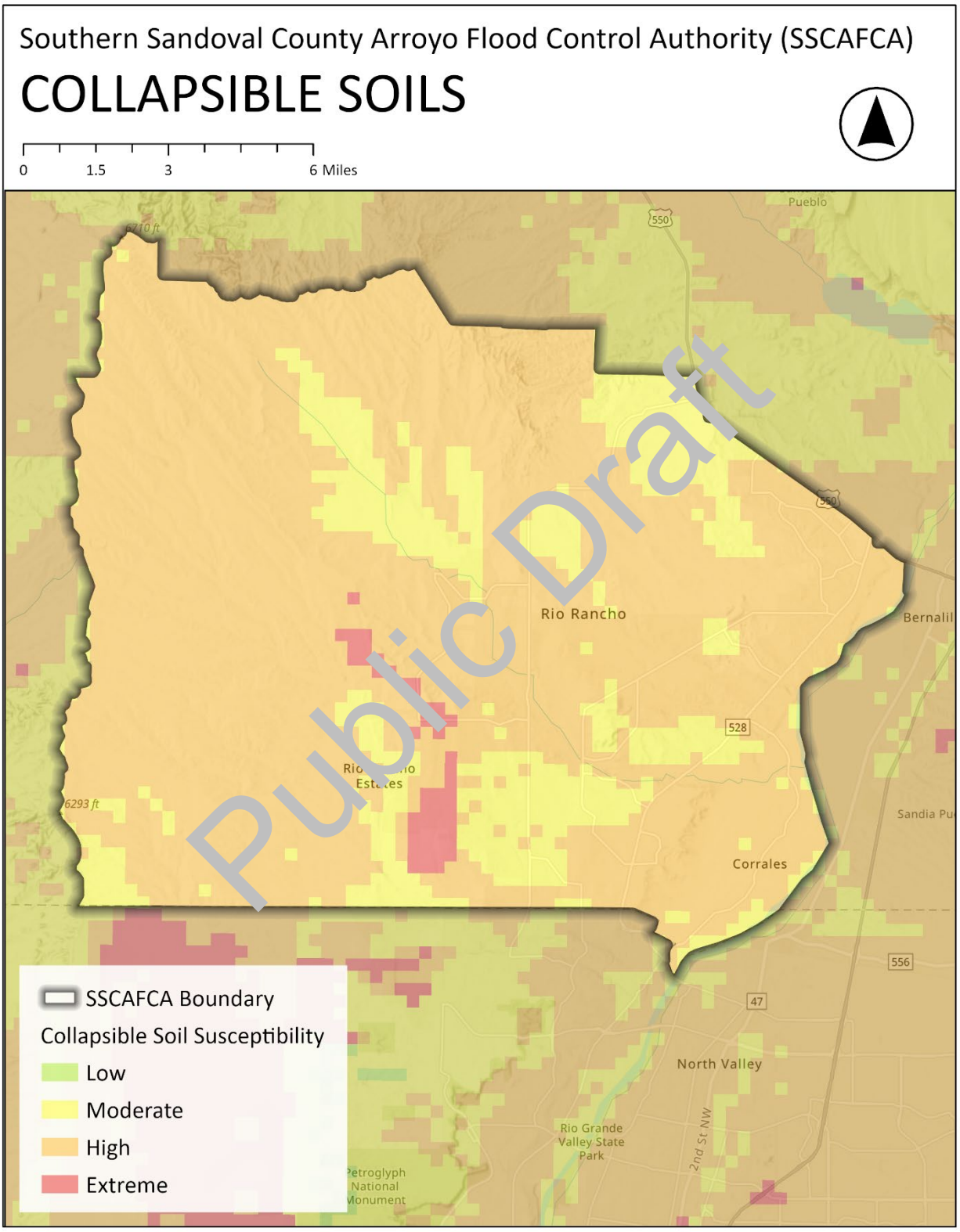
Currently, there is no maintained database or historical reporting of land subsidence events. There is, however, concern for future events as groundwater levels decrease.

6.6.3 Location

New Mexico Tech (NM Tech) developed a collapsible soils susceptibility map for the entire State of New Mexico, shown within the Authority in FIGURE 23. In western Sandoval County, high susceptibilities are found along valley margins draining from the Jemez and Nacimiento Mountains, and cover much of the region.[1]

[1] 2023 NM SHMP

Figure 23 Collapsible Soils Susceptibility



Source: USACE NID, SSCAFCA GIS, New Mexico RGIS, ESRI, USGS, Garmin (Created: 8/12/2025)

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6.6.4 Severity

Land subsidence can be measured by the volume of ground that has collapsed.

6.6.5 Secondary Hazards

When the ground surface lowers due to subsidence, it can reduce the elevation of land relative to rivers and lakes, resulting in flooding.

6.6.6 Exposure and Vulnerability

The Authority's top concern regarding land subsidence is the potential damages to dam embankments (resulting in dam failure) and concrete conveyances and pipelines. These concerns relate to groundwater extraction, particularly in areas like Rio Rancho.

6.6.7 Probability of Future Occurrences

The Planning Team identified the future probability of a damaging land subsidence event to be "Unlikely", not expected to occur over the next 50 years.

6.6.8 Climate Change Impacts

New Mexico will likely see an increased incidence of subsidence from groundwater withdrawal as the climate changes. As the climate warms, increases in irrigation and water use will lead to greater reliance on groundwater reserves, likely lowering groundwater levels below historical levels. When groundwater levels drop, the likelihood of subsidence increases.[2]

6.7 Soil Erosion

6.7.1 General Background

Soil erosion across the Authority is mainly caused by stormwater. The soil in the area is primarily comprised of unconsolidated (loose), fine particles that can be easily swept away by floodwater. This water is carried by arroyos and unlined drainage ways, and can cause them to move laterally (side to side) as well as erode vertically over time.

Arroyos, also known as gullies, are natural, ephemeral stream channels with steep, loose banks and flat, sandy bottoms. Over time, these channels change their shape as water erodes and moves around sand and dirt, especially after heavy rains. Unlike streams that flow all year, arroyos develop slowly and in unpredictable ways because they only have water during big storms.

Both nature and people affect how arroyos form. Sometimes, digging roads or altering the land can initiate the process, but shifts in weather patterns or crossing environmental tipping points also influence these features. True balance in an arroyo is rare, but things can settle down if the

[2] 2023 NM SHMP

land around it stays the same. Even after an arroyo seems stable, its banks can still give way or shift sideways from place to place.

A detailed white paper relating to Lateral Migration of Natural Arroyo Systems is included in APPENDIX C – LATERAL MIGRATION OF NATURAL ARROYO SYSTEMS.

6.7.2 Past Events

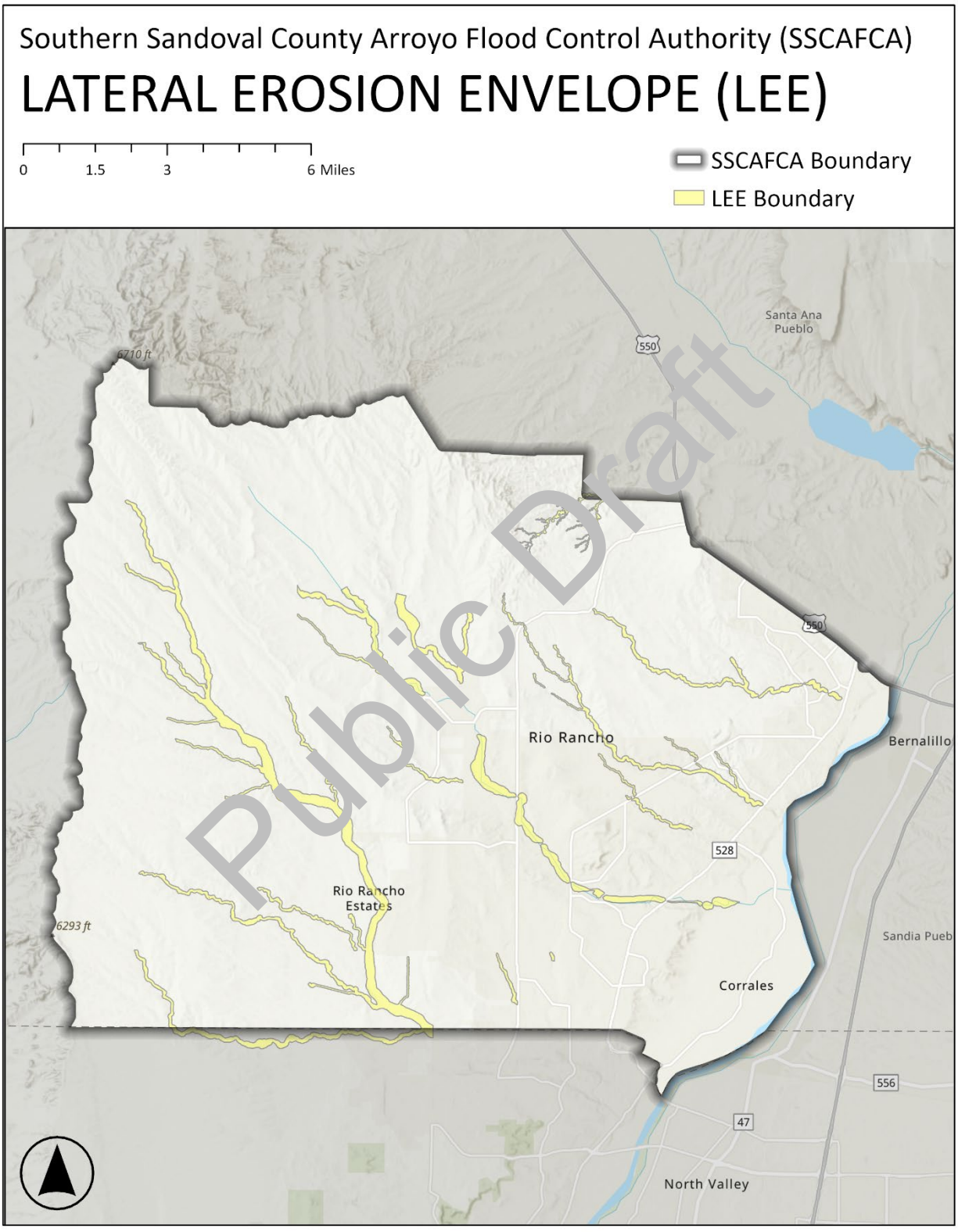
Soil erosion is a constant process across the Authority, who has been closely monitoring bank movement in the Montoyas Arroyo for over the last 15-20 years. Over that time, continual erosion has been seen, with a 40-foot lateral channel movement documented following a single storm event. Vertical erosion has resulted in 30 to 40-foot vertical slopes in areas.

6.7.3 Location

SSCAFCA has developed locations at most risk to soil erosion, termed the Lateral Erosion Envelope (LEE). The LEE is the area adjacent to unlined or natural arroyos or drainage ways that has the potential to be disturbed by erosion, scour (materials being swept away by flowing water), or lateral migration caused by storms up to and including a 100-year storm. A current snapshot of the LEE is shown in FIGURE 24.

Lower Montoyas Bank Stabilization (Source: SSCAFCA)

Figure 24 Lateral Erosion Envelope



Source: SSCAFCA GIS, ESRI, USGS, Garmin (Created: 8/5/2025)

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6.7.4 Severity

Soil erosion can be measured by the volume of earth that has been eroded or by the lateral movement of an arroyo.

6.7.5 Secondary Hazards

Soil erosion can cause lateral channel migration and bank erosion, leading to damaged structures and infrastructure, which could lead to flooding. Sediment deposition downstream reduces channel capacity, increasing the frequency and severity of flooding during storm events.

6.7.6 Exposure and Vulnerability

Soil erosion is the primary issue (flash flooding being the other) affecting the watershed and the Authority's assets, particularly due to stormwater. Any structures within low-lying areas that conveys water are vulnerable to this hazard.

In an urbanizing watershed, lateral and vertical erosion can occur very rapidly in response to either a single significant storm event or a series of smaller storms, endangering adjacent property and delivering large quantities of sediment to downstream reaches.

The consequences of erosion include:

- Infrastructure Damage: Erosion can undermine bridges, culverts, roads, utility crossings, and flood control structures, leading to costly repairs or failures.
- Property Loss: Lateral migration and bank erosion can result in the loss of adjacent land, threatening homes, businesses, and other developments.
- Instability: Erosion can lead to channel incision, widening, and lateral migration, destabilizing the channel and surrounding areas.
- Loss of Agricultural Land: Erosion can strip fertile topsoil, reducing the productivity of agricultural land.
- Sediment Delivery: Erosion increases sediment loads in downstream areas, clogging reservoirs, wetlands, and other water bodies, reducing their capacity and functionality.
- Water Quality Impacts: Sediment-laden runoff increases turbidity, reduces water quality, and harms aquatic life.
- Loss of Vegetation: Erosion can lower the water table, threatening riparian vegetation that stabilizes banks and provides habitat.
- Habitat Degradation: Erosion can destroy riparian habitats, reduce vegetation cover, and disrupt ecosystems dependent on stable channel conditions.
- Environmental Degradation: Increased sediment loads harm aquatic habitats, reduce biodiversity, and disrupt ecosystems.

- Groundwater Impacts: Channel incision can lower the water table, affecting groundwater recharge and availability for nearby wells.
- Economic Costs: Erosion leads to significant costs for mitigation, infrastructure repair, and sediment management.
- Public Safety Risks: Erosion can create steep, unstable banks and sudden channel shifts, posing safety hazards to people and animals.
- Disruption of Utilities: Erosion can expose or damage buried pipelines, cables, and other utilities, leading to service interruptions.
- Cultural and Historical Loss: Erosion can damage or destroy archaeological sites and culturally significant areas located near arroyos.
- Aesthetic and Recreational Impacts: Erosion can degrade the natural beauty of landscapes and reduce their recreational value.
- Increased Vulnerability to Future Events: Erosion can exacerbate the impacts of future storms by creating unstable conditions and reducing the channel's ability to handle runoff.

6.7.7 Probability of Future Occurrences

Soil erosion is a recurring hazard that should be expected to occur annually. The Planning Team identified the future probability of soil erosion to be "Annually".

6.7.8 Climate Change Impacts

Climate projections indicate that while total annual precipitation is likely to decrease in the Southwest region, the heaviest annual rainfall events are expected to become more intense. Extreme precipitation is observed to have generally increased and is projected to continue increasing in a warming atmosphere. This, coupled with drought conditions and the resulting loss of vegetation, can exacerbate the impacts of soil erosion. As a result, damaging flood events that contribute to soil erosion are likely to increase in frequency with climate change.

6.8 Wildfire

Sandoval County recently developed an updated **2025 Community Wildfire Protection Plan**. Readers of this HMP are encouraged to consult that document for additional detailed wildfire-related information and data.

6.8.1 General Background

Wildfires are uncontrolled fires that spread rapidly through vegetation, posing a significant threat to lives, property, and the environment. They are a natural part of many ecosystems, helping maintain ecological balance by clearing dead matter and encouraging new growth. Factors like prolonged droughts, higher temperatures, and human activities have increased their frequency and intensity in recent years. Wildfires can harm natural resources, destroy property, and pose a threat to human safety. The wildland-urban interface (WUI), where

human development meets or mixes with wildland, is especially vulnerable because fires here can cause significant property damage and loss of life.

Wildfire behavior is significantly influenced by three main factors: topography, fuel, and weather. Fires spread more rapidly on steep, dry slopes, especially those facing south, while ridgetops may slow or halt their progress. The type, quantity, and moisture of fuels—such as grasses, shrubs, and timber—determine burn intensity and the challenges of containment. Weather variables like temperature, humidity, wind, and lightning are highly unpredictable but critically affect wildfire occurrence and severity, with wind having the greatest ability to intensify and spread flames swiftly across the landscape.

6.8.2 Past Events

The largest wildfire that occurred in the county in recent memory was the 2022 Cerro Pelado fire, which was fueled by strong winds and dry conditions caused by drought. The fire that spread to over 45,600 acres but did not impact the Authority.

There is a single wildfire event recorded in the NCEI "Storm Events Database" that impacted the Authority, as detailed in TABLE 13.

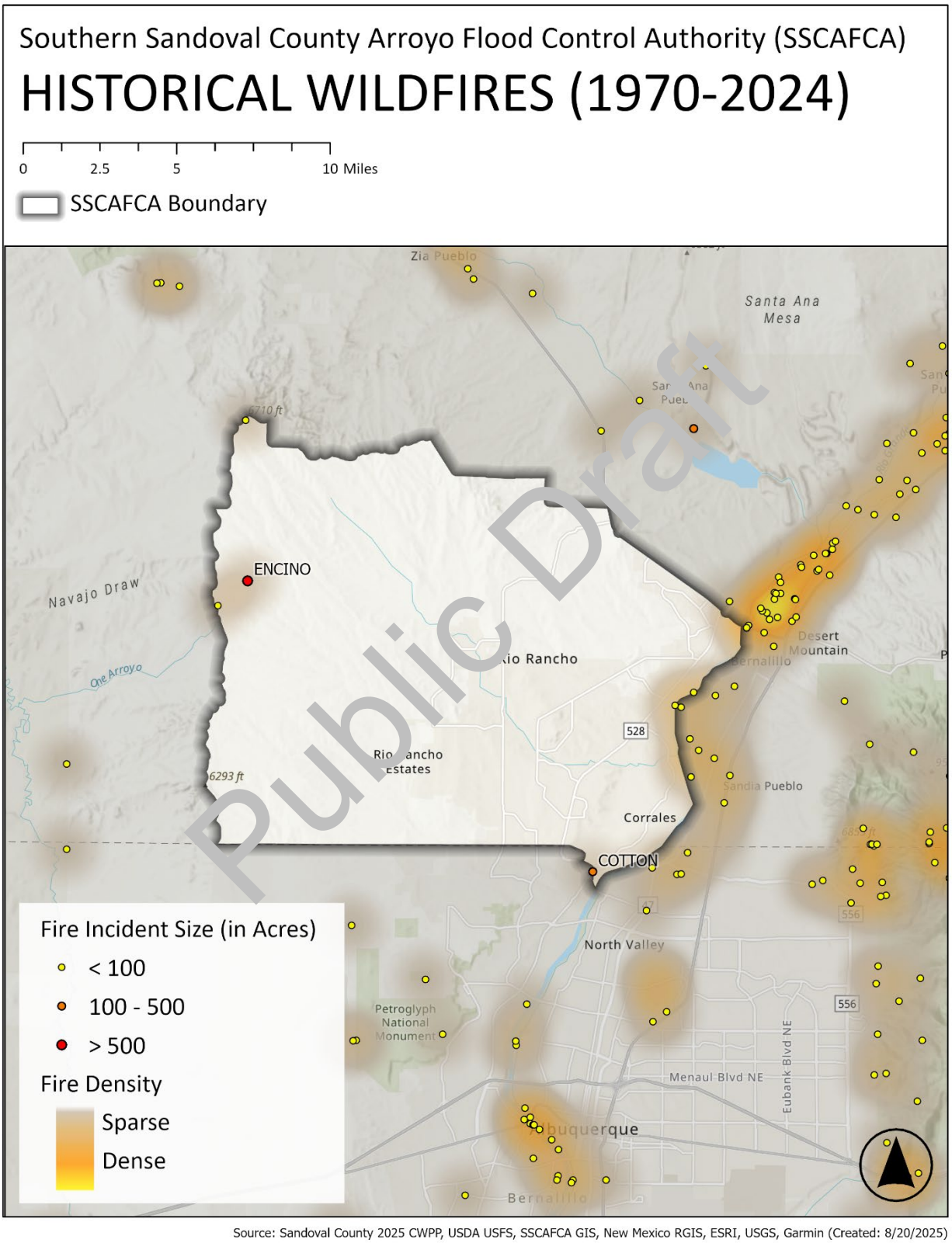
Table 13 Past Wildfire Events

Local Governments Impacted	Event Date	Damages	Injuries / Fatalities
Corrales, SSCAFCA	6/21/2022	N/A	N/A

Source: NCEI

FIGURE 25 presents historical wildfires across the Authority.

Figure 25 Historical Wildfires



Source: Sandoval County 2025 CWPP, USDA USFS, SSCAFCA GIS, New Mexico RGIS, ESRI, USGS, Garmin (Created: 8/20/2025)

State of New Mexico Executive Orders for Wildfire

There have been several statewide executive orders issued by the Office of the Governor for wildfire conditions since 2018, as detailed in TABLE 14.

Table 14 State Executive Orders for Wildfire Conditions Including Sandoval County

Executive Order	Date Issued	Event Description
#2020-040	6/15/2020	An EO was issued for drought and severe fire conditions throughout the state of New Mexico. The EO urged counties and municipalities to enact firework bans.
#2021-028	6/14/2021	An EO was issued for drought and severe fire conditions. The EO urged counties and municipalities to enact firework bans. Around 88% of the state was experiencing severe drought conditions.
#2022-022	4/25/2022	An EO was issued for severe drought and fire conditions. The EO urged counties and municipalities to enact firework bans. Around 93% of the state was experiencing severe drought conditions or worse.
#2022-025	5/03/2022	An EO was issued for the Cerro Pelado Fire Event due to extreme drought conditions and high wind gusts. The fire had spread more than 17,885 acres at the time of the EO and caused widespread damage.
#2023-060	5/17/2023	An EO was issued for drought and severe fire conditions. The EO urged counties and municipalities to enact firework bans. Around 55% of the state was experiencing drought conditions.
#2024-016	5/15/2024	An EO was issued for drought and severe fire conditions. The EO urged counties and municipalities to enact firework bans. Around 97% of the state was experiencing drought conditions.

Source: State of New Mexico - HTTPS://WWW.GOVERNOR.STATE.NM.US/ABOUT-THE-GOVERNOR/EXECUTIVE-ORDERS/

Federal Disaster Declarations

Federal disaster declarations are issued at the county level for hazard events that cause more damage than state and local governments can handle without assistance from the federal government. A federal disaster declaration initiates recovery programs to assist disaster victims, businesses, and public entities. Declarations for Sandoval County relating to wildfire are listed in TABLE 15.

Table 15 Wildfire - Federal Disaster Declarations

Year	Declaration Number	Declaration Type	Declaration Title
1974	FM-2015-NM	Fire Management	GUADALUIPITA FIRE
1977	FM-2025-NM	Fire Management	BARKER FIRE
1996	FM-2177-NM	Fire Management	HONDO FIRE
1998	EM-3128-NM	Emergency Declaration	EXTREME FIRE HAZARDS
1998	FM-2213-NM	Fire Management	OSHA CANYON COMPLEX (COLFAX)
2000	EM-3154-NM	Emergency Declaration	SEVERE FIRE THREATS
2000	DR-1329-NM	Major Disaster	SEVERE FOREST FIRE
2002	FM-2459-NM	Fire Management	NM - LAKES FIRE COMPLEX - 08/26/02
2003	FM-2467-NM	Fire Management	NM-WALKER FIRE-05-09-03
2010	FM-2842-NM	Fire Management	RIO FIRE
2010	FM-2843-NM	Fire Management	CABAZON FIRE
2011	FM-2933-NM	Fire Management	LAS CONCHAS FIRE
2012	FM-2982-NM	Fire Management	ROMERO FIRE
2017	FM-5184-NM	Fire Management	EL CAJETE FIRE
2022	DR-4652-NM	Major Disaster	WILDFIRES, STRAIGHT-LINE WINDS, FLOODING, MUDFLOWS, AND DEBRIS FLOWS

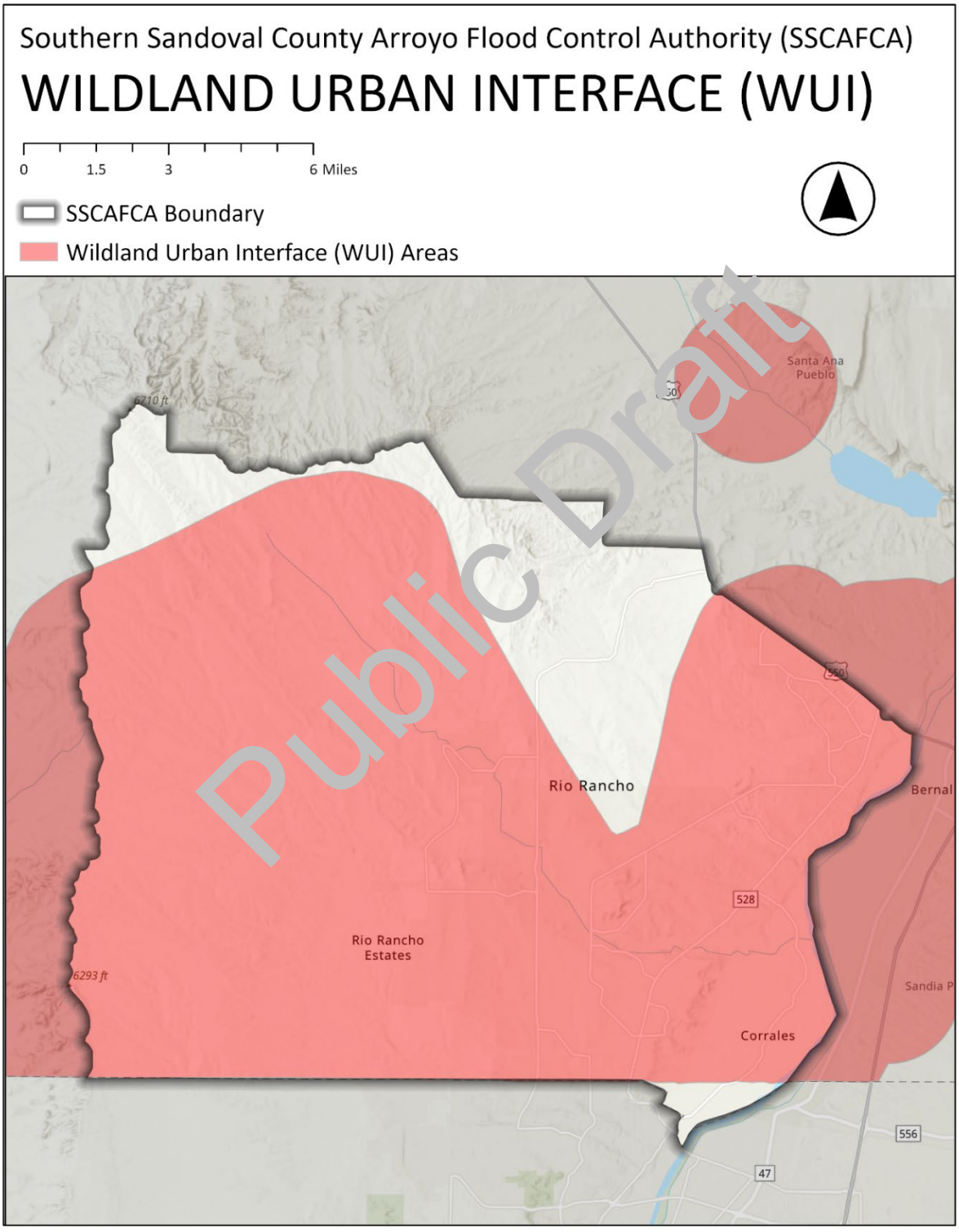
Source: OpenFEMA

6.8.3 Location

Wildfires can occur anywhere across the Authority. The WUI is of most concern, as this is where human development is present and exposed to wildfire events. A map of the WUI was

developed as part of the 2025 Sandoval County Community Wildfire Protection Plan (CWPP) and is presented in FIGURE 26.

Figure 26 Wildland Urban Interface



Source: Sandoval County 2025 CWPP, USDA USFS, SSCAFCA GIS, New Mexico RGIS, ESRI, USGS, Garmin (Created: 8/20/2025)

Hazard Identification and Risk Assessment

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6.8.4 Severity

As part of the 2025 CWPP, a wildfire composite risk layer was developed. FIGURE 27 details the model inputs utilized to create this dataset. The composite risk across the Authority is then presented in FIGURE 28. Most wildfire risk is Very Low to Moderate, with some High and Very High risk areas along the Authority's eastern boundary.

Figure 27 Composite Risk Assessment Model

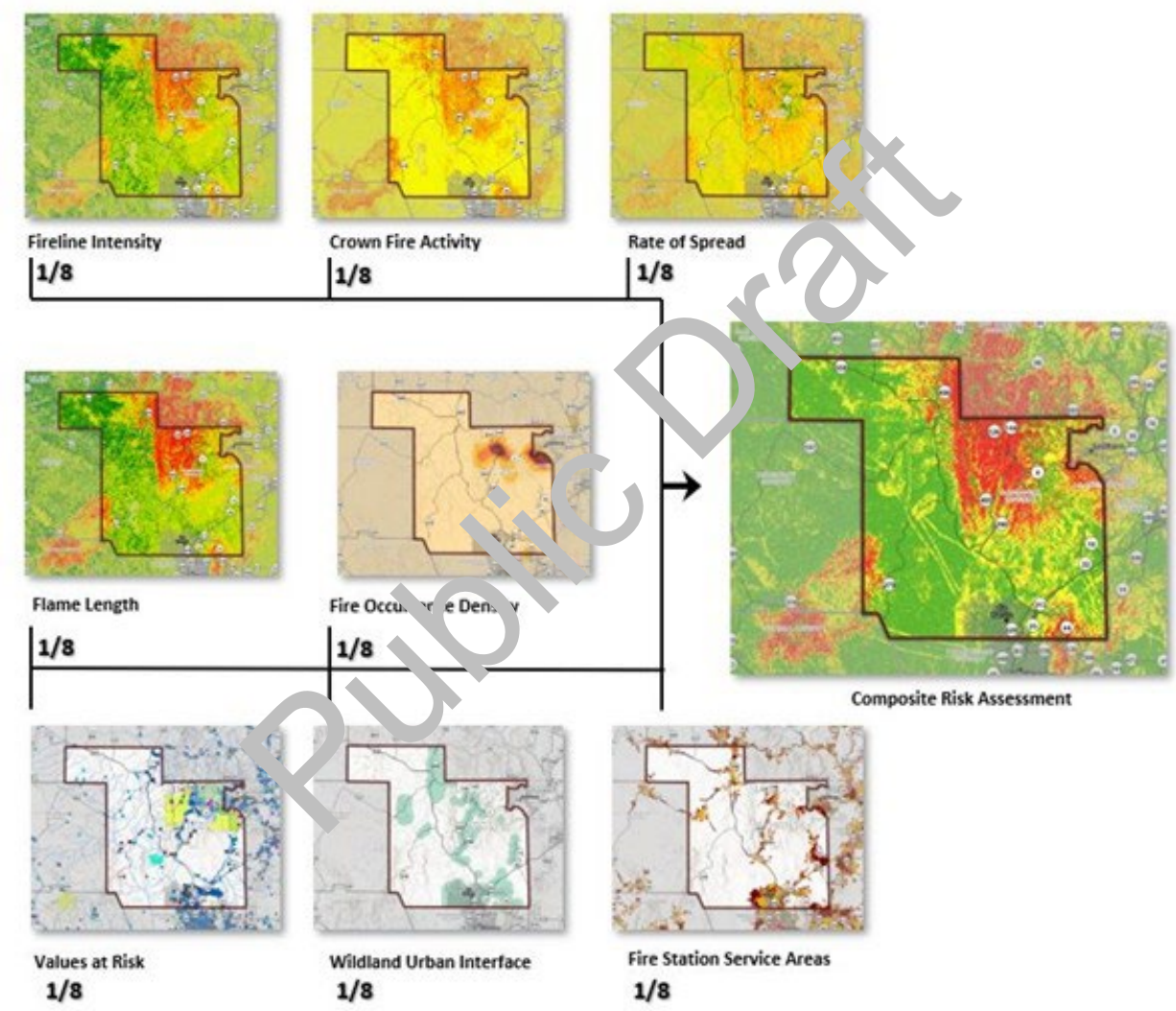
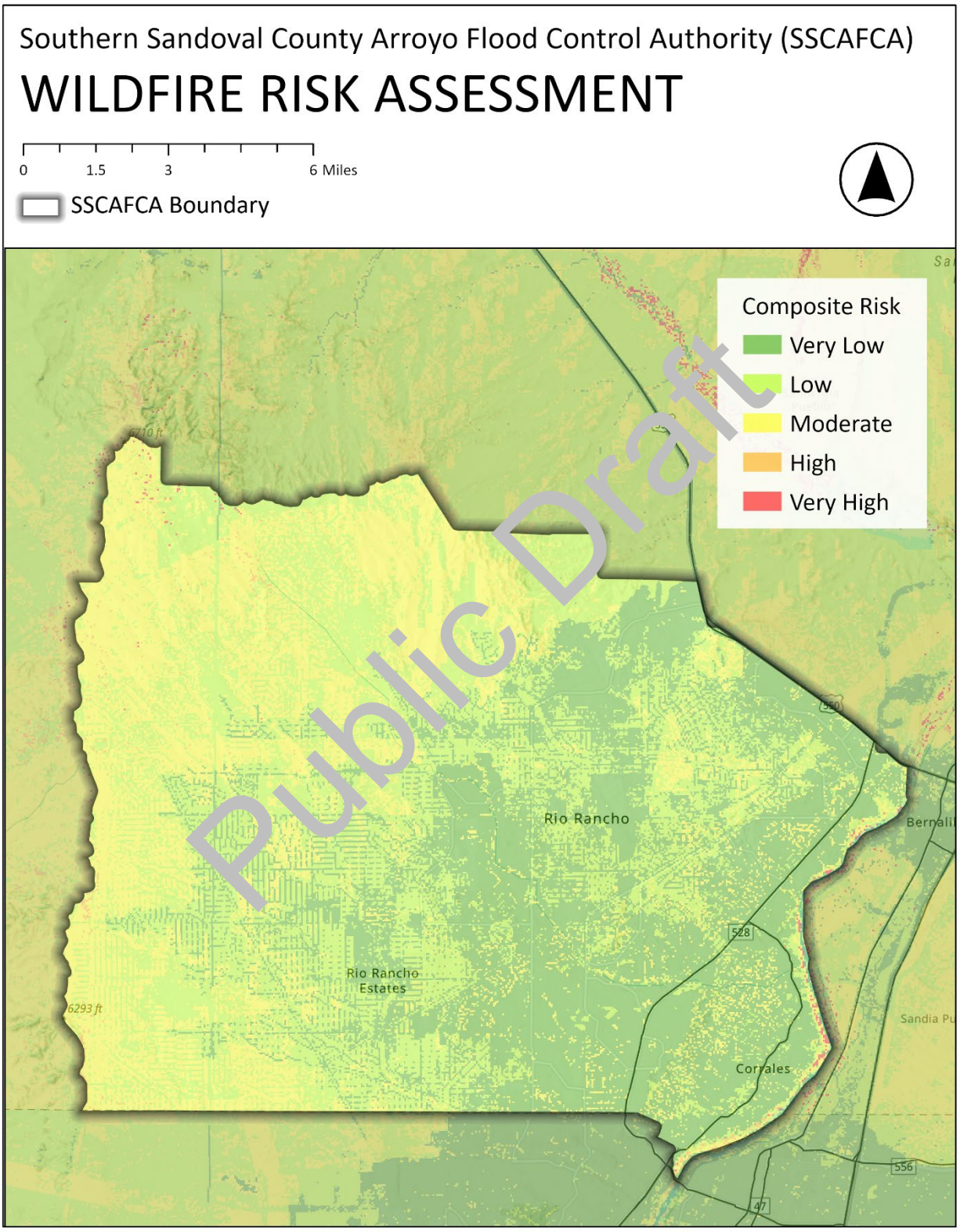


Figure 28 Wildfire Composite Risk



Source: Sandoval County 2025 CWPP, USDA USFS, SSCAFCA GIS, New Mexico RGIS, ESRI, USGS, Garmin (Created: 8/20/2025)

6.8.5 Secondary Hazards

Post-wildfire regions are prone to debris flows and landslides due to the loss of vegetation, resulting in unstable soil. Heavy rainfall can trigger significant earth movements in these areas. Additionally, wildfire heat can render soil hydrophobic, leading to flash floods during thunderstorms.

6.8.6 Exposure and Vulnerability

The Authority's main vulnerability as it relates to wildfire is the resulting post-wildfire erosion and sediment transport that can be expected. The top concern is of a wildfire eliminating vegetative cover in the Northwest Sector of the Authority's boundary.

There is no concern for impacts to any of the Authority's concrete structures.

SSCAFCA's primary focus is flood and sediment control for arroyos within the jurisdictional boundary. Facilities directly owned and operated by SSCAFCA are not particularly vulnerable to wildfire and wildfire mitigation responsibilities are primarily carried out by jurisdictions within SSCAFCA's service area.

6.8.7 Probability of Future Occurrences

Wildfires are a recurring hazard that should be expected on a regular basis. The Planning Team identified the future probability of wildfire to be "Likely", expected to impact the Authority every 10 to 50 years

6.8.8 Climate Change Impacts

Climate change is expected to increase the frequency and severity of wildfires due to rising temperatures and drier conditions. Changes in precipitation patterns may exacerbate droughts, creating conditions that are more conducive to wildfires. Areas previously less prone to fires might experience more activity, particularly in the WUI. Stronger winds can complicate containment efforts. Consequently, climate change is likely to extend wildfire seasons, intensify fires, and pose challenges for firefighting, potentially causing more damage to natural and built environments.

Appendix A – FEMA Approval and SSCAFCA Adoption

Appendix B – Local Planning Team & Stakeholders

Bold names denote those individuals who directly participated in the planning process at meetings and workshops.

Table 16 Planning Roster

Name	Agency/Org.	Title	Sector	Role
Andi Pattillo	NM Dept Homeland Security and Emergency Mgmt	Emergency Preparedness Coordinator	*State Agencies	Planning Team
Andrés Sanchez	Southern Sandoval County Arroyo Flood Control Authority	Design Services Director	Hazard Mitigation (Emergency Management, Public Works, Floodplain Admin., GIS)	Planning Team
Asmita Kaphle	New Mexico Dam Safety Bureau	Technical Specialist	State Dam Safety Agency	Stakeholder
Casey Ish	Middle Rio Grande Conservancy District	Conservation and Lands Director	Regulating Development (Zoning, Planning, Community/Economic Development, Building Officials, Planning Commissions, Elected Officials)	Stakeholder
Dan Heerding	Sandoval County	Emergency Manager	Neighboring Communities	Planning Team
Dave Gatterman	Southern Sandoval County Arroyo Flood Control Authority	Executive Engineer	Hazard Mitigation (Emergency Management, Public Works, Floodplain Admin., GIS)	Planning Team
Elise MacGillivray	Sandoval County	Emergency Management	Neighboring Communities	Planning Team

Name	Agency/Org.	Title	Sector	Role
		Planner/Grants Coordinator		
Jess Lewis	Sandoval Regional Medical Center	Emergency Management, Emergency Manager	Businesses, Academia, Other Private Interests (Utilities, Chambers of Commerce, Dam Owners, Educational Centers, Major Lifeline Employers)	Stakeholder
Kathy Segura-Salas	American Red Cross	Executive Director, New Mexico	Nonprofit & Community Based Orgs. (Faith-based, Disability, NGO, Rural Support, Health & Human/Social Services, Housing Agencies)	Stakeholder
Loren De Azevedo	Pueblo of Santa Ana	Emergency Manager	Neighboring Communities	Planning Team
Matt Montano	Bernalillo Public Schools	Superintendent	Businesses, Academia, Other Private Interests (Utilities, Chambers of Commerce, Dam Owners, Educational Centers, Major Lifeline Employers)	Stakeholder
Max Palmer	NM Dept Homeland Security and Emergency Mgmt	Emergency Preparedness Coordinator	*State Agencies	Planning Team
Mike Carroll	Bernalillo, Town of	Fire Marshal	Neighboring Communities	Planning Team
Nick Molinari	Corrales, Village of	Deputy Fire Chief	Neighboring Communities	Planning Team
Rose Martinez	Rio Rancho, City of	Emergency Manager	Neighboring Communities	Planning Team
Sal Maniaci	Rio Rancho Public Schools	Superintendent, Director of Safety and Security	Businesses, Academia, Other Private Interests (Utilities, Chambers of Commerce, Dam Owners,	Stakeholder

Local Planning Team & Stakeholders

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Name	Agency/Org.	Title	Sector	Role
			Educational Centers, Major Lifeline Employers)	
Seth Muller	Pueblo of Santa Ana	Emergency Manager	Neighboring Communities	Planning Team
Sushil Chaudhary	New Mexico Dam Safety Bureau	Bureau Chief, Dam Safety Bureau	State Dam Safety Agency	Stakeholder
Tanya Lattin	Corrales, Village of	EMS Director/Emergency Manager	Neighboring Communities	Planning Team
Tom Walmsley	Bernalillo County Department of Emergency Management	Emergency Management Director	Neighboring Communities	Stakeholder

Lomitas Negras – Phase 2 (Source: SSCAFCA)

Local Planning Team & Stakeholders

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Appendix C – Lateral Migration of Natural Arroyo Systems

Lateral Migration Whitepaper

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Lateral Migration of Natural Arroyo Systems

November 2018

By
David Gatterman, P.E.
Facility Operations Director
Southern Sandoval County Arroyo Flood Control Authority

Reviewed by:
Andres Sanchez, P.E.
Design Services Director
Southern Sandoval County Arroyo Flood Control Authority

And
Charles Thomas, P.E.
Executive Engineer
Southern Sandoval County Arroyo Flood Control Authority

Lateral migration of natural arroyo systems

Introduction

The Southern Sandoval County Arroyo Control Authority (SSCAFCA) operates and maintains large, regional scale drainage systems in the southern part of Sandoval County, New Mexico. Many of these drainage systems (arroyos) are unlined and remain in a natural condition. For the most part, the soils in southern Sandoval County are highly erodible and allow for high erosion rates and lateral migration of these natural drainage systems during larger storm events.

Since SSCAFCA's creation by the New Mexico legislature in 1991, the agency has been working to raise awareness of the lateral migration potential of these natural drainage systems. In December 2018, SSCAFCA published the Erosion and Sediment Design Guide and in July 2009, the Development Process Manual was finalized in cooperation with the City of Rio Rancho, the largest municipal entity in SSCAFCA's jurisdiction. The design guide and manual identified the Lateral Erosion Envelope (LEE) as a concept that must be considered and protected against when developing in the vicinity of arroyos. Simply put, the LEE concept informs developers (whether it be a public or private entity) that they should either provide for sufficient setback from arroyo banks to allow for lateral arroyo migration or provide bank protection to prevent lateral migration of the arroyos from occurring.

Unfortunately, prior to this timeframe, development in the City of Rio Rancho was not considering the LEE concept. Many of these developments occurred in close proximity to natural arroyo systems and did not protect against lateral migration, which threatens both land and infrastructure. Most of the pre-2009 development took place in the lower (downstream) portions of the arroyo watersheds within SSCAFCA's jurisdiction. As areas further upstream in the watershed developed they created more frequent storm water runoff events and larger volumes and rates of runoff due to increased impervious area.

This whitepaper has been created to identify rationales for assumptions made for lateral migration that occur along natural arroyos and threaten land, infrastructure, and buildings in close proximity to natural arroyo systems.

Historical Lateral Migration

In order to provide guidance for development, SSCAFCA developed and published the Sediment and Erosion Design Guide in 2008. While an inexact science, methodologies for the calculation of Lateral Erosion Envelopes (LEE) have been developed and are part of the current development review process. The calculated LEE for the project area is shown in Figure 5. The methodology for determining the extent of the LEE can be reviewed in the Sediment and Erosion Design Guide (https://sscafca.org/development/documents/sediment_design_guide/Sediment%20Design%20Guide%2012-30-08.pdf).

In order to provide specific guidance for the development of the Benefit Cost Analysis (BCA), SSCAFCA identified a specific series of storm events in the Montoyas arroyo where relatively precise data was available regarding storm event magnitude and lateral migration of the arroyo bank.

The most relevant event to this specific application occurred on the Montoyas Arroyo upstream of the proposed project. Historical aerial images and LIDAR/ground survey data from 2010, 2012, 2013 and 2014 were combined to develop a case study to help quantify potential lateral migration.

In early 2010, LIDAR and orthoimages were taken of the entire SSCAFCA jurisdiction, including the Montoyas arroyo. The 2010 monsoon season (July – October) was significant, including storms that equate to the 100-year storm event (https://sscafca.org/wp-content/uploads/2018/01/GSchoener_Impervious_AcceptedManuscript.pdf, Figures 3 and 4) as modeled in SSCAFCA's Montoyas Watershed Management plan. In 2012, orthophotography was taken again. Since the 2011 had no significant storm events, SSCAFCA was able to compare the banks of the Montoyas arroyo approximately one mile west of the proposed project site. During an evaluation of the bank migration, a maximum of a 70-foot lateral migration was identified on the north bank of the arroyo Figure 1). Smaller areas of migration were also identified within the research area as well, therefore the issue was determined to be of widespread concern.

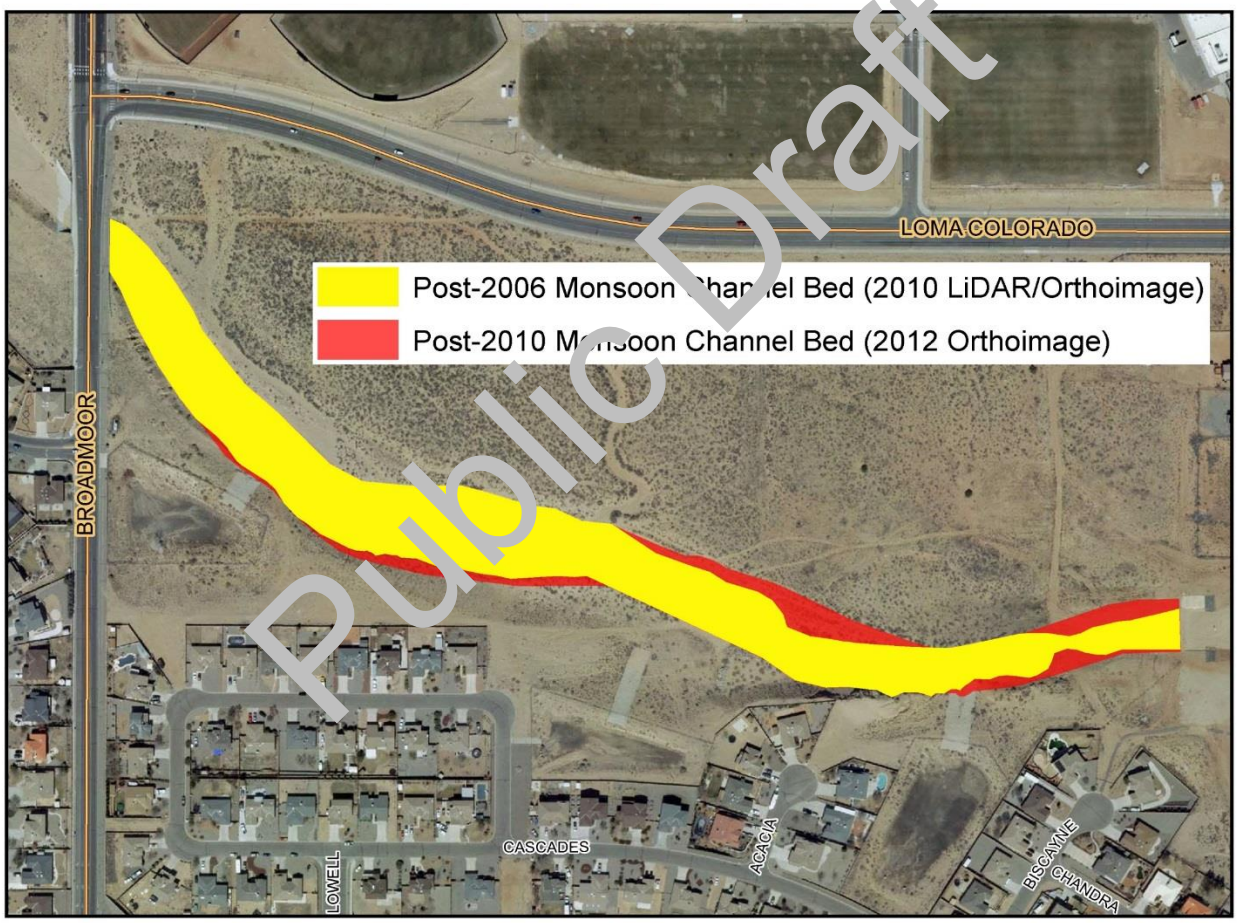

Figure 1

In 2013, SSCAFCA was preparing to do a bank stabilization project in the same area of the Montoyas arroyo as the observed 70-foot lateral migration. We had prepared design topographic mapping for the design of a bank stabilization project and during the design process, a significant storm occurred equating to the 25 to 50-year storm (https://sscafca.org/wp-content/uploads/2018/01/GSchoener_Impervious_AcceptedManuscript.pdf, Figures 3 and 4) as

identified in the Montoyas Watershed Management Plan modelling. During this event, the bank of the arroyo migrated approximately 40-feet laterally (Figures 2 and 3).

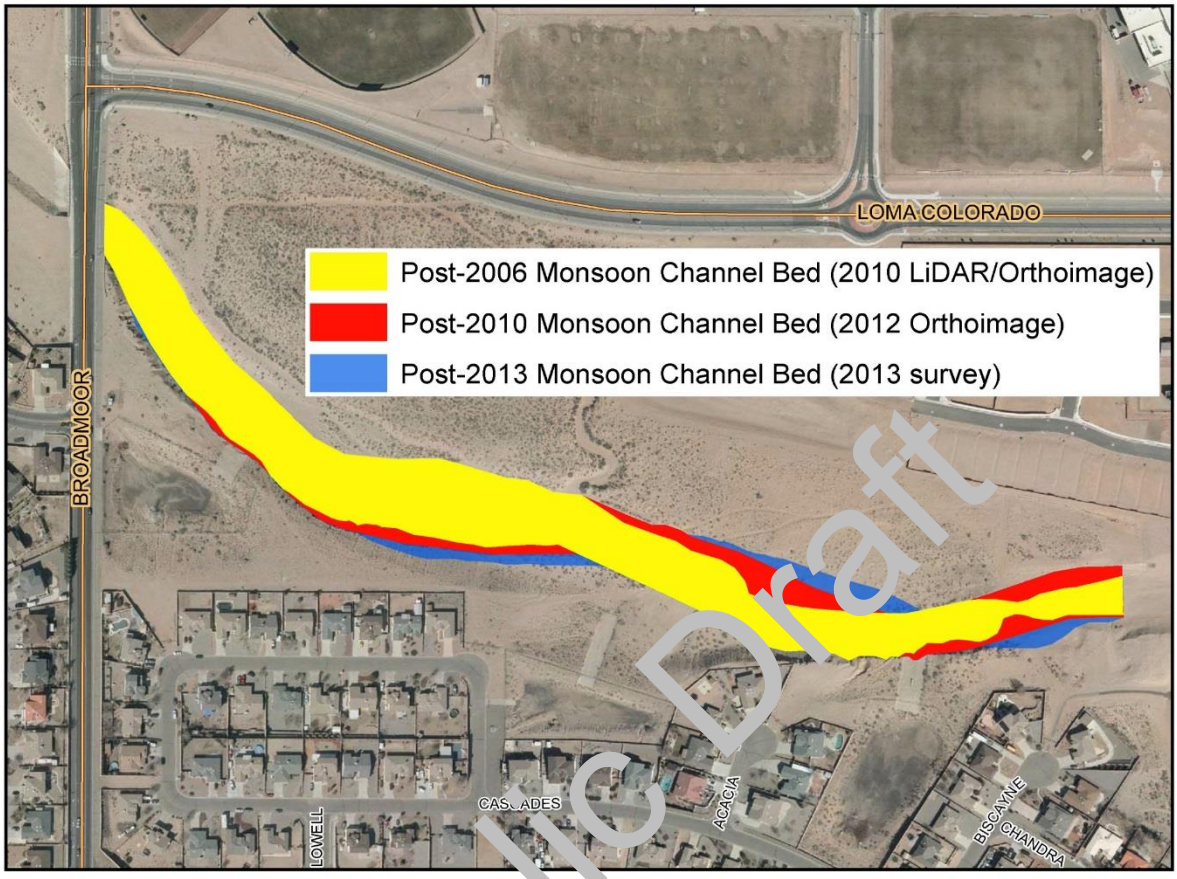

Figure 2

Figure 3

Current conditions on Montoyas Arroyo in Project Area

The existing Montoyas arroyo between New Mexico Highway 528 and the Lower Montoyas Water Quality Feature (Project Area, Figure 4) has similar soil and geometric characteristics as the study area discussed above. This segment of the arroyo is characterized by vertical, unconsolidated side slopes, and a natural, sandy bottom.

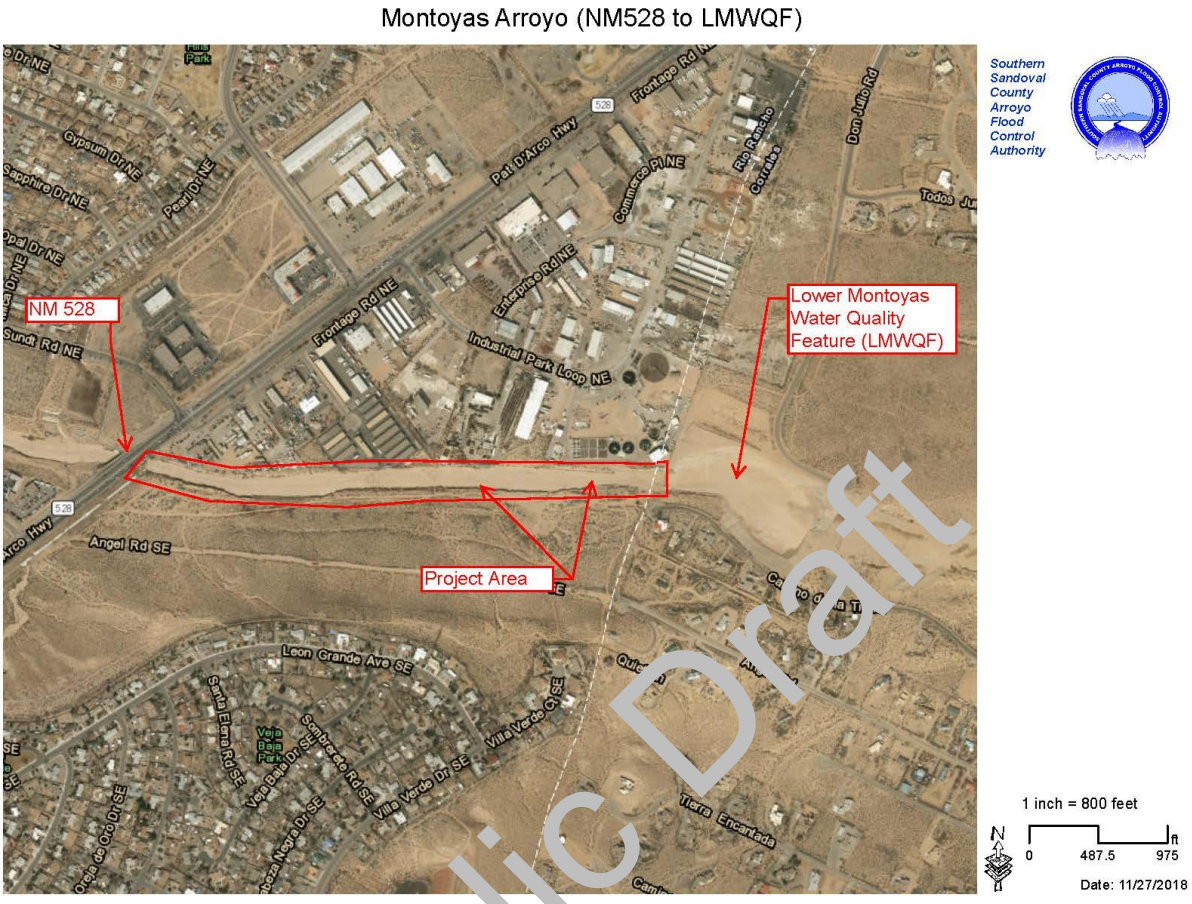

Figure 4

The project area developed prior to the implementation of the Development Process Manual (pre-2009), the LEE was not considered as part of the development process for areas north of the arroyo. In several cases, structures are currently within 40-feet of the arroyo bank. Under a current development scenario, the LEE would preclude development from occurring in the same manner (Figure 5).

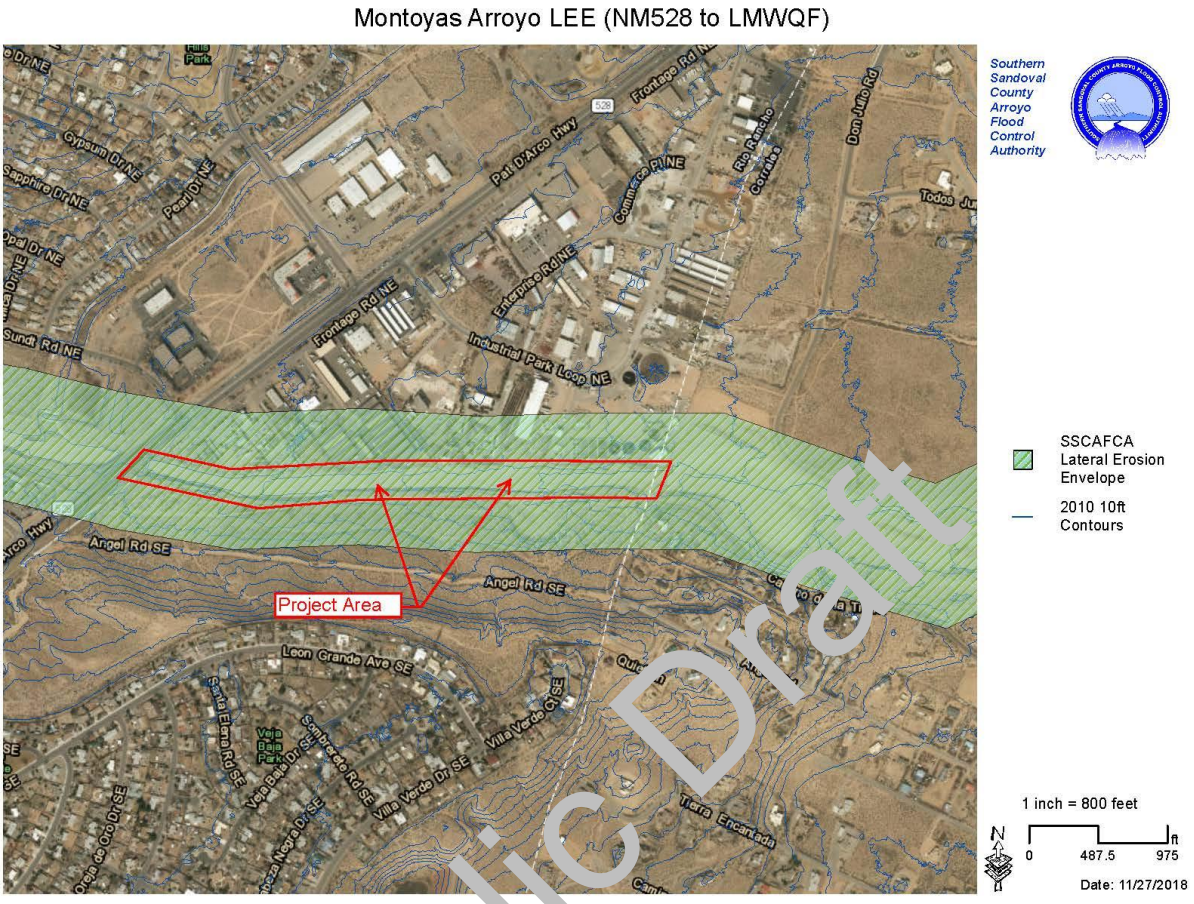

Figure 5

As evidenced by the existence of infrastructure that has failed within the arroyo bottom, the north bank of the Montoyas arroyo in the project area is actively migrating further to the north, threatening structures and infrastructure adjacent to the arroyo. See Figures 6 thru 10.

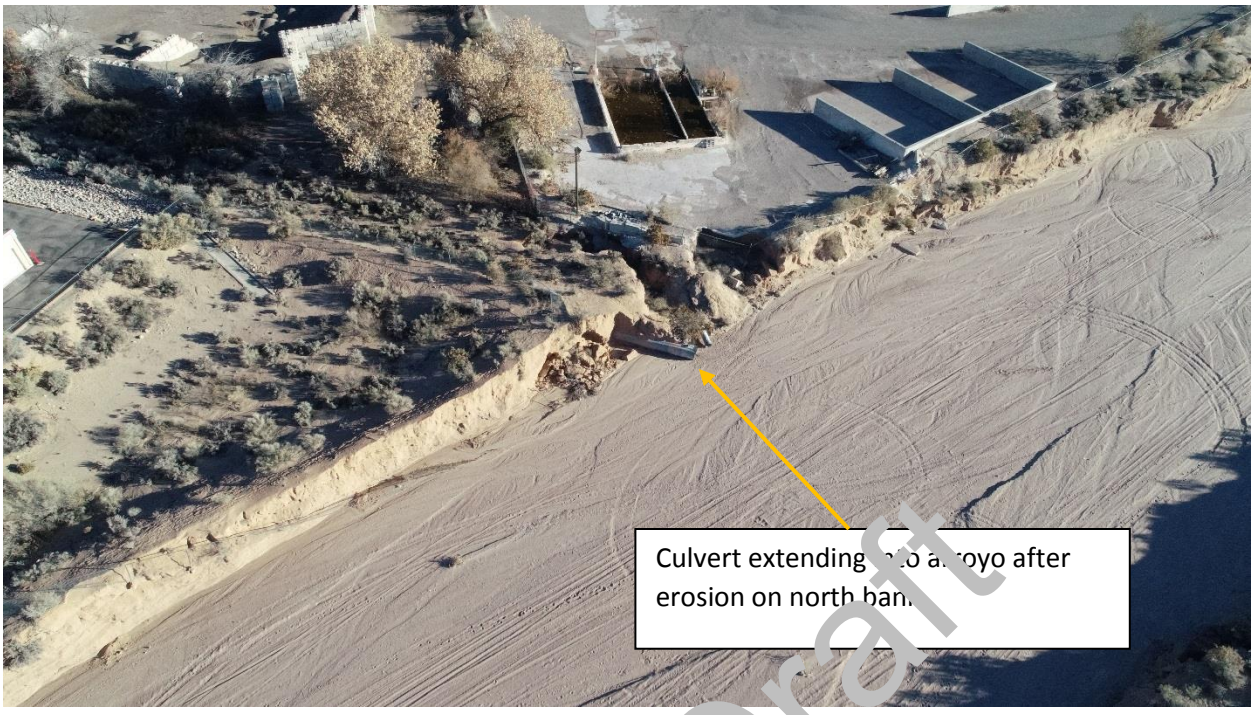

Figure 6

Figure 7

Figure 8

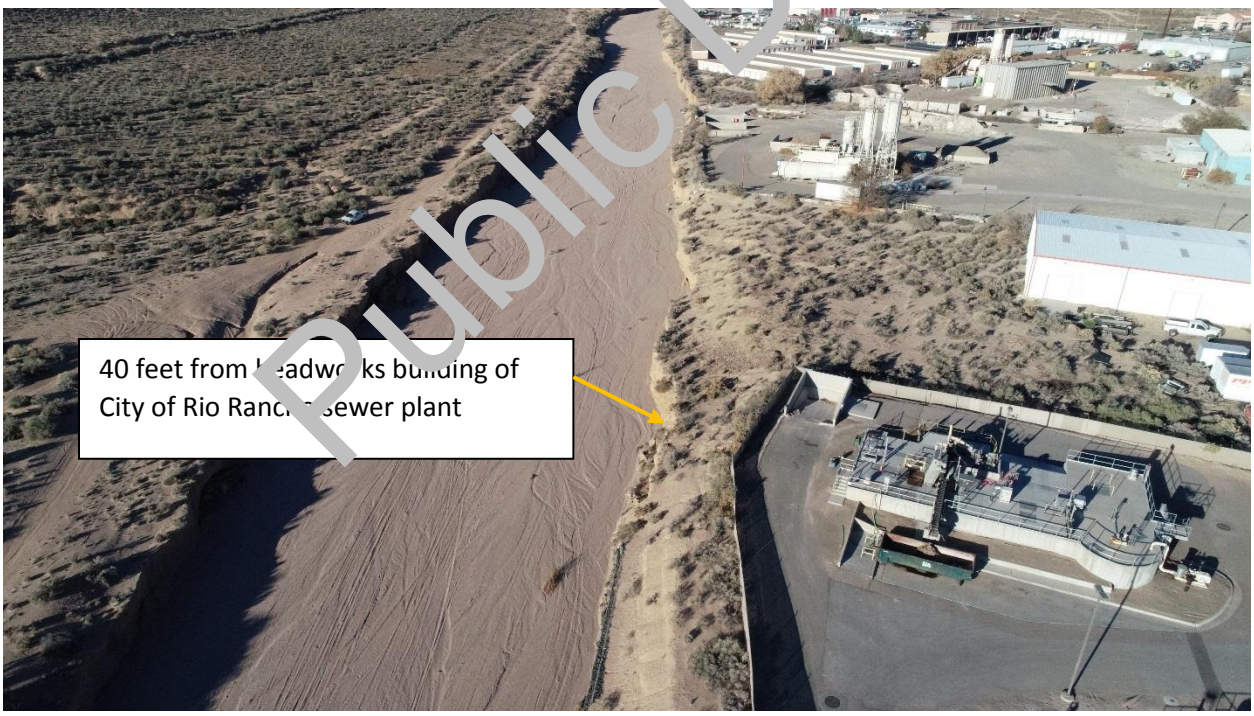

Figure 9

Figure 10

Assumptions for Benefit Cost Analysis model

Due to the nature of bank erosion due to flash flood events, lateral erosion of ephemeral arroyos is unpredictable, but can occur quickly and catastrophically. For the purposes of the Benefit Cost Analysis (BCA) for the proposed project, the analyst made assumptions on potential lateral erosion based on the empirical information available in this document. Since the geology and land forms are similar to the study area from 2010-2013, the potential lateral erosion for each of the storm frequencies in the BCA.

For a 50 year storm interval, it was assumed that there was a potential for lateral migration of approximately 40 feet. This is similar to the storm event experienced in and evaluated in 2013. For the 100 year storm interval, it was assumed that the lateral erosion of the north bank would be

approximately 60 feet, which is consistent with the 2010 storm event effects. And for the 500 year storm interval, it was assumed that lateral erosion of the north bank would be approximately 80 feet.

The distance from the banks of the arroyo to each of the structures was measured using GIS tools to determine the susceptibility of each of these facilities to damage from each of the storm event recurrence intervals.