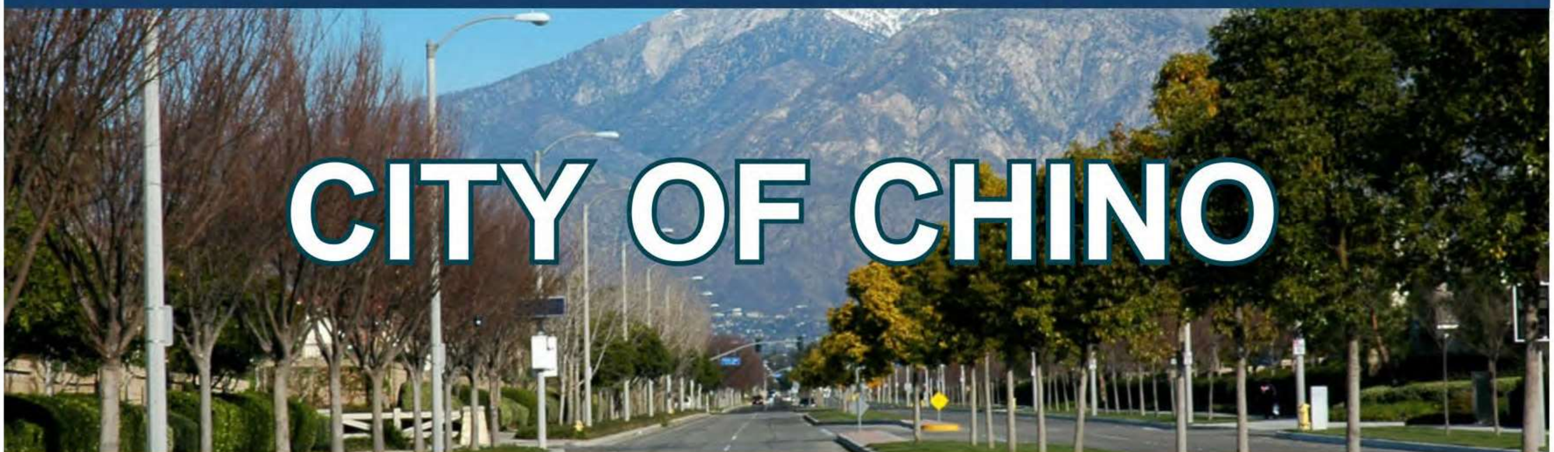
CITY OF CHINO



All-Hazard Mitigation Plan

2025

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Part I: Planning Process

CHAPTER 1: INTRODUCTION

1.1 Introduction

The City of Chino, California, is vulnerable to natural, technological, and manmade hazards that could seriously threaten the health, welfare, and security of its residents. The cost of responding to and recovering from potential disasters, in terms of potential loss of life or property, can be lessened when attention is turned to mitigating their impacts and effects before, they occur or recur.

This All-Hazard Mitigation Plan seeks to identify the City's hazards and understand their impact on vulnerable populations and infrastructure. With that understanding, the plan sets forth solutions that, if implemented, have the potential to significantly reduce threats to life and property. The plan is based on the premise that hazard mitigation works. With increased attention to managing natural, technological, and manmade hazards, communities can reduce the threats to citizens and, through proper land use and emergency planning, can avoid creating new problems in the future. Many solutions can be implemented at minimal cost and social impact.

1.2 Plan Organization

The plan is organized into five main parts:

- Part I provides a general overview of the plan and its planning process.
- Part II contains a community profile of the city.
- Part III provides definitions and analysis of natural and manmade hazards affecting the city.
- Part IV outlines the Mitigation Strategy, identifying goals, objectives, and mitigation projects.
- Part V details the plan maintenance process and provides timelines for future updates.

The Appendix contains contact information, meeting documentation, worksheets, public participation records, and references.

1.3 Purpose

This plan exists to identify natural and manmade hazard threats to the community, prepare mitigation management strategies, develop short-term and long-term goals and objectives, and fulfill federal, state, and local hazard mitigation planning obligations. The intention is to enhance awareness of and provide mitigation strategies for elected officials, agencies, and the public while developing actions that will minimize negative outcomes to citizens, the economy, and the environment.

1.4 Hazard Mitigation and Hazards

Hazard mitigation encompasses cost-effective actions that reduce, limit, or prevent vulnerability to hazards. These measures fall into three categories:

1. Those that keep hazards away from people, property, and structures
2. Those that keep people, property, or structures away from hazards
3. Those that reduce hazard impact on victims, such as insurance

The plan analyzes the following hazards:

Natural Hazards

- Drought
- Dam and Levee Failure
- Flooding (Riverine & Urban/Flash)
- Severe Summer Storms
    - Extreme Heat
    - Hail
    - High Winds
    - Lightning
- Extreme Cold
- Tornado
- Wildfire

Other Hazards of Concern

Although non-natural hazards are not required by FEMA for inclusion in a hazard mitigation plan, the City of Chino wishes to rank and mitigate against a comprehensive list of hazard events that could impact the City. Due to both the nature of non-natural hazards and the discretionary status regarding their inclusion, the following hazards of interest have been briefly and qualitatively assessed for the sake of public education and to inform their inclusion within the hazard ranking and mitigation process.

Technological (Manmade) Hazards

- Civil Disturbance
- Cybersecurity Incident
- Hazardous Materials Incident (Fixed, Transportation)
- Prolonged Power Outage
- Terrorism
- Transportation Incident (Air & Road)

Per FEMA's mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact the City of Chino due to geographic location:

- Hurricane
- Landslide
- Sea Level Rise
- Storm Surge
- Tsunami
- Volcanic Activity

1.5 Scope

The plan provides comprehensive hazard identification, risk assessment, vulnerability and impact analyses, mitigation actions, and an implementation schedule.

Plan Goals and Objectives

The goals of the City of Chino All-Hazard Mitigation Plan include coordinating with local governments to develop the City of Chino's plans and processes that meet the planning components identified in the FEMA Region 9 Crosswalk document, as well as California Office of Emergency Services planning expectations and public input from the local community. The overall objective is risk reduction from natural hazards in the state of California through implementing and updating City, regional, and state of California mitigation plans.

This plan is based on a combination of steering committee and public input, utilizing both qualitative and quantitative assessments. The steering committee's expertise, along with feedback from the public and key stakeholders, was taken to determine the most significant hazards to the City of Chino. These assessments formed the foundation for creating new and continuing existing mitigation actions.

An analysis of public perception of the mitigation actions, based on their desires and needs for the update, was conducted. Survey 1 responses were compared to Survey 2 to determine if the public's input and needs were addressed. When it was determined that the steering committee's conclusions aligned with public input, the data was included in the plan. Additionally, through the comparison and analysis of the data from Survey 1 to Survey 2, any shortcomings were addressed. A summary report, as well as both surveys, are available in the appendix.

1.6 Authorities

1.6.1 Federal

Public Law 93-288 (PL 93-288), as amended, established the basis for federal hazard mitigation activity in 1974. A section of this Act requires the identification, evaluation, and mitigation of hazards as a prerequisite for state receipt of future disaster assistance outlays. Since 1974, many additional programs, regulations, and laws have expanded on the original legislation to establish hazard mitigation as a priority at all levels of government.

Several additional provisions were also included when PL 93-288 was amended by the Stafford Act, which provides for the availability of significant mitigation measures in the aftermath of a presidentially declared disaster. Civil Preparedness Guide 1-3, Chapter 6—Hazard Mitigation Assistance Programs places emphasis on hazard mitigation planning directed toward hazards with a high impact and threat potential.

The Disaster Mitigation Act of 2000 (DMA 2000) was signed into law by President Bill Clinton on October 30, 2000. Section 322 defines mitigation planning requirements for state, local, and tribal governments. Under Section 322, if states submit a mitigation plan (a summary of local/regional mitigation plans) identifying natural hazards, risks, vulnerabilities, and proposed actions to reduce those risks and vulnerabilities, the state is eligible for an increase in the federal share of hazard mitigation.

1.6.2 State

The Governor's Emergency Operation Directive, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, amendments to PL 93-288, as amended, Title 44, CFR, Federal Emergency Management Agency Regulations, as amended, State Emergency Management Act of 1981, California State Code Disaster Response Recovery Act, 63-5A, Executive Order of the Governor, Executive Order 11, Emergency Interim Succession Act, 63-5B.

1.6.3 Local

Effective natural hazard mitigation is dependent upon local governments assuming a vital role. As such, each local government will review all present or potential damages, losses, and related impacts associated with natural hazards to determine what is required for mitigation action and planning. For the City of Chino, the local elected officials are responsible for implementing plans and policies, as such it is critical that local governments be prepared to participate in the post-disaster Hazard Mitigation Team process, as well as the pre-mitigation planning outlined in the All-Hazard Mitigation Plan.

CONCLUSION AND TRANSITION

The introduction of this hazard mitigation plan establishes the foundation for understanding Chino's comprehensive approach to hazard preparedness and resilience. Through careful organization, clear purpose definition, and detailed hazard identification, this chapter sets the stage for the extensive planning effort that follows.

This plan represents more than just a document, it embodies the City of Chino's commitment to protecting its residents, infrastructure, and community assets from the diverse range of hazards it faces. Whether natural, geological, or human-caused, these hazards require thoughtful analysis and strategic planning to effectively reduce their potential impact on the community.

As we move into Chapter 2: Planning Process, we will explore how the City of Chino developed this plan through extensive community engagement, stakeholder participation, and careful analysis. The planning process demonstrates collaborative effort between city officials, community stakeholders, and residents to create effective, implementable mitigation strategies. This inclusive approach ensures that the resulting plan reflects not only technical expertise but also the community's needs, concerns, and priorities.
The planning process chapter will detail how the City of Chino:

- Engaged diverse community segments in meaningful participation
- Incorporated equity considerations throughout the planning effort
- Analyzed existing plans and studies to inform mitigation strategies
- Built partnerships with key stakeholders and organizations
- Developed a comprehensive understanding of community vulnerabilities and capabilities.

Through this transition from foundational concepts to actual planning methodology, we begin to see how Chino's commitment to hazard mitigation transforms from theory into practical, actionable strategies for community protection and resilience.

CHAPTER 2: PLANNING PROCESS

2.1 PLANNING PROCESS

The 2025 City of Chino All-Hazard Mitigation Plan was completed through the collaborative efforts of the California Office of Emergency Services (CAL OES), City of Chino staff members from various departments including Chino Police Department, Administration, Public Works, Development Services and Community Services Parks and Recreation, Chino Valley Fire District, and community members within the City of Chino.

Feedback was solicited through the City of Chino Local Emergency Planning Committee (LEPC). During the plan development, the draft plan was posted on the City of Chino's website for public comments. Public participation was encouraged through public meetings and a review of the 2025 plan on the City of Chino's website. All comments, questions, and discussions resulting from these activities were given thoughtful consideration as the plan was developed.

2.2 PLANNING AREA

This plan covers the City of Chino, California.

2.3 CITY OF CHINO LOCAL HAZARD MITIGATION PLANNING TEAM

The City of Chino established a comprehensive planning team to guide the development of the Hazard Mitigation Plan. This team consisted of a core Steering Committee composed of key city department representatives, supported by an extensive network of stakeholders representing various sectors of the community.

2.3.1 Steering Committee

The Steering Committee provided primary oversight and direction for the planning process. Committee members were selected based on their technical expertise, operational knowledge, and understanding of city functions. Each member brought unique insights into various aspects of hazard mitigation planning:

Table 2-1. Local Hazard Mitigation Planning Team

Representative	Position	Department/Organization
Albert Espinoza	Deputy Director / City Engineer	City of Chino Public Works Department
Lisa Almilli	Accessibility Coordinator	City of Chino Development Services Department
Basel Badawi	Building Official	City of Chino Development Services Department
Jeff Benson	Parks & Facilities Manager	City of Chino Community Services, Parks & Recreation Department
Pete Vicario	Water Utilities Superintendent	City of Chino Public Works Department
Arianna Fajardo	Communications Manager	City of Chino Administration Department

Representative	Position	Department/Organization
Michael Hitz	Principal Planner	City of Chino Development Services Department
Chase Jones	Senior Information Technology Analyst	City of Chino Administration, Information Technology Division
Nathan Marlinski	Environmental Compliance Coordinator	City of Chino Public Works Department
Felicia Marshall	Associate Civil Engineer	City of Chino Public Works Department
Keith Martinez	Assistant Public Works Services Manager	City of Chino Public Works Department
Ben Orosco	Deputy Director / Services	City of Chino Public Works Department
Danielle O'Toole	Fire Marshal	Chino Valley Fire District
Jesus Plasencia	Assistant City Engineer	City of Chino Public Works Department
Denise School	Emergency Services Coordinator	Chino Police Department

2.3.2 Stakeholder Participation

The planning process benefited from robust participation by stakeholders representing diverse sectors of the community. These stakeholders provided valuable input, expertise, and resources throughout the planning process. Key participating organizations included:

Table 2-2. Stakeholder Participation

Name	Title	Jurisdiction / Agency	Invited Participation
Erin Fox	Disaster Program Manager	American Red Cross	Yes
Debra Williams	Executive Director/CEO	Building Resilient Communities	Yes
Rodrigo Jimenez	Public Information Officer	California Highway Patrol	Yes
Paul Ybarra	Lieutenant - PIO	California Institute for Men	Yes
William Newborg	Lieutenant – PIO	California Institute for Women	Yes
Brian Rosenbaum	Emergency Operations Coordinator	CalTrans District 8	Yes
Name?	Title?	Canyon Ridge Hospital	Yes
Troy Ament	Associate Superintendent of Administrative Services & Emergency Operations	Chaffey College	Yes
Maureen Snelgrove	Assistant Director of Airports	Chino Airport	Yes
Kevin Cisneroz	President	Chino Neighborhood House	Yes
Zeb Wellborn	President	Chino Valley Chamber of Commerce	Yes
Juan Mestas	Director of Facilities	Chino Valley Medical Center	Yes

Name?	Director Risk Management and Human Resources	Chino Valley Unified School District	Yes
Joyce Lee	Emergency Services Coordinator	City of Chino Hills	Yes
Simone Blackwell	Environmental Compliance Analyst	City of Eastvale	Yes
Joseph Ramos	Emergency Manager	City of Ontario	Yes
Tony Arellano	Safety Officer	Inland Empire Utilities Agency	Yes
MaryAna DeLos Santos	Director of Operations	Inland Valley Humane Society	Yes
Charleen King	Founder	Isaiah's Rock	Yes
Kelley Donaldson	Communications Affairs Manager	Monte Vista Water District	Yes
Andrew Cheng	Emergency Services Coordinator	OmniTrans	Yes
Serra Rea	Emergency Management/PSPS Coordinator	Rolling Start, Inc.	Yes
Crisanta Gonzales	Director of San Bernardino County Office of Emergency Services	San Bernardino County Office of Emergency Services	Yes
Randy Naquin	Sergeant	San Bernardino County Sheriffs - Chino Hills Station	Yes
Eric Cimuchowski	Chair	San Bernardino County Voluntary Organizations Active in Disaster (VOAD)	Yes
Melissa Boyd	Government Relations Manager	Southern California Edison	Yes
Larry Taylor	Area Manager - Chino District	Southern California Gas Company	Yes
David Kingston	Chief of Emergency Management Branch	U.S. Army Corps of Engineers	Yes
Lupe Valdez	Senior Director, Public Affairs	Union Pacific Railroad	Yes
Glenda Chavez	Solutions Manager	Waste Management	Yes
Brian Rachielles	Branch Director	YMCA - Chino Valley	Yes
Dave Schroder	Facilities and Operations Manager	Chino Basin Water Conservation District	Yes

Also included were the Emergency Managers from the neighboring jurisdictions. Their participation was crucial for ensuring regional coordination and consistency in hazard mitigation efforts. By involving these key stakeholders, the City of Chino aimed to gather diverse insights, promote collaboration, and enhance the effectiveness of the All-Hazard Mitigation Plan across neighboring communities. The Emergency Managers involved included:

- Ontario: Joseph Ramos, Emergency Manager
- Pomona: Naela Cansino, Safety & Emergency Preparedness Officer
- Montclair: Traci Bryan, Emergency Services Coordinator
- Upland: Klasha Ray, Emergency Services Officer
- Rancho Cucamonga: Riley Davis, Emergency Management Coordinator
- Eastvale: Brice Bartlette, Emergency Services Coordinator
- Corona: Lee Shin, Emergency Services Manager

Overview of Stakeholder Participation in the Hazard Mitigation Plan Update

The City of Chino's Hazard Mitigation Plan (HMP) update process engaged a diverse range of stakeholders to ensure a comprehensive and collaborative approach to hazard mitigation. Key organizational partners were invited to participate, providing access to the plan and opportunities to offer feedback. These stakeholders were grouped into six categories, reflecting their roles in the community and their contributions to regional resilience. Their involvement was essential for gathering diverse insights, promoting coordination, and enhancing the effectiveness of the All-Hazard Mitigation Plan across the City of Chino and neighboring jurisdictions. All the identified stakeholders were invited to participate throughout the planning process; not all invitees participated in the initial process. Additional opportunities were provided during the public comment period for further feedback to be incorporated prior to plan submittal to Cal OES and FEMA.

1. **Emergency Services and Law Enforcement (6 participants)**: Representatives from agencies such as the American Red Cross, California Highway Patrol, and San Bernardino County Office of Emergency Services contributed expertise in disaster response, public safety, and emergency management, ensuring the plan addresses critical preparedness and coordination needs.

- **Healthcare and Social Services (5 participants)**: Organizations including Chino Valley Medical Center and Inland Valley Humane Society provided perspectives on public health, vulnerable populations, and social service continuity, strengthening the plan's focus on community well-being during hazards.

- **Education and Youth Services (3 participants)**: Stakeholders like Chaffey College and the Chino Valley Unified School District offered insights into protecting educational institutions and youth, enhancing mitigation strategies for these vital community assets.

- **Utilities and Infrastructure (8 participants)**: Partners such as Southern California Edison, Inland Empire Utilities Agency, and the U.S. Army Corps of Engineers brought technical knowledge on infrastructure resilience, utility continuity, and flood management, critical for mitigating hazard impacts on essential services.

- **Community Organizations and Business (4 participants)**: Groups including the Chino Valley Chamber of Commerce and Building Resilient Communities contributed local knowledge and economic perspectives, fostering a plan that supports community recovery and business continuity.

- **Transportation and Regional Partners (12 participants)**: This category, the largest, included CalTrans, OmniTrans, and Emergency Managers from neighboring jurisdictions like Ontario, Pomona, and Rancho Cucamonga. Their participation ensured regional consistency and coordination, aligning the City of Chino's efforts with broader transportation and jurisdictional strategies.

In total, 38 representatives from these categories actively participated, reflecting a robust and inclusive planning process. This collaboration underscores the City of Chino's commitment to developing a comprehensive All-Hazard Mitigation Plan that addresses local and regional needs, enhances resilience, and meets FEMA's standards for stakeholder engagement.

2.3.3 Stakeholder Engagement Process

Throughout the planning process, all identified stakeholders were provided multiple opportunities to contribute their expertise and perspectives. Each stakeholder organization was:

- Invited to participate in all phases of the planning process and attend public/steering committee meetings.
- Provided access to online and paper surveys.
- Given opportunities to review and comment on draft sections of the plan.
- Encouraged to share data and technical information relevant to their areas of expertise.
- Asked to provide feedback on proposed mitigation strategies.

Stakeholder input significantly shaped the plan's development in several key areas:

Technical Expertise and Data Contributions

- Southern California Edison was asked to provide and or evaluate critical infrastructure vulnerability assessments and power grid resilience data.
- CalTrans District 8 was asked to provide and or shared transportation corridor risk analysis and evacuation route assessments.
- Water districts were asked to review and contribute detailed information about system resilience and backup capabilities.
- Healthcare partners were asked to review and help identify critical facility needs during hazard events.
- Emergency response agencies were asked to review and provide historical incident data and response capabilities partners helped identify critical facility needs during hazard events.

Mitigation Strategy Development

- Emergency services agencies were asked to review and help refine evacuation planning strategies and emergency response protocols.
- Utility providers were asked to review infrastructure protection measures and system hardening priorities.
- Educational institutions were asked to review and contribute to the plan's public awareness program design and community outreach methods.
- Transportation agencies were asked to review and help shape access and mobility improvement strategies and evacuation planning.
- Public health organizations were asked to review and provide input on vulnerable populations and healthcare system resilience Implementation Considerations.

Implementation Considerations

- Healthcare providers were asked to provide and review assessments highlighting medical response capabilities and surge capacity needs.
- Nonprofits were asked to review and identify resource gaps in vulnerable communities and potential support services.
- Healthcare providers were asked to review and identify opportunities for medical response capabilities and surge capacity needs.
- Public safety agencies were asked to review and provide insights on emergency response coordination and resource allocation.
- Utility companies were asked to review and detail any required infrastructure upgrade timelines and capabilities etc.
- Community organizations were asked to review and provide their perspectives on neighborhood-level implementation challenges.

2.4 PLANNING SCHEDULE AND MEETINGS

The planning and steering committee meetings formed the backbone of the hazard mitigation planning process. The committee consisted of subject matter experts representing diverse aspects of the City of Chino, including emergency management, public safety, infrastructure, community development, and hazard mitigation specialists. These experts brought comprehensive knowledge of both the city's unique characteristics and hazard mitigation best practices.

The committee guided the entire planning process through a structured approach:

1. Identifying and analyzing potential hazards.
2. Developing preliminary strategies.
3. Seeking feedback from stakeholders and citizens.
4. Incorporating public input into plan revisions.
5. Making final decisions on plan elements based on combined expertise and community feedback.

2.4.1 Meeting Details/Minutes

Meeting #1: Project Kickoff Meeting—June 8, 2024

Key Components:

2. **Review of FEMA Requirements and Plan Objectives**
3. **Finalization of Plan Goals**
4. **Discussion of the Steering Committee's Role**
    a. Providing Subject Matter Expert (SME) guidance based on their knowledge of city functions and operations.
5. **Balanced Approach Development**
    a. Incorporating both committee expertise and public input.
6. **Planning for Robust Public Involvement**
    a. Emphasizing the importance of inclusive community participation.

Public Engagement Strategy:

- **Public Survey:**
    - To be posted on the city website and advertised in Chino Champion newspaper.
- **Initial Series of Public Meetings to Discuss Hazard Assessment:**
    - **Monday, August 19th, 1:00 PM – 3:00 PM:** Chino Senior Center
    - **Monday, August 19th, 6:30 PM – 8:30 PM:** Chino Police Department
    - **Tuesday, August 20th, 2:00 PM – 4:00 PM:** Stakeholders Workshop
    - **Tuesday, August 20th, 6:30 PM – 8:30 PM:** Preserve Community Center
- **Second Series of Public Meetings:**
    - To be scheduled later, specifically focused on discussing mitigation actions.

Meeting #2: Steering Committee Meeting—August 5, 2024

Key Activities:

1. **Detailed Review of Chapter 4 (Risk Assessment) Data**
2. **Committee Evaluation and Validation of Initial Risk Scores**
3. **Integration of Local Expertise**
    a. Adjusting risk rankings based on historical impacts and local conditions.
4. **Consensus-Building Discussion on Hazard Rankings**

Preliminary Risk Assessment Scores:

1. **Significant Hazards:**
    a. Earthquake (192)
    b. Flooding (Riverine & Urban/Flash) (192)
    c. Severe Summer Storms (Extreme Heat, Hail, High Winds, Lightning) (192)
    d. Wildfire (192)
2. **Other Assessed Hazards:**
    a. Cyber Threats, Power Outages (168)

b. Hazardous Materials Incidents (168)
c. Transportation Incidents (150)
d. Drought (126)
e. Landslide (112)
f. Facility Disaster (95)
g. Civil Disturbance (95)
h. Invasive Species (95)
i. Severe Winter Weather (90)
j. Terrorism (62)

Public Feedback Importance:

- Balancing technical assessment with community perception of hazards.
- Ensuring comprehensive public feedback influences final hazard rankings and selection.

Steering Committee Meeting #3—September 9, 2024

Focus Areas:

1. **Risk Assessment Review Process:**
    a. Reviewing risk scores for each hazard considering:
        i. Historical occurrence data.
        ii. Potential impact on life and property.
        iii. Geographic extent of risk.
        iv. Warning time and duration.
        v. Local capabilities for response.
        vi. Changing future conditions.
2. **Hazard Selection and Prioritization:**
    a. Finalizing hazard categories for inclusion in the plan:
        i. **High-Priority Hazards:** Earthquakes, Power Outages, Cyber Threats, Flooding, Wildfire
        ii. **Medium-Priority Hazards:** Hazardous Materials Incidents, Transportation Incidents, Terrorism, Drought, Facility Disaster, Severe Summer Storms
3. **Initial Mitigation Action Review:**
    a. Evaluating previous mitigation actions from the 2018 plan:
        i. Completed actions and their effectiveness
        ii. Ongoing projects requiring continuation
        iii. Actions that were not implemented and reasons why
        iv. Changes in risk that might affect mitigation priorities
4. **Public Engagement Planning:**
    a. Multi-phase outreach approach.
    b. Identifying key stakeholder groups.
    c. Developing communication materials about selected hazards.
    d. Planning forums for public feedback on mitigation priorities.

Steering Committee Meeting #4—October 30, 2024

Key Focus:

- **Feedback Utilization:**
  - From public meetings, surveys, and key stakeholders.
  - Following up on the hazard prioritization from Meeting #3.
- **Developing Comprehensive Mitigation Actions:**
  - Reviewing existing programs:
    - Status determination: Actions to keep and eliminate.
  - Formulating new strategies based on current risks, capabilities, and public input.

Review of Existing Programs:

- **Strong Programs to Continue Supporting Hazard Mitigation:**
  - All-Hazards Support Functions
  - Chino Cares Program (Goals: 1, 2, 3, 5)
  - Emergency Preparedness Education (Goals: 1, 3, 5)
  - Community Partners Collaboration (Goals: 2, 4, 5)
  - City Employee Training (Goals: 1, 2, 5)
  - Exercise Plan (Goals: 1, 2, 5)
  - Climate Action Plan measures (Goals: 2, 3, 4)

Development of New Mitigation Actions:

- **Focus Areas:**
  - Structural and non-structural mitigation measures.
  - Public education and awareness programs.
  - Natural systems protection.
  - Emergency services enhancement.
  - Infrastructure resilience improvements.

Public Engagement Strategy:

- **Phase 2: Mitigation Strategy Meetings:**
  - **Wednesday, September 16th, 10:00 AM – 12:00 PM:** Chino Senior Center
  - **Wednesday, September 16th, 1:00 PM – 2:00 PM:** Chino Police Department (Stakeholder Workshop #2)
  - **Wednesday, September 16th, 6:00 PM – 8:00 PM:** Chino Police Department
  - **Tuesday, September 17, 6:00 PM – 8:00 PM:** Preserve Community Center

Next Steps:

- Collecting and analyzing public feedback before finalizing mitigation actions in Meeting #5.

Steering Committee Meeting #5—December 1, 2024 - January 15, 2025

Extended Meeting Period:

- **Purpose:**
  - Incorporating public feedback from live public meetings and Survey 2 results.
- **Virtual/Asynchronous Format:**
  - Accommodating holiday schedules.
- **Review of Public Input:**
  - Feedback from public meetings, online surveys, stakeholder consultations, and community organizations.

Final Mitigation Strategy Approval:

- **Approval of:**
  - Final mitigation actions for each priority hazard.
  - Implementation timelines and responsibilities.
  - Resource allocation strategies.
  - Monitoring and evaluation procedures.

Note:

- Public Survey 1 will remain live until October to capture maximum input.
- The planner will monitor the site and report any significant changes in the data.

Meeting 6: Asynchronous Review Period—January 15 to March 30, 2025

Meeting Details:

- **Date Range:** January 15 - March 30, 2025
- **Format:** Asynchronous review
- **Purpose:** Comprehensive review of the current draft Hazard Mitigation Plan update following the completion of Steering Committee Meeting #5.

Process Overview:

- **Following Meeting #5 (Concluded on January 15, 2025):**

- The draft Hazard Mitigation Plan was shared with Steering Committee members and key stakeholders for a comprehensive review period.
- This two-and-a-half-month review window allowed for thorough examination before proceeding to jurisdictional review and public comment phases.

Communication and Feedback:

- **Shared Communication:**
  - Clarifying the assessment of proposed actions.
  - Participants shared their feedback using track changes and comments directly in the draft plan document.
  - The group agreed to give the planner approximately one week to incorporate changes before the next round of reviews.

Final Note:

- Feedback from Survey 2 was critical in shaping the mitigation actions to ensure they met public and key stakeholder feedback.
- After discussions on budget, city priority, and feasibility, the committee unanimously approved the final mitigation action list, located in section 7 of this document.

Targeted Expert Review

During this comprehensive review period, stakeholders who had been involved throughout the plan development provided specialized input based on their areas of expertise. Rather than introducing new stakeholders, this phase capitalized on the knowledge of existing participants to refine implementation strategies and ensure the plan's effectiveness. Each stakeholder group, as identified in Table 2-2 of the plan, focused on evaluating specific aspects of the plan:

- **Healthcare providers** (including Chino Valley Medical Center, Canyon Ridge Hospital) evaluated medical response capabilities and surge capacity provisions
- **Nonprofit organizations** (including American Red Cross, Building Resilient Communities, Isaiah's Rock, YMCA - Chino Valley) assessed support services for vulnerable communities
- **Public safety agencies** (including California Highway Patrol, California Institute for Men, California Institute for Women, San Bernardino County Sheriff's Office) reviewed emergency response coordination mechanisms
- **Utility companies** (including Southern California Edison, Southern California Gas Company, Monte Vista Water District, Inland Empire Utilities Agency, Chino Basin Water Conservation District) verified infrastructure upgrade timelines and capabilities
- **Community organizations** (including Chino Neighborhood House, Chino Valley Chamber of Commerce) evaluated neighborhood-level implementation feasibility

This strategic approach ensured that the final plan would benefit from specialized technical expertise across all sectors involved in hazard mitigation implementation.

- Basic editorial edits and formatting corrections
- Questions regarding data sources and statistics presented in the plan
- Requests for clarification on specific mitigation actions and implementation details
- Suggestions for strengthening the connection between risk assessment and proposed actions
- Comments on resource allocation and implementation feasibility
- Recommendations for improved cross-jurisdictional coordination approaches

Review Components

The review focused on:

- Verification of hazard rankings and prioritization
- Assessment of proposed mitigation actions
- Evaluation of implementation strategies and timelines
- Review of monitoring and evaluation procedures
- Confirmation of resource allocation approaches
- Editorial refinements throughout the document

Key Decisions

1. The plan will be updated to reflect all changes and feedback received during the review period.
2. Once updated, the revised draft will be shared with neighboring jurisdictions before public release.

Review Participants

- The review process included participation from both internal stakeholders and representatives from neighboring jurisdictions. Key stakeholders who participated in this review process included representatives from:
- Emergency Services and Law Enforcement: 6
- Healthcare and Social Services: 5
- Education and Youth Services: 3
- Utilities and Infrastructure: 8
- Community Organizations and Business: 4
- Transportation and Regional Partners: 12

Next Steps

1. Incorporate all feedback and changes from the internal review period.

2. Share the revised draft with the listed neighboring jurisdictions and key stakeholders (Table 2-2).
3. Incorporate feedback from neighboring jurisdictions and key stakeholders.
4. Present the updated plan with all incorporated feedback at Steering Committee Meeting #6 (scheduled for April 2025).
5. Following Steering Committee Meeting #6 and any resulting adjustments, initiate the mandatory 30-day public review period.
6. After the 30-day public review period, incorporate public comments and feedback.
7. The Steering Committee will convene for a final approval meeting in May 2025 before plan submission.

Notes

This jurisdictional review phase is specifically designed to gather input from neighboring communities and county agencies before the plan is released for broader public comment. This approach ensures regional coordination and consistency in hazard mitigation planning efforts, addressing cross-jurisdictional hazards and strengthening the overall resilience of the region.

Steering Committee Meeting #6 - Final Review

Date: April 4, 2025, **Purpose:** Final review and approval of the complete hazard mitigation plan before public review period.

This meeting accomplished the following:

- Made edits via the review process
- Ensure all required elements are included
- Verify incorporation of all stakeholder feedback
- Approving the final plan for submission
- Establish a timeline for plan adoption

Notes

This review phase is specifically designed to gather input from neighboring communities and county agencies before the plan is released for broader public comment. This approach ensures regional coordination and consistency in hazard mitigation planning efforts, addressing cross-jurisdictional hazards and strengthening the overall resilience of the region.

2.5 STAKEHOLDER AND PUBLIC ENGAGEMENT STRATEGY

The City of Chino implemented a strategic three-phase engagement approach that aligned public outreach with the Steering Committee's planning process. This synchronized strategy ensured that public input directly informed each stage of plan development.

Phase 1: General Awareness and Initial Engagement (June-July 2024)

Purpose: Build community awareness and establish participation pathways

- Initial community outreach through:
    - Direct communication with partner organizations.

Focus:

- Introducing the hazard mitigation planning process.
- Inviting community participation.
- Building awareness of upcoming meetings and surveys.
- Establishing communication channels.

Phase 2: Hazard Identification and Risk Perception (August-September 2024)

Purpose: Gather community input on hazards and current mitigation efforts Public Meetings:

- Senior Center Meeting (August 19).
- Evening Community Meetings (August 19-20).
- Stakeholders Workshop (August 20).
- National Night Out (August 7).
- Chino Cares Emergency Preparedness Fair (September 7).

Focus:

- Community hazard perception
- Current preparedness levels
- Experience with previous disasters
- Risk assessment priorities

Survey 1: Risk Perception and Public Safety Assessment

The planning team and assigned elements researched each issue raised during Phase 2 and presented their findings to the full committee, along with basic recommendations for how the issues should be handled. The committee then discussed and came up with an agreement. The agreement was then shared with the public. The findings from the public were then reviewed by the committee, which then made a final decision. The surveys, public meetings, and direct conversations with key stakeholders provided insights that allowed the committee to modify and/or strengthen their positions which were included in the final draft of the plan update.

Phase 3: Mitigation Strategy Development (September-January 2025)

Purpose: Develop and refine mitigation actions based on community priorities Public Meetings:

- Senior Center Meeting (September 16)
- Community Meetings (September 16)
- Stakeholders Workshop (September 16)
- Various community events through December

Focus:

- Gathering input on proposed mitigation actions
- Understanding implementation preferences
- Identifying community priorities

Survey 2: Mitigation Action Evaluation

- Participation extended to all of the organizations previously listed as either key stakeholders or neighboring communities.

Community Event Integration The planning team and or steering committee members actively participated in numerous community events including:

- National Night Out (August 7, 2024)
- Chino Cares Emergency Preparedness Fair (September 7, 2024)
  - Chino Faith Based Collaborative Meetings (Quarterly)
  - Chino Valley MET-Net Meetings (Spring/Fall)
    - CERT Basic Training
- Chino Valley Fire District Open House
- Chino Police Department Open House

The planning team and steering committee followed the same process used after Phase 2 to incorporate Phase 3 feedback. The team analyzed input received through the mitigation strategy meetings, surveys, and stakeholder discussions. This information was compiled and presented to the committee, who then reviewed and discussed the proposed mitigation actions and implementation strategies. The committee's decisions were documented and incorporated into the final hazard mitigation plan update, ensuring that both technical expertise and community input shaped the final mitigation strategies and their implementation approach.

2.6 EQUITY CONSIDERATIONS

The planning process incorporated equity considerations through a comprehensive, community-based approach, recognizing that disasters and hazards can affect different populations in varying ways. Understanding that effective hazard mitigation planning must address the needs of all community members, particularly those most vulnerable, the planning team implemented a multi-faceted strategy to ensure inclusive participation and representation.

Disadvantaged Community: Assessment to establish a data-driven foundation for equity considerations, the planning team conducted a detailed analysis using the Climate & Economic Screening Tool, provided by the U.S. Council on Environmental Quality. This tool enabled a thorough examination of census tracts within the City of Chino to identify disadvantaged communities and their specific needs. The analysis revealed various socioeconomic and environmental burdens experienced in different areas of the city, with detailed findings documented in Appendix C. These insights proved invaluable in directing resources and attention to areas of greatest need throughout the planning process.

Strategic Community Access: Understanding that traditional meeting formats and locations often create barriers to participation, the planning team deliberately selected meeting venues throughout different neighborhoods of Chino. The Preserve Community Center served the southwestern communities, while the Senior Center provided convenient access for central area residents. The Chino Police Department facilitated participation from central and western neighborhoods to ensure comprehensive geographic coverage, effectively bringing the planning process directly to residents rather than expecting them to travel to a central location.

Partnership Development: The planning team conducted outreach to various organizations representing key community segments. Efforts were made to connect with senior centers and support organizations to engage older residents, while outreach to Rolling Start, Inc. aimed to build connections with the disability community. Similarly, organizations such as Chino Neighborhood House and Isaiah's Rock were contacted to engage lower-income families, and the YMCA and educational institutions were approached to connect with younger residents. Religious organizations were also included in outreach efforts to engage faith-based communities. Partner organizations provided strategic guidance on meeting scheduling, helped distribute information through trusted channels, offered insights into specific community needs and concerns, and assisted in reaching traditionally underserved populations.

Survey Implementation and Results: A comprehensive survey strategy employed both electronic and paper formats, ensuring accessibility across digital divides. The survey, available in multiple languages, revealed important insights into community needs and preferences. A significant majority (74.5%) of respondents prioritized family and personal safety, while 29.1% anticipated substantial impacts from potential hazards. The varying levels of desired engagement – from active involvement (22%) to preferring passive updates (32.1%) – helped shape the plan's communication strategies.

The survey specifically addressed accessibility and support needs, examining how effectively emergency information reaches different community segments and identifying potential barriers to evacuation. These insights directly influenced the plan's approach to communication and resource allocation.

Accessibility Measures: To ensure maximum participation, the planning team implemented various accessibility measures. Materials were provided in English, Spanish, and Simplified Chinese, with spoken Mandarin interpretation available as needed. For the first round of community meetings, interpreters were hired to assist attendees, while for the second round, interpretation services were made available upon request. Bilingual staff were present at meetings to support Spanish-speaking participants, as this was the most utilized interpretation service. Meeting schedules were diversified to accommodate different work patterns, including morning sessions for senior residents, evening meetings for working community members, and weekend events. All meeting locations were selected with public transportation accessibility in mind.

Impact on Planning: The equity considerations directly influenced the plan's development in several ways. The planning team created targeted preparedness materials based on community feedback, developed multi-channel communication strategies to reach diverse audiences, and designed evacuation plans considering identified barriers. Resource allocation strategies were adjusted to address specific needs identified through the community assessment and survey responses.

This comprehensive approach to equity ensures that the resulting hazard mitigation plan not only addresses the technical aspects of disaster preparation and response but also considers the diverse needs, capabilities, and circumstances of all Chino residents. The focus on equity throughout the planning process helps build a more resilient community where all members have access to the resources and support, they need during hazard events.

2.7 EXISTING PLANS, STUDIES, AND REPORTS REVIEWED FOR THE DEVELOPMENT OF THE PLAN

A comprehensive review of existing plans, studies, and reports was conducted to ensure alignment with current policies, development patterns, and regional initiatives. This review included state and regional plans, city planning documents, and environmental studies.

State and Regional Plans

- California State Hazard Mitigation Plan
- San Bernardino County Hazard Mitigation Plan
- Adjacent Jurisdictions' Hazard Mitigation Plans

Serving as the foundational planning document for the City of Chino, the 2025 General Plan, was thoroughly reviewed with particular attention to:

Safety Element

- Land Use Element
- Public Facilities and Services Element
- Open Space and Conservation Element
- Housing Element (2021-2029)
- Air Quality Element
- Transportation Element

To better understand Environmental Impact and Development Studies the Recent environmental documents and studies reviewed included:

1. Major Development Projects • Altitude Business Center • Benson Industrial Project • Chino Creek Apartments • Majestic Chino Flight • Majestic Chino Heritage Project • Rancho Miramonte • Van Vliet at The Preserve • Allire Development • Falloncrest Development • Town Centre Development
2. Infrastructure and Planning Studies • Well 11 Pipeline Alignment Project • Climate Action Plan Update • East End Annexation • Ramona-Francis Annexation • South of Pine Update Addendum • Yorba Avenue Industrial

3. Comprehensive Planning Documents • Affordable Housing & Mixed-Use Overlay • Climate Action Plan • Strategic Plan

To ensure planning concepts were in line with existing code and to serve initial overview for possible mitigation action inclusion, the following Municipal Codes and Regulations were reviewed.

- City of Chino Municipal Code (Updated through November 2023)
- Building Codes and Standards
- Zoning Ordinances
- Development Standards

This comprehensive review ensured that:

- The hazard mitigation plan aligns with current City planning objectives
- Recent development patterns and trends are considered
- Environmental impacts and constraints are properly addressed
- Infrastructure needs and capabilities are accurately assessed
- Current regulatory requirements are incorporated

Integration of the Hazard Mitigation Plan with Existing Plans

The 2025 City of Chino All-Hazard Mitigation Plan (HMP) is designed to coexist and coordinate with existing city plans, fostering a collaborative approach to enhance Chino's resilience without mandating changes to those plans. The HMP seeks to align with the 2025 General Plan by offering risk assessment findings—such as earthquake, flood, and wildfire vulnerabilities—for potential inclusion in the Safety and Land Use Elements, encouraging development patterns that reduce hazard exposure. The Emergency Operations Plan (EOP) could incorporate HMP strategies, like critical facility enhancements, to support emergency response, if deemed appropriate by its administrators. The Capital Improvement Program (CIP) is encouraged to consider HMP-identified projects, such as stormwater improvements, for alignment with infrastructure priorities as funding allows. Conversely, the HMP draws from the General Plan's growth objectives, the EOP's facility inventories, and the CIP's funding considerations to shape practical mitigation actions. This voluntary integration, guided by input from the Steering Committee and stakeholders during the planning process, aims to complement existing efforts and promote a unified approach to hazard mitigation across Chino's planning framework. During the planning process, aims to complement existing efforts and promote a unified approach to hazard mitigation across Chino's planning framework.

This comprehensive review of existing plans, studies, and reports provides the foundation for understanding the City of Chino's current planning framework, development patterns, and regulatory environment. The information gathered from these documents informs the hazard mitigation strategies developed in this plan. While this chapter provides an overview of the documents reviewed, Chapter 5: Capabilities Assessment offers a more detailed examination of critical studies, plans, laws, and ordinances in effect within the planning area that can affect hazard mitigation actions. All these documents were reviewed and incorporated into this plan as part of the update process to ensure comprehensive integration of existing policies and procedures.

2.8 CHAPTER SUMMARY AND TRANSITION

Chapter 2 has detailed the comprehensive planning process undertaken for the 2025 City of Chino All-Hazard Mitigation Plan update. The process involved extensive collaboration among City departments, stakeholders, and community members through a structured series of committee meetings, public engagement sessions, and surveys.

Key accomplishments included:

- Formation of a diverse planning team and steering committee representing multiple City departments and areas of expertise
- Implementation of a three-phase public engagement strategy that gathered input from all segments of the community
- Detailed hazard identification and prioritization process incorporating both technical analysis and public input
- Development of mitigation strategies through iterative stakeholder and public feedback
- Integration of equity considerations throughout the planning process
- Comprehensive review and incorporation of existing plans and studies

As we move into Chapter 3: Community Profile, this foundation of collaborative planning and community engagement provides crucial context for understanding Chino's physical, social, and economic characteristics that influence its hazard vulnerability and resilience capacity. The community profile will build upon the planning process described here to provide a comprehensive picture of the planning area and its unique challenges and opportunities for hazard mitigation.

Part II: Community Profile

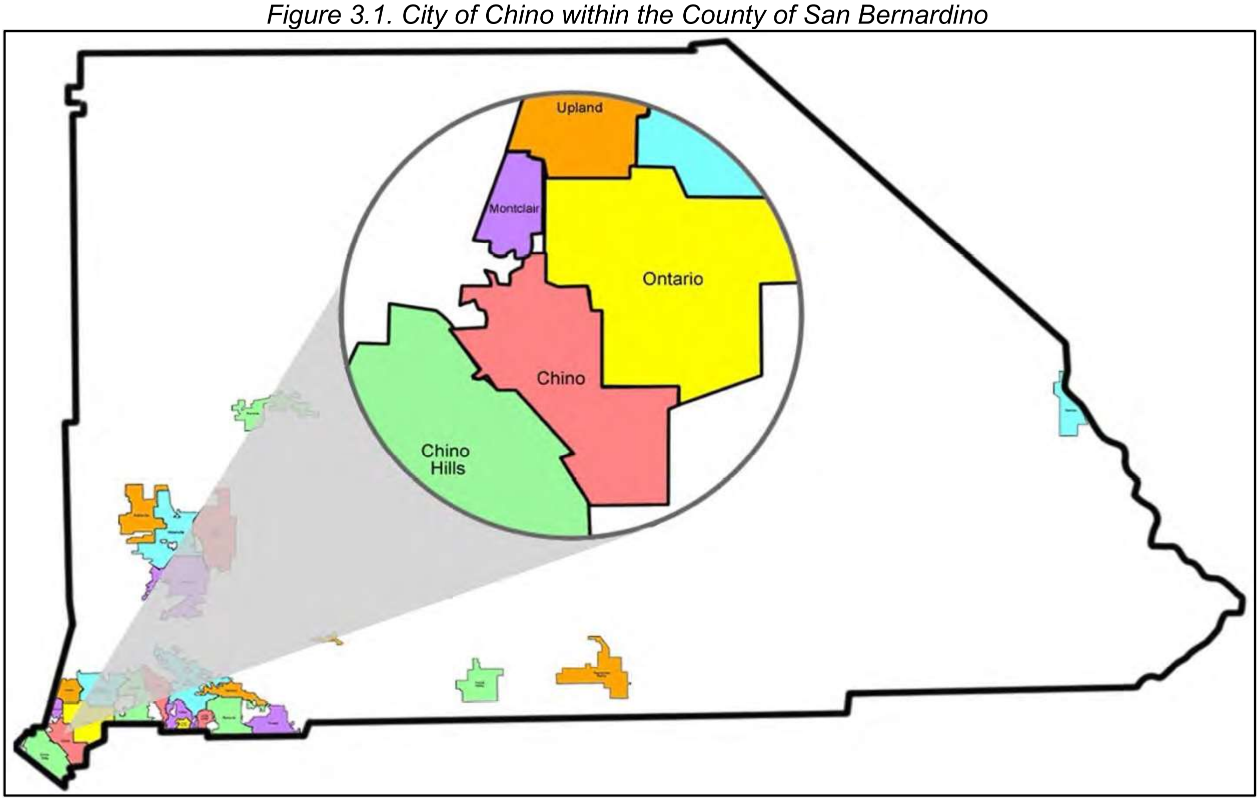
CHAPTER 3 COMMUNITY PROFILE

3.1 Location and Setting

Chino is a city in San Bernardino County, California, United States. It is located in the western end of the Riverside-San Bernardino Area, and it is easily accessible via the Chino Valley (71) and Pomona (60) freeways. Chino is bounded by Chino Hills to the west, unincorporated San Bernardino County (near Montclair) to the north, Ontario to the northeast, Pomona to the northwest, unincorporated San Bernardino County to the southeast, and unincorporated Riverside County to the south. US Census data from 2020 indicates that the City of Chino is approximately 30 square miles. This square-footage data may not include recent annexation of rough 200 acres at the time of this update.

The topography of Chino can best be described as relatively flat with a gentle overall slope of approx. 2%, generally to the south. Chino benefits from a mild, temperate climate, with average monthly temperatures ranging from the low 50s to the upper 80s. Monthly rainfall averages from a high of 4.1 inches to no rain at all. At times, temperatures will rise to the low 100s, and humidity will drop considerably. Additionally, the Chino area is subject to Santa Ana winds of 25 to 40 miles per hour, with gusts up to 60 to 75 miles per hour. These winds come out of the desert, blow to the southwest, and are often accompanied by hot temperatures.

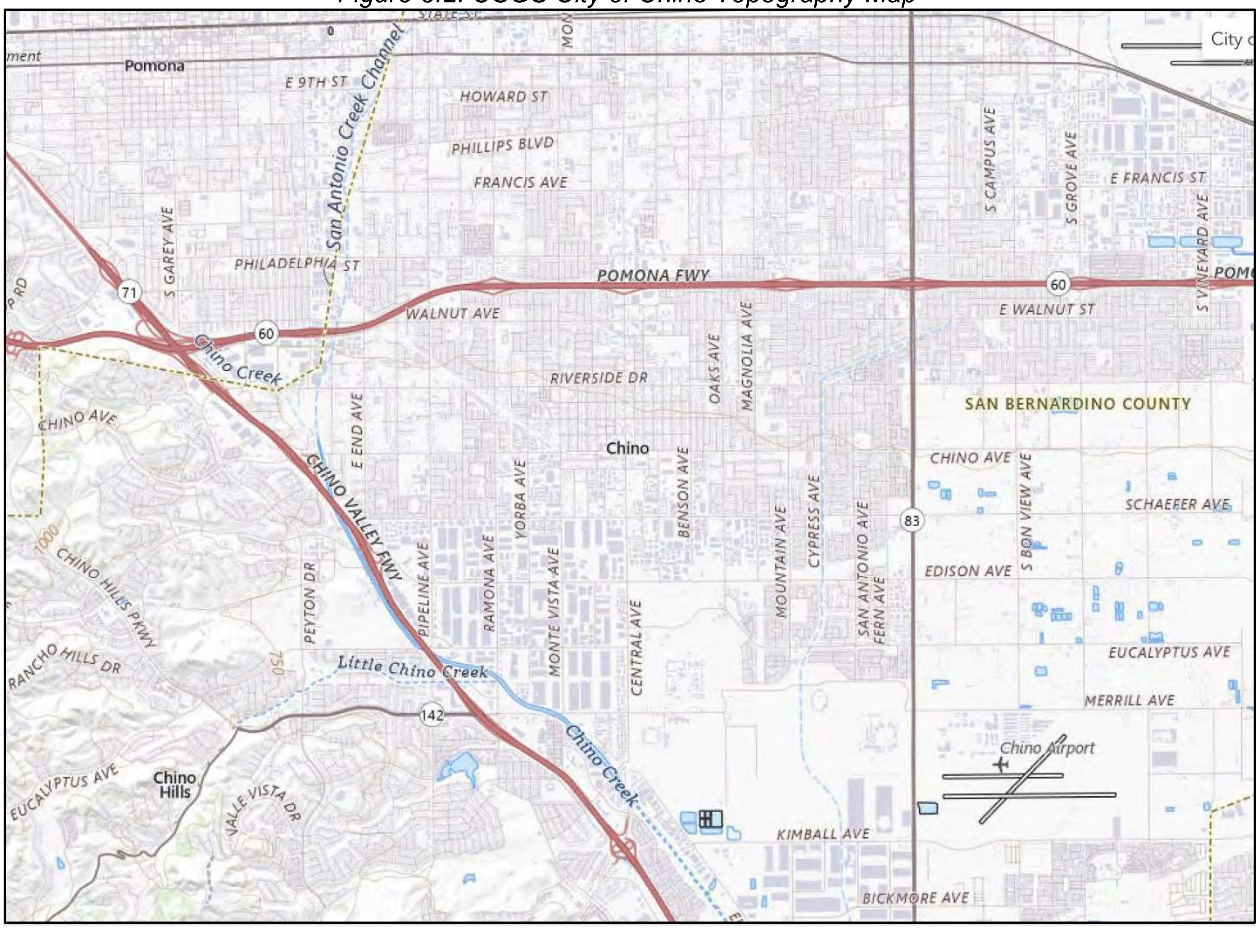
Figure 3.1. City of Chino within the County of San Bernardino



3.2 Topography

The topography of the City of Chino in San Bernardino County, California, features relatively flat terrain with an approximate elevation of 728 feet (222 meters) above sea level.

Figure 3.2. USGS City of Chino Topography Map



Vegetation in Chino primarily consists of urban landscaping with various residential, commercial, and industrial developments interspersed with green spaces. The natural vegetation in surrounding areas includes chaparral and coastal sage scrub, typical of Southern California's inland regions.

3.3 Geology

3.3.1 Soil Types

The City of Chino primarily features young alluvial deposits with good drainage and suitable for agriculture. The topography is relatively flat, minimizing risks of soil erosion and landslides. However, there is potential for soil expansion and settlement in the area. The primary soil types include sandy loams and silty clays, which are typical for regions with alluvial deposits.

3.4 Natural Resources

Chino is part of the larger Los Angeles Basin, which is known for its significant oil and gas reserves. The Monterey Formation within this basin has been assessed to contain substantial amounts of technically recoverable oil and gas resources

Additionally, the Chino Basin is an important groundwater resource. Groundwater outflow from the Chino Basin has been extensively studied, showing variations in permeability and hydraulic gradients over the years. This basin is crucial for water supply, with annual groundwater outflows historically ranging from 9,400 to 38,000 acre-feet, supporting both agricultural and urban needs.

3.5 Climate

The City of Chino's climate is characterized by hot, dry summers and mild, wet winters. This type of climate is typical of the Mediterranean climate found in Southern California.

During the summer months, temperatures often reach the 90s Fahrenheit, and it is not uncommon for temperatures to exceed 100°F. The region experiences very little rainfall during this period, contributing to the dry conditions. The humidity levels are generally low, making the heat more bearable but also increasing the risk of wildfires.

In contrast, winters are mild, with average high temperatures in the 60s°F and lows in the 40s°F. This is the primary rainy season, although the total annual precipitation is relatively low, averaging around 12 to 13 inches. Most of the rainfall occurs between November and March, often in the form of short, intense storms.

The area experiences occasional fog, particularly in the early mornings during the cooler months, and wind patterns typically bring cooler air from the coast in the evenings.

Figure 3.3. NOAA Average Annual Temperature in San Bernardino County (2014-2023)

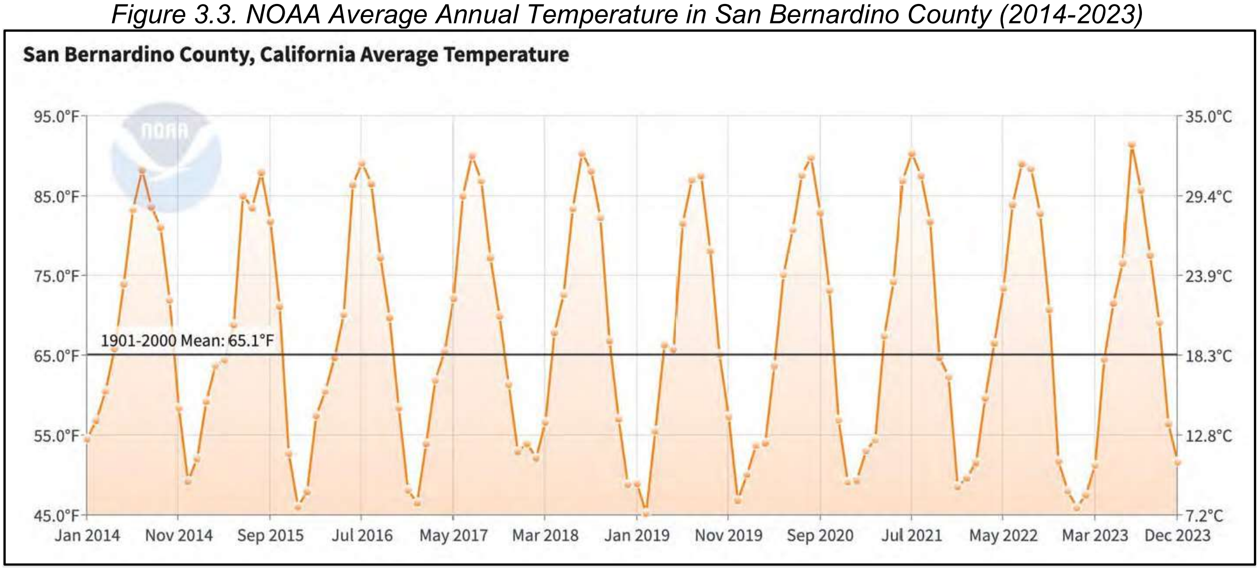
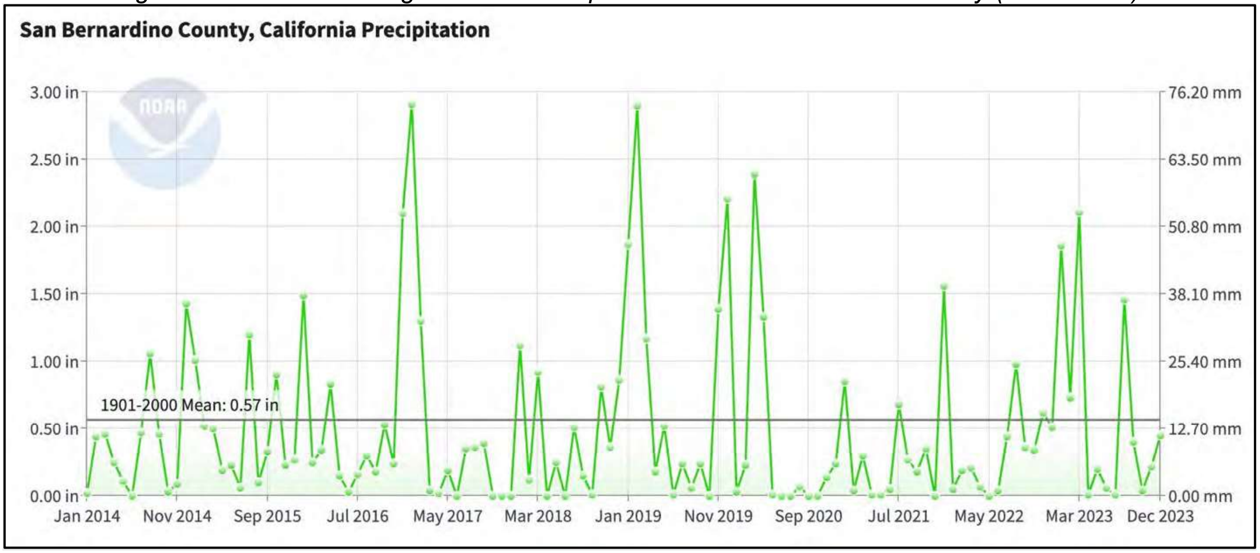


Figure 3.4. NOAA Average Annual Precipitation in San Bernardino County (2014-2023)



3.6 Land Ownership, Land Cover, Land Use and Management

3.6.1 Land Ownership

Land ownership in the City of Chino, California, primarily consists of private lands, with no significant public or federal land holdings. However, certain areas in the southern portion of the city include land managed by the U.S. Army Corps of Engineers or other federal agencies. These lands may be associated with flood control projects, water management infrastructure, or other federally designated purposes.

3.6.2 Land Cover

The land cover in the city of Chino includes a mix of urban, agricultural, and natural areas.

Urban Land Cover: The City of Chino has a significant portion of its land designated as a developed space. This includes residential areas, commercial zones, and industrial sites. The urban areas are characterized by a high percentage of impervious surfaces such as roads, buildings, and other infrastructure.

Agricultural Land Cover: Agriculture is another component of the City of Chino's land cover. The region includes fields and orchards used for growing various crops.

Natural Land Cover: Despite the urban and agricultural development, there are still patches of natural vegetation and open spaces. These areas can include grasslands, wetlands, and riparian zones along streams and rivers, which are vital for local biodiversity and ecosystem services.

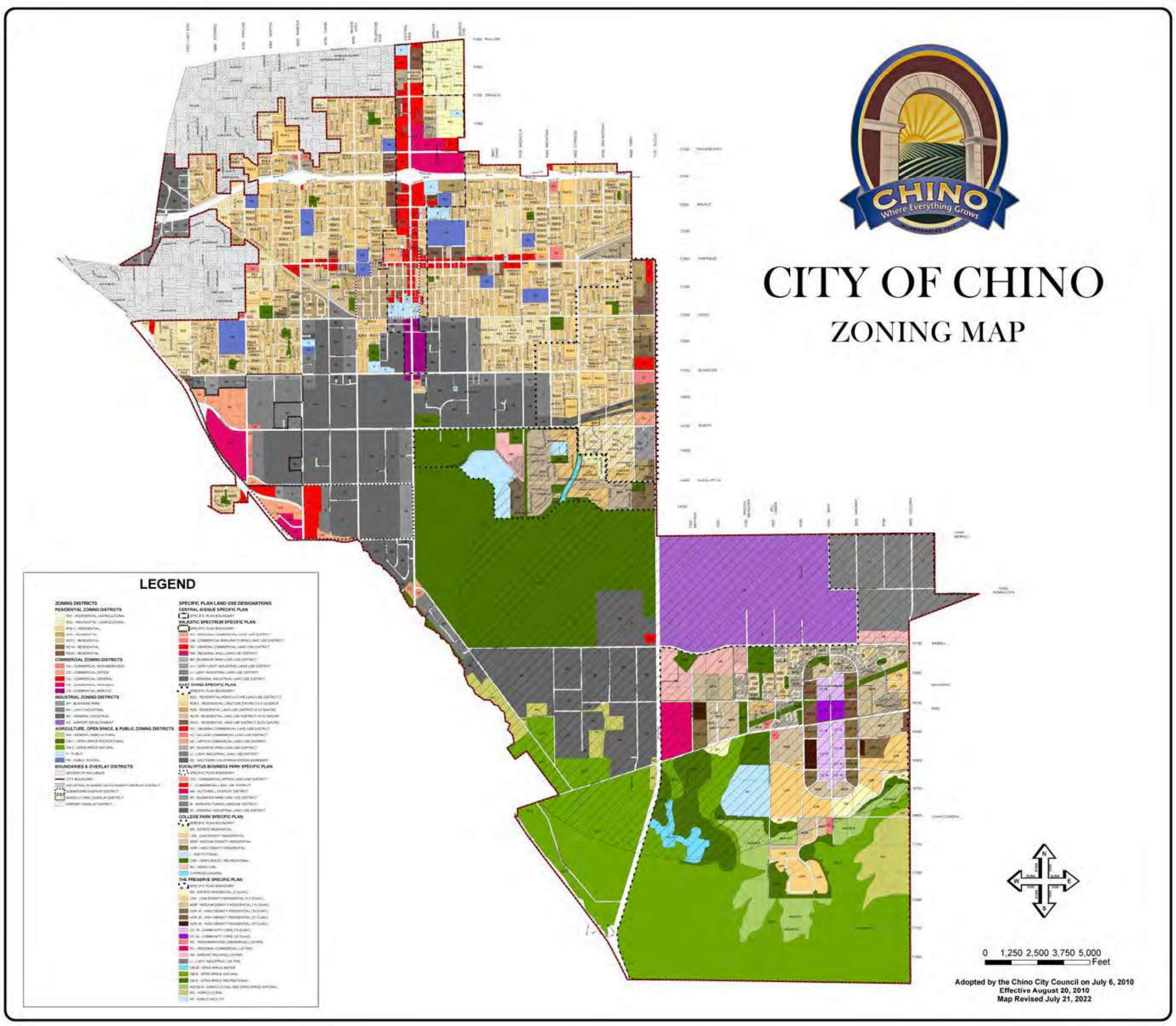
3.6.3 Land Use & Zoning

Since the 1980s, land use in the City of Chino has shifted significantly from its agricultural foundation toward a diverse mix of residential, commercial, industrial, and warehouse/distribution uses. While industrial and warehouse development remains most concentrated in the southern portions of the city, benefiting from proximity to major trucking routes, rail lines, and Ontario Airport, residential and commercial growth has expanded considerably through major planned developments such as the East Chino, The Preserve, and College Park Specific Plans.

These planned communities have introduced new residential neighborhoods, commercial centers, parks, and public amenities, reshaping the city's landscape. The City's primary commercial areas are located along major transportation corridors, including State Route 71, Grand Avenue, Central Avenue, Riverside Drive, and Philadelphia Street. As development has continued, the land area devoted to agricultural production has declined substantially, though some scattered agricultural uses remain.

The following detailed zoning map is available here on the City's website.

Figure 3.5. City of Chino Zoning Map (July 2022)



3.7 History

The Chino area was settled by Europeans in the 1700s as part of the lands of the Mission San Gabriel. At that time, American Indians inhabited the area, and the land was used mainly for cattle grazing. The area from the San Bernardino mountains to San Pedro (Rancho San Antonio) was given in a land grant by Spain to Don Antonio Maria Lugo, and an additional grant (Rancho Santa Ana del Chino) was given to Don Lugo, who continued to use the area for horse and cattle grazing.

The Rancho was sold to Lugo's son-in-law, Isaac Williams, and remained in the family until sold to Richard Gird in 1881. Gird was an engineer who had previously worked at the Tombstone Mine in Arizona and helped prepare a territorial map in that area. He desired to find a prosperous, industrial, and agricultural community in this area, and during the Southern California real estate boom of 1887, he subdivided 24,000 acres into 10-acre lots with smaller residential lots near the town core, at what is now Chino and Central Avenues. He marketed water and built a small gauge railroad to Ontario, which was used until Southern Pacific constructed a line to Chino in 1891. In 1890, he encouraged the Oxnard brothers to build a sugar beet factory, which was in business until 1917, when there was an effort to diversify to more profitable crops.

The late 1890s saw the first creamery and dairies built, with the immigration of Scandinavian, Dutch, and Portuguese residents. Chino was incorporated in 1910 with a population of 1,444, some speculate as a way to prohibit the sale of alcohol. In any event, Chino was "dry" until 1933. Chino has evolved into a full-service community, emphasizing balanced growth and retention of its agricultural heritage. The City seal, with a cornucopia, and the motto "Where Everything Grows," promotes this mix of rural values and positive development.

3.8 Development Trends

Chino was an agricultural town during the 1930s and 1940s with poultry, tree crops, walnuts, and sugar beets grown. Sugar beets played a significant role in Chino's agricultural economy, particularly with the establishment of a sugar beet processing factory in the late 19th century, which operated until 1917 as farming practices evolved. The city's population in 1940 was 4,204. In the late 1960s, Chino entered a period of rapid growth, with the population doubling approximately every ten years, from 10,305 in 1960 to 20,411 in 1970 to 40,100 in 1980. From 1980 to 1990, the population increased to 59,680., In 2000, the population was 67,168, and in 2010, the population was 77,983. The current population is approximately 85,942.

Pressure for growth came in the 1960s with improved transportation as the San Bernardino, Pomona, and Orange freeways were constructed. These freeways opened easy access to inexpensive land in the Chino Valley that could satisfy the residential growth demands of the larger urban region. Chino began to experience some industrial growth, although most development was in the residential sector.

By the late 1970s, Chino had become a community of commuters, with more than half of the residents employed in Los Angeles and Orange counties. Chino also became more affluent, with a higher median income reflecting the occupations of the residents in new housing tracts.

Proposition "M" was passed in 1988 by the citizens of Chino and limited future increases in residential densities without the consent of the residents of the City. This allows Chino to be a "young" city, with larger family sizes and younger median ages. Chino's median income is one of the highest in the Inland Empire. Most of the housing stock is relatively new, with a median age of 28 years (with the exception of approximately 9,000 new units developed in two new master-planned communities over the last ten years).

As a result of the requirements under Measure M, several residential projects have been approved by the voters at various locations throughout the city, primarily along Central and Euclid Avenues. Approximately 625 new homes have been approved, with some under construction and others in the design phase.

The City of Chino has historically been known for its significant agricultural production, particularly in dairy farming. The region once had one of the largest concentrations of dairies in the United States, producing a substantial portion of Southern California's milk supply. During its peak in the late 1980s, the San Bernardino County Dairy Preserve, which included Chino, was home to over 400 dairies and 350,000 cows.

In recent years, much of Chino's agricultural land has been transitioning to suburban residential and commercial uses. The "East Chino Specific Plan" highlights this shift, detailing the move from primarily agricultural uses to mixed-use developments, including residential and commercial projects.

Despite this transition, some agricultural activities remain, particularly those related to dairy and cattle feeding. Additionally, the city has been involved in efforts to preserve some open spaces for natural, recreational, and agricultural uses within the framework of new developments like "The Preserve at Chino."

THE PRESERVE

The Preserve project area is generally located north of SR-71, south of Kimball, east of Euclid, and west of Hellman in the southeastern portion of the City of Chino. The Preserve Specific Plan and EIR were approved in March 2003. Subsequently, The Preserve area was annexed to the City of Chino on July 10, 2003. Construction began in 2004 with the first models opening in February 2005.

The Preserve vision is of a community based on a mixture of residential neighborhoods focused on a lively community core and a regional commercial center, interconnected with a multi-purpose open space feature by a series of paseos and trails. Additional defining features of the concept include integration with the Chino Airport and an unusually complete mix of housing types, including 11,725 dwelling units ranging from equestrian estates, contemporary apartments, and condominiums to entry-level housing.

The Preserve project area totals over 5,226 acres of land. At build-out, The Preserve will have a population of approximately 40,000 people. The Preserve includes Cal-Aero K-8 School and the newly opened Legacy Academy, which serves students in the area. Approximately 3,000 homes are currently occupied in The Preserve, with approximately 10,000 residents.

COLLEGE PARK

College Park is an exciting collaborative partnership between the City of Chino, the State of California, and Chaffey College. The State of California identified 712 acres of the California Institution for Men facility as surplus property and, in cooperation with the City of Chino and Chaffey College, prepared a specific plan to convey the property to the City, the College, and SunCal Companies, a private developer. The project area is generally located south of Edison, east of Central, west of Euclid, and north of Kimball in the geographic center of the City of Chino. The development was subsequently purchased by LS College Park, a collaboration between Lennar Homes and Cal Atlantic.

The primary goal of the plan for College Park is to create a walking-scale, mixed-use community with the character and ambiance of a small college town. The integrated mix of residential, shopping and services, parks, and a college campus establishes College Park as a unique infill master-planned community in which families can live, work, learn, and play. Construction began in 2006, with the first models opening in April 2007. All residential units—totaling approximately 2,200 homes and housing over 7,000 residents—have been completed. However, some components of the original plan remain under development. A planned church and commercial development have yet to be constructed, and the designated school site north of the large park off Mountain Avenue remains vacant.

FUTURE DEVELOPMENT

The City of Chino is actively planning for future development to accommodate growth and evolving community needs. Key initiatives include the recently adopted 2021-2029 Housing Element, recent annexations, and an ongoing General Plan Update.

2021-2029 Housing Element: Adopted by the Chino City Council on November 19, 2024, and certified by the State of California on December 26, 2024, the 2021-2029 Housing Element outlines the City's strategy to meet its Regional Housing Needs Assessment (RHNA) allocation. This plan identifies specific actions and potential sites to accommodate projected housing needs across all economic segments. While the Housing Element designates areas for potential residential development, it does not guarantee that all proposed units will be constructed within the planning period (City of Chino).

Recent Annexations: The City of Chino has recently annexed over 200 acres of land, expanding its boundaries and creating opportunities for new development. These areas present potential for various uses, including residential, commercial, and mixed-use projects. Specific plans for these annexed lands are under consideration, aiming to align with the City's broader development goals.

General Plan Update: Chino is in the process of updating its General Plan to address emerging issues, comply with new state laws, and achieve key objectives. This comprehensive update will guide growth and development over the next two decades, focusing on areas such as the Downtown district and other key regions. The updated General Plan will serve as a blueprint for the City's future, ensuring sustainable and organized development that reflects the community's vision (City of Chino).

3.9 Population, Education, and Demographics

The City of Chino population has demonstrated an upward trend between 2010 and 2020, with a 17.20% increase in population, shown in the table below. Educational attainment has varied between 2018 and 2022, with significant portions of the population holding high school diplomas and bachelor's degrees.

Table 3-1. City of Chino Population Trends 2010-2020

CITY OF CHINO POPULATION TRENDS 2010-2020		
Percent Change 2010-2020	**2010**	**2020**
17.20%	77,983	91,403
Population Per Square Mile	2,631.1	3,087.4
Source: US Census Bureau (2024)		

Table 3-2. City of Chino Educational Attainment 2019-2023

CITY OF CHINO EDUCATIONAL ATTAINMENT 2018-2022	
Education	**Percentage**
High school graduate or higher, percent of persons aged 25 years+	83.4%
Bachelor's degree or higher, percent of persons aged 25 years+	28.1%
Source: US Census Bureau (2024)	

Table 3-3. City of Chino Demographics 2023

CITY OF CHINO DEMOGRAPHICS 2023	
Race and Hispanic Origin	**Percentage**
White alone	37.0%
Black or African American alone	6.7%
American Indian and Alaska Native alone	0.7%
Asian alone	18.5%
Native Hawaiian and Other Pacific Islander alone	0.4%
Two or More Races	17.2%
Hispanic or Latino	54.0%
White alone, not Hispanic or Latino	18.0%
Source: US Census Bureau (2024)	

3.10 Housing

Table 3-4. City of Chino Housing Information 2023

CITY OF CHINO HOUSING INFORMATION 2023	
Description	**Figure**
Housing Units, July 1, 2023	-
Owner-occupied housing unit rate, 2018-2022	63.7%
Median value of owner-occupied housing units, 2018-2022	$599,200
Median selected monthly owner costs – with a mortgage, 2018-2022	$2,726
Median selected monthly owner costs – without a mortgage, 2018-2022	$673
Median gross rent, 2018-2022	$2,001
Building permits, 2023	-
Source: US Census Bureau (2024)	

3.11 Economy

According to Data USA, the economy of Chino, CA employs 42.9k people. The largest industries in Chino, CA are:

- Health Care & Social Assistance (5,409 people)
- Manufacturing (4,140 people)
- Retail Trade (3,942 people)

According to Data USA, the highest-paying industries in Chino, CA, are:

- Utilities ($105,354)
- Public Administration ($80,657)
- Professional, Scientific, & Technical Services ($72,958)

3.12 Transportation

3.12.1 Highways

The City of Chino is served by several major highways and freeways, including:

1. **State Route 71 (Chino Valley Freeway)** – This north-south highway connects the 60 Freeway to the 91 Freeway, facilitating travel through Chino and nearby cities.
2. **State Route 60 (Pomona Freeway)** – Running east-west, this freeway serves as a major corridor connecting Chino with Los Angeles to the west and Riverside to the east.
3. **Interstate 10 (San Bernardino Freeway)** – Located more than two miles north of Chino's city boundary, the I-10 provides a major east-west connection between Los Angeles and San Bernardino, supporting commuter and freight transportation in the region.
4. **Interstate 15 (I-15**) – Situated just over three miles east of Chino's city boundary, this major north-south interstate links Southern California to Nevada and beyond, providing critical access for both commuters and goods movement.

5. **State Route 83 (Euclid Avenue**) – A north-south corridor passing through Chino, connecting Ontario and Chino Hills. Currently a state highway, SR-83 is scheduled to be transferred from Caltrans to the City of Chino in 2026, granting the city control over roadway maintenance and improvements.

3.12.2 Rail

The major railways in Chino include those operated by Union Pacific (UP) Railroad. The UP railway serves most of Chino's manufacturing and distribution facilities, providing freight services and connections for local businesses. Additionally, vacated rail lines and land sets are available for potential future activation as needed to support industrial and transportation growth.

3.12.3 Airports

The major airport within the City of Chino, California, is Chino Airport (IATA: CNO, ICAO: KCNO, FAA LID: CNO). This county-owned airport is located about three miles southeast of Chino and is classified as a reliever airport by the Federal Aviation Administration (FAA) due to its proximity to Ontario International Airport and John Wayne Airport in Orange County. Chino Airport primarily serves general aviation, including private owners, corporate users, flight instructors, and aviation enthusiasts.

Chino Airport features three runways:

- Runway 3/21: 4,919 x 150 feet
- Runway 8L/26R: 4,858 x 150 feet
- Runway 8R/26L: 7,000 x 150 feet

The airport is also home to two aircraft museums: the Planes of Fame Air Museum and the Yanks Air Museum, making it a hub for aircraft restoration and preservation activities.

3.13 Water Resources

3.13.1 Surface Water

The primary surface water resources near Chino include streams and rivers monitored by the USGS. The Chino Creek (Schaefer Avenue) monitoring station provides data on discharge and stream water levels to manage and assess the availability and quality of surface water in the area.

3.13.2 Groundwater

Groundwater is a crucial resource for Chino. The Chino Basin is a significant groundwater basin that provides water for agricultural, industrial, and residential use. The California Active Groundwater Level Network includes numerous wells monitored regularly to ensure sustainable groundwater use.

3.13.3 Water Use & Dams

Water use in Chino encompasses various sectors, including municipal, industrial, and agricultural purposes. The City of Chino publishes annual water quality reports that summarize water sources, testing, and compliance with state and federal standards for drinking water.

3.14 Critical Wildlife and Habitat Types

Wildlife: According to the U.S. Fish and Wildlife Service (USFWS), the Chino area is part of larger wildlife corridors that facilitate the movement and genetic exchange of wildlife. These corridors are essential for maintaining ecological balance and supporting species that require large territories or specific migratory paths.

Habitat Types: Critical habitats in and around the city of Chino typically include wetlands, riparian areas, and grasslands. These areas support the region's biodiversity and provide necessary resources for various species.

3.15 Community Risk Index

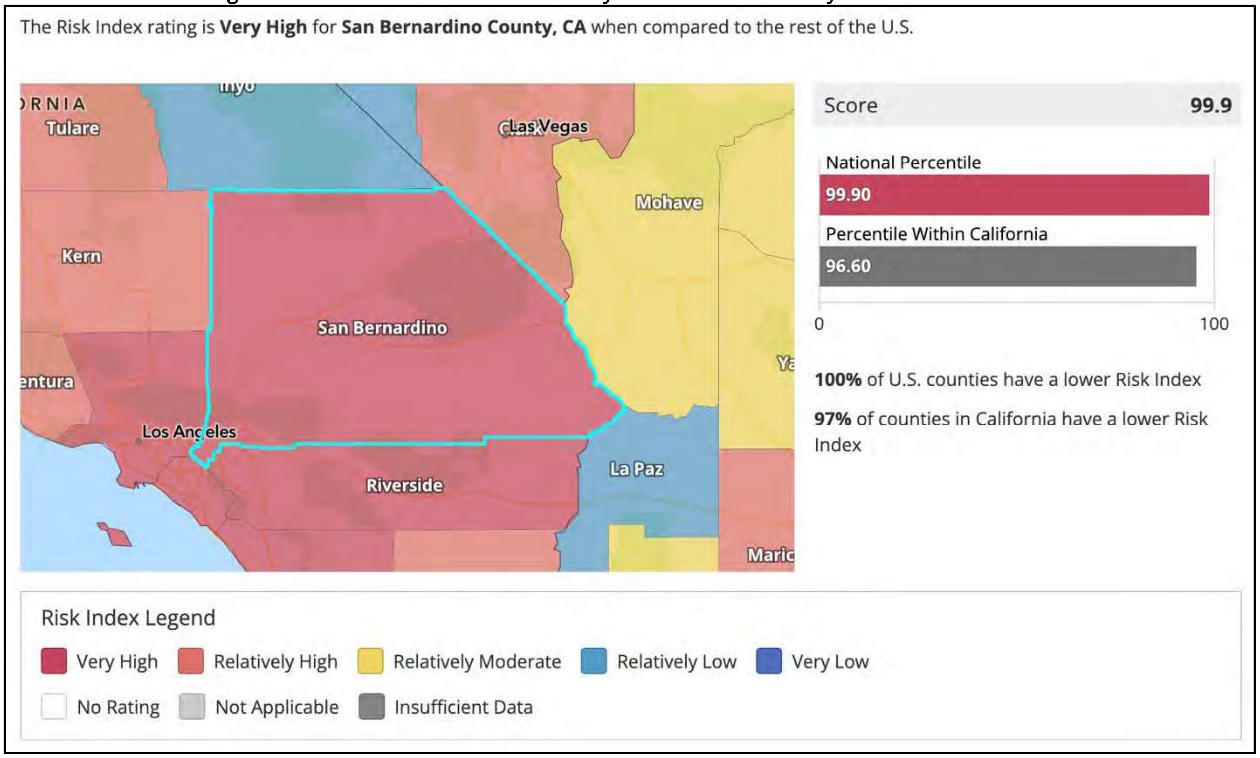
The Risk Index score is based on the following components: Social Vulnerability, Community Resilience, and Estimate Annual Loss (EAL), with EAL based on Exposure, Annualized Frequency, and Historic Loss Ratio (HLR) factors, for a total of five risk factors (FEMA National Risk Index, 2024). See Table 3-11

Each risk factor contributes to either the likelihood or consequence aspect of risk and can be classified as one of two risk types: risk based on geographic location or risk based on the nature and historical occurrences of natural hazards. The five risk factors are summarized in the table below (FEMA National Risk Index, 2024).

Table 3-5. FEMA National Risk Index: Risk Components & Factors

FEMA NATIONAL RISK INDEX				
RISK COMPONENTS & FACTORS				
Risk Component	***Risk Factors***	***Risk Factor Description***	***Risk Contribution***	***Risk Type Assignment***
Social Vulnerability	Social Vulnerability	Consequence Enhancer	Consequence	Geographic Risk
Community Resilience	Community Resilience	Consequence Reducer	Consequence	Geographic Risk
Expected Annual Loss	Exposure	Expected Consequence	Consequence	Natural Hazard Risk
Expected Annual Loss	Annualized Frequency	Probability of Occurrence	Likelihood	Natural Hazard Risk
Expected Annual Loss	Historic Loss Ratio	Expected Consequence	Consequence	Natural Hazard Risk

Figure 3.6. San Bernardino County FEMA Community Risk Index Score



Source: *(FEMA National Index Report 2024)*

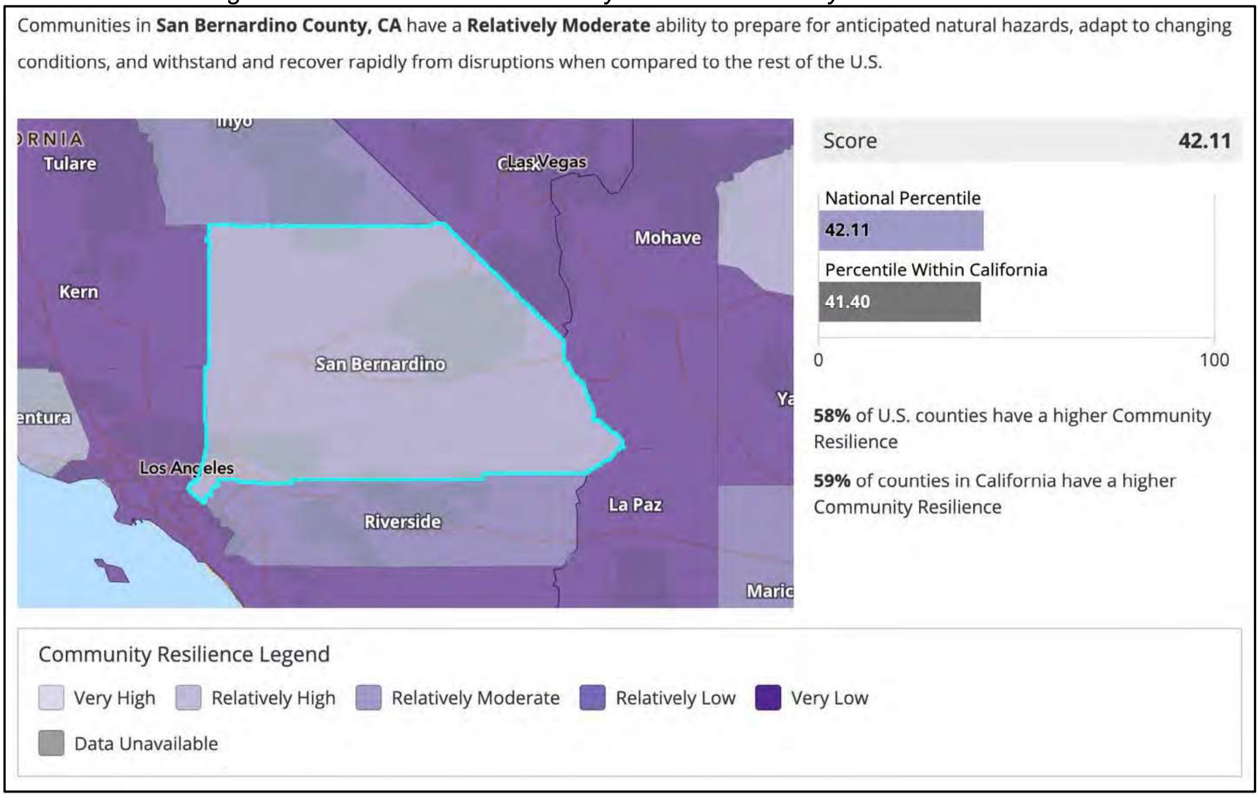
3.16 Community Resilience

Community resilience is defined as the ability of a community to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

The "Community Resilience Score" and "Community Resilience Rating" represent the relative level of a community's resilience compared to all other communities at the same level. The Community Resilience Score is inversely proportional to a community's risk. A higher Community Resilience Score results in a lower Risk Index Score.

For more information about the National Risk Index, its data, and how to interpret the information, visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

Figure 3.7. San Bernardino County FEMA Community Resilience Score



Source: *(FEMA National Index Report 2024)*

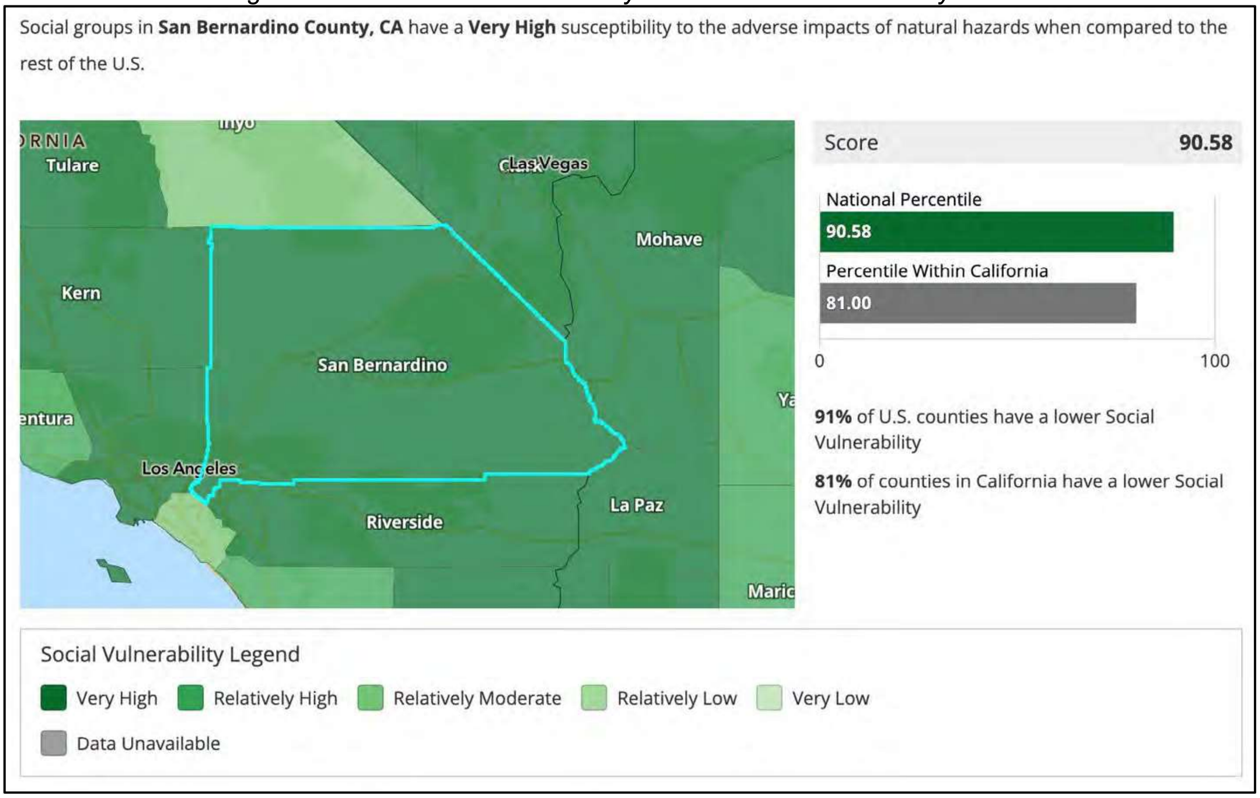
3.17 Social Vulnerability and Underserved Communities

Social vulnerability is defined as the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood (FEMA National Risk Index, 2024).

The "Social Vulnerability Score" and "Rating" represent the relative level of a community's social vulnerability compared to all other communities at the same level. A community's Social Vulnerability Score is also proportional to a community's risk. A higher Social Vulnerability Score results in a higher Risk Index Score (FEMA National Risk Index, 2024).

Social vulnerability is also one of five components included in the formulation of the "National Risk Index Score" in addition to Community Resilience, Estimated Annual Loss (EAL) based on Exposure, Annualized Frequency, and Historic Loss Ratio (HLR) factors, (FEMA National Risk Index, 2024).

Figure 3.8. San Bernardino County FEMA Social Vulnerability Score



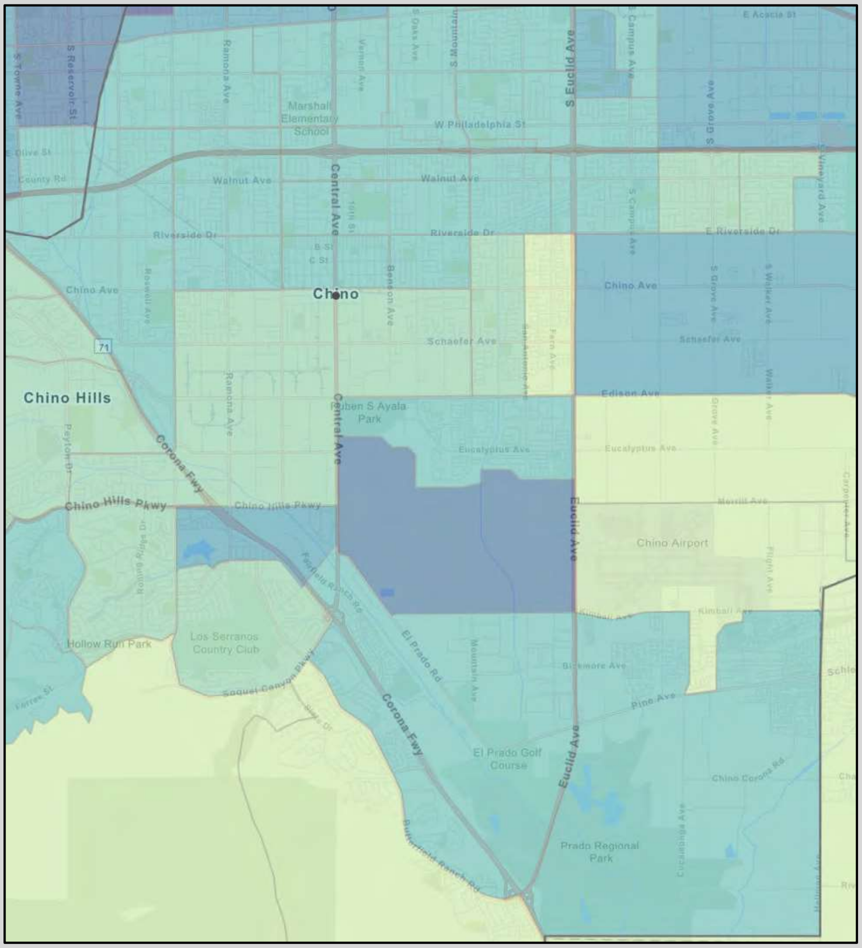
Source: *(FEMA National Index Report 2024)*

The figure below illustrates the City of Chino Community Resilience Index Story Map. This map utilizes density mapping to illustrate community areas that can be overburdened by 22 challenges identified by the FEMA Community Resilience Challenges Index.

Figure 3.9. City of Chino - FEMA Community Resilience Index Story Map

CITY OF CHINO, CALIFORNIA

FEMA COMMUNITY RESILIENCE INDEX STORY MAP



22 CHALLENGE VARIABLES

Population, Household, Housing Characteristics	Economic	Healthcare	Connection to Community
Population without a High School Diploma Population 65 and Older Population with a Disability Households without a Vehicle Households with Limited English Single-parent Households Households without a Smartphone Mobile Homes as Percentage of Housing Owner-Occupied Housing	Population Below Poverty Level Median Household Income Unemployed Labor Force Unemployed Women Labor Force Income Inequality Workforce in Predominant Sector	Number of Hospitals Medical Professional Capacity Population without Health Insurance	Presence of Civic and Social Organizations Population without Religious Affiliation Percent of Inactive Voters Population Change

Source: FEMA Resilience Analysis and Planning Tool (RAPT) 2024

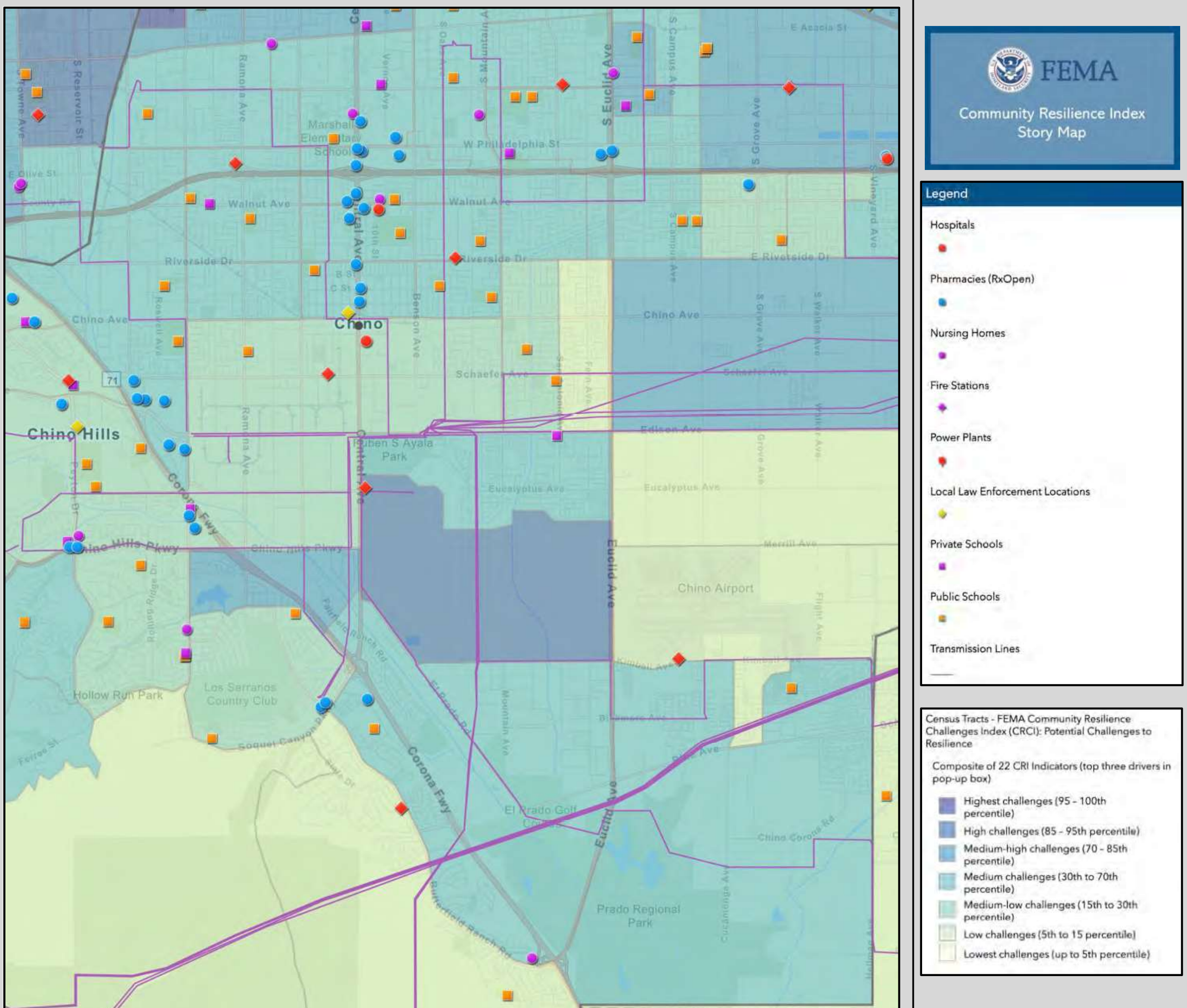
3.18 Critical Infrastructure and Key Resources

Critical facilities are commonly considered to be police stations, fire and rescue facilities, hospitals, shelters, schools, nursing homes, water supply and waste treatment facilities, and other structures the community identifies as essential to the health and welfare of the population and that are especially important following a disaster.

The following figure illustrates the locations of critical facilities within the City of Chino.

Figure 3.10. City of Chino - FEMA Critical Infrastructure Map

CITY OF CHINO CRITICAL INFRASTRUCTURE AND KEY RESOURCES
FEMA CRITICAL INFRASTRUCTURE MAP



Source: FEMA Resilience Analysis and Planning Tool (RAPT) 2024

3.19: Hazard Mitigation Framework in Chino, County, and State

The City of Chino's 2025 All-Hazard Mitigation Plan (HMP), an update to the 2018 Local Hazard Mitigation Plan (LHMP), operates within a robust framework of hazard mitigation-related laws, ordinances, programs, studies, and plans at local, county, and state levels. This update of the HMP, which identified key hazards such as earthquakes, floods, and wildfires (Chapter 4), refining its strategies with new risk data, completed actions (Chapter 7), and extensive community input gathered through surveys, public meetings, and stakeholder engagement (Chapter 2). This framework supports Chino's community profile by enhancing resilience against these hazards. Locally, the following elements are in place:

- **2018 LHMP (Updated 2025)**: The foundational plan evolved in this update to strengthen mitigation strategies and ensure FEMA eligibility through refined actions and updated risk assessments.
- **Local Building Codes**: Adopted as Chapter 15 of the Chino Municipal Code (based on the 2022 California Building Code with local amendments), these enforce seismic safety, fire protection, and flood resistance standards, supporting HMP actions like seismic retrofits (Action 7.3.14).
- **Municipal Code**: Beyond building codes, includes zoning and development standards (updated through November 2023) reviewed in the HMP process, aligning with risk reduction objectives.
- **Emergency Operations Plan (EOP)**: Managed by the Police Department, coordinates emergency response and integrates with HMP strategies such as backup power for critical facilities (Action 7.3.7).
- **Capital Improvement Program (CIP)**: Funds infrastructure projects like storm drains (Action 7.3.8) and bridges (Action 7.3.6), aligning with mitigation priorities.
- **Climate Action Plan**: Links climate resilience to HMP efforts, such as the Urban Forest Management Plan (Action 7.3.12) for heat and emissions reduction.

San Bernardino County contributes additional layers:

- **2022 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP)**: Aligns Chino with regional hazards and mitigation strategies, addressing shared risks like flooding near Prado Dam.
- **Fire Hazard Abatement Program (County Code Section 23.0301–23.0319)**: Enforces vegetation clearance to reduce wildfire risk, supporting HMP Action 7.3.5.
- **County Ordinances**: Mandate risk mitigation in new developments (e.g., avoiding 100-year flood zones), complementing Chino's efforts.

At the state level, key frameworks include:

- **California State Hazard Mitigation Plan (SHMP)**: Maintained by Cal OES, provides statewide guidance, with Chino's HMP submitted for review to ensure alignment.

- **Assembly Bill 2140 (AB 2140)**: Encourages voluntary integration of the HMP into the General Plan's Safety Element for state funding incentives.
- **California Fire and Building Codes**: Set mandatory standards for fire safety and structural resilience, reflected in Chino's local codes.

Together, these local, county, and state efforts form a collaborative mitigation framework that enhances Chino's ability to address its hazard profile. Updated from the 2018 LHMP, this framework leverages refined risk insights, local regulations, and regional/state support to bolster community resilience through voluntary coordination with existing plans and programs.

3.19.1 Local Historical Records and Relevant Technical Studies

- City of Chino Climate Action Plan
- City of Chino Strategic Plan
- City of Chino Capital Improvement Plan
- City of Chino General Plan

Part III: Risk Assessment

CHAPTER 4 HAZARD RISK SUMMARY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- Vulnerability identification—Determine the impact of natural hazard events on the people, property, environment, economy, and lands of the region.
- Cost evaluation—Estimate the cost of potential damage or expense that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets the requirements of the DMA (44 CFR, Section 201.6(c)(2)).

4.1 Identified Hazards

There are countless hazards that pose a threat to human life, health, and well-being, and no attempt is made here to compile an exhaustive list. Those that are addressed in disaster planning are generally categorized as "natural" or "technological" (sometimes "manmade"). The FEMA website contains a thorough discussion and list of hazards in the "National Risk Index for Natural Hazards" section. Some hazards threaten all geographic areas, while others (e.g., flooding) are more limited in their extent. Studies were conducted to determine which hazards are of concern in the City of Chino.

The City of Chino hazards were identified, and their frequency of occurrence was evaluated using several resources, including:

- 2018 City of Chino Hazard Mitigation Plan
- 2022 San Bernardino County Hazard Mitigation Plan
- 2025 City of Chino General Plan
- Hazard planning documents developed by state, federal, and private agencies
- NOAA weather data from the past 72 years
- Data from the United States Geological Survey (USGS) and the California State Geological Survey (CGS)

Hazards identified as significant in this city and that will be considered in this plan are listed below.

Natural Hazards

- Drought
- Dam and Levee Failure
- Flooding (Urban & Flash)
- Severe Summer Storms

  - Extreme Heat
  - Hail
  - High Winds
  - Lightning
- Extreme Cold
- Tornado
- Wildfire

Geological Hazards
- Earthquake

Other Hazards of Concern
Although non-natural hazards are not required by FEMA for inclusion in a hazard mitigation plan, the City of Chino wishes to rank and mitigate against a comprehensive list of hazard events that could impact the city. Due to both the nature of non-natural hazards and the discretionary status regarding their inclusion, the following hazards of interest have been briefly and qualitatively assessed for the sake of public education and informing their inclusion within the hazard ranking and mitigation process.

Technological (Manmade) Hazards
- Civil Disturbance
- Cybersecurity Incident
- Hazardous Material Incident (Fixed, Transportation)
- Prolonged Power Outage
- Terrorism
- Transportation Incident (Air & Road)

Per FEMA's mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact the City of Chino due to geographic location:
- Flooding (Riverine)
- Hurricane
- Landslide
- Sea Level Rise
- Storm Surge
- Tsunami
- Volcanic Activity

While FEMA requires only natural hazards to be addressed, the City of Chino has taken a more comprehensive approach by including both natural and non-natural hazards in its assessment. This inclusive strategy reflects the city's commitment to addressing all potential threats to community safety and resilience, regardless of their origin.

The hazards identified above were not assessed in isolation, but rather through a dynamic process that combined technical analysis with community input. As detailed in Chapter 2, the planning team engaged the Steering Committee, stakeholders, and the general public to evaluate and prioritize these hazards based on both historical data and community perception of risk.

This collaborative approach included:

- **Technical Review:** Analysis of historical occurrences, scientific data, and previous planning documents
- **Community Input:** Feedback from public meetings, surveys, and stakeholder workshops about perceived risks and concerns
- **Stakeholder Expertise:** Professional insights from emergency managers, first responders, and subject matter experts
- **Vulnerability Assessment:** Consideration of impacts on various community segments, including traditionally underserved populations
- **Future Projections:** Analysis of how changing conditions might affect hazard frequency and severity

In the following sections, each hazard will be analyzed in detail, incorporating both technical risk assessment and community perspective. This dual approach ensures that our mitigation strategies address not only the physical risks but also the community's specific concerns and needs. This comprehensive hazard assessment forms the foundation for the mitigation actions presented later in this plan, creating a direct link between identified hazards, community priorities, and proposed solutions.

4.2 Hazard Profile

The risk assessments in the following chapters describe the risks associated with each identified hazard of concern. The following sections were used to describe each hazard and communicate each respective level of risk:

- **Hazard Description**—Each hazard profile contains a description of the general definition and causes of the hazard. It may also include background information for understanding the context of the hazard within the City of Chino.
- **Location**—The location or region in the City of Chino where each hazard may occur is described.
- **Historical Frequency & Probability of Future Occurrence**—This section identifies past hazard events of note that have occurred in the City of Chino. It also includes the likelihood of each hazard occurring again if available.
- **Extent**—The strength or magnitude of each hazard is defined, usually through a form of measurement, such as a formula, scale, chart, or graph.
- **Impacts & Loss Estimates**—The potential impacts of each hazard on the city are discussed. This section also outlines the potential economic/monetary loss from a hazard/event and the loss of property, structures, facilities, systems, livestock, and life.
- **FEMA NRI Score**—The hazard-specific FEMA National Risk Index scores for each natural hazard are included.
- **Related Hazards**—The hazard profiles that fall under a greater hazard category can be found within this section.

4.3 Risk Assessment Methodology

Each hazard included in this plan was assessed and ranked based on a pre-defined hazard risk methodology consistent with FEMA's mitigation plan requirements. Information from the hazard profiles and input from subject matter experts were used to inform the hazard risk assessment process. The following is a description of the key factors.

4.3.1 Probability/Likelihood of Occurrence

The probability of occurrence of a hazard is indicated by a probability factor based on the likelihood of annual occurrence:

- **High**—Significant hazard event is likely to occur annually (Probability Factor = 3)
- **Medium**—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)
- **Low**—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)
- **Unlikely**—There is little to no probability of significant occurrence, or the recurrence interval is greater than every 100 years (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area.

4.3.2 Extent

Extent was assessed in two categories: extent/intensity and catastrophic potential of the hazard. Numerical impact factors were assigned as follows:

Extent/Intensity—Extent is defined as the range of anticipated intensities of the identified hazards. Extent is most expressed using various scientific scales, such as the Enhanced Fujita scale.

- **High**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a high-intensity incident (Extent Factor = 3)
- **Medium**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a medium-intensity incident (Extent Factor = 2)
- **Low**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a low-intensity incident (Extent Factor = 1)
- **Unlikely**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of little to no intensity (Extent Factor = 0)

Catastrophic—The potential that an occurrence of this hazard could be disastrous.

- **High**—High potential that this hazard could be catastrophic (Extent Factor = 3)
- **Medium**—Medium potential that this hazard could be catastrophic (Extent Factor = 2)
- **Low**—Low potential that this hazard could be catastrophic (Extent Factor = 1)
- **Unlikely**—Virtually no potential that this hazard could be catastrophic (Extent Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Extent/Intensity* and its potential to be *Catastrophic*.

4.3.3 Vulnerability

Vulnerabilities were assessed in three categories: population exposure, property exposure, and exposure based on changes in development. Numerical impact factors were assigned as follows:

People—Values were assigned based on the percentage of the total population exposed to the hazard event.

- **High**—30% or more of the population is exposed to this hazard (Vulnerability Factor = 3)
- **Medium**—15% to 29% of the population is exposed to this hazard (Vulnerability Factor = 2)
- **Low**—14% or less of the population is exposed to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the population is exposed to this hazard (Vulnerability Factor = 0)

Property Exposed—Values were assigned based on the percentage of the total property value exposed to the hazard event.

- **High**—25% or more of the total assessed property value is exposed to the hazard (Vulnerability Factor = 3)
- **Medium**—10% to 24% of the total assessed property value is exposed to the hazard (Vulnerability Factor = 2)
- **Low**—9% or less of the total assessed property value is exposed to the hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the total assessed property value is exposed to the hazard (Vulnerability Factor = 0)

Changes in Development—Changes in development since the previous plan was approved have increased or decreased the community's vulnerability/exposure to this hazard.

- **High**—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)
- **Medium**—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)
- **Low**—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *People*, and a weighting factor of 1 was assigned for *Property Exposed* and *Changes in Development*.

4.3.4 Impact

Hazard impacts were assessed in eight categories: population and life/safety, underserved/equity, property damages, economic, environmental, essential operations, future development, and climate change. Numerical impact factors were assigned as follows:

Population and Life/Safety: Values were assigned based on (1) best available historical and probabilistic data for individuals who are vulnerable to the hazard event and (2) the likelihood to experience adverse impacts in the event of its occurrence.

- **High**: Populations exposed to this hazard are likely to experience significant adverse impacts (Impact Factor = 3)
- **Medium**: Populations exposed to this hazard are likely to experience some adverse impacts (Impact Factor = 2)
- **Low**: Populations exposed to this hazard are likely to experience minimal adverse impacts (Impact Factor = 1)
- **No impact**: Populations exposed to this hazard are not likely to experience significant adverse impacts (Impact Factor = 0)

Underserved/Equity—Values were (1) assigned based on the best available data for underserved populations vulnerable to the hazard event and (2) are likely to experience adverse/disproportionate impacts from the hazard incident, resulting in greater disparity in equity.

- **High**—Underserved populations exposed to this hazard are likely to experience significant adverse/disproportionate impacts (Impact Factor = 3)
- **Medium**—Underserved populations exposed to this hazard are likely to experience some adverse/disproportionate impacts (Impact Factor = 2)
- **Low**—Underserved populations exposed to this hazard are likely to experience minimal adverse/disproportionate impacts (Impact Factor = 1)
- **No impact**—Underserved populations exposed to this hazard are not likely to experience significant adverse/disproportionate impacts (Impact Factor = 0)

Property Damages—Values were assigned based on the expected total property damages incurred from a hazard incident. It is important to note that values represent estimates of the loss from a major incident based on historical data or probabilistic models/studies.

- **High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
- **Medium**—More than $500,000 but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to be more than 5% but less than 15% of the property value within the jurisdiction (Impact Factor = 2)

- **Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
- **No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Economic—An estimation of the impact, expressed in dollars, on the local economy is based on a loss of business revenue, crops, worker wages, and local tax revenues or the impact on the local gross domestic product (GDP).

- **High**—Total economic impact is likely to be greater than $10,000,000 (Impact Factor = 3)
- **Medium**—Total economic impact is likely to be greater than $100,000 but less than or equal to $10,000,000 (Impact Factor = 2)
- **Low**—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
- **No Impact**—Virtually no significant economic impact (Impact Factor = 0)

Environmental Factor: Environmental impact from a major hazard event requiring outside resources and support and/or repair, clean-up, restoration, and/or preservation work.

- **High**: Environmental impact from a single major hazard event is likely to be significant, requiring extensive outside resources and support and/or repair, clean-up, restoration, and/or preservation work (Impact Factor = 3)
- **Medium**: Environmental impact from a single major hazard event is likely to be localized, requiring some outside resources and support and/or repair, clean-up, restoration, or preservation work (Impact Factor = 2)
- **Low**: Environmental impact from a single major hazard event is likely to be minimal, requiring little to no outside resources and support, and/or minimal repair, clean-up, restoration, or preservation work (Impact Factor = 1)
- **No impact**: No environmental impacts from a single major hazard event is likely (Impact Factor = 0)

Essential Operations Factor: Impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event.

- **High**: Significant impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 3)
- **Medium**: Some impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 2)
- **Low**: Minimal impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 1)

- **No Impact**: No impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 0)

Future Development—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard.

- **High**—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)
- **Medium**—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)
- **Low**—Future development trends will minimally increase the impact/consequence of this hazard (Impact Factor = 1)
- **No Impact**—Future development trends will not increase the impact/consequence of this hazard and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)

Climate Change—The potential that climate change will increase the risk of this hazard (e.g., type, location, and range of anticipated intensities of the identified hazard and impacts).

- **High**—Climate change trends will significantly increase the risk of this hazard and its impacts (Impact Factor = 3)
- **Medium**—Climate change trends will increase the risk of this hazard and its impacts, but not significantly (Impact Factor = 2)
- **Low**—Climate change trends will minimally increase the risk of this hazard and its impacts (Impact Factor = 1)
- **No Impact**—Climate change trends will not increase the risk of this hazard and its impacts (Impact Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Population and Life Safety* and *Underserved/Equity*, and a weighting factor of 2 was assigned for *Property Damages.* In addition, a weighting factor of 1 was assigned for *Economic*, *Environmental, Essential Operations*, *Future Development,* and *Climate Change*.

4.4 FEMA NRI Risk Scores

The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather. Because not all hazards apply to the City of Chino, only those with a defined risk to the city are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability and Community Resilience, to develop a baseline relative risk measurement for each United States county and census tract. These measurements are calculated using average past conditions but cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision-makers as they develop risk reduction strategies.

4.4.1 Social Vulnerability

Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Table 4-6. City of Chino – FEMA NRI Social Vulnerability Score and Rating

FEMA NRI Score	FEMA NRI Rating
61.43	Relatively High
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2023e; 2023f	

4.4.2 Community Resilience

Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table 4-7. City of Chino – FEMA NRI Community Resilience Score and Rating

FEMA NRI Score	FEMA NRI Rating
31.35	Relatively Low
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2023b; 2023e	

4.4.3 Expected Annual Loss

The table below shows the overall expected annual loss score for the entire city based on all natural hazards. Hazard-specific scores are included in each hazard chapter under Impacts & Loss Estimates.

Table 4-8. City of Chino – FEMA NRI Expected Annual Loss Score and Rating

FEMA NRI Score	FEMA NRI Rating
87.35	Relatively High
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: National Risk Index, 2023d; 2023e	

4.4.4 Overall NRI Score

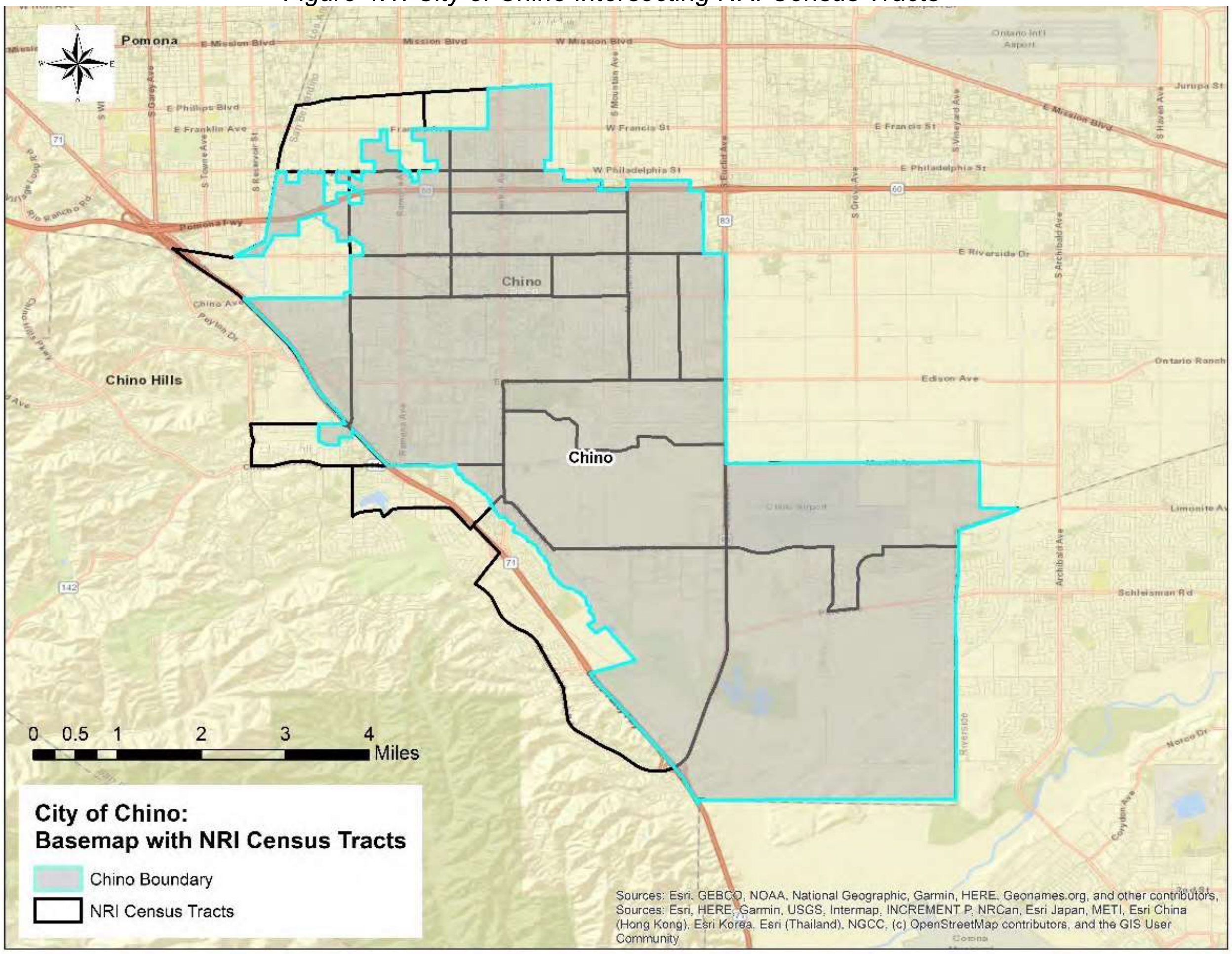
The table below shows the overall FEMA National Risk Index Score for the City of Chino, based on all natural hazards. Hazard-specific scores are included in each hazard chapter under the FEMA NRI Score.

Table 4-9. City of Chino – FEMA Overall NRI Score and Rating

FEMA Overall NRI Score	Expected Annual Loss Rating
88.16	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2023c; 2023e	

Although city specific data is not made available via NRI datasets, the census tracts level data was utilized. Census tracts were selected based on the intersecting lines between the city boundary and those census tracts in proximity. A total of 20 census tracts were selected that were either completely within the city boundaries or a significant portion of the census tract intersected the city boundary. The image below identifies the City of Chino and intersecting NRI Census Tracts.

Figure 4.1. City of Chino Intersecting NRI Census Tracts



4.5 Overall Risk Scores

The following table represents the new overall risk scores for the City of Chino based on the methodology described. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores.

Double-click [HERE] to access the full assessment and tool (this is only accessible when utilizing the Microsoft Word version of the plan).

Table 4-10. Hazard Risk Scores for City of Chino

Hazard Event	Probability	Consequence				Total Risk Score (Probability x Consequence)
	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	
Drought	3	12	9	21	42	6
Dam and Levee Failure	1	18	11	30	59	3
Flooding (Urban/Flash)	3	18	13	33	64	9
Severe Summer Storms (Extreme Heat, Hail, High Winds, Lightning)	3	18	13	33	64	9
Extreme Cold	2	12	9	24	45	4
Tornado	3	18	11	33	62	3
Wildfire	3	18	13	33	64	9
Earthquake	3	18	13	33	64	9
Civil Disturbance	2	12	9	24	45	4
Cybersecurity Incident	1	12	9	19	40	3
Hazardous Materials Incident (Fixed, Transportation)	3	15	11	30	56	9
Prolonged Power Outage	2	18	9	25	52	6
Terrorism	1	18	11	33	62	3
Transportation Incident (Road & Air)	3	12	11	27	50	6

4.5.1 Qualitative Hazard Assessment Methodology

In addition to the quantitative assessment and FEMA NRI analysis specific to the City of Chino, a comprehensive stakeholder engagement process was implemented to ensure local expertise and community priorities were incorporated into the hazard assessment. This process consisted of two key phases (Subject Matter Expert (SME) Assessment & Community Stakeholder Evaluation).

The Subject Matter Expert (SME) Assessment consisted of A panel of local subject matter experts conducted a detailed evaluation of each hazard utilizing their comprehensive knowledge of:

- City operations and available resources
- Historical hazard impacts within the community
- Local vulnerabilities and risk factors
- Community response capabilities and limitations

The SMEs ranked each hazard from least to most important based on their understanding of the City's specific context and challenges. Each hazard was assigned a value from 1 to 15, with 1 representing the least important to the community and 15 representing the most critical hazards requiring attention.

Following the SME assessment, the process was expanded to engage the broader community through a comprehensive Community Stakeholder Evaluation phase. This evaluation specifically targeted individuals with direct connections to Chino, including those who:

- Live within the city
- Work in Chino
- Own property or businesses in the city
- Recreate within the community

The evaluation garnered significant participation, with over 150 stakeholders providing input. These participants represented a cross-section of the community, including:

- Local residents
- Business owners and operators
- Representatives from community organizations
- Civic and community leaders

Each participant ranked the hazards using the same 1-15 scoring system employed in the SME assessment, ensuring consistency in the evaluation process while bringing valuable community perspective to the hazard prioritization effort.

4.5.2 Qualitative Assessment Results

The qualitative assessment process revealed significant insights through a unique dual-perspective approach, combining expert evaluation with community input. This comprehensive methodology provided a deeper understanding of how different segments of our community perceive and prioritize various hazards, while highlighting important distinctions between technical expertise and public experience.

Through the assessment process, subject matter experts brought their professional knowledge and technical understanding of hazard impacts, while public stakeholders contributed valuable insights based on lived experiences and community concerns. This combination of perspectives proved essential in developing a complete picture of hazard vulnerabilities and community priorities.

4.5.3 Key Findings

The assessment revealed several notable patterns in how different groups perceive and prioritize hazards within our community. Earthquakes emerged as the predominant concern across all groups, receiving the highest possible ranking from both subject matter experts and public stakeholders. This unanimous assessment underscores a shared recognition of seismic risk that transcends technical and public perspectives.

Other hazards showed interesting variations between expert and public perspectives, providing valuable insights into different ways these risks are understood and experienced. For instance, flooding, particularly urban/flash flooding, ranked as the second-highest concern among subject matter experts, while public stakeholders rated it somewhat lower. This difference likely reflects the technical understanding of the City's flood vulnerabilities compared to the public's direct experience with flooding events.

Infrastructure-related hazards revealed particularly notable distinctions between expert and public priorities. While subject matter experts placed high emphasis on facility disasters, public stakeholders expressed greater concern about power outages and cyber threats. This divergence highlights the different ways these groups experience and evaluate infrastructure vulnerabilities - experts focusing on system-wide implications while the public emphasizes daily impact scenarios.

Natural hazards such as severe summer storms and wildfires also generated different responses between groups. Subject matter experts ranked severe summer storms, including extreme heat, hail, high winds, and lightning, significantly higher than the public. Conversely, public stakeholders placed greater emphasis on wildfire risk, possibly reflecting recent regional events and increased media attention to fire dangers.

Some hazards generated strong agreement between groups. Both technical experts and public stakeholders consistently ranked landslides, invasive species, and severe winter weather among the lower-priority risks. Similar alignment appeared in the assessment of civil disturbance and terrorism, with both groups assigning these hazards moderate to low priority rankings.

4.5.4 Steering Committee Hazard Assessment and Prioritization Process

The Steering Committee's hazard assessment and prioritization process represented the culmination of both technical analysis and comprehensive community input. Their final determinations emerged from a systematic evaluation that combined rigorous data analysis with extensive community feedback.

The Committee's evaluation process began with a thorough review of technical components, including quantitative risk scores, FEMA National Risk Index data, and historical occurrence patterns. They examined scientific projections and modeling data while also conducting detailed infrastructure vulnerability assessments. This technical foundation provided the scientific framework necessary for understanding the physical risks facing the community.

Equally important was the integration of community input gathered throughout the planning process. The Committee carefully considered feedback from public meetings held across different neighborhoods, analyzing survey results that revealed community risk perceptions and concerns. They paid particular attention to input from organizations serving various population segments, ensuring that perspectives from traditionally underserved communities were properly represented in the decision-making process.

To synthesize this wealth of information, the Committee adopted a collaborative approach. They began by reviewing technical risk scores and scientific data, then layered in community feedback and survey results to create a more complete picture of each hazard's impact. Local conditions and vulnerabilities were discussed in detail, with careful consideration given to the city's implementation capabilities and available resources.

Throughout their deliberations, the Committee worked to strike a careful balance between technical risk data and community perceptions. They emphasized the importance of ensuring equitable consideration of impacts across all neighborhoods while remaining mindful of practical implementation constraints. Both immediate and long-term hazard impacts were evaluated, along with careful assessment of the city's capacity to implement effective mitigation strategies.

This comprehensive evaluation process resulted in hazard priorities that reflect not only technical accuracy but also genuine community concerns. The resulting framework provides a strong foundation for the mitigation strategies presented in this plan, ensuring they address both the scientific reality of hazard risks and the expressed needs of the community.

4.5.5 Steering Committee Key Findings

Earthquakes emerged as the predominant concern, receiving the highest possible ranking (15) from both SMEs and public stakeholders, resulting in a maximum combined score of 30. This unanimous assessment underscores the community's unified recognition of seismic risk.

Urban/flash flooding ranked as the second-highest concern among SMEs (14), though public stakeholders rated it somewhat lower (10). This difference might reflect the SMEs' technical understanding of the city's flood vulnerabilities versus the public's lived experience with flooding events.

Infrastructure-related hazards showed interesting variations between expert and public perspectives. While SMEs ranked Facility Disaster high (13), public stakeholders placed greater emphasis on power outages (14) and cyber threats (13). This divergence might indicate different priorities based on daily impacts versus system-wide vulnerabilities. Natural hazards such as Severe Summer Storms and Wildfire revealed notable differences in perception. SMEs ranked Severe Summer Storms, which includes extreme heat, hail, high winds, and lightning, higher than the public (12 versus 7). Conversely, the public ranked Wildfire risk significantly higher than SMEs (12 versus 7), possibly reflecting recent regional wildfire events and increased public awareness of fire danger.

There was strong agreement on lower-priority hazards, with both groups ranking Landslide, Invasive Species, and Severe Winter Weather among the lowest risks. Civil Disturbance and Terrorism also received consistent mid-to-low rankings from both groups, suggesting agreement on their relative importance compared to other hazards. The assessment demonstrates the value of incorporating both expert knowledge and community perspective in hazard prioritization. While technical expertise identifies systemic vulnerabilities, public input reflects lived experiences and community concerns, providing a more complete picture of hazard priorities for planning purposes.

4.5.6 Steering Committee Final Determination Process

The final selection of hazards for inclusion in the plan emerged from robust dialogue and careful deliberation by the Steering Committee. The committee engaged in extensive discussion, weighing multiple factors and perspectives before reaching consensus.

Decision-Making Process

The committee's deliberations were characterized by:

- In-depth analysis of the quantitative risk scores
- Careful consideration of both SME and public stakeholder rankings
- Thorough evaluation of the city's capabilities and resources
- Extended dialogue with committee members sharing diverse perspectives
- Thoughtful debate about competing priorities
- Assessment of the city's ability to effectively implement mitigation strategies

Selection Criteria

The final selection of hazards was based on three primary factors:

1. **Risk Assessment Scores**
    a. Quantitative analysis results
    b. Technical evaluation of potential impacts
    c. Historical occurrence data
    d. Vulnerability assessments
2. **Stakeholder Input**
    a. SME rankings and justifications
    b. Public stakeholder priorities
    c. Community concerns and experiences
    d. Local knowledge and perspectives
3. **City Capacity**
    a. Available resources for mitigation
    b. Implementation capabilities

c. Current and planned city priorities
d. Feasibility of mitigation actions
e. Ability to sustain long-term mitigation efforts

4.5.7 Selected Hazards

Through this comprehensive evaluation process, the committee reached consensus on including the following hazards in the plan:

1. **Urban/Flash Flooding:** Inundation of property in built environments, particularly in densely populated areas, caused by rainfall overwhelming drainage systems due to increased impervious surfaces
2. **Earthquakes:** Sudden ground shaking caused by movement within the Earth's crust
3. **Severe Summer Storms:** Intense weather events occurring in warm months, including extreme heat, hail, high winds, and lightning
4. **Wildfire:** Uncontrolled fire spreading through vegetation in rural or wilderness areas
5. **Drought:** Prolonged period of unusually dry weather causing water shortages
6. **Cyber Threat:** Potential attacks on computer systems, networks, or digital devices
7. **Prolonged Power Outage:** Extended period when electrical power is unavailable to a large area
8. **Hazardous Materials Incident:** Accidental release of dangerous substances that can harm people, property, or the environment
9. **Transportation Incident:** Accidents involving vehicles on roads or aircraft that disrupt normal travel
10. **Disobedient Acts:** Actions limited to public gatherings that significantly disrupt community peace
11. **Facility Disaster:** Events causing significant damage or disruption to buildings or infrastructure

These selected hazards represent threats that are both significant to the community and within the city's capacity to address through meaningful mitigation actions.

4.5.8 Hazard Analysis

The following section provides a comprehensive analysis of all hazards evaluated during the planning process, including those ultimately selected and not selected for inclusion in the final hazard mitigation plan. This analysis was developed through the three-phase process that included quantitative risk assessment scoring, Subject Matter Expert evaluation, and extensive public stakeholder input from over 150 participants. The final determination of which hazards to include in the plan was made by the Steering Committee through careful deliberation, weighing risk scores, stakeholder priorities, and the city's capacity to implement effective mitigation strategies.

The analysis draws upon data from authoritative sources, prioritizing the most localized data available for each hazard. Primary data sources include:

- FEMA's National Risk Index (NRI) data providing hazard-specific risk scores and expected annual loss estimates

- Cal Fire's Fire Hazard Severity Zone maps and historical fire data
- National Weather Service (NWS) records of severe weather events
- USGS seismic and geological hazard data
- California Department of Water Resources flood hazard mapping
- NOAA's National Centers for Environmental Information (NCEI) historical event database
- California Office of Emergency Services (Cal OES) hazard event records
- Local emergency response and incident reports from the City of Chino

Where city-specific data was available, it served as the primary source for analysis. In cases where local data was limited or unavailable, county-level data from San Bernardino County and regional assessments were utilized to ensure comprehensive coverage. This approach of using the most granular data available, while supplementing with broader regional data when necessary, ensures the most accurate possible assessment of each hazard's potential impact on the City of Chino.

4.6 Drought

4.6.1 Hazard Description

Drought is an expected phase in the climactic cycle of almost any geographical region and is certainly the case in California. Objective and quantitative definitions for drought exist, but most authorities agree that because of the many factors contributing to it. None are entirely satisfactory because their onset and relief are slow and indistinct. According to the National Drought Mitigation Center, drought “originates from a deficiency of precipitation over an extended period, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector.” What is clear is that a condition perceived as “drought” in each location results from a significant decrease in water supply relative to what is “normal” in that area.

4.6.1.1 Drought Types

- Meteorological Drought – Defined as below-normal precipitation over a set period. Often, this type of drought is region-specific based on regional climatology. This drought type is often thought of as ‘drought’.
- Agricultural Drought – This type of drought occurs when a reduction in soil moisture results in unmet demand for crops. This drought type is region-, crop-, and time-specific and usually occurs after meteorological droughts. Agricultural drought can cause significant crop losses and economic disruption for agriculture-dependent communities.
- Hydrological Drought – This type of drought is driven by a deficiency of surface and subsurface water resources, often indicated by reduced streamflow, lake or reservoir water levels, and groundwater table heights. Due to the complex hydrological network that feeds surface and subsurface water resources, hydrological drought occurs after meteorological drought.
- Socioeconomic Drought – This type of drought occurs when physical water shortages impact individuals or communities. Socioeconomic drought impacts can vary according to an individual’s or community’s ability to adapt or mitigate.

4.6.2 Hazard Location

Drought could occur anywhere in the City of Chino, likely affecting the entire city.

4.6.3 Hazard Extent/Intensity

The figure below displays the precipitation conditions for the United States using the Palmer Drought Severity Index (PDSI), taken from the National Weather Service (NWS). The PDSI quantifies drought in terms of prolonged and abnormal moisture deficiency or excess. This index indicates general conditions and not local variations caused by isolated rain. The PDSI is an important climatological tool for evaluating the scope, severity, and frequency of prolonged periods of abnormally dry or wet weather. In addition, it can help delineate disaster areas and indicate the availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and potential intensity of forest fires (NCAR, 2024).

The PDSI compares moisture deficiency and excess on a numerical scale that usually ranges from positive five to negative five. Positive values reflect excess moisture supplies, while negative values indicate moisture demands more than supplies.

Figure 4.2. Palmer Drought Severity Index (PDSI)

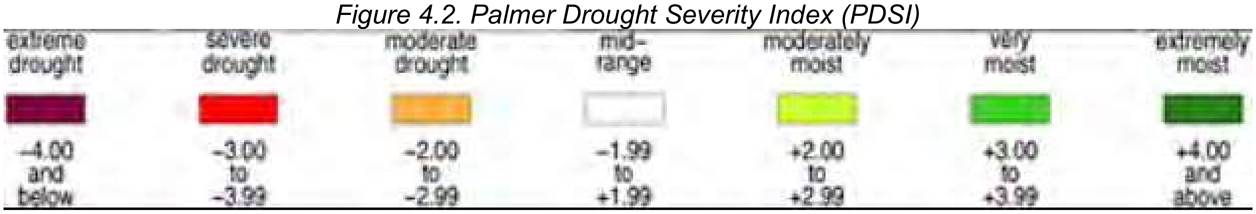
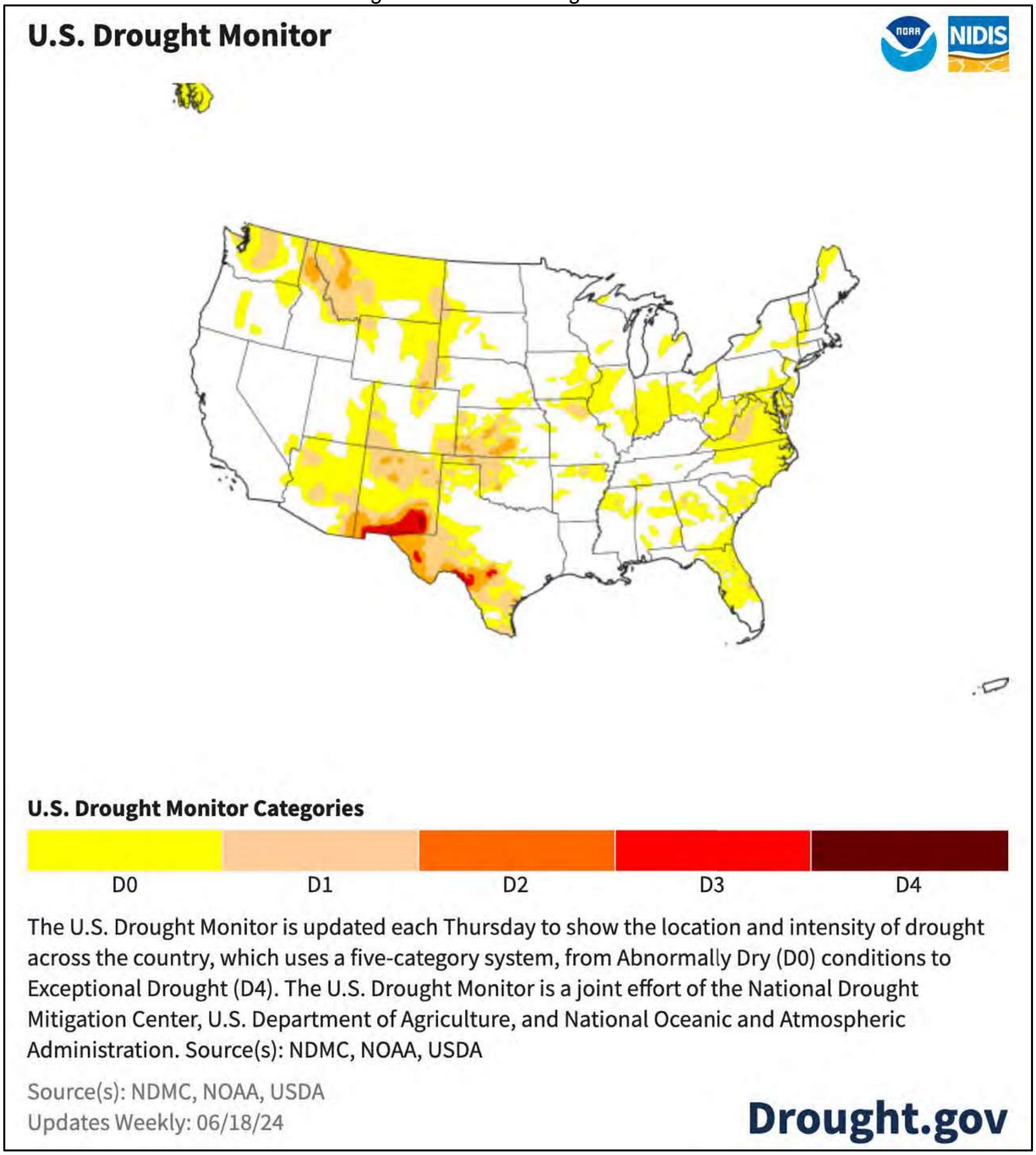


Figure 4.3. U.S. Drought Monitor

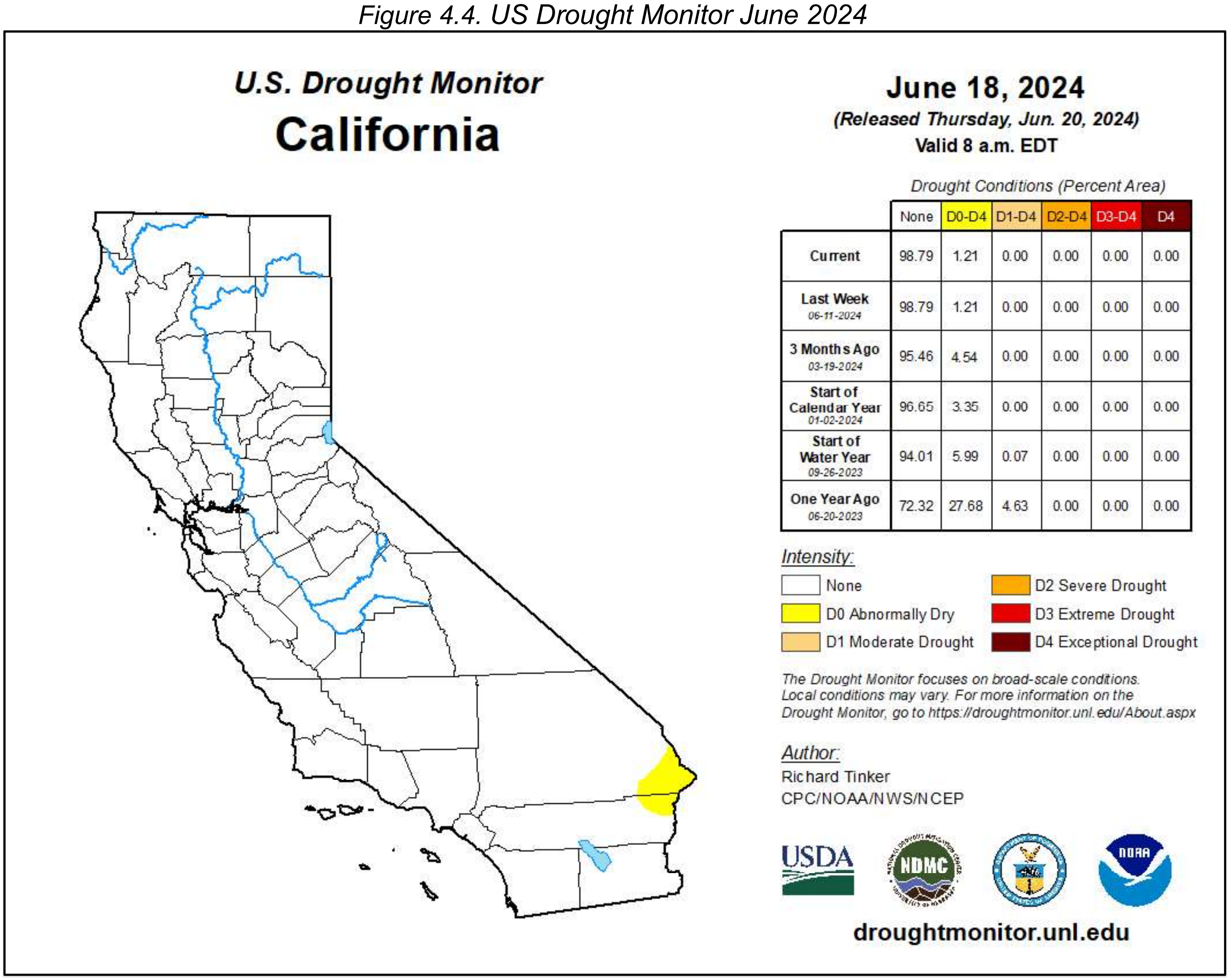


4.6.4 Probability and Frequency

According to NOAA, the probability of drought is determined using precipitation, temperature, soil moisture, and streamflow data, among others. Key methods and tools used to assess and predict drought conditions include:

1. **Palmer Drought Severity Index (PDSI)**: This index assesses the severity of a drought based on precipitation, temperature, and soil moisture. It helps identify the onset and end of drought conditions.
2. **Standardized Precipitation Index (SPI)**: This index measures the amount of precipitation over various timescales and is used to monitor both short-term and long-term drought conditions.
3. **Soil Moisture Analysis**: Soil moisture data, particularly from NASA's GRACE satellite, provides insights into the wetness or dryness of soil at various depths, indicating drought conditions.
4. **U.S. Drought Monitor**: This tool integrates data from multiple indicators to provide a weekly map that shows the location and intensity of droughts across the U.S.

Figure 4.4. US Drought Monitor June 2024



	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	98.79	1.21	0.00	0.00	0.00	0.00
Last Week 06-11-2024	98.79	1.21	0.00	0.00	0.00	0.00
3 Months Ago 03-19-2024	95.46	4.54	0.00	0.00	0.00	0.00
Start of Calendar Year 01-02-2024	96.65	3.35	0.00	0.00	0.00	0.00
Start of Water Year 09-26-2023	94.01	5.99	0.07	0.00	0.00	0.00
One Year Ago 06-20-2023	72.32	27.68	4.63	0.00	0.00	0.00

According to the State of California HMP, the cyclical occurrence of drought and documentation of past and current losses point to the strong probability that California will continue to be vulnerable to short and longer-term drought impacts. Based on the historical and more recent drought events in California, the State has a high probability of future drought events. According to FEMA, USDA, and NOAA, California experienced 117 drought events between 1950 and 2022. California can anticipate at least one period of drought somewhere in the State every year (State of California, 2023).

Figure 4.5. Drought: Probability and Frequency

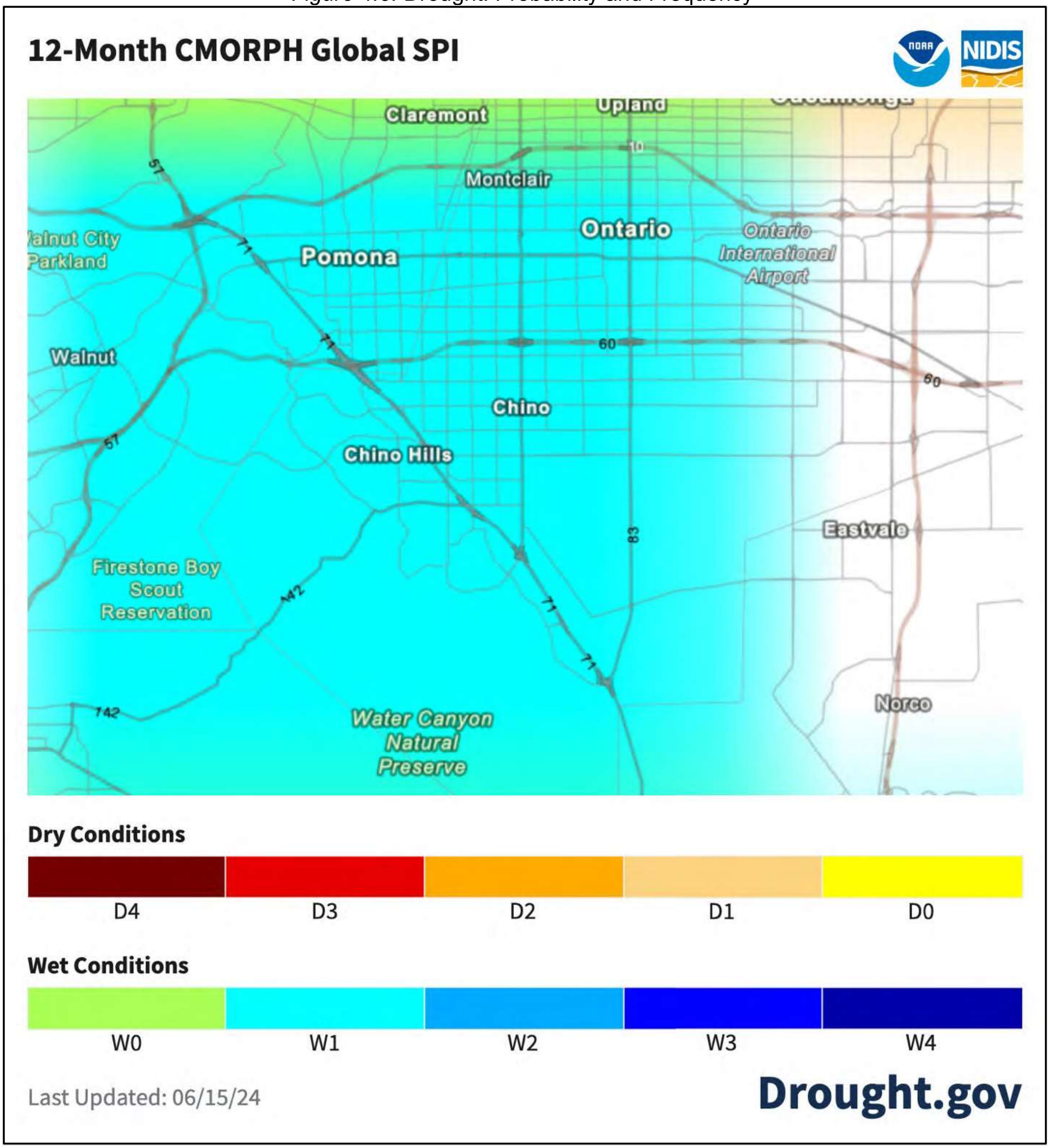
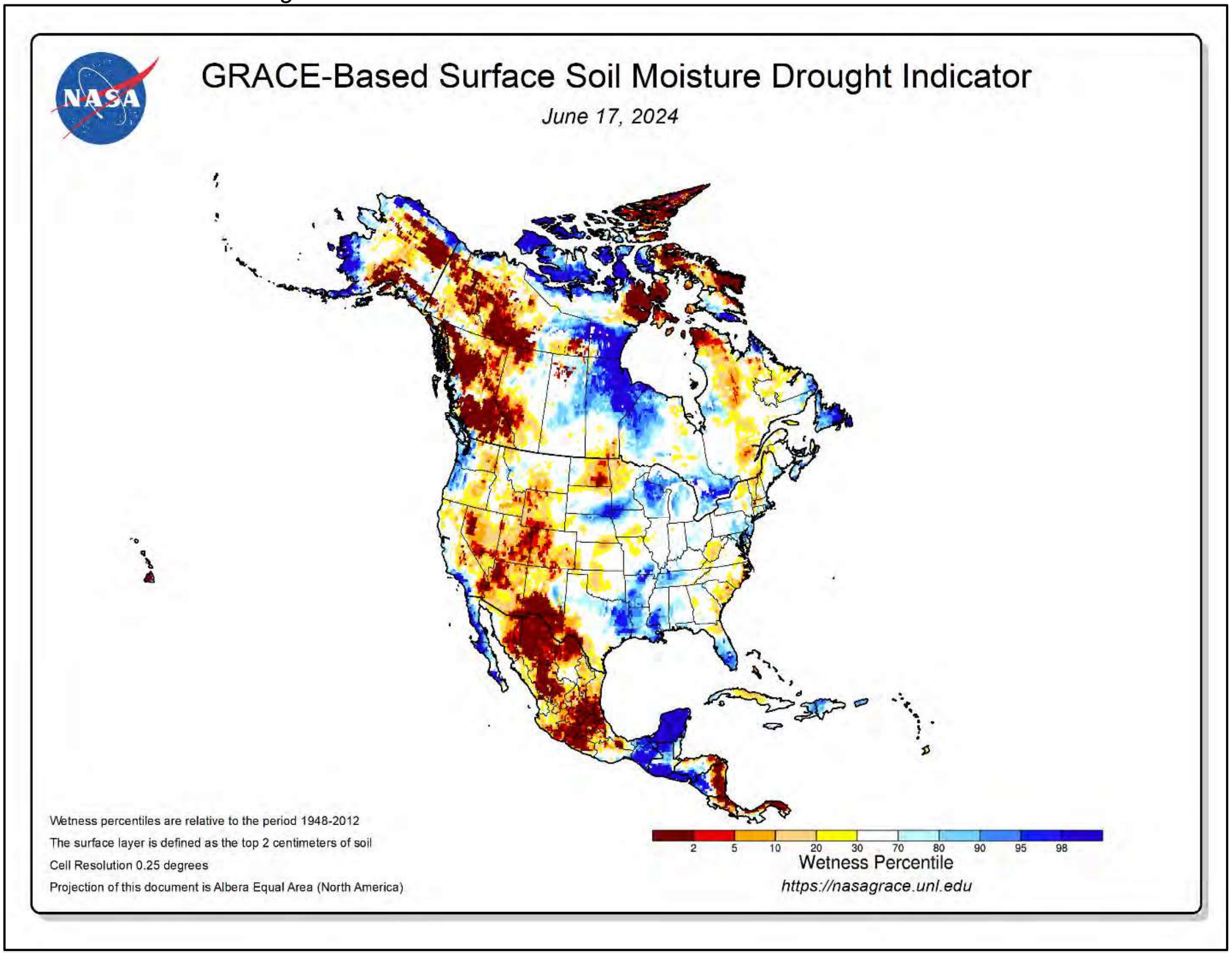


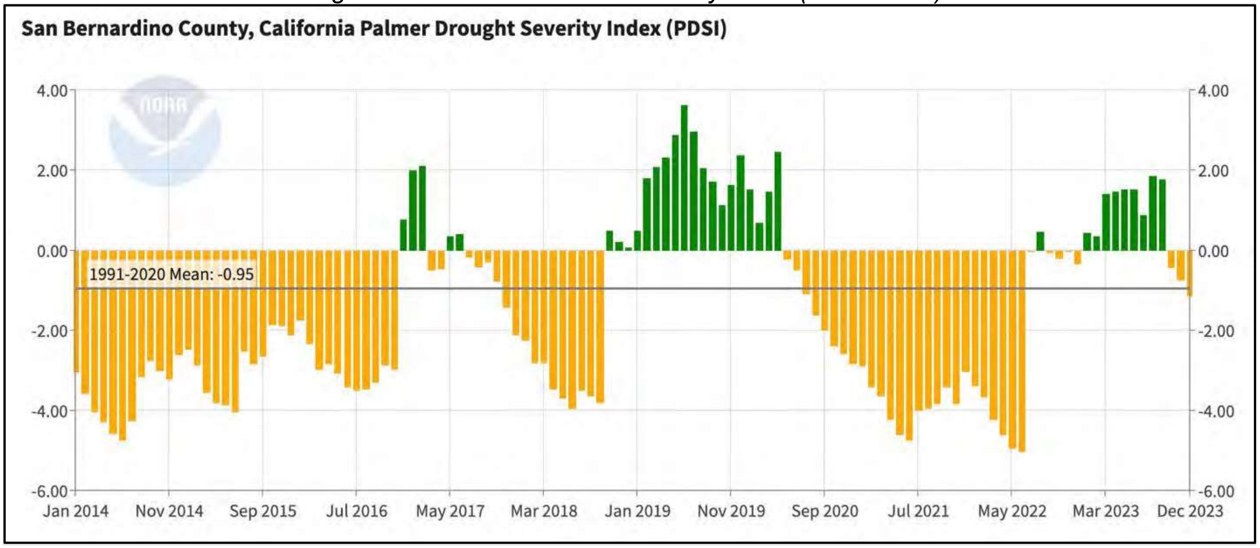
Figure 4.6. NASA GRACE Surface Soil Moisture Percentile



4.6.5 Past Events

According to NOAA, between 01/01/13 and 12/31/24 there have been no documented drought event in the City of Chino or San Bernardino County. The figure below represents the PDSI for San Bernardino County between 2014 and 2023.

Figure 4.7. San Bernardino County PDSI (2014-2023)



4.6.6 Vulnerability and Impacts

Life Safety and Health: Droughts affect life safety and public health in several ways. Health problems can arise from poor water quality, poor food quality, and increased dust in the air. In addition, droughts make fires more likely, spread more quickly, and make them more challenging. In addition, poor air quality and a lack of water may reduce residents' engagement in recreational activities, reducing overall mental and physical well-being.

Property Damage and Critical Infrastructure: Drought has a negligible impact on buildings. Possible losses/impacts to critical facilities include the loss of essential functions due to low water supplies. Severe droughts can negatively affect drinking water supplies. Should a public water system be involved, the losses could total millions if outside water is shipped. Possible losses to infrastructure include the loss of potable water.

Economy: Although no data demonstrates the economic impact of past drought events on the City of Chino, the most significant financial effect of drought is on agriculture.

Changes in Development and Impact of Future Development: No data exists demonstrating the impact of drought on future development in the City of Chino. However, excessive drought can result in water shortages and increased competition for limited water resources, which can limit the ability of developers to expand projects within the city.

Effects of Climate Change on Severity of Impacts: According to the University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including severe drought. UCAR explains that warmer temperatures cause more evaporation, turning water into vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century.

Providing projections of future climate change for a specific region is challenging. Shorter-term projections are more closely tied to existing trends, making longer-term projections even more challenging. The further a prediction reaches, the more subject it becomes to changing dynamics. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water's future
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management, and ecosystem functions
- Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness, and emergency response

Climate Change Impact on Drought: According to NOAA, climate change can lead to increased frequency and severity of drought. Warmer temperatures accelerate evaporation rates and reduce soil moisture, intensifying drought conditions. This is particularly problematic for regions already prone to droughts, which are now experiencing longer and more intense drought periods. Climate change also heightens the likelihood of compound extreme events, such as concurrent heatwaves and droughts. These combined events can overwhelm adaptive capacities and significantly increase damage to ecosystems, agriculture, and infrastructure.

Furthermore, climate change contributes to increased water stress by altering precipitation patterns and elevating temperatures, which affect both water availability and quality. This stress impacts agriculture, energy production, and urban water supplies. Ecologically, intensified droughts pose significant threats to ecosystems and wildlife. For example, reduced stream-flows and higher water temperatures can negatively affect fish populations and other aquatic life. Economically, droughts exacerbated by climate change led to substantial costs, including losses in crop yields, increased wildfire risks, and strains on municipal and industrial water supplies.

Table 4-11. 25-Year Climate Projections for City of Chino, California

25-YEAR CLIMATE PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
City of Chino is expected to experience a **46% increase** in extremely hot days within 25 years.
By 2049, the City of Chino is expected to have a **2°F increase** (from 66°F to 69°F) in average annual temperatures.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **33% increase** in extremely hot days within 25 years.
By 2049, he City of Chino is expected to have a **2°F increase** (from 66°F to 68°F) in average annual temperatures.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/6071/explore/climate)

Table 4-12. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	**Higher Emissions**	**Lower Emissions**	**Higher Emissions**	**Lower Emissions**	**Higher Emissions**
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation							
Average Annual Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Days Per Year With No Precipitation	**321 days**	**322 days**	**323 days**	**324 days**	**325 days**	**324 days**	**327 days**
	318-322	316-329	314-333	316-331	312-334	314-332	300-344
Maximum Number Of Consecutive Dry Days	**78 days**	**82 days**	**81 days**	**83 days**	**85 days**	**84 days**	**92 days**
	70-94	67-100	68-95	72-101	71-106	69-108	69-140
Temperature Thresholds							
Annual days with Maximum temperature > 90°	**114 days**	**133 days**	**135 days**	**141 days**	**147 days**	**148 days**	**169 days**
	114-121	127-143	120-147	131-154	134-161	137-163	152-188
Annual days with Maximum temperature > 100°	**52 days**	**69 days**	**72 days**	**78 days**	**85 days**	**87 days**	**111 days**
	49-54	59-84	60-87	66-99	73-108	74-99	97-143
Source: Climate Mapping for Resilience and Adaptation (2024)							

4.6.7 FEMA NRI Expected Annual Loss Estimates

Table 4-13. San Bernardino County Expected Annual Loss Table

SAN BERNARDINO COUNTY, CA FEMA NRI EXPECTED ANNUAL LOSS TABLE - DROUGHT							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value EALT**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
61.20 events per year	N/A	N/A	N/A	N$1,643	$1,643	15.95	Very Low
***Annualized Frequency**: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population**: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss** scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2024)							

4.6.8 FEMA Hazard-Specific Risk Index Table

Table 4-14. City of Chino FEMA Hazard Specific Risk Index Table

CITY OF CHINO, CA FEMA HAZARD SPECIFIC RATINGS - DROUGHT		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
15.99	Relatively High	Relatively Low
***Risk Index Scores**: are a quantitative rating calculated using data for only a single hazard type. Risk Index Scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.* ***Social Vulnerability Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).* ***Community Resilience Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).*		
Source: FEMA National Risk Index (2024)		

4.6.9 FEMA NRI Exposure Value Table

Table 4-15. San Bernardino County FEMA NRI Exposure Value Table

SAN BERNARDINO COUNTY, CA FEMA EXPOSURE VALUE TABLE - DROUGHT					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
Drought	$79,073,920	N/A	N/A	N/A	$79,073,920
***Buildings**: Building exposure value is defined as the dollar value of the buildings determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible building exposure of an area (Census block, Census tract, or county) is its building value as recorded in Hazus 6.0, which provides 2022 valuations of the 2020 Census.* ***Population:** Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible population exposure of an area (Census block, Census tract, or county) is its population as recorded in Hazus 6.0. Population loss is monetized into a population equivalence value using a VSL approach in which each fatality or ten injuries is treated as $11.6 million of economic loss (2022 dollars).* ***Agriculture:** Agriculture exposure value is defined as the estimated dollar value of the crops and livestock determined to be exposed to a hazard according to a hazard type-specific methodology. This is derived from the USDA 2017 Census of Agriculture county-level value of crop and pastureland with 2018 values for the US territories. All dollar values are inflation-adjusted to 2022 dollars.*					
Source: FEMA National Risk Index (2024)					

4.7 Dam and Levee Failure

4.7.1 Hazard Description

Dam: A barrier constructed across a watercourse for storage, control, or diversion of water. Dams typically are constructed of earth, rock, concrete, or mine tailings.

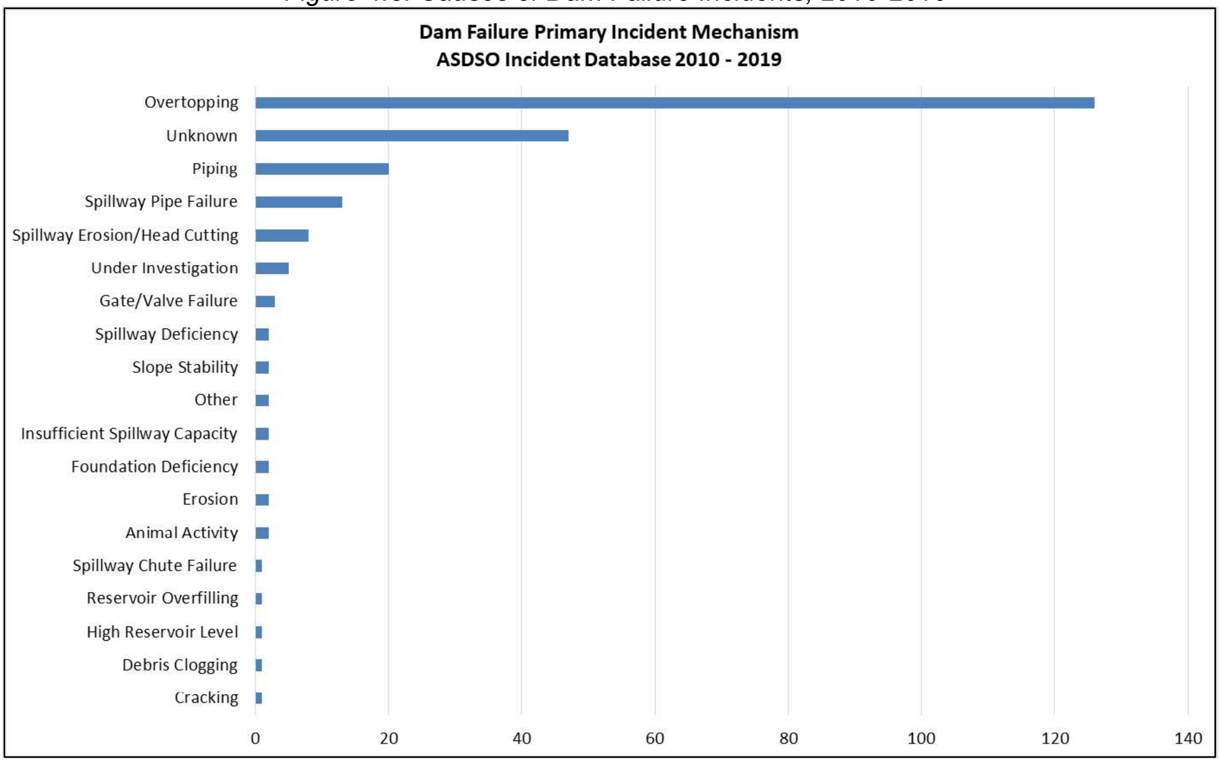
Dam Failure: Failure characterized by the sudden rapid and uncontrolled release of impounded water or liquid-borne solids. It is recognized that there are lesser degrees of failure and that any malfunction or abnormality outside the design assumptions and parameters that adversely affect a dam's primary function of impounding water could be considered a failure.

The Causes of Dam Failure: Dam failures are most likely to happen for one of five reasons (ASDSO, 2024):

1. Overtopping caused by water spilling over the top of a dam. Overtopping of a dam is often a precursor of dam failure. National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for approximately 34% of all U.S. dam failures.
2. Foundation defects, including settlement and slope instability, cause about 30% of all dam failures.
3. Cracking caused by movements like the natural settling of a dam.
4. Inadequate maintenance and upkeep.

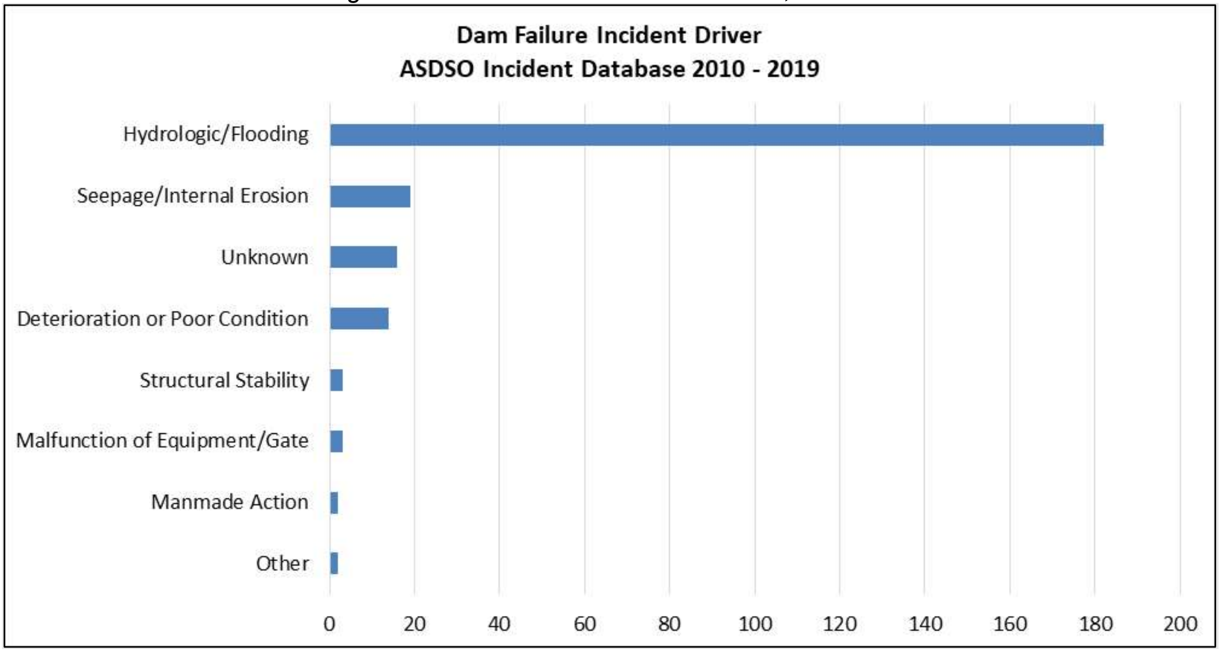
5. Piping is when seepage through a dam is not properly filtered, and soil particles continue to progress, and form sink holes in the dam. Another 20% of U.S. dam failures have been caused by piping (internal erosion caused by seepage). Seepage often occurs around hydraulic structures, such as pipes and spillways; through animal burrows; around roots of woody vegetation; and through cracks in dams, dam appurtenances, and dam foundations.

*Figure 4.8. Causes of Dam Failure Incidents, 2010-2019***



*** From the ASDSO Dam Incident Database, dam failure incidents for the years 2010 through 2019. Incident data is mostly obtained from the state dam safety programs and/or media reports. The incident data is not inclusive of all dam safety incidents.*

Figure 4.9. Dam Failure Incident Driver, 2010-2019



Levees: A man-made structure, typically an earthen embankment, designed and constructed according to sound engineering practices to contain, control, or divert the flow of water to provide protection from temporary flooding. Levees are often built alongside rivers and are used to prevent high water levels from flooding adjacent land. The primary function of a levee is to provide flood risk reduction; however, they may also serve other purposes such as water conservation, irrigation, or to support a roadway or railway.

Levees can vary in size and complexity, from simple mounds of earth to large-scale systems incorporating elements such as floodwalls, gates, and pumps. The effectiveness of a levee can be influenced by its design, construction, and maintenance, as well as by natural factors like river flow and sedimentation.

Causes of Levee Failure: The definition of a "levee failure" according to the National Levee Database (NLD) generally encompasses the following:

1. **Breach:** The most severe form of failure, a breach occurs when a levee fails completely, resulting in an opening that allows water to flow through uncontrolled. This can lead to significant flooding and damage to areas that the levee was intended to protect.
2. **Overtopping:** Occurs when water levels rise above the height of the levee, leading to spillover on the protected side. While technically an overtopping may not be a structural failure of the levee itself, it represents a failure to contain the water as designed.
3. **Structural Damage:** This includes any form of damage that compromises the integrity of the levee, such as erosion, seepage, or structural weakening. These issues may not immediately lead to a breach or overtopping but indicate that the levee is at risk of failing.

4. **Inadequate Performance:** This refers to situations where the levee does not perform as designed, even if there's no visible structural damage. This could be due to design flaws or unforeseen environmental conditions.

4.7.2 Hazard Location

The following table and image illustrate the location and the details of each of dam surrounding the City of Chino. All of these structures are classified as "High" or "Significant" risk, meaning they have sufficient downstream populations to warrant the classification.

Table 4-16. List of Dams Surrounding the City of Chino

Name	National ID#	Location	Owner	Year Built	Primary Purpose	Height (feet)	Storage Capacity (acre-feet)	Max Discharge (cubic feet/sec)
Chino Ranch Dam #1	CA00755	San Bernardino, California	Tres Hermanos Conservation Authority	1918	Water Supply, Irrigation	22	137	-
Rancho Cielito Dam	CA00761	San Bernardino, California	Rolling Ridge Ranch	1912	Water Supply, Irrigation	9	110	-
Prado Dam	CA10022S003	San Bernardino, California	USACE - Los Angeles District	2017	Flood Risk Reduction	32	1,289,000	-
San Antonio Dam	CA00813	San Bernardino, California	USACE - Los Angeles District	1956	Flood and debris control	160	11,880	-
Seven Oaks Dam	CA01530	San Bernardino, California	Orange County Flood Control District & San Bernardino County Flood Control District	Construction began in 1993 and was completed in 2000	Flood Control	550	145,600	Peak inflow of 85,000 to a Controlled Outflow of 7,000
Source: National Inventory of Dams (2024)								

Figure 4.10. A Map of Dams Surrounding the City of Chino

According to the US Army National Levee Database, there are 6 levee systems located within 3 miles of the City of Chino.

4.7.3 Hazard Extent/Intensity

Dams: Existing dam classification systems are numerous and vary within and between both federal and state agencies. Although differences in classification systems exist, they share a common thread: each system attempts to classify dams according to the potential impacts from a dam failure or mis-operation, should it occur. The hazard potential classification does not reflect in any way on the current condition of the dam (e.g., safety, structural integrity, flood routing capacity).

California dam classifications are defined under the California Water Code and used to permit construction, operation, and maintenance of dams by the California Department of Water Resources (CDWR) .

According to California administrative code, dams are classified based on the potential downstream hazard in the event of a failure. This classification system helps prioritize regulatory oversight and emergency preparedness. These classifications are:

1. **Low Hazard Potential**: Failure or misoperation results in no probable loss of human life and low economic or environmental losses.
2. **Significant Hazard Potential**: Failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities.
3. **High Hazard Potential**: Failure or misoperation will probably cause loss of human life and significant economic and environmental losses.
4. **Extremely High Hazard Potential**: A potential dam failure would result in considerable loss of life and inundate an area with a population of 1,000 people or more.

Federal dam safety hazard classifications can be found in FEMA's *Federal Guidelines for Dam Safety Hazard Potential Classification System for Dams* publication. FEMA categorizes dams "according to the degree of adverse incremental consequences of a failure or mis-operation of a dam. The National Inventory of Dams uses the federal classification system. Dams are federally categorized into Low, Significant and High Hazard Potential based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests. Improbable loss of life exists where persons are only temporarily in the potential inundation area.

1. **Low Hazard Potential**: dams where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.
2. **Significant Hazard Potential:** dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.
3. **High Hazard Potential**: dams where failure or mis-operation will probably cause loss of human life.

Levees: The Levee Safety Action Classification (LSAC) is one of the many tools used to better inform stakeholders and residents of the residual risk in their communities.

The LSAC is neither a levee rating or grade, it is a classification system designed to consider the probability of the levees being loaded (Hazard), existing condition of the levee, the current and future maintenance of the levee (Performance), and the Consequences if a levee were to fail or be overwhelmed. The following figure illustrates the Levee Safety Action Classification Table.

Figure 4.11. Levee Safety Classification

USACE LEVEE SAFETY ACTION CLASSIFICATION TABLE*

RISK	ACTIONS FOR LEVEE SYSTEMS AND LEVEED AREAS IN THIS CLASS (ADAPT ACTIONS TO SPECIFIC LEVEE SYSTEM CONDITIONS.)	RISK CHARACTERISTICS OF THIS CLASS
VERY HIGH (1)	Based on risk drivers, take immediate action to implement interim risk reduction measures. Increase frequency of levee monitoring, communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning systems and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions as very high priority.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very high risk.
HIGH (2)	Based on risk drivers, implement interim risk reduction measures. Increase frequency of levee monitoring; communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions as high priority.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in high risk.
MODERATE (3)	Based on risk drivers, implement interim risk reduction measures as appropriate. Verify risk information is current and implement routine monitoring program; assure O&M is up to date; communicate risk characteristics to the community in a timely manner; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions as a priority.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in moderate risk.
LOW (4)	Verify risk information is current and implement routine monitoring program; assure O&M is up to date; communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions to further reduce risk to as low as practicable.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in low risk.
VERY LOW (5)	Continue to implement routine levee monitoring program, including operation and maintenance, inspections, and monitoring of risk. Communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very low risk.
NO VERDICT	Not enough information is available to assign an LSAC.	

*LEVEE RISK IS THE RISK THAT EXISTS DUE TO THE PRESENCE OF THE LEVEE SYSTEM, AND THIS IS THE RISK USED TO INFORM THE DECISION ON THE LSAC ASSIGNMENT. THE INFORMATION PRESENTED IN THIS TABLE DOES NOT REFLECT THE OVERTOPPING WITHOUT BREACH RISK ASSOCIATED WITH THE PRESENCE OR OPERATION OF THE LEVEE SYSTEM.

4.7.4 Probability and Frequency

Dams: A dam can fail at any time, given the right circumstances. As a dam ages, the likelihood of failure increases as undesirable woody vegetation on the embankment, deteriorated concrete, inoperable gates, and corroded outlet pipes become problems. Since dam failures are often exacerbated by flooding, the probability of dam failures can be associated with projected flood frequencies. The probability of future dam failure for regulated dams can be reduced by proactive preventative actions in compliance with existing dam safety programs.

Levees: Determining levee failure probability depends on the condition and level of protection that levees provide. FEMA and the U.S. Army Corps of Engineers are working together to make sure that flood hazard maps clearly reflect the flood protection capabilities of levees, and that the maps accurately represent the flood risks posed to areas situated behind them. Levee owners— usually states, communities, or in some cases private individuals or organizations—are responsible for ensuring that the levees they own are maintained according to their design.

4.7.5 Past Events

There is no documented history of Dam and Levee Failure within the City of Chino or immediate area.

4.7.6 Vulnerability and Impacts

Public Health and Life Safety: According to FEMA, the public health and life safety impacts of dam or levee failure can be significant and wide-ranging. The primary concerns include:

- Loss of Life: This is the most serious impact. A sudden dam or levee failure can lead to fast-moving floods, potentially resulting in loss of life, especially in areas immediately downstream of a dam or in the protected area behind a levee.
- Injuries: The force and unpredictability of floodwaters can result in physical injuries to people in the affected areas.
- Displacement of Populations: Dam or levee failures can lead to the displacement of people from their homes, either temporarily or permanently, due to flood damage. This displacement can have long-term impacts on mental health and community stability.
- Contamination of Water Supplies: Floodwaters can contaminate drinking water sources, leading to waterborne diseases and health complications. This is a particular concern in urban areas or where industrial and agricultural chemicals may be present.
- Sanitation and Hygiene Issues: Flooding can disrupt sewage systems and overwhelm sanitation services, leading to increased risks of diseases, particularly in densely populated areas.
- Disruption of Healthcare Services: Flooding can damage healthcare facilities and disrupt services, making it difficult for injured or ill individuals to receive necessary medical care.

- Mental Health Impacts: The trauma and stress associated with flooding, displacement, loss of property, and potential loss of life can have long-lasting effects on mental health.
- Strain on Emergency Services: Dam or levee failures require significant emergency response efforts, which can strain local resources, especially in smaller or rural communities.

Property Damage and Critical Infrastructure: According to FEMA, dam or levee failure can have severe impacts on property and critical infrastructure. These impacts include:

- Extensive Property Damage: The sudden release of water from a dam or levee failure can lead to widespread flooding, resulting in significant damage to residential, commercial, and industrial properties. This includes damage to buildings, homes, and vehicles.
- Critical Infrastructure Damage: Flooding from dam or levee failures can severely impact critical infrastructure such as bridges, roads, railways, and utilities (water and sewage systems, electrical grids, gas lines). This not only causes immediate disruption but can also lead to long-term economic impacts due to the time and cost associated with repairs and reconstruction.
- Agricultural Losses: In rural areas, flooding can inundate farmland, leading to crop destruction, soil erosion, and loss of livestock, which can have a profound impact on local and regional agricultural economies.
- Environmental Contamination: Floodwaters can carry and spread pollutants and hazardous materials from industrial sites, sewage systems, and other sources, leading to environmental contamination of water, soil, and ecosystems.
- Disruption of Services: Essential services such as healthcare, education, emergency services, and transportation can be disrupted, affecting the wellbeing and daily life of the community.
- Economic Impact: The combined effect on property, infrastructure, and services can lead to significant economic losses, both direct and indirect. The cost of repairs, loss of business operations, and decrease in property values can have a lasting impact on affected communities.
- Recovery and Mitigation Costs: The financial burden of recovery and rebuilding can be substantial. In addition to immediate repair costs, there is often a need for investing in mitigation measures to prevent future incidents.

Economy: No data exists demonstrating the economic impact of past dam or levee failure events within the City of Chino. However, past events have shown that water supply and could lead to costly repairs.

Changes in Development and Impact of Future Development: According to FEMA, dam failure or levee failure can significantly impact current and future development in several ways:

- Reassessment of Land Use: After a dam or levee failure, there may be a need to reassess land use in affected areas. This can lead to changes in zoning laws and development regulations, especially in areas deemed high-risk for future flooding.

- Impact on Real Estate Values: The perceived risk of flooding due to potential dam or levee failure can affect real estate values. Properties in areas identified as high risk may see a decrease in value, which can impact both current and future development decisions.
- Changes in Insurance and Financing: The risk of flooding may lead to higher insurance premiums for properties in the affected areas. In some cases, insurance may become difficult to obtain. This can influence development decisions, as the cost and availability of insurance are important factors in real estate development and investment.
- Infrastructure Redesign and Reinforcement: Existing and future infrastructure projects may need to be redesigned to withstand potential flood events. This can include strengthening or raising buildings, bridges, and roads, as well as improving drainage systems.
- Mitigation and Resilience Planning: There may be an increased focus on mitigation and resilience in future development to reduce the impact of potential flood events. This can include creating more green spaces, implementing better water management practices, and using flood-resistant building materials and techniques.
- Shift in Development Focus: In some cases, there might be a shift away from developing in high-risk areas. Development might be directed towards safer areas, potentially leading to changes in urban and regional planning strategies.
- Emergency Preparedness and Response Planning: Future development may need to incorporate improved emergency preparedness and response plans, including evacuation routes, emergency shelters, and communication systems.

Effects of Climate Change on Severity of Impacts: According to the US Army Corps of Engineers, climate change can impact the severity of dam or levee failure. One of the primary concerns is the increased frequency and intensity of storms due to climate change. These more severe weather events can result in higher water levels and greater pressure on dams and levees, potentially exacerbating existing vulnerabilities and leading to structural failures. Additionally, the rising likelihood of flooding, driven by higher sea levels and extreme weather, places additional stress on these systems, particularly those already classified as high or extremely high hazard potential. The increased water flow and volume during such events can overwhelm these structures, leading to potential breaches.

Temperature changes associated with climate change can also affect the materials used in dam and levee construction. Extreme heat, for instance, can cause materials to expand and contract, leading to cracks and weakening the integrity of the structures over time. Furthermore, altered precipitation patterns and increased runoff can accelerate sedimentation in reservoirs. This sediment buildup reduces the storage capacity of reservoirs, limiting their ability to manage floodwaters and increasing the risk of overtopping during heavy rainfall events.

Heavy precipitation leads to both riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding.

Table 4-17. 25-Year Precipitation Projections for City of Chino, CA

25-YEAR PRECIPITATION PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **6% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.2″ decrease** (from 3.2″ to 3.4″) in average annual precipitation.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **2% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.3″ decrease** (from 3.1″ to 3.18″) in average annual precipitation.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/600013210/explore/climate)

Table 4-18. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation:							
Annual Average Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation (Wet Days)	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Maximum Period of Consecutive Wet Days	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**5 days**
	5-6	5-7	4-7	4-7	4-7	4-7	3-9
Annual Days With:							
Annual Days With Total Precipitation > 1 inch	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**
	1-1	0-1	1-1	0-1	0-1	0-1	0-1
Annual Days With Total Precipitation > 2 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days With Total	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0

Precipitation > 3 inches							
Annual Days That Exceed 99th Percentile Precipitation	2 days	2 days	3 days	2 days	3 days	3 days	3 days
	1-16	1-17	1-18	1-17	1-18	1-19	1-19
*Days With Maximum Temperature Below 32*F*	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Source: Climate Mapping for Resilience and Adaptation (2024)							

4.7.7 FEMA NRI Expected Annual Loss Estimates

The FEMA National Risk Index does not assess High Hazard Dams and Levees.

4.7.8 FEMA Hazard-Specific Risk

The FEMA National Risk Index does not assess High Hazard Dams and Levees.

4.7.9 FEMA NRI Exposure Value

The FEMA National Risk Index does not assess High Hazard Dams and Levees.

4.8 Flooding

4.8.1 Hazard Description

Flooding is defined by the National Weather Service (NWS) as “the inundation of normally dry areas as a result of increased water levels in an established water course.” River flooding, the condition where the river rises to overflow its natural banks, may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams. In addition to these natural events, there are a number of factors controlled by human activity that may cause or contribute to flooding. These include dam failure (discussed below) and activities that increase the rate and amount of runoff, such as paving, reducing ground cover, and clearing forested areas. Flooding is a periodic event along most rivers, with the frequency depending on local conditions and controls, such as dams and levees. The land along rivers that is identified as being susceptible to flooding is called the floodplain.

Flooding can threaten life, safety, and health and often results in substantial damage to infrastructure, homes, and other property. The extent of damage caused by a flood depends on the topography, soils, and vegetation in an area, and the depth and duration of flooding, velocity of flow, rate of rise, and the amount and type of development in the floodplain.

Flooding can occur in a number of ways, and many instances are not independent of each other and can occur simultaneously during a flood event. The types of flooding considered for this plan include:

- Heavy rainfall
- Urban stormwater overflow
- Rapid snowmelt
- Rising groundwater (generally in conjunction with heavy prolonged rainfall and saturated conditions)
- Riverine ice jams
- Flash floods
- Alluvial fan flooding
- Flooding from dam failure

Urban/Flash Flooding: Urban (or “Flash”) flooding, as defined in the Urban Flooding Awareness Act, is “the inundation of property in a built environment, particularly in more densely populated areas, caused by rainfall overwhelming the capacity of drainage systems, such as storm sewers. ‘Urban flooding’ does not include flooding in undeveloped or agricultural areas. ‘Urban flooding’ includes (i) situations in which stormwater enters buildings through windows, doors, or other openings, (ii) water backup through sewer pipes, showers, toilets, sinks, and floor drains, (iii) seepage through walls and floors, and (iv) the accumulation of water on property or public rights-of-way. Urban flooding is characterized by its repetitive, costly, and systemic impacts on communities, regardless of whether these communities are located within formally designated floodplains or near any body of water. These impacts include damage to buildings and infrastructure, economic disruption, and negative effects on health and safety.

A watershed is the land area that drains to a particular waterbody, such as a river, lake, or ocean. It is a geographic region that collects and channels precipitation and surface water to a common outlet, a stream, river, or other waterbody. Watersheds can vary in size, from a small drainage basin encompassing only a few acres to a large river basin spanning thousands of square miles. The health and quality of a watershed are critical for the sustainability of the ecosystem and the organisms that depend on it, including humans (US Environmental Protection Agency, 2024).

A healthy watershed is one in which natural land cover supports:

- Dynamic hydrologic and geomorphologic processes within their natural range of variation
- Habitat of sufficient size and connectivity to support native aquatic and riparian species
- Physical and chemical water quality conditions can support healthy biological communities.

Natural vegetative cover in the landscape, including the riparian zone, helps maintain the natural flow regime and fluctuations in water levels in lakes and wetlands. This, in turn, helps maintain natural geomorphic processes, such as sediment storage and deposition, that form the basis of aquatic habitats. The connectivity of aquatic and riparian habitats in the longitudinal, lateral, vertical, and temporal dimensions helps ensure the flow of chemical and physical materials and the movement of biota among habitats.

A healthy watershed has the structure and function in place to support healthy aquatic ecosystems. Key components of a healthy watershed include:

- Intact and functioning headwater streams, floodplains, riparian. corridors, biotic refugia, instream habitat, and biotic communities.
- Natural vegetation in the landscape; and
- Hydrology, sediment transport, fluvial geomorphology, and disturbance regimes are expected for its location.

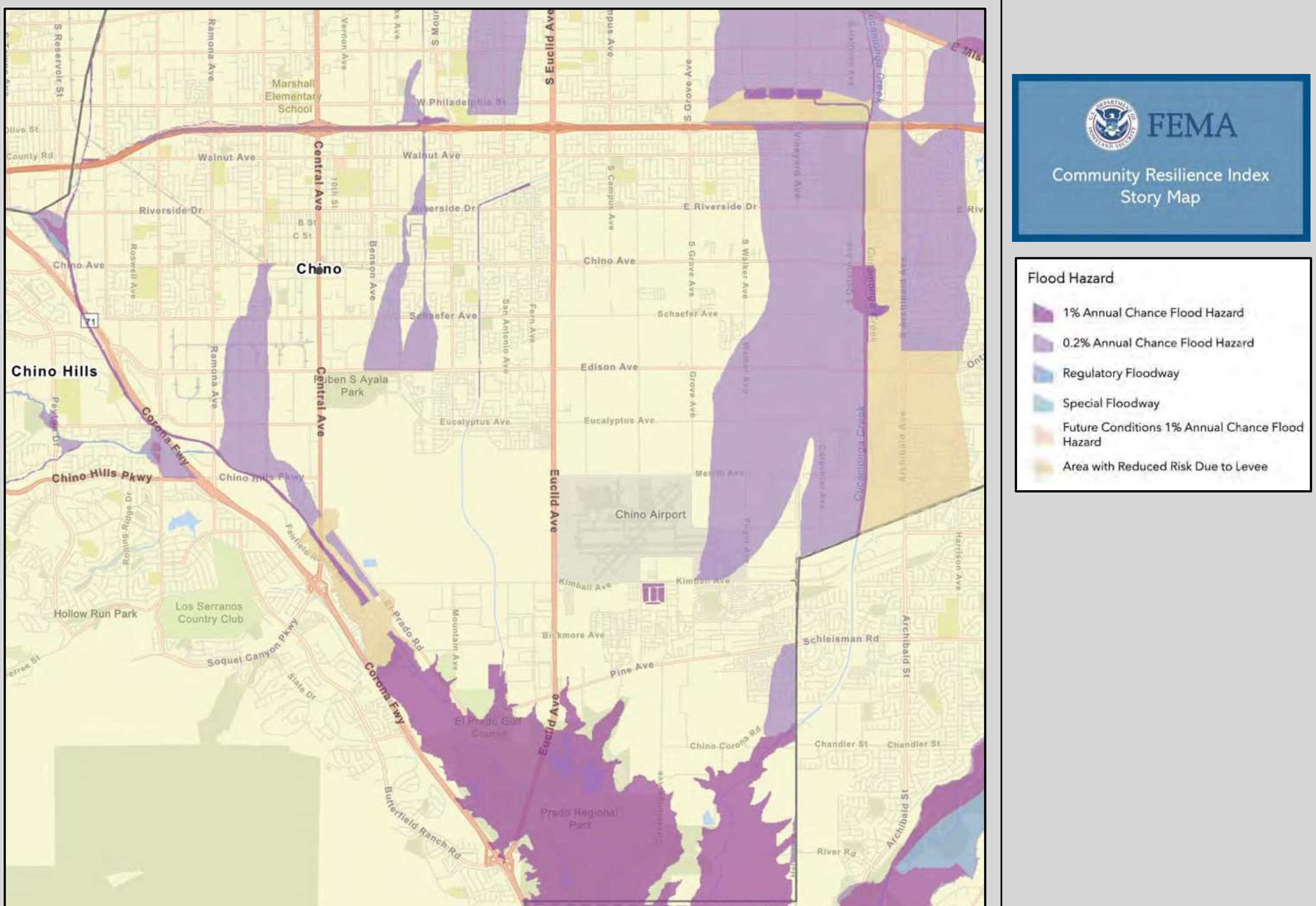
A stream's flow regime refers to its characteristic pattern of flow magnitude, timing, frequency, duration, and rate of change. The flow regime plays a central role in shaping aquatic ecosystems and the health of biological communities. Alteration of natural flow regimes (e.g., more frequent floods) can reduce the quantity and quality of aquatic habitat, degrade aquatic life, and result in the loss of ecosystem services (US Environmental Protection Agency, 2024).

4.8.2 Hazard Location

Most flooding occurs along natural streams or river channels. The land along a stream or river identified as susceptible to flooding is called the floodplain. Floods vary greatly in frequency and magnitude. Small flood events occur much more frequently than large, devastating events. A FEMA RAPT map illustrating flood risk to the City of Chino is below.

Figure 4.12. FEMA RAPT Tool Flood Hazard Map for City of Chino

CITY OF CHINO, CA
FEMA COMMUNITY RESILIENCE INDEX STORY MAP



Source: FEMA Resilience Analysis and Planning Tool (RAPT) 2024

4.8.3 Hazard Extent/Intensity

The NFIP classifies floods through the use of recurrence intervals as seen in the NFIP Flood Recurrence Intervals table below.

Table 4-19. NFIP Flood Recurrence Intervals

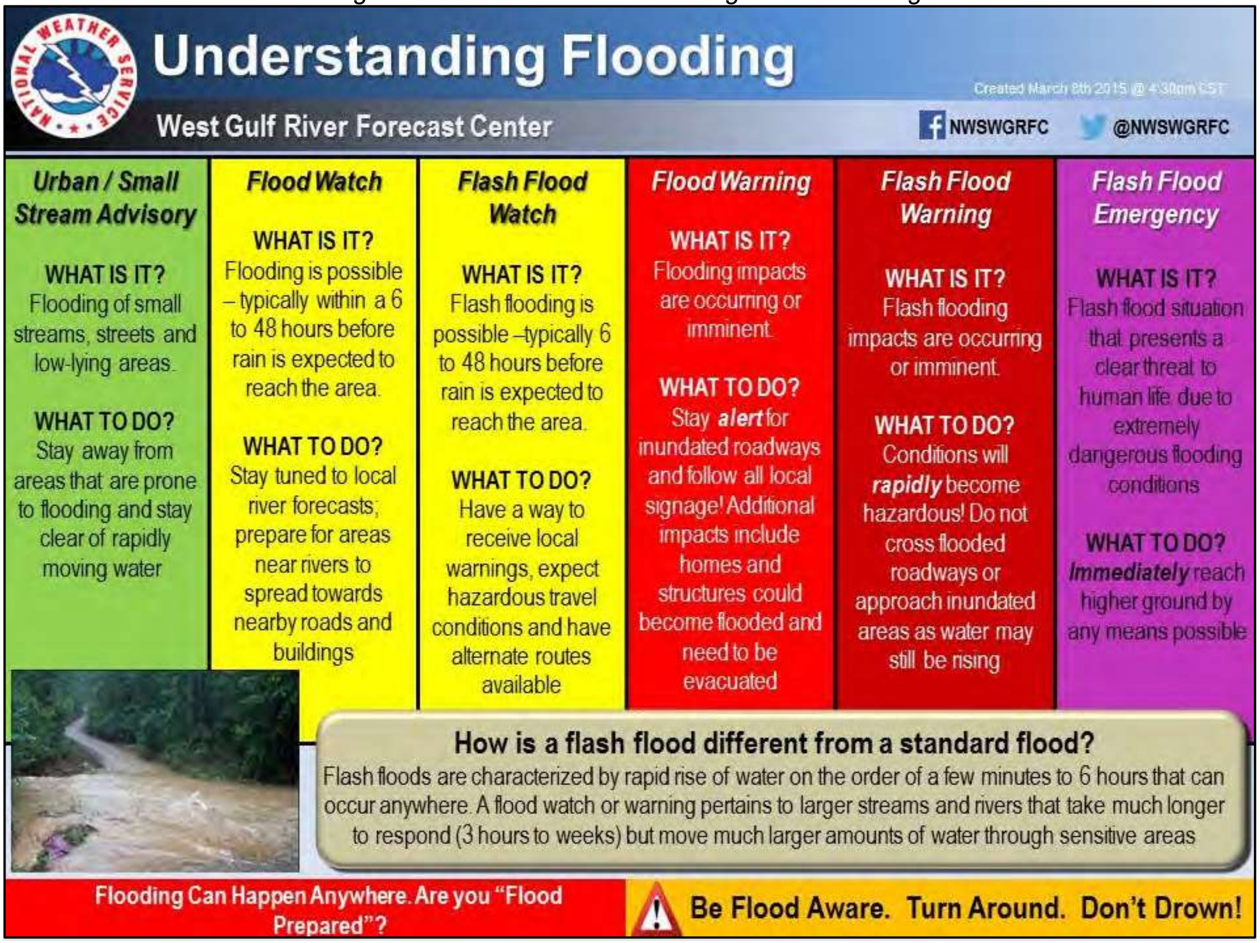
NFIP FLOOD RECURRENCE INTERVALS	
Flood Recurrence Interval	**Chance of Occurrence During Any Given Year**
5 year	20%
10 year	10%
50 year	2%
100 year	1%
500 year	0.20%

The federal standard for floodplain management under the National Flood Insurance Plan (NFIP) is the 100-year floodplain. This area is chosen using historical data such that in any given year there is a 1% chance of a “base flood (also known as 100-year flood or regulatory flood). A base flood is one that covers or exceeds the 100-year floodplain. A 500-year floodplain is an area with at least a .2% chance of flood occurrence in any given year.

When surface water runoff introduced into streams and rivers exceeds the capacity of the natural or constructed channels to accommodate the flow, water overflows the stream banks, spilling out into adjacent low lying areas. Riverine flooding occurs as a consequence (FEMA, 2024).

Flash flooding can occur suddenly within six hours of intense rainfall from a thunderstorm or several thunderstorms. Flash floods are common near canyons, cliffs, and creek beds, making these areas especially hazardous during rainfall.

Figure 4.13. NWS - Understanding Flash Flooding



4.8.4 Probability and Frequency

San Bernardino County has experienced 13 FEMA declarations associated with floods of all types between 1966-2023, which is an average of about 0.96 flood declarations every 4 years.

Urban/Flash Flooding: According to NOAA, 187 flash flooding incidents were recorded in San Bernardino County between 2019-2023 (1,826 days). This frequency averages 0.10240 incidents daily during this timeframe and would indicate a similar trend moving forward.

Urban areas (such as the City of Chino) are typically connected to municipal sewer systems (stormwater and/or sanitary sewer). That said, it is more probable that flash flooding will occur within this area. Additionally, as development continues within Chino, an increase in flash flooding may occur.

4.8.5 National Flood Insurance Program (NFIP) Participation

San Bernardino County and the City of Chino participate in the NFIP and are known to have adopted local ordinances and/or site plan review standards that regulate construction, and land uses within designated floodplains.

In addition, as amended, Part 31, Water Resources Protection, Act 451 of 1994 regulates activities that result in occupation, fill or grade lands within floodplains along watercourses with a drainage area over two square miles. Such actions require an application, review, and permit issuance from the MDEQ before disturbance.

Policies In-Force: According to FEMA, the City of Chino has 27 insurance policies in-force, totaling $9,506,000.

Table 4-20. Summary of NFIP Policies and Claims – San Bernardino County

Community Name	NFIP Entry Date	Policies In-Force	Total Coverage	Total Written Premium + FPF
SAN BERNARDINO COUNTY* (060270)	09/29/78	761	$194,450,000	$816,612
CHINO, CITY OF (060272)	03/18/96	27	$9,506,000	$85,997
Source: FEMA as of 12/31/2024				

Table 4-21. CRS Eligible Communities within San Bernardino County

Area	CRS Entry Date	Current Effective Date	Current Class	% Discount for SFHA	% Discount for Non-SFHA	Participating
San Bernardino County	NA	NA	NA	NA	NA	No
City of Chino	NA	NA	NA	NA	NA	No
Source: FEMA as of 08/31/2024						

As of the date of the plan update, the City of Chino does not participate in the CRS.

4.8.6 Past Flash Flood Events

According to NOAA, 187 events were reported between 01/01/2019 and 12/31/2023 (1,826 days).

Table 4-22. Past Flash Flood Events in San Bernardino County

Location	County	State	Date	Time	Type	Dth	Inj	PrD	CrD
Totals:						**0**	**0**	**15.291M**	**10.00K**
CEDAR PINES	SAN BERNARDINO CO.	CA	1/17/19	13:00	PST-8	Flash Flood	0	0	0.00K
JOSHUA TREE ARPT	SAN BERNARDINO CO.	CA	2/2/19	16:41	PST-8	Flash Flood	1	0	100.00K

SUGARLOAF	SAN BERNARDINO CO.	CA	2/14/19	6:00	PST-8	Flash Flood	0	0	100.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	2/14/19	6:31	PST-8	Flash Flood	0	0	50.00K
MT BALDY	SAN BERNARDINO CO.	CA	2/14/19	7:00	PST-8	Flash Flood	0	0	30.00K
RUNNING SPGS	SAN BERNARDINO CO.	CA	2/14/19	7:00	PST-8	Flash Flood	0	0	5.000M
MONTE VISTA	SAN BERNARDINO CO.	CA	5/22/19	13:00	PST-8	Flash Flood	0	0	1.00K
CHINO	SAN BERNARDINO CO.	CA	5/22/19	14:00	PST-8	Flash Flood	0	0	0.00K
UPLAND	SAN BERNARDINO CO.	CA	5/22/19	15:00	PST-8	Flash Flood	0	0	0.00K
JOSHUA TREE ARPT	SAN BERNARDINO CO.	CA	7/22/19	14:07	PST-8	Flash Flood	0	0	10.00K
JOSHUA TREE ARPT	SAN BERNARDINO CO.	CA	7/25/19	13:30	PST-8	Flash Flood	0	0	0.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	7/25/19	14:30	PST-8	Flash Flood	0	0	20.00K
BANNOCK	SAN BERNARDINO CO.	CA	7/25/19	16:00	PST-8	Flash Flood	0	0	2.00K
SALTMARSH STATION	SAN BERNARDINO CO.	CA	7/25/19	16:15	PST-8	Flash Flood	0	0	1.00K
(NXP)MCAF TWENTYNINE	SAN BERNARDINO CO.	CA	7/25/19	20:13	PST-8	Flash Flood	0	0	5.00K
BUSH	SAN BERNARDINO CO.	CA	8/7/19	14:36	PST-8	Flash Flood	0	0	1.00K
EARP	SAN BERNARDINO CO.	CA	9/1/19	22:35	PST-8	Flash Flood	0	0	2.00K
GROMMET	SAN BERNARDINO CO.	CA	11/19/19	21:44	PST-8	Flash Flood	0	0	700.00K
(EED)NEEDLES ARPT	SAN BERNARDINO CO.	CA	11/20/19	2:13	PST-8	Flash Flood	0	0	5.00K
JOSHUA TREE	SAN BERNARDINO CO.	CA	11/28/19	15:08	PST-8	Flash Flood	0	0	2.00K

VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	11/28/19	15:49	PST-8	Flash Flood	0	0	1.00K
(EED)NEEDLES ARPT	SAN BERNARDINO CO.	CA	11/28/19	16:30	PST-8	Flash Flood	0	0	1.00K
BANNOCK	SAN BERNARDINO CO.	CA	11/28/19	17:34	PST-8	Flash Flood	0	0	50.00K
PHELAN	SAN BERNARDINO CO.	CA	12/4/19	11:00	PST-8	Flash Flood	0	0	0.00K
CHAMPAGNE	SAN BERNARDINO CO.	CA	3/12/20	13:00	PST-8	Flash Flood	0	0	0.00K
CROWN JEWELL	SAN BERNARDINO CO.	CA	3/12/20	14:00	PST-8	Flash Flood	0	0	0.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	3/12/20	15:19	PST-8	Flash Flood	0	0	1.00K
VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	3/12/20	16:10	PST-8	Flash Flood	0	0	5.00K
AMBOY	SAN BERNARDINO CO.	CA	3/12/20	18:15	PST-8	Flash Flood	0	0	2.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	4/8/20	8:45	PST-8	Flash Flood	0	0	1.00K
CLARK	SAN BERNARDINO CO.	CA	8/22/20	12:44	PST-8	Flash Flood	0	0	2.00K
NIPTON	SAN BERNARDINO CO.	CA	8/22/20	15:15	PST-8	Flash Flood	0	0	1.00K
CIMA	SAN BERNARDINO CO.	CA	8/22/20	15:50	PST-8	Flash Flood	0	0	1.00K
BARSTOW	SAN BERNARDINO CO.	CA	7/18/21	16:26	PST-8	Flash Flood	0	0	1.00K
MINNEOLA	SAN BERNARDINO CO.	CA	7/18/21	18:06	PST-8	Flash Flood	0	0	1.00K
BARSTOW	SAN BERNARDINO CO.	CA	7/18/21	19:41	PST-8	Flash Flood	0	0	2.00K
NEEDLES	SAN BERNARDINO CO.	CA	7/19/21	16:45	PST-8	Flash Flood	0	0	1.00K
BAKER	SAN BERNARDINO CO.	CA	7/26/21	11:00	PST-8	Flash Flood	0	0	1.00K

TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	7/28/21	12:34	PST-8	Flash Flood	0	0	0.00K
SEVEN OAKS	SAN BERNARDINO CO.	CA	7/30/21	12:35	PST-8	Flash Flood	0	0	10.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	7/30/21	14:49	PST-8	Flash Flood	0	0	1.00K
JOSHUA TREE ARPT	SAN BERNARDINO CO.	CA	7/30/21	16:45	PST-8	Flash Flood	0	0	1.00K
(NXP)MCAF TWENTYNINE	SAN BERNARDINO CO.	CA	8/9/21	14:41	PST-8	Flash Flood	0	0	2.00K
HAVASU LAKE	SAN BERNARDINO CO.	CA	8/29/21	18:21	PST-8	Flash Flood	0	0	50.00K
DESERT CITY	SAN BERNARDINO CO.	CA	8/30/21	12:30	PST-8	Flash Flood	0	0	1.00K
WHEATON SPGS	SAN BERNARDINO CO.	CA	8/30/21	12:52	PST-8	Flash Flood	0	0	5.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	8/30/21	14:20	PST-8	Flash Flood	0	0	10.00K
FOREST FALLS	SAN BERNARDINO CO.	CA	10/25/21	16:00	PST-8	Flash Flood	0	0	5.00K
CRESTLINE	SAN BERNARDINO CO.	CA	12/30/21	17:56	PST-8	Flash Flood	0	0	0.00K
YERMO	SAN BERNARDINO CO.	CA	7/18/22	14:50	PST-8	Flash Flood	0	0	10.00K
LENWOOD	SAN BERNARDINO CO.	CA	7/18/22	15:20	PST-8	Flash Flood	0	0	1.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	7/25/22	16:00	PST-8	Flash Flood	0	0	2.00K
IBIS	SAN BERNARDINO CO.	CA	7/25/22	16:45	PST-8	Flash Flood	0	0	2.00K
WHEATON SPGS	SAN BERNARDINO CO.	CA	7/29/22	22:08	PST-8	Flash Flood	0	0	2.00K
DESERT CITY	SAN BERNARDINO CO.	CA	7/29/22	22:14	PST-8	Flash Flood	0	0	2.00K
LUCERNE VLY	SAN BERNARDINO CO.	CA	7/30/22	17:00	PST-8	Flash Flood	0	0	0.00K

FOREST FALLS	SAN BERNARDINO CO.	CA	7/30/22	17:25	PST-8	Flash Flood	0	0	0.00K
MOUNTAIN PASS	SAN BERNARDINO CO.	CA	7/31/22	11:00	PST-8	Flash Flood	0	0	1.00K
SEVEN OAKS	SAN BERNARDINO CO.	CA	7/31/22	11:00	PST-8	Flash Flood	0	0	0.00K
SEVEN OAKS	SAN BERNARDINO CO.	CA	7/31/22	11:05	PST-8	Flash Flood	0	0	0.00K
HALLORAN SPGS	SAN BERNARDINO CO.	CA	7/31/22	13:03	PST-8	Flash Flood	0	0	100.00K
BAKER	SAN BERNARDINO CO.	CA	7/31/22	13:09	PST-8	Flash Flood	0	0	15.00K
BAKER	SAN BERNARDINO CO.	CA	7/31/22	14:36	PST-8	Flash Flood	0	0	2.00K
PARKER DAM	SAN BERNARDINO CO.	CA	7/31/22	15:08	PST-8	Flash Flood	0	0	1.00K
KLINEFELTER	SAN BERNARDINO CO.	CA	7/31/22	15:21	PST-8	Flash Flood	0	0	1.00K
CRUCERO	SAN BERNARDINO CO.	CA	7/31/22	15:40	PST-8	Flash Flood	0	0	1.000M
VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	7/31/22	16:08	PST-8	Flash Flood	0	0	1.00K
DESERT SPGS	SAN BERNARDINO CO.	CA	7/31/22	17:10	PST-8	Flash Flood	0	0	0.00K
LUDLOW	SAN BERNARDINO CO.	CA	7/31/22	17:42	PST-8	Flash Flood	0	0	10.00K
BIG BEAR LAKE	SAN BERNARDINO CO.	CA	8/1/22	11:27	PST-8	Flash Flood	0	0	0.00K
SUGARLOAF	SAN BERNARDINO CO.	CA	8/1/22	11:43	PST-8	Flash Flood	0	0	0.00K
LANDERS	SAN BERNARDINO CO.	CA	8/1/22	12:42	PST-8	Flash Flood	0	0	1.00K
DESERT SPGS	SAN BERNARDINO CO.	CA	8/1/22	12:45	PST-8	Flash Flood	0	0	0.00K
JOSHUA TREE ARPT	SAN BERNARDINO CO.	CA	8/1/22	13:13	PST-8	Flash Flood	0	0	2.00K

WHEATON SPGS	SAN BERNARDINO CO.	CA	8/1/22	14:49	PST-8	Flash Flood	0	0	1.00K
JOSHUA TREE ARPT	SAN BERNARDINO CO.	CA	8/4/22	15:15	PST-8	Flash Flood	0	0	5.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	8/8/22	12:55	PST-8	Flash Flood	0	0	1.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	8/8/22	14:34	PST-8	Flash Flood	0	0	1.00K
WHEATON SPGS	SAN BERNARDINO CO.	CA	8/9/22	14:45	PST-8	Flash Flood	0	0	0.00K
BAKER	SAN BERNARDINO CO.	CA	8/9/22	15:44	PST-8	Flash Flood	0	0	1.00K
BAKER	SAN BERNARDINO CO.	CA	8/9/22	17:25	PST-8	Flash Flood	0	0	1.00K
HOMER	SAN BERNARDINO CO.	CA	8/11/22	16:01	PST-8	Flash Flood	0	0	2.00K
BANNOCK	SAN BERNARDINO CO.	CA	8/12/22	15:30	PST-8	Flash Flood	0	0	1.00K
(NXP)MCAF TWENTYNINE	SAN BERNARDINO CO.	CA	8/12/22	21:40	PST-8	Flash Flood	0	0	20.00K
BANNOCK	SAN BERNARDINO CO.	CA	8/12/22	22:06	PST-8	Flash Flood	0	0	1.00K
(NXP)MCAF TWENTYNINE	SAN BERNARDINO CO.	CA	8/12/22	23:42	PST-8	Flash Flood	0	0	30.00K
BUSH	SAN BERNARDINO CO.	CA	8/12/22	23:59	PST-8	Flash Flood	0	0	5.00K
JOSHUA TREE	SAN BERNARDINO CO.	CA	8/13/22	14:29	PST-8	Flash Flood	0	0	1.00K
NEEDLES	SAN BERNARDINO CO.	CA	8/13/22	18:15	PST-8	Flash Flood	0	0	1.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	8/16/22	14:13	PST-8	Flash Flood	0	0	2.00K
VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	8/16/22	14:19	PST-8	Flash Flood	0	0	10.00K
BANNOCK	SAN BERNARDINO CO.	CA	8/18/22	16:30	PST-8	Flash Flood	0	0	1.00K

EARP	SAN BERNARDINO CO.	CA	8/18/22	19:28	PST-8	Flash Flood	0	0	5.00K
MOUNTAIN PASS	SAN BERNARDINO CO.	CA	8/24/22	13:49	PST-8	Flash Flood	0	0	2.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	8/24/22	17:16	PST-8	Flash Flood	0	0	1.00K
RICE	SAN BERNARDINO CO.	CA	8/24/22	19:22	PST-8	Flash Flood	0	0	10.00K
HAVASU LAKE	SAN BERNARDINO CO.	CA	8/24/22	20:25	PST-8	Flash Flood	0	0	1.00K
VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	8/24/22	22:10	PST-8	Flash Flood	0	0	5.00K
VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	8/25/22	0:03	PST-8	Flash Flood	0	0	2.00K
BANNOCK	SAN BERNARDINO CO.	CA	8/26/22	17:30	PST-8	Flash Flood	0	0	1.00K
DEVORE	SAN BERNARDINO CO.	CA	9/11/22	17:30	PST-8	Flash Flood	0	0	0.00K
CRESTLINE	SAN BERNARDINO CO.	CA	9/11/22	17:36	PST-8	Flash Flood	0	0	0.00K
BAKER	SAN BERNARDINO CO.	CA	9/12/22	1:00	PST-8	Flash Flood	0	0	50.00K
LAKE ARROWHEAD	SAN BERNARDINO CO.	CA	9/12/22	12:00	PST-8	Flash Flood	0	0	0.00K
LUCERNE VLY	SAN BERNARDINO CO.	CA	9/12/22	14:12	PST-8	Flash Flood	0	0	0.00K
HODGE	SAN BERNARDINO CO.	CA	9/12/22	14:43	PST-8	Flash Flood	0	0	2.00K
FALLSVALE	SAN BERNARDINO CO.	CA	9/12/22	15:00	PST-8	Flash Flood	0	0	4.000M
FOREST FALLS	SAN BERNARDINO CO.	CA	9/12/22	15:00	PST-8	Flash Flood	0	0	200.00K
FOREST FALLS	SAN BERNARDINO CO.	CA	9/12/22	15:00	PST-8	Flash Flood	0	0	100.00K
FOREST FALLS	SAN BERNARDINO CO.	CA	9/12/22	15:00	PST-8	Flash Flood	0	0	100.00K

CALICO	SAN BERNARDINO CO.	CA	9/12/22	16:49	PST-8	Flash Flood	0	0	1.00K
WILD	SAN BERNARDINO CO.	CA	9/12/22	17:08	PST-8	Flash Flood	0	0	0.00K
JOSHUA TREE	SAN BERNARDINO CO.	CA	9/24/22	17:00	PST-8	Flash Flood	0	0	1.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	9/28/22	11:21	PST-8	Flash Flood	0	0	0.00K
JOSHUA TREE	SAN BERNARDINO CO.	CA	9/28/22	13:00	PST-8	Flash Flood	0	0	10.00K
DUNLAP ACRES	SAN BERNARDINO CO.	CA	9/28/22	15:00	PST-8	Flash Flood	0	0	0.00K
(NXP)MCAF TWENTYNINE	SAN BERNARDINO CO.	CA	9/29/22	13:53	PST-8	Flash Flood	0	0	25.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	10/12/22	14:15	PST-8	Flash Flood	0	0	1.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	10/15/22	14:57	PST-8	Flash Flood	0	0	0.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	10/15/22	14:57	PST-8	Flash Flood	0	0	1.00K
SALTUS	SAN BERNARDINO CO.	CA	10/15/22	15:30	PST-8	Flash Flood	0	0	5.00K
OLD DALE	SAN BERNARDINO CO.	CA	10/15/22	19:06	PST-8	Flash Flood	0	0	10.00K
ONTARIO	SAN BERNARDINO CO.	CA	11/8/22	7:00	PST-8	Flash Flood	3	0	0.00K
YUCAIPA	SAN BERNARDINO CO.	CA	11/8/22	9:30	PST-8	Flash Flood	0	0	0.00K
MT BALDY	SAN BERNARDINO CO.	CA	11/8/22	9:45	PST-8	Flash Flood	0	0	0.00K
JOSHUA TREE	SAN BERNARDINO CO.	CA	11/8/22	12:16	PST-8	Flash Flood	0	0	1.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	11/8/22	12:20	PST-8	Flash Flood	0	0	1.00K
RANCHO CUCAMONGA	SAN BERNARDINO CO.	CA	12/11/22	7:00	PST-8	Flash Flood	0	0	0.00K

MORONGO LODGE	SAN BERNARDINO CO.	CA	1/16/23	9:30	PST-8	Flash Flood	0	0	2.00K
LYTLE CREEK	SAN BERNARDINO CO.	CA	2/24/23	20:45	PST-8	Flash Flood	0	0	0.00K
CHINO	SAN BERNARDINO CO.	CA	3/14/23	20:00	PST-8	Flash Flood	0	0	0.00K
AMBOY	SAN BERNARDINO CO.	CA	3/15/23	15:45	PST-8	Flash Flood	0	0	1.00K
(EED)NEEDLES ARPT	SAN BERNARDINO CO.	CA	3/15/23	16:04	PST-8	Flash Flood	0	0	50.00K
HARVARD	SAN BERNARDINO CO.	CA	3/15/23	16:37	PST-8	Flash Flood	0	0	1.00K
VALLEY WELLS	SAN BERNARDINO CO.	CA	5/20/23	13:32	PST-8	Flash Flood	0	0	5.00K
ADELANTO	SAN BERNARDINO CO.	CA	5/20/23	18:03	PST-8	Flash Flood	0	0	0.00K
EL MIRAGE	SAN BERNARDINO CO.	CA	5/21/23	16:30	PST-8	Flash Flood	0	0	0.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	5/21/23	16:43	PST-8	Flash Flood	0	0	50.00K
BARSTOW	SAN BERNARDINO CO.	CA	5/22/23	15:25	PST-8	Flash Flood	0	0	5.00K
BARNWELL	SAN BERNARDINO CO.	CA	8/2/23	13:00	PST-8	Flash Flood	0	0	5.00K
JOSHUA TREE ARPT	SAN BERNARDINO CO.	CA	8/13/23	16:21	PST-8	Flash Flood	0	0	1.00K
GOFFS	SAN BERNARDINO CO.	CA	8/18/23	18:31	PST-8	Flash Flood	0	0	1.00K
BANNOCK	SAN BERNARDINO CO.	CA	8/18/23	18:35	PST-8	Flash Flood	0	0	1.00K
JAVA	SAN BERNARDINO CO.	CA	8/18/23	19:19	PST-8	Flash Flood	0	0	1.00K
OLD DALE	SAN BERNARDINO CO.	CA	8/18/23	20:00	PST-8	Flash Flood	0	0	5.00K
WRIGHTWOOD	SAN BERNARDINO CO.	CA	8/20/23	11:30	PST-8	Flash Flood	0	0	0.00K

CRUCERO	SAN BERNARDINO CO.	CA	8/20/23	12:00	PST-8	Flash Flood	0	0	1.000M
FOREST FALLS	SAN BERNARDINO CO.	CA	8/20/23	14:00	PST-8	Flash Flood	0	0	0.00K
(NXP)MCAF TWENTYNINE	SAN BERNARDINO CO.	CA	8/20/23	14:13	PST-8	Flash Flood	0	0	5.00K
SUGARLOAF	SAN BERNARDINO CO.	CA	8/20/23	15:00	PST-8	Flash Flood	0	0	0.00K
JOSHUA TREE	SAN BERNARDINO CO.	CA	8/20/23	15:01	PST-8	Flash Flood	0	0	2.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	8/20/23	16:00	PST-8	Flash Flood	0	0	5.00K
SEVEN OAKS	SAN BERNARDINO CO.	CA	8/20/23	16:00	PST-8	Flash Flood	0	0	0.00K
MORONGO LODGE	SAN BERNARDINO CO.	CA	8/20/23	17:13	PST-8	Flash Flood	0	0	1.00K
BAKER	SAN BERNARDINO CO.	CA	8/20/23	17:37	PST-8	Flash Flood	0	0	10.00K
VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	8/20/23	17:48	PST-8	Flash Flood	0	0	1.00K
WESTEND	SAN BERNARDINO CO.	CA	8/20/23	17:52	PST-8	Flash Flood	0	0	10.00K
YUCCA VLY ARPT	SAN BERNARDINO CO.	CA	8/20/23	18:19	PST-8	Flash Flood	0	0	2.00K
BAKER	SAN BERNARDINO CO.	CA	8/20/23	18:40	PST-8	Flash Flood	0	0	1.000M
(NXP)MCAF TWENTYNINE	SAN BERNARDINO CO.	CA	8/20/23	18:46	PST-8	Flash Flood	0	0	2.00K
RED MTN	SAN BERNARDINO CO.	CA	8/20/23	19:18	PST-8	Flash Flood	0	0	1.00K
DAGGETT	SAN BERNARDINO CO.	CA	8/20/23	19:33	PST-8	Flash Flood	0	0	1.00K
PIONEERTOWN	SAN BERNARDINO CO.	CA	8/20/23	22:19	PST-8	Flash Flood	0	0	1.00K
MORONGO LODGE	SAN BERNARDINO CO.	CA	8/20/23	23:19	PST-8	Flash Flood	0	0	10.00K

MORONGO LODGE	SAN BERNARDINO CO.	CA	8/20/23	23:56	PST-8	Flash Flood	0	0	10.00K
KLINEFELTER	SAN BERNARDINO CO.	CA	9/1/23	5:28	PST-8	Flash Flood	0	0	1.00K
RICE	SAN BERNARDINO CO.	CA	9/1/23	14:10	PST-8	Flash Flood	0	0	5.00K
VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	9/1/23	14:25	PST-8	Flash Flood	0	0	2.00K
BUSH	SAN BERNARDINO CO.	CA	9/1/23	14:27	PST-8	Flash Flood	0	0	1.00K
HORSE THIEF SPGS	SAN BERNARDINO CO.	CA	9/1/23	15:05	PST-8	Flash Flood	0	0	1.000M
HORSE THIEF SPGS	SAN BERNARDINO CO.	CA	9/1/23	15:06	PST-8	Flash Flood	0	0	1.00K
(NXP)MCAF TWENTYNINE	SAN BERNARDINO CO.	CA	9/1/23	15:13	PST-8	Flash Flood	0	0	2.00K
RICE	SAN BERNARDINO CO.	CA	9/1/23	15:51	PST-8	Flash Flood	0	0	1.00K
BARSTOW	SAN BERNARDINO CO.	CA	9/1/23	15:57	PST-8	Flash Flood	0	0	2.00K
HORSE THIEF SPGS	SAN BERNARDINO CO.	CA	9/1/23	16:09	PST-8	Flash Flood	0	0	1.00K
SALTUS	SAN BERNARDINO CO.	CA	9/1/23	16:14	PST-8	Flash Flood	0	0	5.00K
BANNOCK	SAN BERNARDINO CO.	CA	9/1/23	16:35	PST-8	Flash Flood	0	0	1.00K
HORSE THIEF SPGS	SAN BERNARDINO CO.	CA	9/1/23	17:06	PST-8	Flash Flood	0	0	1.00K
VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	9/1/23	17:18	PST-8	Flash Flood	0	0	5.00K
TWENTY NINE PALMS	SAN BERNARDINO CO.	CA	9/1/23	18:23	PST-8	Flash Flood	0	0	2.00K
CROSS RDS	SAN BERNARDINO CO.	CA	9/2/23	11:53	PST-8	Flash Flood	0	0	10.00K
HARVARD	SAN BERNARDINO CO.	CA	9/2/23	13:26	PST-8	Flash Flood	0	0	1.00K

VIDAL JCT ARPT	SAN BERNARDINO CO.	CA	9/2/23	14:25	PST-8	Flash Flood	0	0	100.00K
(EED)NEEDLES ARPT	SAN BERNARDINO CO.	CA	9/2/23	15:23	PST-8	Flash Flood	0	0	2.00K
FENNER	SAN BERNARDINO CO.	CA	9/2/23	15:45	PST-8	Flash Flood	0	0	1.00K
YUCCA VLY	SAN BERNARDINO CO.	CA	12/22/23	2:15	PST-8	Flash Flood	0	0	0.00K
YUCCA VLY	SAN BERNARDINO CO.	CA	12/22/23	2:42	PST-8	Flash Flood	0	0	1.00K
Totals:						**0**	**0**	**15.291M**	**10.00K**

4.8.7 Vulnerability and Impacts

Life Safety and Public Health: Safety and health concerns during a flood range greatly. One of the primary issues communities experience, especially during flash floods, is vehicles getting stuck and/or swept away by rapidly moving waters. These scenarios also present danger to first responders and bystanders attempting to rescue vehicle occupants.

According to FEMA (FEMA, 2021):

- Six inches of water will reach the bottom of most passenger cars, causing loss of control and potential stalling.
- A foot of water will float to many vehicles.
- Two feet of rushing water will carry away most vehicles, including SUVs and pickups.

Just as vehicles are recommended to stay away from standing and/or moving flood waters, the CDC recommends the same for individuals. Flood water can be both unsanitary and dangerous. When individuals do get stuck within flood waters, some experience heart attacks and other medical conditions while trying to free themselves from the water. Contact with flood waters can increase the possibility of contracting a communicable disease (and other medical issues due to pollutants, chemicals, waste, and an increased number of insects).

When receding, flood waters can also saturate the ground, leading to infiltration into sanitary sewer lines. When wastewater treatment facilities are flooded, there is often nowhere for the treated sewage to be discharged or inflowing sewage to be stored. Infiltration and lack of treatment lead to overloaded sewer lines, which back up into low-lying areas and some homes. Even though diluted by flood waters, raw sewage can be a breeding ground for bacteria, such as E. coli, and other disease-causing agents. Because of this threat, tetanus shots are given to people affected by a flood.

Stagnant water is often a perfect breeding ground for insects, specifically mosquitoes, known to carry and distribute various types of diseases. Standing water also creates mold, which can be a health issue for everyone but is an extreme hazard to those with breathing issues, children, and the elderly. If forced-air systems are affected by floods and are not subsequently cleaned properly, individuals may inadvertently breathe in pollutants. If the water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The force of flood waters can damage gas lines, which creates the potential for secondary hazards such as gas leaks and fires. This force, along with standing water, can also damage the structural integrity of buildings, which can cause injuries if issues go unnoticed or unrepaired. While fires have not resulted from flooding within the City of Chino, history shows that floods can prevent fire departments and protection agencies from successfully combating and sometimes even accessing a fire, allowing it to spread.

According to FEMA, flooding can also disproportionately impact disadvantaged or challenged communities in the following ways:

- Lack of Resilience Infrastructure: Disadvantaged communities often lack the infrastructure necessary to mitigate flood impacts, such as well-maintained levees, flood barriers, and stormwater management systems. The absence of these protective measures can make these areas more susceptible to flooding and its consequences.
- Inadequate Housing: Residents of disadvantaged communities may be more likely to live in substandard or low-lying areas prone to flooding. Such housing may lack flood-resistant construction and provide inadequate protection during floods.
- Limited Financial Resources: These communities often have fewer financial resources to prepare for, respond to, and recover from flooding. This can lead to difficulty purchasing flood insurance, repairing flood-damaged homes, or accessing emergency resources.
- Health Vulnerabilities: Residents of disadvantaged communities may have higher rates of pre-existing health conditions or limited access to healthcare services. Flooding can exacerbate these health vulnerabilities, especially if contaminated floodwater spreads diseases or disrupts medical care.
- Transportation Challenges: Limited access to reliable transportation can hinder evacuation efforts during flooding events, placing residents in these areas at greater risk. Public transportation options may be insufficient or inaccessible, leaving residents stranded.
- Information Access: Disadvantaged communities may have limited access to timely, accurate information about flood risks and preparedness measures. This lack of information can lead to delayed or inadequate responses to flood warnings.
- Environmental Justice Concerns: Flooding can lead to the release of hazardous materials, contaminating soil and water. Disadvantaged communities are likelier to be located near industrial sites or toxic facilities, exacerbating environmental justice concerns.

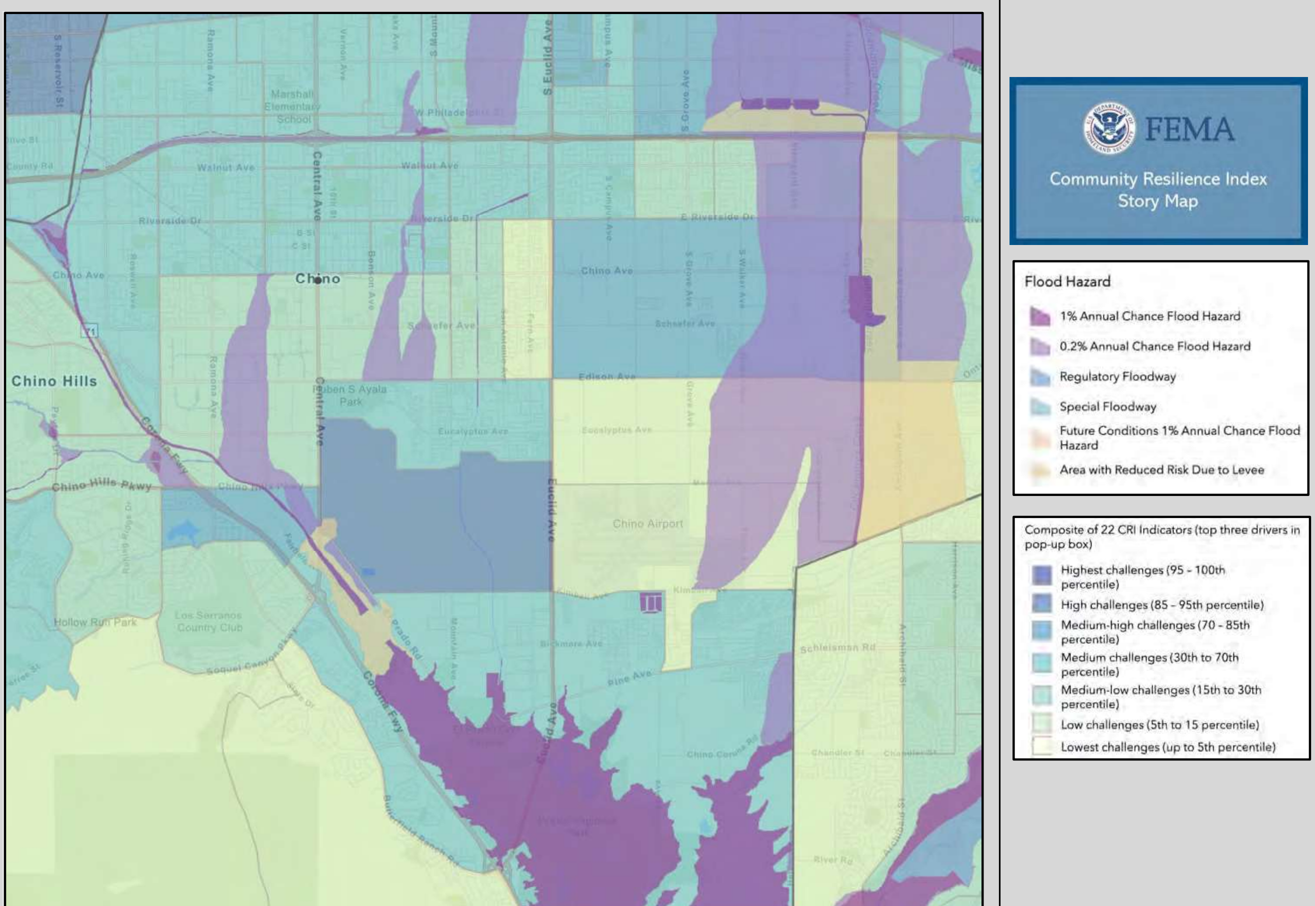
- Community Disruption: Flooding can displace residents from their homes, disrupting communities and increasing social and economic hardships. The recovery and rebuilding process may take longer in these areas due to limited resources.

The FEMA Community Resilience Challenges Index (CRCI) provides a relative assessment of a community's potential resilience and gives insights into population and community characteristics from which to build emergency operations plans and targeted outreach strategies. The following figure illustrates the impact of flooding on the City of Chino.

Figure 4.14. Flooding Impacts to the City of Chino

CITY OF CHINO, CA

FEMA COMMUNITY RESILIENCE INDEX STORY MAP



Source: FEMA Resilience Analysis and Planning Tool (RAPT) 2024

Property Damage and Critical Infrastructure: A HAZUS analysis was conducted for a 100-year and 500-year flood to examine the exposure and damages of buildings to flooding.

100-year Flood Analysis:
HAZUS estimates that about 468 buildings will be at least moderately damaged. This is over 68% of the total number of buildings in the scenario.

Table 4-23. HAZUS 100-year Expected Building Damage by Occupancy

Expected Building Damage by Occupancy												
Damage Level	**1-10**		**11-20**		**21-30**		**31-40**		**41-50**		**>50**	
Occupancy	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**
Agriculture	1	100	0	0	0	0	0	0	0	0	0	0
Commercial	70	53	58	44	3	2	0	0	0	0	0	0
Education	2	100	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	9	38	14	58	0	0	1	4	0	0	0	0
Religion	3	33	6	67	0	0	0	0	0	0	0	0
Residential	181	32	240	42	86	15	43	8	13	2	4	1
Total	**266**		**318**		**89**		**44**		**13**		**4**	

Table 4-24. HAZUS 100-year Expected Damage to Essential Facilities

Expected Damage to # of Essential Facilities				
Classification	**Total**	**At Least Moderate**	**At Least Substantial**	**Loss of Use**
Emergency Operations Center	1	0	0	0
Fire Stations	5	0	0	0
Hospitals	2	0	0	0
Police Stations	1	0	0	0
Schools	27	0	0	0

Table 4-25. HAZUS 100-year Building-Related Economic Loss Estimates

Building-Related Economic Loss Estimates (Millions of Dollars)						
	Area	**Residential**	**Commercial**	**Industrial**	**Others**	**Total**
Building Loss	Building	60.51	81.83	33.33	5.23	180.90
	Content	35.53	285.86	88.27	32.72	442.38
	Inventory	0.00	42.53	12.98	1.93	57.45
	Subtotal	**96.04**	**410.22**	**134.58**	**39.88**	**680.72**
Business Interruption	Income	1.40	208.98	5.57	11.08	227.03
	Relocation	18.47	72.90	5.04	7.02	103.43
	Rental Income	11.86	46.09	2.19	0.97	61.11
	Wage	3.30	192.00	8.40	43.56	247.26
	Subtotal	**35.03**	**519.97**	**21.19**	**62.64**	**638.83**
All	**Total**	**131.07**	**930.19**	**155.78**	**102.52**	**1,319.56**

The total economic loss estimated for the flood is $1,319.56 million, representing 18.76% of the total replacement value of the scenario buildings.

The total building-related losses were $680.72 million. 48% of the estimated losses were related to business interruption in the region. The residential occupancies made up 9.93% of the total loss.

HAZUS estimates the number of households expected to be displaced due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodation in temporary public shelters. The model estimates that 1,341 households (4,024 people) will be displaced due to the flood. Displacement includes households evacuated from within or very near the inundated area. Of these, 247 people are expected to seek temporary shelter in public shelters.

500-year Flood Analysis:
HAZUS estimates that about 1,287 buildings will be at least moderately damaged. This is over 67% of the total number of buildings in the scenario.

Table 4-26. HAZUS 500-year Expected Building Damage by Occupancy

Expected Building Damage by Occupancy												
Damage Level	**1-10**		**11-20**		**21-30**		**31-40**		**41-50**		**50>**	
Occupancy	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**
Agriculture	2	40	3	60	0	0	0	0	0	0	0	0
Commercial	60	27	139	62	19	9	4	2	1	0	0	0
Education	3	100	0	0	0	0	0	0	0	0	0	0
Government	1	100	0	0	0	0	0	0	0	0	0	0
Industrial	18	24	42	55	12	16	4	5	0	0	0	0
Religion	1	8	11	92	0	0	0	0	0	0	0	0
Residential	326	24	524	38	274	20	151	11	64	5	39	3
Total	**411**		**719**		**305**		**159**		**65**		**39**	

Table 4-27. HAZUS 500-year Expected Damage to Essential Facilities

Expected Damage to # of Essential Facilities				
Classification	**Total**	**At Least Moderate**	**At Least Substantial**	**Loss of Use**
Emergency Operations Center	1	0	0	0
Fire Stations	5	0	0	0
Hospitals	2	0	0	0
Police Stations	1	0	0	0
Schools	27	0	0	0

Table 4-28. HAZUS 500-year Building-Related Economic Loss Estimates

Building-Related Economic Loss Estimates (Millions of Dollars)						
	Area	**Residential**	**Commercial**	**Industrial**	**Others**	**Total**
Building Loss	Building	149.20	168.47	77.52	9.74	404.93
	Content	86.83	570.69	205.74	61.13	924.38
	Inventory	0.00	91.11	29.14	4.88	125.12
	Subtotal	**236.03**	**830.26**	**312.40**	**75.74**	**1,454.44**
Business Interruption	Income	2.81	356.52	9.00	18.50	386.83
	Relocation	41.56	124.42	9.08	11.33	186.39
	Rental Income	23.38	80.44	3.36	1.46	108.55
	Wage	6.62	329.99	13.54	67.41	417.56
	Subtotal	**74.27**	**891.37**	**34.98**	**98.71**	**1099.33**
All	**Total**	**310.30**	**1,721.63**	**347.39**	**174.45**	**2,553.76**

The total economic loss estimated for the flood is $2,553.76 million, representing 36.31% of the full replacement value of the scenario buildings.

The total building-related losses were $1,454.44 million. 43% of the estimated losses were related to business interruption in the region. The residential occupancies made up 12.15% of the total loss.

HAZUS estimates the number of households expected to be displaced due to a flood and the associated potential evacuation. HAZUS also estimates the number of people requiring accommodation in temporary public shelters. The model estimates that 2,710 households (8,129 people) will be displaced due to a flood. Displacement includes households evacuated from within or very near the inundated area. Of these, 426 people are expected to seek temporary shelter in public shelters.

Repetitive Loss Properties*:* There are several different definitions of a "repetitive loss property." The current FEMA definition of a repetitive loss property is:

"**Repetitive Loss Structure:** An NFIP-insured structure that has had at least two paid flood losses of more than $1,000 each in any 10-year period since 1978." (FEMA, 2024).

Additionally, the definitions of a severe repetitive loss building, and severe repetitive loss property are:

"Severe Repetitive Loss Building: Any building that:

1. It is covered under a Standard Flood Insurance Policy made available under this title.
2. Has incurred flood damage for which:

a. Four or more separate claim payments have been made under a Standard Flood Insurance Policy issued pursuant to this title, with the amount of each such claim exceeding $5,000 and with the cumulative amount of such claims payments exceeding $20,000; or

b. At least two separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claim payments exceeding the fair market value of the insured building on the day before each loss" (FEMA, 2024).

"Severe Repetitive Loss Property: Either a severe repetitive loss building or the contents within a severe repetitive loss building, or both" (FEMA, 2024).
FEMA encourages the mitigation of severe repetitive loss and repetitive loss properties through the distribution of mitigation grants, the NFIP's Increased Cost of the Compliance program, and the Community Rating System (CRS) program. Depending on the number of repetitive loss properties within a CRS community, the community may be required to develop a specific plan to determine the causes of the repetitive claims and ways to mitigate the causes of the repetitive claims. At a minimum, each CRS community must conduct an annual outreach project to these properties advising the owners of their location in the regulatory floodplain, property protection measures, and any funding options for property protection and flood insurance.

FEMA offers several programs to support communities in identifying and addressing the root causes of their repetitive losses. One such program is the Community Rating System (CRS), which this Plan fulfills the requirements for as outlined in Chapter 4.

4.8.8 Property Damage and Critical Infrastructure

Flooding can also disproportionately damage property and critical infrastructure within disadvantaged or challenged communities. Here are some of the ways in which flooding can affect these communities more severely:

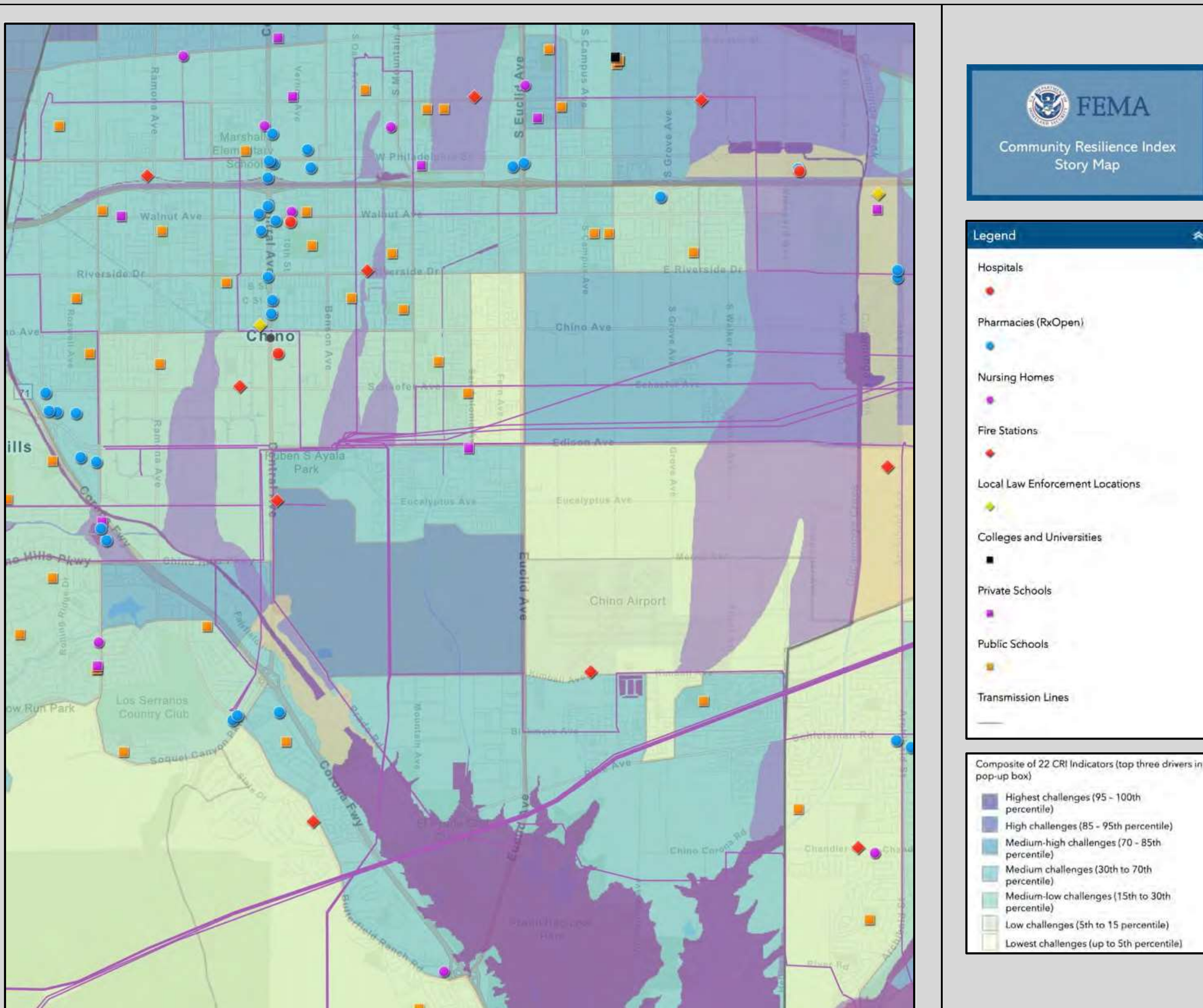
- Housing Vulnerability: Disadvantaged communities often have a higher percentage of residents living in substandard or poorly constructed housing. These homes are more susceptible to flood damage, leading to significant property losses and displacement of residents.
- Limited Insurance Coverage: Residents in disadvantaged communities may be less likely to have flood insurance, either due to affordability issues or lack of awareness. This leaves property owners financially vulnerable when flooding occurs, resulting in a heavier burden of property damage.
- Inadequate Infrastructure: Critical infrastructure, such as roads, bridges, sewage systems, and utilities, may be subpar or outdated in disadvantaged areas. Flooding can damage or disrupt these systems, impeding emergency response efforts and hindering recovery.
- Healthcare Facilities: These communities may have limited access to healthcare facilities and services. Flooding can damage or inundate healthcare facilities, making it challenging for residents to access medical care during and after a flood event.
- Schools and Education: Flood damage to schools can disrupt education for children in these communities. It may take longer for schools to reopen, affecting students' academic progress and overall well-being.
- Economic Impact: Flooding can devastate local economies, including small businesses, which are often the backbone of disadvantaged communities. Loss of income and job displacement can have long-lasting economic consequences.

- Transportation Disruptions: Inadequate transportation infrastructure can be overwhelmed by floodwaters, making it difficult for residents to evacuate or access emergency services. This can also impede the delivery of essential supplies and aid.
- Environmental Justice: Disadvantaged communities may be more likely to be located near industrial or hazardous sites, which can release pollutants during flooding events, further exacerbating environmental justice concerns.

The following figure illustrates the flooding impact on critical infrastructure in the City of Chino.

Figure 4.15. Flooding Impacts to Critical Infrastructure in the City of Chino

CITY OF CHINO, CA
FEMA COMMUNITY RESILIENCE INDEX STORY MAP



Source: FEMA Resilience Analysis and Planning Tool (RAPT) 2023

4.8.9 Economy

Flooding can have several different impacts on the City of Chino economy. One potential impact is damage to local businesses and infrastructure. Flooding can damage or destroy buildings, equipment, and inventory, disrupting operations and resulting in significant financial losses for businesses. Infrastructure such as roads, bridges, and utilities can also be damaged, which can impede transportation and communication networks and further disrupt the operations of businesses and other economic activity.

Another potential economic impact includes local area property values and insurance rates. Properties located in flood-prone areas may decline in value, and insurance rates may increase as the risk of flooding increases. This can make it more difficult for homeowners and businesses to secure loans and other forms of financing.

4.8.10 Changes in Development and Impact of Future Development

The risks associated with flooding are directly related to the population and infrastructure located within the boundaries of the riverine floodplains. Development should be limited in these potential impact areas. Infrastructure improvements should also consider potential impacts. Existing floodplain and construction regulations are in place to help reduce the impacts of flooding. Stormwater infrastructure should also be looked at to determine the impact of flash flooding. This infrastructure does not always take into effect the growth of a community. Increasing impervious surfaces (e.g., concrete parking lots) may cause increased stormwater runoff during short rain events.

4.8.11 Effects of Climate Change on Severity of Impacts

According to NOAA, climate change is impacting the severity and frequency of flooding events, including higher temperatures, which lead to more intense and frequent heavy rainfall, and rising sea levels, which exacerbate coastal flooding. Warmer temperatures also increase the atmosphere's capacity to hold moisture, resulting in more substantial and intense rainfall events.

This increase in heavy precipitation can overwhelm drainage systems and lead to flash flooding. Additionally, the increase in sea levels, driven by the melting of ice caps and thermal expansion of seawater, means that coastal areas are more prone to flooding during storms and high tide events. This combination of factors creates a greater risk of severe flooding, both inland and along the coasts.

Table 4-29. 25-Year Precipitation Projections for City of Chino, CA

25-YEAR PRECIPITATION PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **6% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.2″ decrease** (from 3.2″ to 3.4″) in average annual precipitation.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **2% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.3″ decrease** (from 3.1″ to 3.18″) in average annual precipitation.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/600013210/explore/climate)

Table 4-30. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation:							
Annual Average Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation (Wet Days)	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Maximum Period of Consecutive Wet Days	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**5 days**
	5-6	5-7	4-7	4-7	4-7	4-7	3-9
Annual Days With:							
Annual Days With Total Precipitation > 1 inch	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**
	1-1	0-1	1-1	0-1	0-1	0-1	0-1
Annual Days With Total Precipitation > 2 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days With Total Precipitation > 3 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days That Exceed 99th Percentile Precipitation	2 days	2 days	3 days	2 days	3 days	3 days	3 days
	1-16	1-17	1-18	1-17	1-18	1-19	1-19
*Days With Maximum Temperature Below 32*F*	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Source: Climate Mapping for Resilience and Adaptation (2024)							

4.8.11 FEMA NRI Expected Annual Loss Estimates

The FEMA NRI does not assess Urban/Flash flooding.

4.8.12 FEMA Hazard-Specific Risk Index Table

The FEMA NRI does not assess Urban/Flash flooding.

4.8.13 FEMA NRI Exposure Value Table

The FEMA NRI does not assess Urban/Flash flooding.

4.9 Severe Summer Storms

4.9.1 Hazard Description

In this *Plan*, Severe Summer Storms are considered to be extreme heat, hail, high winds, and lightning.

4.9.2 Hazard Location

Severe summer storms could occur anywhere in the City of Chino.

4.9.3 Hazard Extent/Intensity

Extreme Heat: NOAA defines extreme heat as a period of excessively high temperatures that significantly exceeds the long-term average for a particular location. This definition takes into account the local climate and expected temperature ranges for a given region. Extreme heat events are typically characterized by several consecutive days of high temperatures that can pose significant health and safety risks. NOAA often uses specific temperature thresholds, such as heat indices or heat advisories, to define extreme heat conditions. During such events, there is an increased likelihood of heat-related illnesses, including heat exhaustion and heatstroke, as well as potential stress on critical infrastructure, power grids, and water resources. Extreme heat events are becoming more frequent and severe due to climate change, making them a growing concern for public health and safety.

Hail: NOAA defines a hailstorm as a weather event in which hail, a form of solid precipitation consisting of ice, is produced within thunderstorms. Hail forms when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere, causing them to freeze. These hailstones then grow as they collide with supercooled water droplets, which freeze upon contact with the hailstone's surface. Eventually, the hailstones become heavy enough to overcome the strength of the updraft and fall to the ground.

Hail can vary significantly in size, ranging from small pellets to large stones several inches in diameter. It is particularly dangerous because it can cause extensive damage to property, crops, and vehicles, and can also be deadly to livestock and humans. The size and impact of hailstones are influenced by the intensity of the updrafts and the availability of supercooled water droplets within the storm.

High Winds: NOAA defines high wind events as meteorological conditions in which wind speeds exceed certain threshold values, typically posing risks to life, property, and the environment. These events are characterized by strong and sustained winds that may be accompanied by gusts or bursts of even higher wind speeds. The specific wind speed thresholds for defining high wind events can vary depending on the region and the local climate. NOAA and the National Weather Service (NWS) issue various wind-related advisories and warnings, such as High Wind Warnings and Wind Advisories, to alert the public to potential high wind events and their associated hazards. High wind events can result from various weather phenomena, including cold fronts, severe thunderstorms, tropical cyclones, and other meteorological patterns, and they can lead to power outages, transportation disruptions, and damage to structures and vegetation.

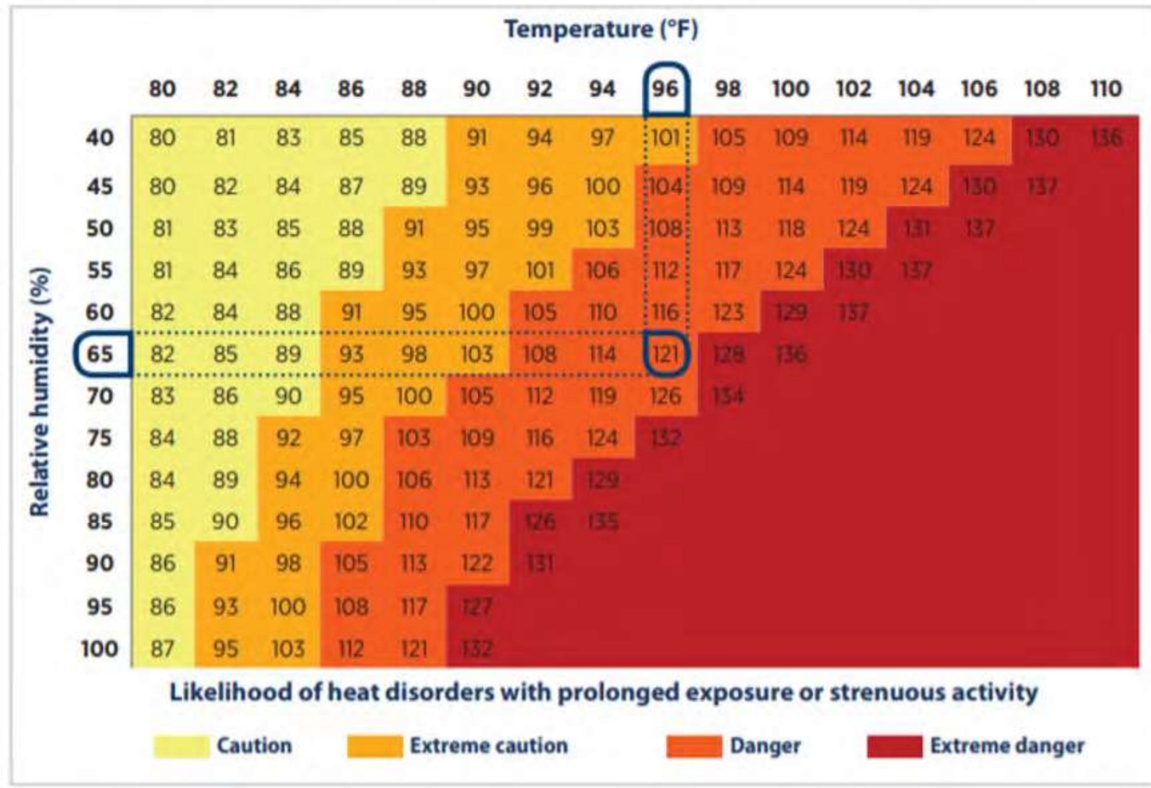
Lightning: NOAA defines lightning as a transient, high-current electric discharge with a path length that typically ranges from a few meters to tens of kilometers. This electrical discharge occurs within a cloud, between clouds, or between a cloud and the ground. Lightning is a natural atmospheric electrical phenomenon that produces a brilliant flash of light and is often accompanied by thunder. It is caused by the rapid movement of electrical charges, typically between positively charged areas in the upper part of a cloud and negatively charged regions in the lower part of the cloud or on the ground. Lightning is a common occurrence in thunderstorms and can have various forms, including cloud-to-cloud lightning, cloud-to-ground lightning, and intra-cloud lightning.

4.9.4 Hazard Extent/Intensity

Extreme Heat: When an extreme heat event occurs, NWS may issue an excessive heat warning, an excessive heat watch, a heat advisory, or a heat outlook. The NWS defines these as the following:

- Excessive Heat Warning – Take Action. An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Warning is when the maximum heat index temperature is expected to be 105° or higher for at least two days and nighttime air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas not used to extreme heat conditions. If you don't take precautions immediately when conditions are extreme, you may become seriously ill or die (NOAA, 2024).
- Excessive Heat Watches—Be Prepared. Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain (NOAA, 2024).
- Heat Advisory – Take Action. A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Advisory is when the maximum heat index temperature is expected to be 100° or higher for at least two days, and nighttime air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas that are not used to dangerous heat conditions. Take precautions to avoid heat illness. If you don't take precautions, you may become seriously ill or even die (NOAA, 2024).
- Excessive Heat Outlooks are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead-time to prepare for the event (NOAA, 2024).

Figure 4.16. National Oceanic and Atmospheric Administration National Weather Service Heat Index



Temperature (°F)

Relative humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of heat disorders with prolonged exposure or strenuous activity

Caution · Extreme caution · Danger · Extreme danger

Hail: NOAA measures extent and intensity using Doppler radar, which can detect hail by identifying signals that resemble extremely heavy rainfall. Dual-polarization radar technology, utilized by the NWS also enhances this capability by distinguishing between different types of precipitation, such as hail, ice pellets, and rain, and even estimating hail size.

The Hail Detection Algorithm (HDA) is used for radars, providing single hail size estimates and probabilities of severe hail. This tool is used in addition to balloon-borne radiosondes and computer models that simulate hailstorm dynamics, to provide comprehensive forecasts and assessments of hailstorm severity.

Table 4-31. National Weather Service Hail Descriptions

NATIONAL WEATHER SERVICE HAIL DESCRIPTIONS	
DESCRIPTION	**DIAMETER (INCHES)**
Pea	0.25”
Marble or Mothball	0.5”
Penny or Dime	0.75”
Nickel	0.88”
Quarter	1.0”
Half Dollar	1.25”
Walnut or Ping Pong Ball	1.5”
Golf Ball	1.75”
Hen’s Egg	2.0”
Tennis Ball	2.5”
Baseball	2.75”
Teacup	3.0”
Grapefruit	4.0”
Softball	4.5”
SOURCE: National Weather Service (2024)	

The TORRO Hailstorm Intensity Scale (shown below) was developed by Jonathan Webb to measure and categorize hailstorms. It extends from H0 (hard hail, no damage) to H10 (super hailstorm, extensive structural damage, risk of severe/fatal injuries) with its increments of intensity or damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind. The scale could be modified depending on factors such as building materials and types (e.g., whether roofing tiles are predominantly slate, shingle, or concrete).

Figure 4.17. TORRO Hailstorm Intensity Scale

Scale	Intensity category	Typical hail diameter (mm)*	Probable kinetic energy J m^{-2}	Typical damage impacts
H0	Hard hail	5	0-20	No damage
H1	Potentially damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Hail is considered severe when reaching a size of 0.75 inches in diameter or greater. The NWS Hail Descriptions table illustrates different hail sizes with a description for comparison.

NWS defines the local threat of severe hail for specified areas based on the likelihood that severe hail will occur combined with the anticipated size or diameter of the largest hailstones.

Table 4-32. NWS Severe Hail Threat Levels

NWS SEVERE HAIL THREAT LEVELS	
Severe Hail Threat Level	**Threat Level Descriptions**
Extreme	**"An Extreme Threat to Life and Property from Severe Hail."** Within 12 miles of a location, there is a moderate likelihood or greater (6% of 15% probability) of severe hail with storms capable of baseball to softball sized stones. *See diameter description below.*
	AND/OR...a high likelihood or greater (26% probability or greater) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See diameter description below.*
	AND/OR...a very high likelihood (36% or greater) of severe hail, with storms capable of quarter to golf ball sized hail stones. *See diameter description below.*
High	**"A High Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a low likelihood (6% to 15% probability) of severe hail, with storms capable of baseball to softball sized stones. *See diameter description below.*
	AND/OR...a moderate likelihood (16% to 25% probability) of very large hail (golf ball to baseball sized hail stones). *See diameter description below.*
	AND/OR...a high likelihood (26% to 35% probability) of large hail (quarter to golf ball sized hail stones). *See diameter description below.*
Moderate	**"A Moderate Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of baseball to softball sized stones. *See description below.*
	AND/OR...a low likelihood (6% to 15% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See description below.*
	AND/OR...a moderate likelihood (16% to 25% probability) of severe hail, with storms capable of quarter to golf ball sized hail stones. *See diameter description below.*
Low	**"A Low Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See diameter description below.*
	AND/OR...a low likelihood (6% to 15% probability) of severe hail, with storms capable of quarter to golf ball sized hail stones. *See diameter description below.*
Very Low	**"A Very Low Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
	AND/OR...a low likelihood or greater (6% or greater) of small hail (less than 1 inch). *See diameter description below.*
Non-Threatening	**"No Discernable Threat to Life and Property from Severe Hail."** Within 12 miles of a location, environmental conditions do not support the occurrences of severe hail.
Note: To be considered severe, hail stones must be at least 1 inch in diameter. **Small Hail** - Hail less than 1 inch in diameter (from the size of peas to nickels). **Large Hail** - Hail from 1 inch to 1 3/4 inch in diameter (from the size of quarters to golf balls) causing minor damage. **Very Large Hail** - Hail from 1 3/4 inch to 2 3/4 inch in diameter (from the size of golf balls to baseballs) causing moderate damage. **Giant Hail** - Hail larger than 2 3/4 inch (larger than baseballs, such as the size of grapefruit or softballs) causing major damage.	
Source: National Weather Service (2024)	

High Winds: NOAA measures and monitors high wind incidents through a combination of meteorological tools, observation networks, and reporting systems, including:

1. Weather Stations and Anemometers: NOAA operates a vast network of weather stations equipped with anemometers that measure wind speed. These stations are strategically located across the United States and provide real-time data on wind conditions. The data collected from these stations is crucial for monitoring wind speed and direction.
2. Weather Radar: NOAA's Doppler weather radar systems are capable of detecting and tracking severe weather events, including high winds associated with thunderstorms, hurricanes, and other atmospheric disturbances. Radar data help meteorologists identify areas with strong winds and their movement.
3. Satellite Observations: NOAA uses weather satellites equipped with various sensors, including instruments that can provide information about atmospheric circulation and wind patterns. These satellite observations are particularly valuable for tracking high wind incidents in remote or oceanic areas.
4. Meteorological Models: NOAA utilizes advanced meteorological models and computer simulations to forecast and predict high wind events. These models take into account various factors, such as atmospheric pressure gradients, temperature differences, and weather patterns, to anticipate areas where high winds may occur.
5. NWS Reporting and Warnings: NOAA's National Weather Service (NWS) issues a range of alerts and warnings related to high wind events. These include High Wind Watches, High Wind Warnings, and Wind Advisories. The NWS uses data from weather stations, radar, and satellite observations to issue these alerts when high winds are expected.
6. Storm Spotter Reports: NOAA encourages the participation of trained storm spotters, emergency responders, and the public in reporting high wind incidents. Observations from storm spotters and the public help validate and refine NOAA's understanding of ongoing weather conditions.
7. Real-Time Data and Observations: NOAA continuously collects and analyzes real-time data and observations to monitor wind conditions. This information is disseminated through various communication channels, including websites, mobile apps, and weather broadcasts.

The NOAA Beaufort Wind Scale shown below is a system used to estimate wind speeds based on observed sea conditions or the effects of the wind on land features. The scale ranges from 0 to 12, with each number corresponding to a specific range of wind speeds and associated sea or land conditions.

Table 4-33. NOAA Beaufort Scale for Estimating Wind Speed

NOAA BEAUFORT WIND SCALE				
ESTIMATING WIND SPEED AND SEA STATE WITH VISUAL CLUES				
Beaufort Number	**Wind Description**	**Wind Speed (Knots)**	**Wave Height**	**Visual Clues**
0	Calm	0 kts	0 feet	The sea is like a mirror. Smoke rises vertically.
1	Light Air	1-3 kts	< 1/2	Ripples with the appearance of scales are formed, but without foam crests. Smoke drifts from funnel.
2	Light breeze	4-6 kts	1/2 ft (max 1)	Small wavelets, still short but more pronounced, crests have glassy appearance and do not break. Wind fell on my face. Smoke rises to about 80 degrees.
3	Gentle Breeze	7-10 kts	2 ft (max 3)	Large wavelets and crests begin to break. Foam of glassy appearance. Perhaps scattered white horses (white caps). Wind extends light flags and pennants. Smoke rises to about 70 deg.
4	Moderate Breeze	11-16 kts	3 ft (max 5)	Small waves, becoming longer. Fairly frequent white horses (white caps). Wind raises dust and loose paper on the deck. Smoke rises to about 50 deg. No noticeable sound in the rigging. Slack halyards curve and sway. Heavy flag flaps limply.
5	Fresh Breeze	17-21 kts	6 ft (max 8)	Moderate waves, taking more pronounced long form. Many white horses (white caps) are formed (chance of some spray). Wind felt strongly on my face. Smoke rises at about 30 deg. Slack halyards whip while bending continuously to leeward. Taut halyards maintain slightly bent position. Low whistle in the rigging. Heavy flag doesn't extend but flaps over entire length.
6	Strong Breeze	22-27 kts	9 ft (max 12)	Large waves begin to form. White foam crests are more extensive everywhere (probably some spray). Wind stings face in temperatures below 35 deg F (2C). Slight effort in maintaining balance against wind. Smoke rises at about 15 deg. Both slack and taut halyards whip slightly in bent position. Low moaning, rather than whistle, in the rigging. Heavy flag extends and flaps more vigorously.
7	Near Gale	28-33 kts	13 ft (max 19)	The sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of wind. It is necessary to lean slightly into the wind to maintain balance. Smoke rises at about 5 to 10 deg. Higher pitched moaning and whistling heard from rigging. Halyards still whip slightly. Heavy flag extends fully and flaps only at the end. Oilskins and loose clothing inflate and pull against the body.
8	Gale	34-40 kts	18 ft (max 25)	Moderately high waves of greater length. Edges of crests begin to break into the spindrift. The foam is blown in well-marked streaks along the direction of the wind. Head pushed back by the force of the wind

				if allowed to relax. Oilskins and loose clothing inflate and pull strongly. Halyards rigidly bent. Loud whistle from rigging. Heavy flag straight out and whipping.
9	Strong Gale	41-47 kts	23 ft (max 32)	High waves. Dense streaks of foam along the direction of wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility.
10	Storm	48-55 kts	29 ft (max 41)	Very high waves with long overhanging crests. The resulting foam, in great patches, is blown in dense streaks along the direction of the wind. On the whole, the sea takes on a whitish appearance. Tumbling of the sea becomes heavy and shock-like. Visibility affected.
11	Violent Storm	56-63 kts	37 ft (max 52)	Exceptionally high waves (small and medium-sized ships might be for time lost to view behind the waves). The sea is completely covered with long white patches of foam lying in the direction of the wind. Everywhere, the edges of the wave crests are blown into froth. Visibility greatly affected.
12	Hurricane	64+ kts	45+ ft	The air is filled with foam and spray. The sea is completely white with driving spray. Visibility is seriously affected.
Source: National Weather Service (2024)				

Lightning: NOAA measures the extent and intensity of lightning using a network of ground-based sensors and satellites. The primary system used by NOAA to monitor lightning activity in the United States is the National Lightning Detection Network (NLDN), which functions as follows:

1. Ground-Based Sensors: The NLDN consists of a network of ground-based sensors strategically placed across the United States. These sensors are equipped with specialized antennas and electronics to detect the radio frequency signals generated by lightning discharges.
2. Detection of Lightning Strikes: When lightning occurs, it generates a burst of radio frequency signals. The ground-based sensors in the NLDN are designed to detect these signals. By measuring the time, it takes for the signals to reach multiple sensors, the NLDN can pinpoint the location of lightning strikes with high accuracy.
3. Data Collection and Analysis: Data from the NLDN sensors are collected and analyzed in real-time. This information includes the location (latitude and longitude), time, and polarity (positive or negative) of each lightning strike.
4. Intensity and Extent Monitoring: NOAA uses the data from the NLDN to monitor the intensity and extent of lightning activity. This information is important for various purposes, including weather forecasting, monitoring storm development, and assessing the risk of severe weather events.
5. Visualization and Public Alerts: The data from the NLDN are often visualized on weather radar displays and shared with the public, meteorologists, and emergency management agencies. It is used to issue warnings and advisories related to thunderstorms and lightning safety.
6. Lightning Activity Level (LAL): NWS uses a scale to describe the frequency of lightning strikes in a specific area.

NOAA also uses data from weather satellites equipped with sensors that can detect lightning from space. These satellite-based sensors provide a broader view of lightning activity, particularly in remote or oceanic areas.

Table 4-34. NWS Lightning Activity Level

NATIONAL WEATHER SERVICE	
LIGHTNING ACTIVITY LEVEL (LAL)	
LAL 1	No thunderstorms.
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent. 1 to 5 cloud to ground strikes in a 5-minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5-minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5-minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5-minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.
Source: NOAA National Weather Service (2023)	

4.9.5 Probability and Frequency

Extreme Heat Frequency: Between 01/01/19 and 12/31/23 San Bernardino County recorded 255 events over 1,826 days. This averages 0.13964 incidents per day during this time and 51 incidents annually.

Extreme Heat Probability: NOAA measures the probability of extreme heat through a comprehensive approach, integrating meteorological tools and data analysis. It closely monitors temperature forecasts, heat index values, and the output of advanced meteorological models to assess the potential for extreme heat events. Comparisons to historical climate data help determine the likelihood of such events. NOAA also considers the duration and intensity of extreme heat conditions, with a focus on nighttime warmth, which can significantly affect public health. Collaboration with public health agencies contributes to the analysis of heat-related illnesses. Ultimately, NOAA issues Heat Advisories and Excessive Heat Warnings to provide the public with information on the probability of extreme heat, associated health risks, and recommended safety measures.

Hail Frequency: Between 01/01/19 and 12/31/23 San Bernardino County recorded eight events over 1,826 days. This averages 0.000438 incidents per day during this time and 1.6 incidents annually.

Hail Probability: NOAA assesses the probability of hail through atmospheric data from weather satellites, radar systems, and ground stations. This data provides insights into conditions conducive to hail formation, such as temperature, humidity, wind patterns, and atmospheric pressure. Meteorologists focus on factors essential for hail development, like the presence of strong updrafts in thunderstorms that lift raindrops to heights where they freeze, as well as the height of the freezing level, wind strength and direction at different altitudes, and atmospheric instability.

This collected data feeds into advanced weather prediction models that simulate potential weather scenarios, using complex mathematical equations to foresee changes in weather conditions, including the likelihood of hail. NOAA presents hail probabilities as percentages to indicate the chance of hail occurring in a particular area and timeframe, taking into account the inherent uncertainties of weather forecasting. When conditions indicate the potential for hail, NOAA issues warnings and alerts particularly in areas where hail poses a substantial threat to property and agriculture.

High Winds Frequency: Between 01/01/19 and 12/31/23 San Bernardino County recorded 184 events over 1,826 days. This averages to 0.100766 incidents per day during this time and 36.8 incidents annually.

High Winds Probability: NOAA measures the probability of high winds by utilizing meteorological tools and data analysis. Doppler radar systems monitor atmospheric conditions and the movement of weather systems, offering real-time information on high wind intensity. Advanced meteorological models consider atmospheric parameters, including pressure gradients, temperature differences, and wind patterns, to forecast the likelihood of high winds. Monitoring temperature and pressure patterns in the atmosphere, in addition to wind speed and gusts, provides crucial indicators of high wind probability. NOAA tracks severe weather events associated with high winds, such as thunderstorms, hurricanes, and tornadoes. Real-time data from weather stations and public observations further contribute to the assessment of high wind probability. This information supports NOAA in issuing weather advisories and warnings to ensure public safety during high wind events.

Lightning Frequency: Between 01/01/19 and 12/31/23 San Bernardino County recorded six events over 1,826 days. This averages 0.00328587 incidents per day during this time and 1.2 incidents annually.

Lightning Probability: NOAA measures the probability of lightning by employing a multifaceted approach, using radar and satellite data to monitor atmospheric conditions, particularly thunderstorm development. Assessment of atmospheric instability, temperature, humidity, air mass clashes, and real-time observations plays a crucial role in gauging the likelihood of lightning. Advanced meteorological models are utilized for forecasting thunderstorm development, incorporating various factors like pressure, temperature, humidity, and wind patterns. Additionally, ground-based lightning detection networks are employed to track lightning strikes, contributing real-time data for assessing the probability and intensity of lightning in specific areas. Public reports and observations from weather spotters also enhance NOAA's understanding of local weather conditions. This comprehensive data analysis supports the issuance of weather advisories and warnings, ensuring public awareness and preparedness for potential lightning-related hazards.

4.9.6 Past Events

According to NOAA, 225 extreme heat events were reported between 01/01/2019 and 12/31/2023 (1,826 days).

Table 4-35. Extreme Heat Events in San Bernardino County (2019-2023)

Location	County	State	Date	Time	T.Z.	Type	Dth	Inj	PrD	CrD
Totals:							**4**	**0**	**500.0K**	**0.00K**
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	6/11/19	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	6/11/19	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	6/11/19	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	6/11/19	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/11/19	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/24/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	7/27/19	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/27/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/3/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/3/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/3/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/4/19	0:00	PST-8	Excessive Heat	0	0	500.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/13/19	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	8/14/19	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/14/19	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/14/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/14/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/14/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/20/19	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	8/20/19	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/20/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/20/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/20/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	8/21/19	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/21/19	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/26/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	8/30/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/30/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/30/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	8/30/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	9/1/19	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	9/1/19	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	9/1/19	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	9/1/19	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	9/1/19	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	9/3/19	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/13/19	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/21/19	13:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/22/19	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	4/28/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	5/26/20	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	5/27/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	5/27/20	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	5/27/20	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	5/27/20	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	5/27/20	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	5/27/20	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	6/2/20	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	6/2/20	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	6/3/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	6/3/20	12:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	7/11/20	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/11/20	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	7/11/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	7/11/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	7/11/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/11/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	7/11/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	7/11/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	7/11/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	7/17/20	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	7/30/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	7/30/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	7/30/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/30/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	7/30/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	7/30/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	7/30/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	8/1/20	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/1/20	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	8/1/20	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/1/20	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/1/20	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/1/20	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	8/1/20	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	8/1/20	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/1/20	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/13/20	9:00	PST-8	Excessive Heat	1	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	8/13/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/14/20	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	8/14/20	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	8/14/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/14/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/14/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/14/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	8/14/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/20/20	0:00	PST-8	Excessive Heat	1	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/24/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/24/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/25/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/25/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	9/4/20	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	9/4/20	9:00	PST-8	Excessive Heat	1	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	9/4/20	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	9/4/20	10:00	PST-8	Excessive Heat	1	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	9/4/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	9/4/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	9/4/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	9/4/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	9/4/20	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/5/20	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/17/20	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/29/20	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/12/20	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	4/1/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	4/2/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	4/28/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	4/28/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	6/2/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	6/2/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	6/2/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	6/2/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	6/14/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	6/14/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	6/14/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	6/14/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	6/14/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	6/14/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	6/14/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	6/14/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	6/14/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	6/14/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	6/27/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	6/27/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	6/27/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	6/27/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	7/7/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/7/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	7/7/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	7/7/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	7/7/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	7/9/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	7/9/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/2/21	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	8/2/21	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	8/2/21	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/3/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/3/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO	SAN BERNARDINO	CA	8/3/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

COUNTY-UP...	COUNTY-UP...									
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/3/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	8/4/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	8/4/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	8/15/21	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	8/15/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	8/25/21	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/25/21	8:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	8/25/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/25/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/26/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/26/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/26/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	8/29/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	8/29/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/4/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	9/6/21	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	9/6/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO	SAN BERNARDINO	CA	9/6/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

COUNTY-UP...	COUNTY-UP...									
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	9/6/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	9/6/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	9/7/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	9/9/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	9/12/21	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	9/12/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/28/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	10/28/21	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	6/9/22	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	6/9/22	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	6/9/22	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	6/9/22	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	6/9/22	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	6/9/22	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	7/21/22	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/21/22	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	8/30/22	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	8/30/22	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	8/30/22	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/30/22	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	8/30/22	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	8/30/22	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/30/22	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP EAST (ZON...	JOSHUA TREE NP EAST (ZON...	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	9/1/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	9/5/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	9/5/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	9/5/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	9/5/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	9/5/22	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	7/1/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/1/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	7/1/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	7/1/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	7/1/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	7/1/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	7/1/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/1/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/11/23	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/11/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	7/12/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	7/12/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	7/12/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	7/13/23	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO	SAN BERNARDINO	CA	7/14/23	9:00	PST-8	Excessive Heat	0	0	0.00K	0.00K

COUNTY MO...	COUNTY MO...									
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	7/14/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/14/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	7/14/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	7/14/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	7/14/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	7/19/23	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/19/23	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	7/19/23	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	7/19/23	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	7/19/23	0:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	7/25/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/28/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	8/28/23	11:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
CADIZ BASIN (ZONE)	CADIZ BASIN (ZONE)	CA	8/28/23	18:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY-UP...	SAN BERNARDINO COUNTY-UP...	CA	8/28/23	18:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
JOSHUA TREE NP WEST (ZON...	JOSHUA TREE NP WEST (ZON...	CA	6/11/19	10:00	PST-8	Excessive Heat	0	0	0.00K	0.00K
Totals:							**4**	**0**	**500.0K**	**0.00K**

According to NOAA, 8 hail events were reported between 01/01/2019 and 12/31/2023 (1,826 days).

Table 4-36. Hail Events in San Bernardino County (2019-2023)

Location	County	State	Date	Time	T.Z.	Type	Dth	Inj	PrD	CrD
Totals:							**0**	**0**	**251.1K**	**0.00 K**
BALDWIN LAKE	SAN BERNARDINO CO.	CA	4/29/19	10:00	PST -8	Hail	0	0	0.10K	0.00 K
LUDLOW	SAN BERNARDINO CO.	CA	4/29/19	16:30	PST -8	Hail	0	0	0.00K	0.00 K
WRIGHTWOOD	SAN BERNARDINO CO.	CA	5/6/19	16:00	PST -8	Hail	0	0	0.00K	0.00 K
APPLE VLY	SAN BERNARDINO CO.	CA	5/11/19	11:00	PST -8	Hail	0	0	0.00K	0.00 K
LUCERNE VLY	SAN BERNARDINO CO.	CA	7/23/19	15:00	PST -8	Hail	0	0	0.00K	0.00 K
MOUNTAIN PASS	SAN BERNARDINO CO.	CA	8/22/20	13:10	PST -8	Hail	0	0	250.00 K	0.00 K
YUCCA VLY	SAN BERNARDINO CO.	CA	9/24/21	13:15	PST -8	Hail	0	0	0.00K	0.00 K
BIG BEAR CITY	SAN BERNARDINO CO.	CA	6/22/22	11:30	PST -8	Hail	0	0	1.00K	0.00 K
Totals:							**0**	**0**	**251.1K**	**0.00 K**

According to NOAA, 46 high wind events were reported between 01/01/2019 and 12/31/2023 (1,826 days).

Table 4-37. High Wind Events in San Bernardino County (2019-2023)

Location	County	State	Date	Time	T.Z.	Type	Dth	Inj	PrD	CrD
Totals:							**0**	**1**	**179.1 K**	**2.037 M**
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	5/21/19	12:00	PST -8	Strong Wind	0	0	5.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	11/25/19	13:24	PST -8	Strong Wind	0	0	10.00 K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	12/30/19	0:00	PST -8	Strong Wind	0	0	10.00 K	0.00K

SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/29/20	10:00	PST -8	Strong Wind	0	0	10.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/29/20	15:00	PST -8	Strong Wind	0	0	10.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/29/20	18:00	PST -8	Strong Wind	0	0	10.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	2/10/20	5:00	PST -8	Strong Wind	0	0	15.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	2/11/20	2:00	PST -8	Strong Wind	0	0	15.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	2/11/20	6:00	PST -8	Strong Wind	0	0	15.00K	0.00K
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	10/25/20	19:01	PST -8	Strong Wind	0	0	15.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	1/25/21	20:00	PST -8	Strong Wind	0	0	0.00K	2.000M
EASTERN MOJAVE DESERT (Z...	EASTERN MOJAVE DESERT (Z...	CA	2/24/21	20:39	PST -8	Strong Wind	0	1	40.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	10/11/21	17:00	PST -8	Strong Wind	0	0	0.00K	5.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/21/22	22:42	PST -8	Strong Wind	0	0	0.00K	2.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/22/22	0:24	PST -8	Strong Wind	0	0	0.00K	5.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/22/22	1:58	PST -8	Strong Wind	0	0	0.00K	10.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/22/22	2:13	PST -8	Strong Wind	0	0	0.00K	5.00K
SAN BERNARDIN	SAN BERNARDIN	CA	1/22/22	9:25	PST -8	Strong Wind	0	0	0.00K	5.00K

O AND RIVER...	O AND RIVER...									
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/22/22	18:16	PST -8	Strong Wind	0	0	0.00K	5.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	2/2/22	11:00	PST -8	Strong Wind	0	0	5.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	2/2/22	12:00	PST -8	Strong Wind	0	0	1.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	2/22/22	14:00	PST -8	Strong Wind	0	0	0.10K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	3/19/22	14:00	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	3/19/22	15:00	PST -8	Strong Wind	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	3/19/22	15:00	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	3/19/22	15:00	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	3/20/22	1:51	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	3/21/22	2:30	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	3/28/22	8:53	PST -8	Strong Wind	0	0	1.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/24/22	4:46	PST -8	Strong Wind	0	0	1.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/24/22	5:36	PST -8	Strong Wind	0	0	1.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	11/15/22	0:00	PST -8	Strong Wind	0	0	5.00K	0.00K

SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/14/23	21:06	PST -8	Strong Wind	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	1/16/23	6:18	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/23/23	0:01	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	1/23/23	2:29	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/23/23	7:32	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	1/31/23	14:00	PST -8	Strong Wind	0	0	1.00K	0.00K
MORONGO BASIN (ZONE)	MORONGO BASIN (ZONE)	CA	7/30/23	17:18	PST -8	Strong Wind	0	0	0.00K	0.00K
WESTERN MOJAVE DESERT (Z...	WESTERN MOJAVE DESERT (Z...	CA	8/13/23	15:44	PST -8	Strong Wind	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	11/20/23	7:30	PST -8	Strong Wind	0	0	1.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	11/20/23	7:30	PST -8	Strong Wind	0	0	1.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	11/20/23	8:30	PST -8	Strong Wind	0	0	1.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	11/20/23	9:15	PST -8	Strong Wind	0	0	2.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	11/20/23	12:45	PST -8	Strong Wind	0	0	2.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	11/20/23	13:20	PST -8	Strong Wind	0	0	2.00K	0.00K
Totals:							**0**	**1**	**179.1K**	**2.037M**

According to NOAA, 6 lightning events were reported between 01/01/2019 and 12/31/2023 (1,826 days).

Table 4-38. Lightning Events in San Bernardino County (2019-2023)

Location	County	State	Date	Time	T.Z.	Type	Dth	Inj	PrD	CrD
Totals:							**0**	**0**	**40.0K**	**2.00 K**
HECTOR	SAN BERNARDINO CO.	CA	6/23/21	17:45	PST-8	Lightning	0	0	10.00 K	0.00 K
BIG BEAR CITY	SAN BERNARDINO CO.	CA	7/31/21	11:30	PST-8	Lightning	0	0	0.00K	1.00 K
MOONRIDGE	SAN BERNARDINO CO.	CA	8/10/21	12:00	PST-8	Lightning	0	0	10.00 K	0.00 K
MENTONE	SAN BERNARDINO CO.	CA	9/9/21	14:16	PST-8	Lightning	0	0	0.00K	1.00 K
ARROWBEAR LAKE	SAN BERNARDINO CO.	CA	4/21/22	0:00	PST-8	Lightning	0	0	10.00 K	0.00 K
BARSTOW	SAN BERNARDINO CO.	CA	8/20/23	12:00	PST-8	Lightning	0	0	10.00 K	0.00 K
Totals:							**0**	**0**	**40.0K**	**2.00 K**

4.9.7 Vulnerability and Impacts

Life Safety and Public Health (Extreme Heat): According to NOAA, extreme heat events carry significant health and life safety risks, notably heat-related illnesses such as heat exhaustion and heatstroke. These conditions can be life-threatening if not promptly addressed, with the elderly, young children, and individuals with pre-existing health conditions being particularly susceptible. Dehydration is a common and dangerous consequence of high temperatures, leading to symptoms like dizziness and confusion, and exacerbating the effects of heat-related illnesses. Respiratory problems are also aggravated by the heat, especially in areas with poor air quality, increasing the likelihood of respiratory distress for individuals with chronic respiratory diseases.

Extreme heat also places strain on both the human body and critical infrastructure. The cardiovascular system can be overburdened, heightening the risk of heart-related issues in individuals with underlying heart conditions. Physical and cognitive functions can be impaired due to excessive body strain, which raises the risk of accidents and injuries. Infrastructure such as roads and power lines may fail, causing widespread disruptions. Heatwaves intensify water scarcity, affecting potable water availability and agriculture, and increase the propensity for wildfires, endangering both life and property. These conditions can also lead to a spike in heat-related mortality rates, particularly in vulnerable groups, underscoring the importance of effective heatwave preparedness and response strategies.

Life Safety and Public Health (Hail): According to NOAA, hail events can have several life safety and public health implications. Hailstones, which vary in size from small pellets to golf ball size or larger, can inflict bodily injury to those caught outside during a hailstorm. Such injuries can range from minor bruises to more serious trauma, especially if the hail is large. The risk extends to animals as well, both livestock and pets, which can be severely injured or killed in extreme cases. For the public, hail can pose a significant hazard, prompting advisories for individuals to seek shelter during severe hailstorms.

Beyond direct physical harm, hail can cause substantial property damage, affecting homes, vehicles, and critical infrastructure like power lines and roofing. The resulting debris from damaged structures can lead to secondary public health concerns, such as obstructed roadways that impede emergency and medical services. Crop damage is another significant impact of hail events, which can compromise local food supplies and economic stability in agricultural communities. In the aftermath of severe hail, cleanup and repair efforts pose additional health risks, with individuals potentially exposed to injury from debris removal or structural repairs. NOAA emphasizes preparedness and timely weather warnings to mitigate these risks, urging the public to heed hailstorm advisories and take protective actions.

Life Safety and Public Health (High Winds): According to NOAA, high winds present a range of health and life safety impacts including direct physical risks, such as injuries or fatalities caused by flying debris, falling trees, or structural damage. Individuals who are outdoors during high winds are particularly vulnerable to being struck by debris. Additionally, high winds can cause significant property damage, including roof damage, broken windows, and structural failures, resulting in both financial losses and safety risks for occupants.

Strong winds can also damage power lines and electrical infrastructure, leading to power outages. These outages can disrupt essential services, affect communication systems, and impact public safety and emergency response efforts. High winds also make travel hazardous, especially for high-profile vehicles, leading to accidents, road closures, and transportation delays, thereby posing safety risks for drivers and passengers.

In addition, strong winds can exacerbate wildfires, causing them to spread rapidly and intensify, which threatens life and property. Damage to telecommunication infrastructure can disrupt emergency communication systems, hindering the ability to convey critical information and coordinate response efforts.

Life Safety and Public Health (Lightning): According to NOAA, lightning poses health and life safety impacts and can cause injuries and fatalities, with victims potentially suffering from burns, cardiac arrest, neurological damage, and other severe health consequences. The risk is notably higher for individuals engaged in outdoor activities during thunderstorms. Additionally, lightning can lead to structural fires when it strikes buildings, trees, or other objects, thereby increasing the risk of injuries and property damage.

Lightning strikes to power lines and electrical equipment can result in power outages, affecting critical infrastructure and disrupting emergency services, which can hinder public safety responses. Lightning is also a common cause of wildfires, which can spread rapidly and pose severe threats to communities, property, and public safety. Moreover, lightning can damage communication equipment and infrastructure, impacting emergency communication systems and obstructing the conveyance of life-saving information.

Property Damage and Critical Infrastructure (Extreme Heat): According to NOAA, extreme heat can lead to property damage and critical infrastructure impacts. Prolonged exposure to high temperatures can cause structural damage to buildings and transportation networks, affecting road surfaces and railway tracks. High demand for electricity during heatwaves can strain electrical grids, resulting in power outages that impact homes, businesses, and critical facilities. Water supply shortages and reduced water quality may occur due to drought conditions. Healthcare facilities may be overwhelmed with patients suffering from heat-related illnesses, affecting critical healthcare infrastructure. Extreme heat can also disrupt telecommunications equipment and communication systems and contribute to the ignition and spread of wildfires, resulting in property damage and environmental impacts. Lastly, vulnerable populations are at increased risk of heat-related illnesses, and public safety concerns arise, regarding strained emergency response and healthcare systems.

Property Damage and Critical Infrastructure (Hail): According to NOAA, hail incidents can impact property and critical infrastructure and cause billions of dollars in damage to structures, crops, and livestock. The severity of impact depends on the size and intensity of the hailstones. For example, hailstones can damage roofs, windows, and siding on buildings, often leading to costly repairs and maintenance. Vehicles left unprotected during hailstorms are also highly susceptible to damage, such as dents and broken windshields.

Hail can also disrupt critical infrastructure by damaging power lines and causing power outages. These outages can affect essential services, including emergency response systems, healthcare facilities, and communication networks. The damage to electrical infrastructure can lead to extended periods of downtime, impacting businesses and residential areas alike.

In agricultural areas, hailstorms can destroy crops, leading to significant economic losses for farmers. The impact on crops can also disrupt the food supply chain, affecting prices and availability of produce. Additionally, hail can harm livestock, leading to direct financial losses and affecting the overall productivity of farming operations.

Property Damage and Critical Infrastructure (High Winds): According to the NOAA, high winds can cause property damage and disrupt critical infrastructure. High winds often lead to significant financial losses and safety hazards by damaging roofs, windows, and siding on buildings, as well as vehicles. Severe wind events can result in partial or complete structural collapse, posing immediate risks to occupants and potentially causing fatalities.

Regarding critical infrastructure, high winds frequently cause power outages by damaging power lines and transformers. These outages disrupt essential services such as healthcare, emergency response, and communications, and restoration efforts can be time-consuming, especially if the damage is extensive. Additionally, wind damage to telecommunication lines and towers can hinder communication systems, impacting both emergency services and the general public's ability to receive important updates.

Transportation is also impacted by high winds, which can make travel dangerous by reducing road visibility, causing vehicles to lose control, and leading to road closures. This increases the likelihood of transportation delays and accidents, particularly for high-profile vehicles like trucks and buses. Lastly, high winds can exacerbate other natural hazards such as wildfires by rapidly spreading flames and can contribute to secondary hazards like flooding and landslides when combined with heavy rainfall.

4.9.8 Economy

Extreme Heat: According to NOAA, there are many economic impacts associated with extreme heat including increased healthcare costs resulting from a surge in heat-related illnesses, which necessitate medical treatment and contribute to healthcare expenditures. Extreme heat can also lead to reduced productivity in various economic sectors, impacting labor efficiency and overall economic output. During heatwaves, cooling demands soar, driving up energy consumption, elevating utility bills, and placing strain on energy infrastructure.

The agricultural sector is also impacted by extreme heat due to damaged crops, reducing yields and affecting agriculture, thereby disrupting food supply chains and causing financial losses for farmers. Additionally, high temperatures can stress transportation infrastructure, causing road buckling, rail deformation, and necessitating repairs. Water resources may also face increased demand, requiring additional treatment and distribution efforts, which come with associated costs. The tourism and outdoor recreation industries can be adversely affected as extreme heat deters tourists and outdoor enthusiasts, impacting local economies dependent on these sectors. In the realm of insurance, heightened heat-related property and infrastructure damage may lead to higher premiums for individuals and businesses. Lastly, prolonged periods of extreme heat heighten the risk of wildfires, incurring costs associated with property damage, ecosystem disruption, firefighting efforts, and resource allocation.

Hail: According to NOAA, hail events can have economic impacts, due to the damage they inflict on vehicles, homes, and agriculture. Automobiles exposed to hail can sustain dents and broken glass, leading to expensive repairs and insurance claims. Residential and commercial roofing can be severely damaged, necessitating costly repairs or replacements. For the insurance industry, hailstorms often result in a high volume of claims, impacting their financial reserves and potentially leading to higher insurance premiums for customers in hail-prone areas.

The agricultural sector is especially vulnerable to hail events. Crops can be devastated by hail, leading to a loss of yield for farmers and affecting the local and regional food supply, which can drive up food prices. Hail can also damage greenhouses and farm equipment, adding to the financial burden on agricultural businesses. The cumulative economic effect of hail includes not only the direct costs of damage and repairs but also the indirect costs associated with business interruptions and the increased prices of goods and services affected by the loss of crops and property damage.

High Winds: According to NOAA, high winds can impact public health and life safety impacts. Firstly, they present direct physical risks such as flying debris, falling trees, or structural damage, which can result in injuries and fatalities. Individuals who are outdoors during strong winds are particularly vulnerable to being struck by debris. In addition to physical injuries, high winds can cause extensive property damage, including roof damage, broken windows, and structural failures. This not only leads to substantial financial losses but also poses safety risks to the occupants of the affected buildings.
Furthermore, strong winds can damage power lines and other electrical infrastructure, leading to power outages. These outages can disrupt essential services, hinder communication systems, and impact public safety and emergency response efforts. High winds also make travel hazardous, especially for high-profile vehicles, leading to accidents, road closures, and transportation delays, thereby posing safety risks for drivers and passengers.
Moreover, high winds can exacerbate wildfires, causing them to spread rapidly and intensify, thus posing significant threats to life and property. Additionally, damage to telecommunication infrastructure can disrupt emergency communication systems, hampering the ability to convey critical information and coordinate response efforts effectively. High winds can also trigger secondary hazards such as landslides, storm surges, and flooding, depending on the specific weather event and geographical location.

Lightning: According to NOAA, lightning can impact public health and life safety including injuries and/or fatalities, with victims potentially experiencing burns, cardiac arrest, neurological damage, and other serious health consequences. The risk is particularly elevated for individuals engaged in outdoor activities during thunderstorms. Additionally, lightning can lead to electrical fires when it strikes buildings, trees, or other objects, increasing the risk of injuries and property damage.

Lightning strikes can also cause power outages by damaging power lines and electrical equipment. These outages can disrupt critical infrastructure, emergency services, and public safety responses and further impede communications and infrastructure, impacting emergency communication systems and hindering the ability to convey life-saving information. Lastly, lightning is a common cause of wildfires, which can spread rapidly and pose severe threats to communities, property, and public safety. It can also trigger secondary hazards, such as flash floods and landslides, which further endanger public safety.

4.9.9 Changes in Development and Impact to Future Development

Extreme Heat: According to NOAA, extreme heat events can impact changes in development and future urban planning and construction. As temperatures rise, cities and developers are increasingly considering the heat resilience of buildings and infrastructure. Currently, there's an increasing emphasis on designing structures that can withstand high temperatures while minimizing the need for energy-intensive cooling methods. This includes integrating materials that reflect rather than absorb heat, enhancing natural ventilation, and increasing green spaces to reduce the urban heat island effect. Additionally, there's a trend toward "cool roofs," urban tree canopies, and permeable pavements to manage heat.

In many areas, climate-resilient urban planning is becoming a priority to accommodate the anticipated increase in frequency and severity of heatwaves due to climate change. This planning involves the creation of heat action plans, the development of early warning systems, and the construction of cool refuges to protect vulnerable populations. Water resource management also becomes more critical in the design of new developments, as extreme heat can exacerbate water scarcity. Communities are also re-evaluating building codes, zoning laws, and development policies to ensure that new constructions and city expansions are both sustainable and resilient in the face of rising temperatures.

Hail: According to NOAA, hail events can impact development and construction practices, particularly in hail-prone regions. The frequency and intensity of hailstorms can influence the choice of building materials or design considerations in new constructions. In addition, there is an increasing emphasis on using hail-resistant materials, especially for roofing and siding. For instance, the adoption of impact-resistant shingles and reinforced glass is becoming more common to reduce damage and subsequent repair costs. Lastly, architectural designs are evolving to include features that can minimize hail damage, such as protective overhangs and the strategic placement of vulnerable elements like windows and skylights.

Urban and regional planning is also accounting for the risk of hail events. This involves selecting appropriate materials and designs for buildings and considering the broader impact on infrastructure such as transportation and utilities. Finally, the agricultural sector is particularly vulnerable to hail, is also adapting through the use of protective structures like hail nets over crops.

High Winds: According to NOAA, high wind events can influence changes in development and future planning. Given that high winds can cause damage to buildings, power lines, and other infrastructure, urban planners and developers are typically prompted to reconsider/update building codes and construction practices to enhance the resilience of structures against high wind events. There also may be an increased emphasis on using materials and designs that can withstand strong winds to minimize damage, depending on the structure such as a high-rise building.
High wind events can also impact the planning and placement of critical infrastructure including power lines, communication towers, and other essential services that could be relocated to reduce vulnerability to wind damage. The disruption of power and

communication services during high wind events highlights the need for more robust and redundant systems that can quickly recover from such incidents.

Future development strategies may also incorporate more comprehensive emergency preparedness and response plans to address risks associated with high winds, including the creation of buffer zones, implementing better land-use practices, and/or investing in technologies that improve early warning systems and weather forecasting capabilities.

Lightning: According to NOAA, lightning events can influence changes in development and future planning, due to its ability to cause extensive damage to property, ignite wildfires, and disrupt critical infrastructure. These impacts necessitate changes in building codes, construction practices, and urban planning to mitigate the risks associated with lightning.

One significant impact of lightning is the potential for structural fires when it strikes buildings, trees, or other objects. This can lead to increased emphasis on the use of fire-resistant materials and the implementation of advanced lightning protection systems in new developments. Additionally, lightning can cause power outages by damaging power lines and electrical equipment, prompting the need for more resilient electrical infrastructure and backup power solutions in both urban and rural areas.

Lightning can also affect communication systems, damaging equipment and infrastructure essential for emergency services. This disruption highlights the need for robust and redundant communication networks to ensure continuous operation during severe weather events. Furthermore, the occurrence of lightning-ignited wildfires necessitates changes in land-use planning, particularly in areas prone to wildfires. This includes creating buffer zones, using fire-resistant landscaping, and improving early detection and response systems for wildfires.

4.9.10 Effects of Climate Change on Severity of Impacts

Extreme Heat: According to the NOAA, climate change is impacting the severity and frequency of extreme heat events. As global temperatures rise due to increasing greenhouse gas emissions, extreme heat events are becoming more intense, frequent, and prolonged. NOAA data indicates that heatwaves are occurring earlier in the year and lasting longer, leading to higher temperatures than historically recorded. This increase in temperature exacerbates the urban heat island effect in cities, where concrete and asphalt store and re-radiate heat, further intensifying the impact of extreme heat events in these areas.

The compounding effects of climate change on extreme heat also have broader ecological impacts, such as altering natural ecosystems and increasing the risk of wildfires. Higher temperatures contribute to more significant evaporation and soil dryness, which in turn can lead to drought conditions, affecting water supplies and agriculture. Additionally, the changing patterns of extreme heat are impacting public health, with increases in heat-related illnesses and deaths, particularly among vulnerable populations such as the elderly, children, and those with pre-existing health conditions.

Hail: According to NOAA, climate change is impacting the severity of hail events, including an increase in the intensity of hailstorms. As global temperatures rise, the atmosphere can hold more moisture, leading to greater instability and energy, which are critical factors for the formation of thunderstorms that produce hail. This can result in stronger updrafts in thunderstorms, essential for the formation of larger hailstones. Consequently, while the frequency of hail events may not necessarily increase, the intensity and size of the hail produced during these events could also escalate, leading to more significant damage.

According to NOAA, the relationship between climate change and hail is intricate and varies by region. In some areas, warming temperatures might actually reduce the likelihood of hail by increasing the height at which hail melts before reaching the ground. This could lead to a decrease in the number of hail events or a shift in their geographical distribution. Lastly, climate change may affect the seasonality of hail, potentially altering the timing of hailstorms and impacting agricultural planning and preparedness.

High Winds: According to NOAA, climate change is likely to increase the severity of high wind events. As global temperatures rise, the atmosphere holds more moisture, which can lead to more intense storms and stronger wind events. Warmer temperatures can enhance atmospheric instability, which contributes to the formation of severe storms and high wind occurrences. Additionally, changes in the jet stream patterns, influenced by the warming Arctic, can result in more frequent and intense high wind events.

These changes can lead to more extreme weather patterns, including stronger and more persistent high winds. These intensified winds have the potential to cause greater damage to infrastructure, increase the frequency of power outages, and amplify risks to public safety.

Lightning: According to NOAA, climate change is expected to increase the severity of lightning events. Warmer global temperatures lead to more intense thunderstorms, as the atmosphere can hold more moisture and energy, which are key factors in the formation of lightning. Increased atmospheric instability due to higher temperatures contributes to the development of more frequent and severe thunderstorms. In addition, studies have indicated that for every degree Celsius increase in global temperatures, the frequency of lightning strikes could increase by approximately 12%. This heightened activity poses greater risks of wildfires, power outages, and damage to critical infrastructure, all of which can have significant economic and safety implications.

Table 4-39. 25-Year Precipitation Projections for City of Chino, CA

25-YEAR PRECIPITATION PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **6% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.2″ decrease** (from 3.2″ to 3.4″) in average annual precipitation.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **2% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.3″ decrease** (from 3.1″ to 3.18″) in average annual precipitation.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/600013210/explore/climate)

Table 4-40. 25-Year Climate Projections for City of Chino, CA

25-YEAR CLIMATE PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **46% increase** in extremely hot days within 25 years.
By 2049, The City of Chino is expected to have a **2°F increase** (from 66°F to 69°F) in average annual temperatures.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **33% increase** in extremely hot days within 25 years.
By 2049, The City of Chino is expected to have a **2°F increase** (from 66°F to 68°F) in average annual temperatures.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/6071/explore/climate)

Table 4-41. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation:							
Annual Average Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation (Wet Days)	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Maximum Period of Consecutive Wet Days	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**5 days**
	5-6	5-7	4-7	4-7	4-7	4-7	3-9
Annual Days With:							
Annual Days With Total Precipitation > 1 inch	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**
	1-1	0-1	1-1	0-1	0-1	0-1	0-1
Annual Days With Total Precipitation > 2 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days With Total Precipitation > 3 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days That Exceed 99th Percentile Precipitation	2 days	2 days	3 days	2 days	3 days	3 days	3 days
	1-16	1-17	1-18	1-17	1-18	1-19	1-19
*Days With Maximum Temperature Below 32*F*	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Source: Climate Mapping for Resilience and Adaptation (2024)							

Table 4-42. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	**Higher Emissions**	**Lower Emissions**	**Higher Emissions**	**Lower Emissions**	**Higher Emissions**
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation							
Average Annual Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Days Per Year With No Precipitation	**321 days**	**322 days**	**323 days**	**324 days**	**325 days**	**324 days**	**327 days**
	318-322	316-329	314-333	316-331	312-334	314-332	300-344
Maximum Number Of Consecutive Dry Days	**78 days**	**82 days**	**81 days**	**83 days**	**85 days**	**84 days**	**92 days**
	70-94	67-100	68-95	72-101	71-106	69-108	69-140
Temperature Thresholds							
Annual days with Maximum temperature > 90°	**114 days**	**133 days**	**135 days**	**141 days**	**147 days**	**148 days**	**169 days**
	114-121	127-143	120-147	131-154	134-161	137-163	152-188
Annual days with Maximum temperature > 100°	**52 days**	**69 days**	**72 days**	**78 days**	**85 days**	**87 days**	**111 days**
	49-54	59-84	60-87	66-99	73-108	74-99	97-143
Source: Climate Mapping for Resilience and Adaptation (2024)							

4.9.11 FEMA NRI Expected Annual Loss Estimates

Table 4-43. San Bernardino County Expected Annual Loss Table

CITY OF CHINO CA FEMA NRI EXPECTED ANNUAL LOSS TABLE – EXTREME HEAT							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
4.45 events per year	0.00065	$ 7,578.37	$ 0.084	$ 24,324	$31,902.45	50.21	Relatively Moderate
CITY OF CHINO, CA FEMA NRI EXPECTED ANNUAL LOSS TABLE – HAIL							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0.13 events per year	0.0006	$ 7,578.38	$118.69	$ 86.70	$ 6,101.20	29.56	Very Low
CITY OF CHINO, CA FEMA NRI EXPECTED ANNUAL LOSS TABLE – HIGH WIND							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0.22 events per year	0.00003	$ 6,703.48	$ 6516.08	$ 0.82	$13,220.38	18.02	Very Low
CITY OF CHINO, CA FEMA NRI EXPECTED ANNUAL LOSS TABLE – LIGHTNING							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0.78 events per year	0.0003	$ 3,246.61	$ 819.43	N/A	$4,066.04	4.98	Very Low
***Annualized Frequency**: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. **Population**: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. **Expected Annual Loss** scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2024)							

4.9.12 FEMA Hazard-Specific Risk Index Table

Table 4-44. San Bernardino County FEMA Hazard Specific Risk Index Table

CITY OF CHINO, CA FEMA HAZARD SPECIFIC RATINGS – EXTREME HEAT		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
52.15	Relatively High	Relatively Low
CITY OF CHINO, CA FEMA HAZARD SPECIFIC RATINGS - HAIL		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
29.70	Relatively High	Relatively Low
CITY OF CHINO, CA FEMA HAZARD SPECIFIC RATINGS – HIGH WIND		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
17.19	Relatively High	Relatively Low
CITY OF CHINO, CA FEMA HAZARD SPECIFIC RATINGS – LIGHTNING		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
5.37	Relatively High	Relatively Low
***Risk Index Scores**: are a quantitative rating calculated using data for only a single hazard type. Risk Index Scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.* ***Social Vulnerability Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).* ***Community Resilience Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).*		
Source: FEMA National Risk Index (2024)		

4.9.13 FEMA NRI Exposure Value Table

Table 4-45. San Bernardino County FEMA NRI Exposure Value Table

CITY OF CHINO, CA FEMA EXPOSURE VALUE TABLE – EXTREME HEAT					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
Extreme Heat	$1,343,572,557,379	$26,538,369,569	$1,316,913,200,000	113,527	$ 120,987,810
CITY OF CHINOCA FEMA EXPOSURE VALUE TABLE - HAIL					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
Hail	$1,343,572,557	$26,538,369,569	$1,316,913,200,000	113,527	$12,098,781,0
CITY OF CHINO, CA FEMA EXPOSURE VALUE TABLE – HIGH WIND					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
High Wind	$1,343,572,557	$26,538,369,569	$1,316,913,200,000	113,527	$120,987,810
CITY OF CHINO, CA FEMA EXPOSURE VALUE TABLE – LIGHTNING					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
Lightning	$1,343,451,569,569	$26,538,369,569	$1,316,913,200,000	113,527	N/A

***Buildings**: Building exposure value is defined as the dollar value of the buildings determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible building exposure of an area (Census block, Census tract, or county) is its building value as recorded in Hazus 6.0, which provides 2022 valuations of the 2020 Census.*
***Population:** Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible population exposure of an area (Census block, Census tract, or county) is its population as recorded in Hazus 6.0. Population loss is monetized into a population equivalence value using a VSL approach in which each fatality or ten injuries is treated as $11.6 million of economic loss (2022 dollars).*
***Agriculture:** Agriculture exposure value is defined as the estimated dollar value of the crops and livestock determined to be exposed to a hazard according to a hazard type-specific methodology. This is derived from the USDA 2017 Census of Agriculture county-level value of crop and pastureland with 2018 values for the US territories. All dollar values are inflation-adjusted to 2022 dollars.*

Source: FEMA National Risk Index (2024)

4.10 Extreme Cold

4.10.1 Hazard Description

NOAA defines extreme cold as a period of excessively low temperatures that significantly fall below the long-term average for a specific location. This definition takes into account the local climate and expected temperature ranges. Extreme cold events are typically characterized by a prolonged duration of very cold weather, often accompanied by harsh wind chills, which can pose significant risks to human health, safety, and infrastructure. NOAA often uses specific temperature thresholds to define extreme cold conditions, and they issue advisories and warnings, such as Wind Chill Advisories and Extreme Cold Warnings, to alert the public to these hazardous conditions. During extreme cold events, there is an increased risk of cold-related illnesses, such as frostbite and hypothermia, and the potential for damage to water systems, transportation infrastructure, and power grids. Extreme cold events are a concern, especially during the winter months, and can vary in intensity based on geographical location and local climate.

4.10.2 Hazard Location

Extreme Cold could occur anywhere in the City of Chino.

4.10.3 Hazard Extent/Intensity

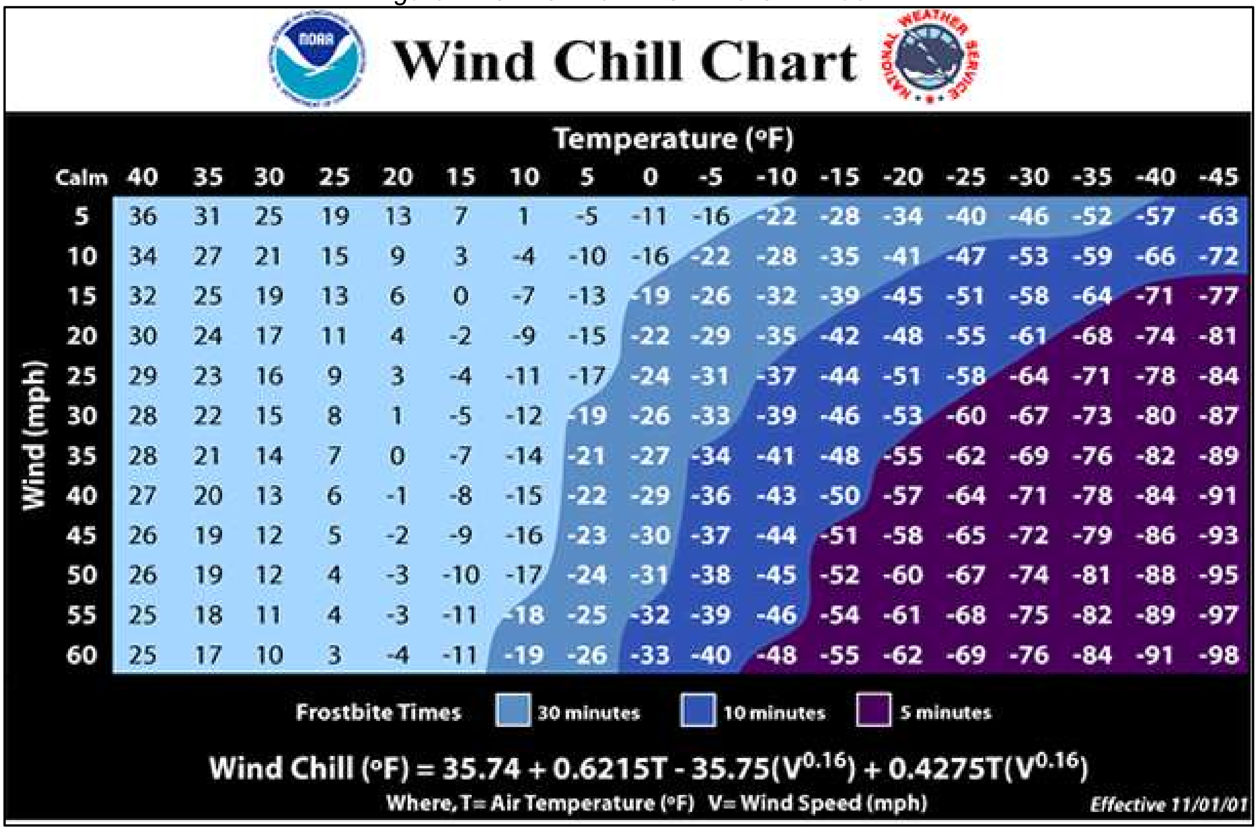
Extreme Cold: NOAA measures the extent and intensity of extreme cold using a combination of meteorological tools and observation networks. The assessment of extreme cold conditions involves analyzing various data points and indicators, including:

- <u>Temperature Readings</u>: NOAA uses a network of weather stations and temperature sensors to record air temperature data. During extreme cold events, temperature readings well below the normal or seasonal averages are noted. Extremely low temperatures are a primary indicator of the intensity of extreme cold conditions.
- <u>Wind Chill Index</u>: In addition to actual air temperature, NOAA calculates the wind chill index. This index reflects how cold it feels to the human body and is determined by a combination of air temperature and wind speed. A lower wind chill index indicates more severe cold conditions.
- <u>Historical Climate Data</u>: NOAA maintains extensive records of historical climate data, including records of the lowest temperatures ever recorded in specific locations. Comparing current temperatures to historical records helps assess the extremeness of the cold event.
- <u>Duration of Extreme Cold</u>: The length of time that extreme cold conditions persist is another factor in assessing their intensity. Prolonged periods of extreme cold can have more significant impacts on both the environment and human health.
- <u>Wind Speed and Gusts</u>: Wind speed and gusts can exacerbate the intensity of extreme cold. NOAA monitors these parameters to determine whether wind-driven cold temperatures are causing more significant issues.
- <u>Real-Time Monitoring</u>: NOAA continuously collects real-time data from weather stations and sensors to monitor the current conditions during an extreme cold event. These data points provide insights into the extent and intensity of the event.
- <u>Public Reports</u>: Reports from the public, including trained weather spotters and community members, are valuable sources of information regarding the extent and impacts of extreme cold. Public reports contribute to NOAA's understanding of the real-time conditions on the ground.

NOAA uses all these tools and data sources to assess the extent and intensity of extreme cold conditions and to issue appropriate advisories and warnings, such as Wind Chill

Warnings and Extreme Cold Warnings, to inform the public and provide guidance on how to stay safe during extreme cold events.

Figure 4.18. NOAA / NWS Wind Chill Index



Wind (mph) \ Temperature (°F): Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

4.10.4 Frequency/Probability

Extreme Cold Frequency: Between 01/01/2019 and 12/31/2023 San Bernardino County recorded no extreme cold events.

Extreme Cold Probability: NOAA measures the probability of extreme cold using meteorological tools and data analysis. It closely monitors temperature forecasts and calculates the Wind Chill Index, which assesses the impact of temperature and wind speed on human comfort. Advanced meteorological models are used to forecast extreme cold events by considering atmospheric conditions, high-pressure systems, temperature anomalies, and other relevant factors. Historical climate data and records of the lowest temperatures recorded in specific areas aid in evaluating the probability of extreme cold. NOAA also examines the expected duration and intensity of extreme cold, particularly during prolonged periods of low temperatures. Collaboration with public health agencies enhances the analysis of cold-related illnesses, and advisories and warnings are issued to provide the public with information about the likelihood of extreme colds, health risks, and recommended safety measures.

4.10.5 Past Events

Between 01/01/2019 and 12/31/2023 San Bernardino County recorded no extreme cold events.

4.10.6 Vulnerability and Impacts

Life Safety and Public Health: According to NOAA, extreme cold poses the following health and life safety impacts:

- Hypothermia: Exposure to extreme cold can lead to hypothermia, a life-threatening condition where the body loses heat faster than it can produce it. Hypothermia can cause confusion, loss of consciousness, and, if not treated promptly, death.
- Frostbite: Frostbite occurs when skin and underlying tissues freeze, typically affecting extremities like fingers, toes, ears, and the nose. Severe frostbite can result in tissue damage and the need for amputation.
- Respiratory Issues: Cold air can exacerbate respiratory conditions, such as asthma, and increase the risk of respiratory distress, particularly in areas with high levels of air pollution.
- Cardiovascular Stress: Extreme cold can strain the cardiovascular system, increasing the risk of heart-related complications, especially in individuals with heart conditions.
- Slips and Falls: Icy and slippery conditions increase the risk of slips, trips, and falls, which can lead to injuries, fractures, and head trauma.
- Transportation Disruption: Cold weather can impact transportation systems, causing road closures, flight cancellations, and delays, which can pose safety risks for travelers.
- Power Outages: Extreme cold can damage power lines and electrical infrastructure, leading to power outages that can affect critical services, including heating and medical equipment.
- Water Infrastructure Issues: Freezing temperatures can damage water supply systems and lead to water shortages or frozen pipes, affecting drinking water availability.
- Snow-Related Hazards: Heavy snowfall and blizzards can lead to snow accumulation, road closures, and the risk of being trapped in vehicles or homes.
- Shelter and Homelessness: Extreme cold poses particular risks to individuals experiencing homelessness, who may lack access to shelter and adequate protection from the elements.

Property Damage and Critical Infrastructure: According to NOAA, extreme cold can lead to property damage and critical infrastructure impacts. Low temperatures can result in frozen and burst water pipes, heating system failures, road and transportation infrastructure damage, and power outages, affecting homes, businesses, and critical facilities like hospitals. Healthcare facilities may struggle to provide care in frigid conditions, and transportation disruptions, including road closures and accidents, can impact critical infrastructure and supply chains. Communication equipment can be affected, potentially hindering emergency communication systems, and snow accumulation can stress roofs and structures, leading to damage. Finally, extreme cold poses health risks, particularly for vulnerable populations, and can strain emergency response and healthcare systems.

4.10.7 Economy

According to NOAA, Extreme cold has a range of economic impacts including healthcare costs stemming from cold-related illnesses and injuries, which result in medical expenses. Severe cold can also disrupt daily activities, reduce productivity across various economic sectors, and affect labor efficiency, impacting overall economic output. Cold weather necessitates increased heating demands, driving up energy consumption, utility bills, and placing strain on energy infrastructure. The agricultural sector is also vulnerable to extreme cold, which can damage crops and agricultural operations, causing food supply disruptions and financial losses for farmers. Transportation disruptions, including road closures, accidents, and heightened maintenance requirements, can affect supply chains and commerce. Infrastructure, such as roads, bridges, and water supply systems, is stressed by freezing temperatures, necessitating repairs and maintenance.

Extreme cold events may also increase the demand for emergency response and public safety services, resulting in additional costs, and can necessitate emergency shelters and services for vulnerable populations, incurring expenses for local governments. Insurance premiums for individuals and businesses may rise due to increased cold-related property damage. Lastly, extreme cold can harm wildlife and ecosystems, leading to conservation and recovery efforts.

4.10.8 Changes in Development and Impact to Future Development

According to NOAA, extreme cold events can impact current and future development. In areas prone to such conditions, there is an increasing emphasis on constructing buildings and infrastructure that can withstand the rigors of extreme cold. This includes enhanced insulation, robust heating systems, and materials resistant to freezing and thawing cycles. Building codes are also being revised to incorporate these considerations, ensuring structures are not only energy-efficient but also resilient to cold-related damages like burst pipes and ice accumulation. Urban planning is also focusing on ensuring essential services and transportation remain operational during severe cold events, and that communities, (especially vulnerable populations), have access to adequate heating and emergency services.

According to NOAA, the frequency and intensity of extreme cold events can potentially be exacerbated by climate change and are being factored into long-term development strategies. This involves planning for increased energy demands during cold snaps, incorporating sustainable and renewable energy sources, and developing emergency response protocols for cold weather events. Additionally, environmental considerations, such as the ecological impact of road salt and other ice-melting agents, are becoming a part of the planning process.

4.10.9 Effects of Climate Change on the Severity of Impacts

According to NOAA, climate change can lead to various effects on the severity of extreme cold events. While global temperatures are generally rising, shifts in atmospheric circulation patterns and disruptions in polar vortex behavior can contribute to more variable and severe cold weather in specific regions. These changes can result in intense cold snaps and frigid conditions, even during overall warming trends. Extreme cold events can also have adverse effects on public safety, infrastructure, and agriculture.

Table 4-46. 25-Year Precipitation Projections for City of Chino, CA

25-YEAR PRECIPITATION PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **6% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.2″ decrease** (from 3.2″ to 3.4″) in average annual precipitation.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **2% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.3″ decrease** (from 3.1″ to 3.18″) in average annual precipitation.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/600013210/explore/climate)

Table 4-47. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation:							
Annual Average Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation (Wet Days)	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Maximum Period of Consecutive Wet Days	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**5 days**
	5-6	5-7	4-7	4-7	4-7	4-7	3-9
Annual Days With:							
Annual Days With Total Precipitation > 1 inch	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**
	1-1	0-1	1-1	0-1	0-1	0-1	0-1
Annual Days With Total Precipitation > 2 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days With Total Precipitation > 3 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days That Exceed 99th Percentile Precipitation	2 days	2 days	3 days	2 days	3 days	3 days	3 days
	1-16	1-17	1-18	1-17	1-18	1-19	1-19
*Days With Maximum Temperature Below 32*F*	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Source: Climate Mapping for Resilience and Adaptation (2024)							

4.10.10 FEMA NRI Expected Annual Loss Estimates

Table 4-48. San Bernardino County Expected Annual Loss Table

CITY OF CHINO, CA FEMA NRI EXPECTED ANNUAL LOSS TABLE – EXTREME COLD							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0 events per year	0.00	$0	$0	N/A	$0	0.00	No Expected Annual Loss
Annualized Frequency: *The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population***: *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss*** *scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2024)							

4.10.11 FEMA Hazard-Specific Risk Index Table

Table 4-49. City of Chino FEMA Hazard Specific Risk Index Table

CITY OF CHINO, CA FEMA HAZARD SPECIFIC RATINGS – EXTREME COLD		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
0.00	Very High	Relatively Moderate
Risk Index Scores: *are a quantitative rating calculated using data for only a single hazard type. Risk Index Scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.* ***Social Vulnerability Ratings***: *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).* ***Community Resilience Ratings***: *are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).*		
Source: FEMA National Risk Index (2024)		

4.10.12 FEMA NRI Exposure Value Table

Table 4-50. City of Chino FEMA NRI Exposure Value Table

CITY OF CHINO, CA FEMA EXPOSURE VALUE TABLE – EXTREME COLD					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
Extreme Cold	$0	$0	$0	$0	$0
***Buildings**: Building exposure value is defined as the dollar value of the buildings determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible building exposure of an area (Census block, Census tract, or county) is its building value as recorded in Hazus 6.0, which provides 2022 valuations of the 2020 Census.* ***Population:** Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible population exposure of an area (Census block, Census tract, or county) is its population as recorded in Hazus 6.0. Population loss is monetized into a population equivalence value using a VSL approach in which each fatality or ten injuries is treated as $11.6 millions of economic loss (2022 dollars).* ***Agriculture:** Agriculture exposure value is defined as the estimated dollar value of the crops and livestock determined to be exposed to a hazard according to a hazard type-specific methodology. This is derived from the USDA 2017 Census of Agriculture county-level value of crop and pastureland with 2018 values for the US territories. All dollar values are inflation-adjusted to 2022 dollars.*					
Source: FEMA National Risk Index (2024)					

4.11 Tornado

4.11.1 Hazard Description

The National Weather Service describes a tornado as a violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena. Like hail, most tornadoes are spawned by supercell thunderstorms. They usually last only a few minutes, although some have lasted more than an hour and traveled several miles.

4.11.2 Hazard Location

A tornado incident could occur anywhere within the City of Chino.

4.11.3 Hazard Extent/Intensity

Wind speeds within tornadoes are estimated based on the damage caused and expressed using the Enhanced Fujita (EF) Scale.

Table 4-51. Header Enhanced Fujita (EF) Scale

EF Scale	Class	Windspeed (mph)	Windspeed (km/h)	Description
EF0	Weak	65–85	105–137	Gale
EF1	Weak	86–110	138–177	Weak
EF2	Strong	111–135	178–217	Strong
EF3	Strong	136–165	218–266	Severe
EF4	Violent	166–200	267–322	Devastating
EF5	Violent	> 200	> 322	Incredible
Source: NOAA (2024)				

4.11.4 Frequency and Probability

Frequency: Between 01/01/2019 and 12/31/2023 San Bernardino County recorded one tornadic event over 1,826 days. This averages 0.00054765 incidents per day during this time and 0.20 incidents annually.

Probability: To measure tornado probability, NOAA uses atmospheric data from satellites, radar systems, weather stations, and weather balloons. This includes information on temperature, humidity, atmospheric pressure, and wind patterns at various altitudes.

Typically, the probability of tornadoes is presented in percentages, reflecting the likelihood of occurrence in specific areas and timeframes. This probabilistic forecasting accounts for the inherent uncertainties in weather prediction. Meteorologists interpret this data and model outputs, considering both the current atmospheric situation and historical weather patterns, to assess tornado risks and generate accurate forecasts.

NWS issues tornado watches or warnings based on current conditions for tornadoes. A tornado watch indicates favorable conditions for tornadoes, while a warning signifies an imminent threat, often based on sightings or radar detection. This process involves continuous monitoring and updating of forecasts and warnings to adapt to rapidly changing weather conditions.

4.11.5 Past Events

Location	County	State	Date	Time	TZ	Type	Mag	Dth	Inj	PrD	CrD
Totals:								**0**	**0**	**1.00K**	**0.00K**
SPANGLER	SAN BERNARDINO CO.	CA	4/16/19	15:05	PST-8	Tornado	EF0	0	0	1.00K	0.00K
Totals:								**0**	**0**	**1.00K**	**0.00K**

4.11.6 Vulnerabilities and Impacts

Public Health and Life Safety: According to NOAA, Tornadoes have potential to cause catastrophic life safety and public health impacts. The immediate threat to life from tornadoes can result in fatalities and injuries to humans and animals due to flying debris, collapsing structures, and the sheer force of the tornado itself. The risk to individuals in the path of a tornado is extremely high, as the rapid onset of these events often allows little time for seeking adequate shelter. Post-event, survivors may face a range of health concerns, including trauma, emotional distress, and the potential for injury during rescue efforts or cleanup operations.

Beyond personal safety, tornadoes can devastate critical infrastructure, leading to extended power outages, water supply contamination, and the disruption of healthcare services and emergency response capabilities. The destruction of homes and businesses contributes to public health concerns, displacing residents and potentially causing long-term socioeconomic challenges. The public health system can be strained as medical facilities cope with the influx of casualties and the broader needs of the affected community.

Property Damage and Critical Infrastructure: Tornadoes are among the most destructive weather events, with the potential to cause catastrophic property damage and critical infrastructure impacts, as per NOAA's findings. The intense winds of a tornado, which can exceed 200 miles per hour in the most severe cases, have the force to destroy buildings, homes, and vegetation, leaving a trail of debris. They can displace or overturn vehicles, rip apart roofs, and even lift and destroy well-built structures. The resultant debris can compound the damage by becoming airborne projectiles. For businesses, this means not only structural loss but also potential disruption of operations and economic activity, with recovery and rebuilding efforts often costing significantly.

When it comes to critical infrastructure, tornadoes can result in widespread destruction, compromising public safety and community functionality. They can severely damage power lines and utilities, leading to prolonged power outages and water supply contamination. Transportation infrastructure such as roads, bridges, and railways may be rendered unusable, hindering emergency response efforts and recovery operations. Tornadoes also pose a risk to healthcare infrastructure by damaging hospitals and medical facilities, thereby limiting access to medical care when it is most needed. The extensive damage to infrastructure necessitates comprehensive disaster response plans and resilient construction practices to mitigate the impacts of tornadoes.

Economy: According to NOAA, tornadoes can have severe economic impacts resulting in long-term recovery efforts. Tornadoes can obliterate buildings, homes, infrastructure, and agricultural fields in mere moments, resulting in significant repair and reconstruction costs. The destruction of commercial and industrial facilities can disrupt local economies, leading to job losses, business interruptions, and a reduction in tax revenues for affected communities. Furthermore, the cost burden is often shared by insurance companies, which may face substantial claims following a tornado, potentially increasing premiums for customers and influencing the insurance market's stability.

In addition to property damage, the economic repercussions of tornadoes include the expense of emergency response, debris cleanup, and temporary housing for displaced residents. Long-term economic impacts can be exacerbated by the loss of public services and utilities, reduced property values, and the potential for displaced businesses and residents to relocate permanently. These factors contribute to a complex economic aftermath, which can persist long after the physical debris has been cleared.

Changes in Development and Impact to Future Development: According to NOAA, tornadic events can impact changes in development and future construction practices, particularly in tornado-prone regions. Historical patterns and frequency of occurrence have also led to a focus on building resilience, with an emphasis on stronger construction standards to withstand high winds. This includes reinforcing the structural integrity of buildings, using wind-resistant materials, and incorporating tornado-safe rooms or shelters in both new and existing structures. Architects and engineers are increasingly adopting these enhanced safety measures in building designs, considering factors such as roof shapes and anchoring methods that can reduce wind damage. Finally, there's a growing trend towards community-wide tornado preparedness planning, which includes the development of emergency response strategies and the establishment of public storm shelters.

For future development, understanding and mapping tornado risk areas play a crucial role in urban planning decisions. This can influence zoning regulations, with potential restrictions on development in high-risk areas or requirements for specific building codes in such regions. The increasing frequency and intensity of tornadoes, possibly linked to climate change, also necessitates the integration of tornado risk assessments in long-term development plans.

Effects of Climate Change on Severity of Impacts: According to NOAA, climate change is impacting the severity and behavior of tornadic events, although the exact nature of these effects is complex and still a subject of ongoing research. One of the primary challenges in understanding the relationship between climate change and tornadoes is the complexity of tornado formation. Tornadoes require specific atmospheric conditions, including a combination of high instability and strong wind shear. Climate change may affect these conditions, but how these changes will influence tornado occurrence and intensity is not yet fully understood.

According to NOAA, climate change is expected to increase atmospheric instability by warming the Earth's surface and may also lead to a decrease in wind shear, particularly in areas where tornadoes are most common. This could potentially lead to a change in the number or intensity of tornadoes, but the evidence is not yet conclusive. Second, shifts in climate patterns could affect the geographical distribution and seasonality of tornadoes, potentially leading to tornadoes in regions where they were previously less common or during times of the year when they were less expected.

Table 4-52. 25-Year Precipitation Projections for City of Chino, CA

25-YEAR PRECIPITATION PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **6% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.2″ decrease** (from 3.2″ to 3.4″) in average annual precipitation.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **2% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.3″ decrease** (from 3.1″ to 3.18″) in average annual precipitation.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/600013210/explore/climate)

Table 4-53. 25-Year Climate Projections for City of Chino, CA

25-YEAR CLIMATE PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **46% increase** in extremely hot days within 25 years.
By 2049, The City of Chino is expected to have a **2°F increase** (from 66°F to 69°F) in average annual temperatures.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **33% increase** in extremely hot days within 25 years.
By 2049, The City of Chino is expected to have a **2°F increase** (from 66°F to 68°F) in average annual temperatures.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/6071/explore/climate)

Table 4-54. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation:							
Annual Average Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation (Wet Days)	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Maximum Period of Consecutive Wet Days	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**5 days**
	5-6	5-7	4-7	4-7	4-7	4-7	3-9
Annual Days With:							
Annual Days With Total Precipitation > 1 inch	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**
	1-1	0-1	1-1	0-1	0-1	0-1	0-1
Annual Days With Total Precipitation > 2 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days With Total Precipitation > 3 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days That Exceed 99th Percentile Precipitation	2 days	2 days	3 days	2 days	3 days	3 days	3 days
	1-16	1-17	1-18	1-17	1-18	1-19	1-19
*Days With Maximum Temperature Below 32*F*	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Source: Climate Mapping for Resilience and Adaptation (2024)							

Table 4-55. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	**Higher Emissions**	**Lower Emissions**	**Higher Emissions**	**Lower Emissions**	**Higher Emissions**
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation							
Average Annual Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Days Per Year With No Precipitation	**321 days**	**322 days**	**323 days**	**324 days**	**325 days**	**324 days**	**327 days**
	318-322	316-329	314-333	316-331	312-334	314-332	300-344
Maximum Number Of Consecutive Dry Days	**78 days**	**82 days**	**81 days**	**83 days**	**85 days**	**84 days**	**92 days**
	70-94	67-100	68-95	72-101	71-106	69-108	69-140
Temperature Thresholds							
Annual days with Maximum temperature > 90°	**114 days**	**133 days**	**135 days**	**141 days**	**147 days**	**148 days**	**169 days**
	114-121	127-143	120-147	131-154	134-161	137-163	152-188
Annual days with Maximum temperature > 100°	**52 days**	**69 days**	**72 days**	**78 days**	**85 days**	**87 days**	**111 days**
	49-54	59-84	60-87	66-99	73-108	74-99	97-143
Source: Climate Mapping for Resilience and Adaptation (2024)							

4.11.11 FEMA NRI Expected Annual Loss Estimates

Table 4-56. City of Chino Expected Annual Loss Table

CITY OF CHINO, CA FEMA NRI EXPECTED ANNUAL LOSS TABLE – TORNADO							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0.00027 events per year	0.0067	$78,082.12	$127,985.59	$385.83	$206,453.55	23.74	Very Low
***Annualized Frequency**: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population**: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss** scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2024)							

4.11.12 FEMA Hazard-Specific Risk Index Table

Table 4-57. San Bernardino County FEMA Hazard Specific Risk Index Table

CITY OF CHINO, CA FEMA HAZARD SPECIFIC RATINGS – TORNADO		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
24.02	Relatively High	Relatively Low
***Risk Index Scores**: are a quantitative rating calculated using data for only a single hazard type. Risk Index Scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.* ***Social Vulnerability Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).* ***Community Resilience Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).*		
Source: FEMA National Risk Index (2024)		

4.11.13 FEMA NRI Exposure Value Table

Table 4-58. City of Chino FEMA NRI Exposure Value Table

CITY OF CHINO, CA FEMA EXPOSURE VALUE TABLE – TORNADO					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
Tornado	$1,343,572,557,379	$26,538,369,569	$1,316,913,200,000	113,527	$120,987,810
Buildings: *Building exposure value is defined as the dollar value of the buildings determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible building exposure of an area (Census block, Census tract, or county) is its building value as recorded in Hazus 6.0, which provides 2022 valuations of the 2020 Census.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible population exposure of an area (Census block, Census tract, or county) is its population as recorded in Hazus 6.0. Population loss is monetized into a population equivalence value using a VSL approach in which each fatality or ten injuries is treated as $11.6 million of economic loss (2022 dollars).* ***Agriculture:*** *Agriculture exposure value is defined as the estimated dollar value of the crops and livestock determined to be exposed to a hazard according to a hazard type-specific methodology. This is derived from the USDA 2017 Census of Agriculture county-level value of crop and pastureland with 2018 values for the US territories. All dollar values are inflation-adjusted to 2022 dollars.*					
Source: FEMA National Risk Index (2024)					

4.12 Wildfire

4.12.1 Hazard Description

Wildfire is an uncontrolled vegetative fire that burnt in forests, grasslands, and other natural areas. Wildfires can spread quickly, driven by factors like wind and dry conditions, and they often pose significant threats to life, property, and the environment. These fires can be ignited by various sources, including lightning, human activities, and other natural causes. Wildfires can result in widespread devastation and require coordinated efforts for containment, suppression, and recovery.

In California, wildfire is common due to the combination of complex terrain, Mediterranean climate that annually facilitates several month-long rain-free periods, productive natural plant communities that provide ample fuels, and ample natural and anthropogenic ignition sources. The State has an extensive history of severe wildfire events and faces the probability of future events that are even more destructive than those of the past. Wildfires are the most frequent source of declared disasters and account for the third highest combined losses of natural hazards in California.

4.12.2 General Wildfire Types

Flammable expanses of brush, diseased timberland, overstocked forests, hot and dry summers, extreme topography, intense fire weather wind events, summer lightning storms, and human acts all contribute to California’s wildfire threat. Wildfires can generally be classified as follows:

- Ground fires occur when fuels ignite and burn underground. Ground fires may eventually burn through the ground surface and become surface fires.

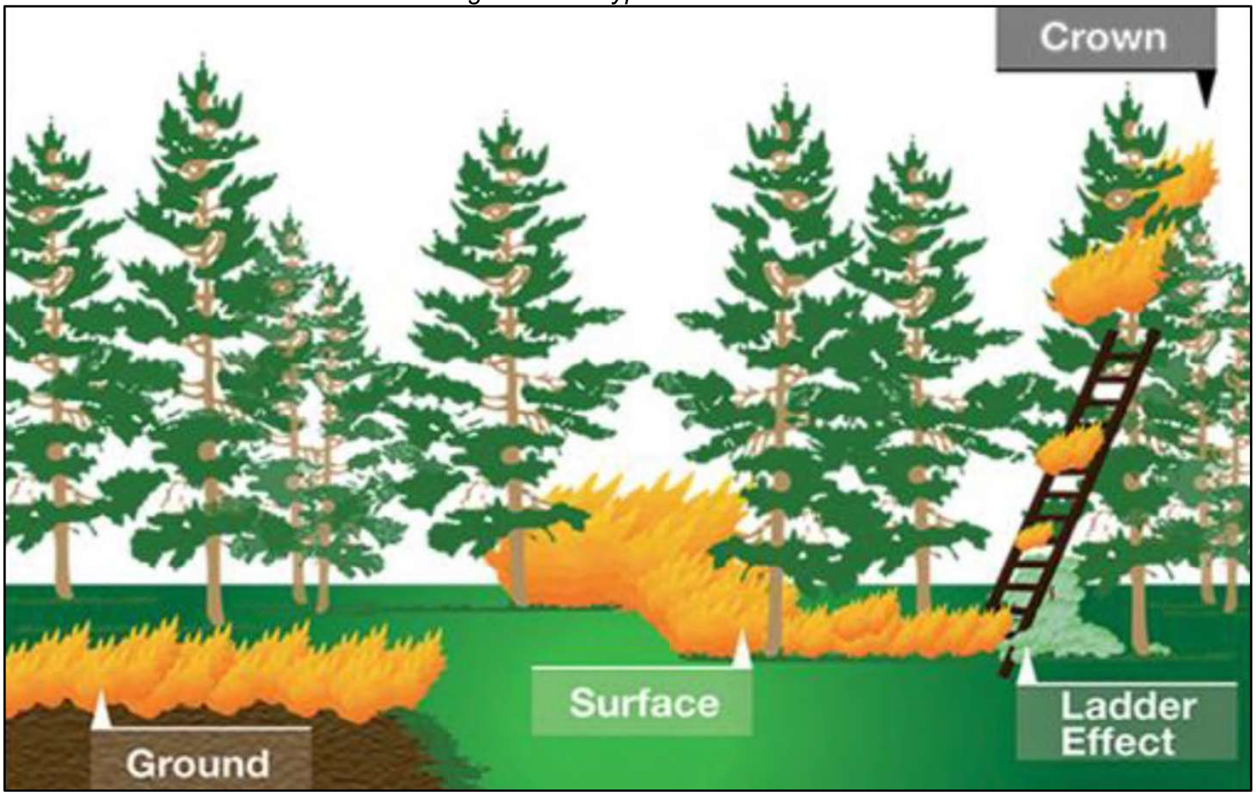
- Surface fires burn on the surface of the ground and are primarily fueled by low-lying vegetation.
- Ladder fuels are vegetation that allow surface fires to climb into the tree canopy and become crown fires.
- Crown fires spread from treetop to treetop at a rapid pace. Crown fires are often pushed by wind and can be extremely intense.

4.12.3 Factors Affecting Fire Behavior

According to the State of California 2023 HMP, fire behavior is based on factors such as the following:

- **<u>Fuel</u>**: Fuel may include living and dead vegetation on the ground, along the surface as brush and small trees, and above the ground in tree canopies. Lighter fuels such as Arundo donax and other grasses, leaves, and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs, and trunks take longer to warm and ignite. Trees killed or defoliated by forest insects and diseases are more susceptible to wildfire.
- **<u>Weather</u>:** Relevant weather conditions include temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount and duration, and the stability of the atmosphere. Conditions are very favorable for extensive and severe wildfires when the temperature is high, relative humidity is low, wind speed is increasing and coming from the east (offshore flow), and there has been little or no precipitation, so vegetation is dry. These conditions occur more frequently inland where temperatures are higher, and fog is less prevalent.
- **<u>Terrain</u>:** The slope and elevation of a region influences the amount and moisture of fuel; the impact of weather conditions such as temperature and wind; potential barriers to fire spread, such as highways and lakes; and elevation and slope of landforms (fire spreads more easily uphill than downhill).

Figure 4.19. Types of Wildfires



4.12.4 Wildland Fire vs. Wildland Urban Interface Fires

According to the State of California 2023 HMP, fire science distinguishes between wildland fires, which burn predominately in undeveloped areas, and wildland urban Interface (WUI) fires (USFS 2019). Mitigation actions, response actions and damage associated with the two types of fire may differ significantly.

Wildland Fires: Wildland fires that burn in undeveloped settings are part of a natural fire regime and may be beneficial to the landscape if they burn within the historical range of variability for fire size and intensity. Many species are adapted to California's natural fire regimes and flourish after a low or mixed severity burn. These fires also enhance ecosystem function by creating landscapes that have more variation, are more resilient to other disturbances, and are better suited to withstand extremes in precipitation. However, wildland fires still pose a threat and can have catastrophic impacts on wildlife and habitat.

Wildland fires may result in secondary negative impacts in the form of air pollution, including GHG emissions, soil erosion (resulting in siltation of streams and lakes), postfire flooding, or mudslides. The impacts can even extend beyond State borders. In 2020, wildfire smoke not only blanketed large swaths of California, but also worsened air quality across the United States.

Unless wildland fires or their related cascading hazards occur in or near developed areas, they are rarely classified as disasters because they do not pose severe risk to life or widescale damage to the environment. Wildland fires that burn primarily on federally managed lands are only rarely classified as disasters. For example, the 2007 Zaca Fire (240,207 acres) and 2009 Station Fire (160,577 acres), both of which burned on U.S. Forest Service lands, were enormous in size but did not result in federal disaster status. Those fires stand in contrast to the October 2017 Northern California Wildfires, which were smaller in area but much more destructive, due to their proximity to larger urbanized areas.

WUI Fires: The WUI has been defined as “the area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. The WUI can be configured in many ways including a classic “interface” (e.g., a community that abuts a National Forest at a distinct boundary), an “intermix” (e.g., vegetative fuels distributed between buildings throughout a subdivision between buildings), or an “occlusion” (e.g., a community that completely surrounds a designated open space area) The combination of natural and human-made fuels that are burned in WUI fires may lead to the formation or release of toxic emissions not found in purely wildland fires.

WUI fires represent an increasingly significant concern for California. California has a chronic and destructive WUI fire history with significant losses of life, structures, infrastructure, agriculture, and businesses (USFS 2019). Most local governments that have prepared LHMPs have identified fire and WUI fires as specific hazards. Even relatively small WUI fires may result in disastrous damage.

Most WUI fires are suppressed before they exceed 100 acres (Li and Banerjee 2021). The remainder usually occur during episodes of hot, windy conditions that exceed initial attack capabilities and are more likely to cause heightened losses to the built environment. Many WUI fires occur in areas that have a historical pattern of wildland fires that burn under extreme conditions. The pattern of increased damage is directly related to increased urban spread into areas that have historically had wildfire as part of the natural ecosystem.

California has a strong statewide approach toward WUI planning and regulatory requirements, including minimum WUI building code requirements, Fire Safe regulations, and State land use planning guidance from the California Governor’s Office of Planning and Research (OPR).

4.12.5 Hazard Location

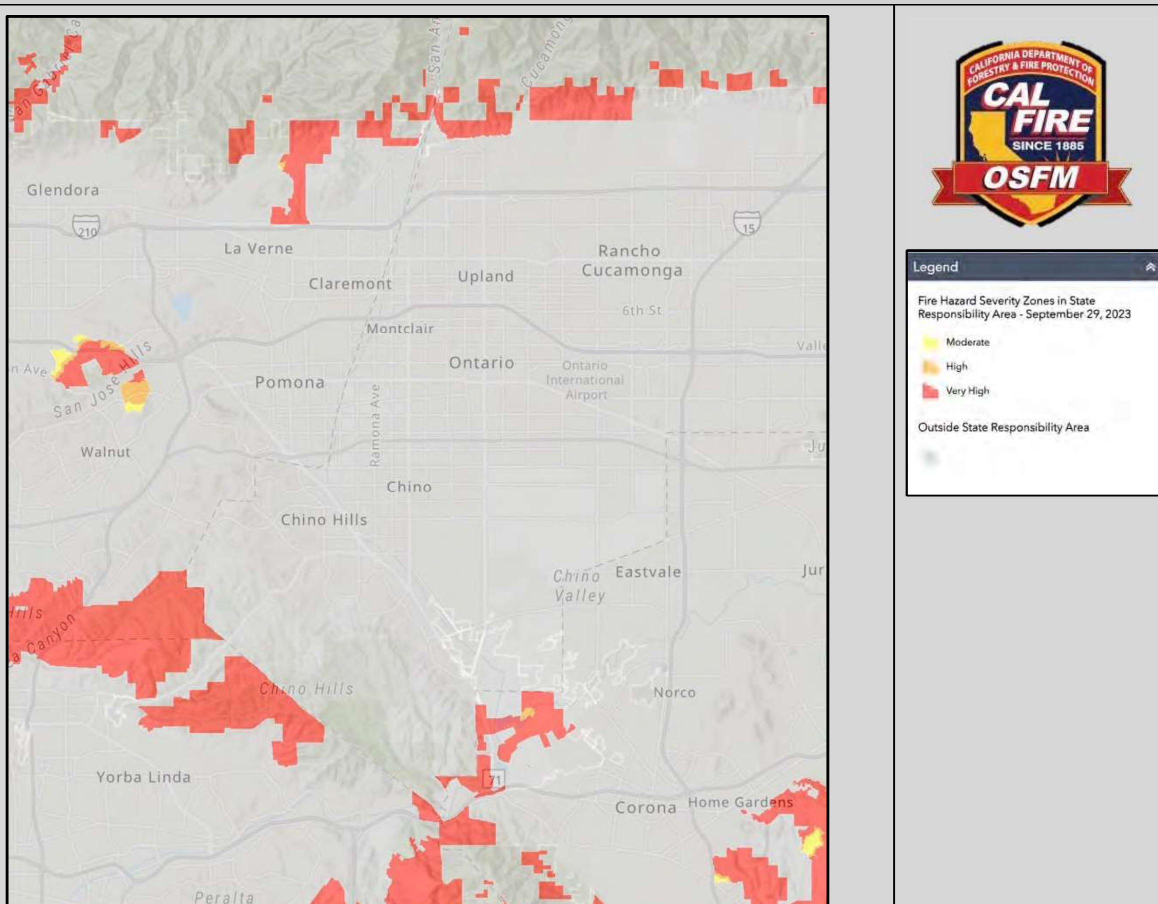
Fire Hazard Severity Zone (FHSZ) maps are developed using a science-based and field-tested model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior. Many factors are considered such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area. There are three levels of hazard in the State Responsibility Areas: moderate, high, and very high.

Fire Hazard Severity Zone maps evaluate “hazard,” not “risk”. They are like flood zone maps, where lands are described in terms of the probability level of a particular area being inundated by floodwaters, and not specifically prescriptive of impacts. “Hazard” is based on the physical conditions that create a likelihood and expected fire behavior over a 30 to 50-year period without considering mitigation measures such as home hardening, recent wildfire, or fuel reduction efforts. “Risk” is the potential damage a fire can due to the area under existing conditions, accounting for any modifications such as fuel reduction projects, defensible space, and ignition resistant building construction. Based on Figure 4.25 the City of Chino does not have a direct risk However given the approximation to The City of Chino Hills and other vegetate concerns the hazard should note outright discounted.

Figure 4.20. OSFM CAL Fire Hazard Severity Zone

CITY OF CHINO, CA

OSFM CAL FIRE HAZARD SEVERITY ZONE



Source: OSFM Cal Fire (2024)

4.12.6 Hazard Extent/Intensity

The National Interagency Fire Center (NIFC) employs several measures and tools to assess the extent and intensity of wildfires. These include the acreage burned, which quantifies the size of the affected area, with larger acreage indicating more extensive wildfires. Fire behavior indicators such as the rate of spread, fire line intensity, and flame length offer insights into the wildfire's intensity, with rapid spread and high-intensity flames signifying a more severe fire. The table below illustrates fire suppression interpretations of flame length and fire-line intensity.

Table 4-59. Flame Length and Fireline Intensity Table

US DEPARTMENT OF AGRICULTURE – FOREST SERVICE		
Fire Suppression Interpretations of Flame Length and Fireline Intensity		
Flame Length	**Fire Intensity**	**Interpretation**
Feet	*Btu/ft/s*	Fire can generally be attacked at the head or flanks by persons using hand tools. Handline should hold the lire
< 4	< 100	
4-8	100-500	Fires are too intense for direct attack on the head by persons using hand tools. Handline cannot be relied on to hold fire. Equipment such as plows, dozers, pumpers, and retardant aircraft can be effective.
8-11	500-1,000	Fires may present serious control problems-torching out, crowning, and spotting. Controlling efforts at the fire head will probably be ineffective.
>11	>1,000	Crowning, spotting, and major fire runs are probable. Control efforts at the head of a fire are ineffective.
Source: US Department of Agriculture – Forest Service		

The containment status, measured as the percentage of the fire's perimeter under control, tracks the progress in limiting the wildfire's spread. Meteorological data on temperature, humidity, wind speed, and direction are crucial for understanding fire potential, with critical fire weather conditions contributing to more intense wildfires. The extent of damage to homes, infrastructure, and communities, as well as the scale of evacuation orders issued, reflects the wildfire's impact. Lastly, resource deployment and fire danger ratings are considered, enabling NIFC to assess wildfire severity and effectively manage response efforts.

4.12.7 Frequency and Probability

Frequency: Between 01/01/2013 and 12/31/2022 San Bernardino County recorded 43 wildfire events over 1,826 days. This averages 0.023548 incidents per day during this time and 8.60 incidents annually.

Probability: The National Interagency Fire Center (NIFC) measures the probability of wildfires by considering various factors and conditions that contribute to the likelihood of ignition and fire spread. Key elements in assessing this probability include:

- Weather Conditions: NIFC monitors weather data, including temperature, humidity, wind speed, and precipitation, to evaluate the fire weather outlook. Dry and windy conditions with low humidity increase the likelihood of wildfires.
- Fuel Moisture: The moisture content of vegetation, such as grasses, shrubs, and trees, is a critical factor. Dry or drought-affected fuels are more susceptible to ignition.
- Lightning Activity: NIFC tracks lightning activity in wildfire-prone regions, as lightning strikes are a common natural cause of wildfires.

- Human Activities: Monitoring human activities that can lead to unintentional ignitions, such as campfires, discarded cigarettes, and equipment sparks, helps assess the human-related wildfire risk.
- Historical Data: Historical wildfire data, including the frequency and size of past wildfires, can inform the probability of future incidents.
- Fire Danger Ratings: Fire danger ratings, such as the Fire Weather Index, provide a standardized assessment of fire risk based on weather and fuel conditions.

Past Events: The table below illustrates all wildfire events in San Bernardino County between 2019-2023. During this time there were 43 events with five deaths and 23 injuries reported.

Location	County	State	Date	Time	T.Z.	Type	Dth	Inj	PrD	CrD
Totals							**5**	**23**	**18.340M**	**0.00K**
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/15/19	18:00	PST-8	Wildfire	0	0	400.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/4/19	12:00	PST-8	Wildfire	0	3	100.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/14/19	19:00	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/10/19	11:00	PST-8	Wildfire	2	0	8.000M	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/10/19	11:00	PST-8	Wildfire	0	0	100.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/30/19	7:00	PST-8	Wildfire	0	0	100.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/30/19	10:00	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/30/19	10:00	PST-8	Wildfire	0	1	100.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/31/19	0:00	PST-8	Wildfire	0	1	4.000M	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/31/19	0:30	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	7/3/20	14:00	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	7/20/20	17:00	PST-8	Wildfire	0	0	0.00K	0.00K

SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	7/31/20	17:30	PST-8	Wildfire	0	0	10.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	8/1/20	0:00	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	9/5/20	10:40	PST-8	Wildfire	1	13	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/29/20	13:30	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	12/1/20	17:00	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	12/3/20	2:00	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	12/13/20	13:40	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	2/18/21	0:00	PST-8	Wildfire	0	0	30.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	5/24/21	10:00	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	6/5/21	16:00	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	6/5/21	17:00	PST-8	Wildfire	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	6/9/21	14:10	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	6/28/21	15:48	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	8/25/21	15:11	PST-8	Wildfire	0	0	2.500M	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/21/21	14:20	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/22/21	11:27	PST-8	Wildfire	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	3/14/22	0:00	PST-8	Wildfire	0	0	0.00K	0.00K

SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	6/12/22	5:45	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	8/17/22	12:15	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	9/5/22	14:37	PST-8	Wildfire	2	3	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	9/23/22	14:30	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO COUNTY MO...	SAN BERNARDINO COUNTY MO...	CA	4/26/23	9:16	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	5/22/23	13:11	PST-8	Wildfire	0	0	0.00K	0.00K
APPLE AND LUCERNE VALLEY...	APPLE AND LUCERNE VALLEY...	CA	6/17/23	16:03	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	6/27/23	18:31	PST-8	Wildfire	0	0	3.000M	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/13/23	23:58	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/14/23	13:57	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/14/23	14:30	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/15/23	14:28	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	7/27/23	17:49	PST-8	Wildfire	0	0	0.00K	0.00K
SAN BERNARDINO AND RIVER...	SAN BERNARDINO AND RIVER...	CA	10/30/23	11:37	PST-8	Wildfire	0	2	0.00K	0.00K
Totals							**5**	**23**	**18.340M**	**0.00K**

4.12.8 Vulnerabilities and Impacts

Life Safety and Public Health: Wildfires can have significant life safety and public health impacts. First, wildfires produce smoke and particulate matter that can degrade air quality over large areas, potentially leading to respiratory issues, exacerbating pre-existing conditions, and causing symptoms such as coughing, shortness of breath, and irritation of the eyes and throat. Secondly, wildfires often necessitate the evacuation of communities, temporarily displacing residents from their homes. This displacement can result in stress, anxiety, and potential health risks, particularly for vulnerable populations.

Additionally, the dynamic nature of wildfires can lead to injuries and fatalities among responders and the public. These incidents may occur during evacuations, firefighting efforts, or while navigating hazardous fire conditions. Furthermore, the mental health impact of wildfires is noteworthy, as they can cause stress, anxiety, and trauma for those affected. The loss of homes and possessions, coupled with the uncertainty of wildfire impacts, can contribute to long-term mental health challenges. Wildfires also have the potential to disrupt the food supply chain and water infrastructure, potentially leading to contamination of drinking water sources and causing shortages of essential supplies. Lastly, evacuation centers and crowded living conditions can facilitate the spread of infectious diseases, making disease control and public health management a priority during and after wildfires.

Property Damage and Critical Infrastructure: Overall, wildfires have far-reaching consequences on both property and critical infrastructure, emphasizing the importance of fire prevention and mitigation measures. Wildfires can cause extensive destruction to homes, buildings, and infrastructure, resulting in significant financial losses. Homes and properties situated in or near the path of a wildfire are particularly vulnerable, and even with firefighting efforts, many structures may be lost. In addition to property damage, wildfires can disrupt critical infrastructure such as power lines, electrical substations, transportation networks, and communication facilities.

Power outages can occur as a result of infrastructure damage, impacting not only residents but also essential services like hospitals, water treatment plants, and emergency communication systems. Roads and bridges may be compromised or rendered impassable due to the force of the wildfires, hindering access to affected areas. The aftermath of wildfires can also lead to environmental damage, with erosion, sedimentation, and water quality issues affecting ecosystems and water sources. Cleanup and restoration efforts can be costly and time-consuming, and the long-term economic impact on communities and regions is a significant concern.

Figure 3-9 in the Community Profile illustrates the locations of critical facilities within the City of Chino.

Economy: Wildfires can result in significant economic losses for communities and regions affected by these disasters. Some of the primary economic impacts include property damage and loss, the cost of firefighting efforts, and the expenses associated with recovery and rebuilding. Property damage encompasses homes, businesses, and infrastructure, leading to insurance claims and financial burdens on individuals and organizations. The cost of deploying firefighting resources, including personnel, equipment, and air support, is another significant economic factor. Additionally, post-fire efforts such as erosion control, reforestation, and repair of damaged infrastructure contribute to the economic toll. The disruption of economic activities, such as agriculture, tourism, and outdoor recreation, can further affect the local and regional economies.

Changes in Development and Impact of Future Development: Wildfires can significantly impact changes in development and future development in several ways. The effects of wildfires on communities, infrastructure, and ecosystems can influence land use planning and development decisions. After a wildfire, local authorities may reassess land use and zoning regulations, especially in areas prone to wildfires. They may impose stricter building codes, setback requirements, and vegetation management rules to reduce fire risk in future developments.

Wildfires can also expose vulnerabilities in critical infrastructure, such as power lines, roads, and water supply systems. This can lead to investment in infrastructure upgrades to enhance resilience and prevent future damage. Communities affected by wildfires often face the decision of whether to rebuild in the same location or relocate to safer areas. The experience of a wildfire can influence the choices made by property owners and developers. The increased frequency and severity of wildfires may impact the availability and cost of property insurance. Insurers may adjust premiums or coverage terms, affecting property development decisions. Moreover, wildfires can lead to increased community awareness and preparedness efforts, influencing development decisions. Communities may implement Firewise practices and community wildfire protection plans that affect future development.

Lastly, wildfires can alter ecosystems and natural landscapes. Land managers and conservationists may adjust their plans for ecological restoration and habitat conservation, which can, in turn, influence land development in affected areas. Lastly, the cumulative impact of wildfires on a region can inform long-term planning strategies, influencing where and how future development occurs. It may lead to regional development policies that prioritize resilience and fire risk reduction. In summary, wildfires can prompt changes in development and future development by affecting land use regulations, infrastructure investment, community resilience, and long-term planning. These changes are often driven by the need to reduce the risks associated with wildfires and their potential impacts on communities and the environment.

Effects of Climate Change on Severity of Impacts: According to NOAA, climate change is having a profound influence on wildfires. Climate change can manifest its impact in various ways, significantly intensifying the frequency and severity of wildfires. Firstly, escalating global temperatures lead to heightened evaporation rates, causing vegetation to dry out and become more susceptible to ignition. This prolonged warmth results in an extended fire season, providing more opportunities for wildfires to occur. Secondly, climate change can exacerbate drought conditions in many regions, depleting soil moisture and rendering vegetation more flammable. As a result, severe and extended droughts increase the ease with which wildfires ignite and spread. Additionally, alterations in precipitation patterns, driven by climate change, can lead to more intense rainfall events, followed by prolonged dry periods. This cycle promotes rapid vegetation growth, which, in turn, creates additional fuel for wildfires. The impact of climate change is further exacerbated by an increase in extreme weather events, like thunderstorms and lightning strikes, which often serve as ignition sources for wildfires. Changes in wind patterns, brought about by shifting atmospheric circulation, can result in more frequent and intense wind events, facilitating the rapid spread of wildfires. Warmer temperatures can also contribute to increased insect outbreaks, weakening and killing trees, thus providing more fuel for fires. Lastly, climate change can extend the fire season in many regions, heightening the likelihood of wildfires.

Table 4-60. 25-Year Precipitation Projections for City of Chino, CA

25-YEAR PRECIPITATION PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **6% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.2″ decrease** (from 3.2″ to 3.4″) in average annual precipitation.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **2% increase** in heavy precipitation within 25 years.
By 2049, the City of Chino is expected to have a **0.3″ decrease** (from 3.1″ to 3.18″) in average annual precipitation.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/600013210/explore/climate)

Table 4-61. 25-Year Climate Projections for City of Chino, CA

25-YEAR CLIMATE PROJECTIONS FOR CITY OF CHINO, CA
HIGHER EMISSIONS (RCP8.5)
The City of Chino is expected to experience a **46% increase** in extremely hot days within 25 years.
By 2049, The City of Chino is expected to have a **2°F increase** (from 66°F to 69°F) in average annual temperatures.
LOWER EMISSIONS (RCP4.5)
The City of Chino is expected to experience a **33% increase** in extremely hot days within 25 years.
By 2049, City of Chino is expected to have a **2°F increase** (from 66°F to 68°F) in average annual temperatures.
Source: Neighborhoods at Risk (https://nar.headwaterseconomics.org/6071/explore/climate)

Table 4-62. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation:							
Annual Average Total Precipitation	**6”**	**6”**	**7”**	**6”**	**6”**	**6”**	**6”**
	6-7	5-8	6-8	5-8	5-8	5-8	5-10
Days Per Year With Precipitation (Wet Days)	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Maximum Period of Consecutive Wet Days	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**6 days**	**5 days**
	5-6	5-7	4-7	4-7	4-7	4-7	3-9
Annual Days With:							
Annual Days With Total Precipitation > 1 inch	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**	**1 day**
	1-1	0-1	1-1	0-1	0-1	0-1	0-1
Annual Days With Total Precipitation > 2 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days With Total Precipitation > 3 inches	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Annual Days That Exceed 99th Percentile Precipitation	2 days	2 days	3 days	2 days	3 days	3 days	3 days
	1-16	1-17	1-18	1-17	1-18	1-19	1-19
*Days With Maximum Temperature Below 32*F*	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**	**0 days**
	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Source: Climate Mapping for Resilience and Adaptation (2024)							

Table 4-63. Future Climate Indicators for San Bernardino County

FUTURE CLIMATE INDICATORS FOR SAN BERNARDINO COUNTY, CA							
Indicator	**Modeled History** (1976-2005)	**Early Century** (2015-2044)		**Mid Century** (2035-2064)		**Late Century** (2070-2099)	
		Lower Emissions	**Higher Emissions**	**Lower Emissions**	**Higher Emissions**	**Lower Emissions**	**Higher Emissions**
	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max	Min-Max
Precipitation							
Days Per Year With No Precipitation (dry days)	**321 days**	**322 days**	**323 days**	**324 days**	**325 days**	**324 days**	**327 days**
	318-322	316-329	314-333	316-331	312-334	314-332	300-344
Maximum Number Of Consecutive Dry Days	**78 days**	**82 days**	**81 days**	**83 days**	**85 days**	**84 days**	**92 days**
	70-94	67-100	68-95	72-101	71-106	69-108	69-140
Days Per Year With Precipitation (wet days)	**44 days**	**43 days**	**42 days**	**41 days**	**41 days**	**41 days**	**39 days**
	43-47	37-49	32-51	34-49	31-53	33-52	22-65
Temperature Thresholds							
Annual days with Maximum temperature > 90°	**114 days**	**133 days**	**135 days**	**141 days**	**147 days**	**148 days**	**169 days**
	114-121	127-143	120-147	131-154	134-161	137-163	152-188
Annual days with Maximum temperature > 100°	**52 days**	**69 days**	**72 days**	**78 days**	**85 days**	**87 days**	**111 days**
	49-54	59-84	60-87	66-99	73-108	74-99	97-143
Source: Climate Mapping for Resilience and Adaptation (2024)							

4.12.9 FEMA NRI Expected Annual Loss Estimates

Table 4-64. City of Chino Expected Annual Loss Table

CITY OF CHINO, CA FEMA NRI EXPECTED ANNUAL LOSS TABLE – WILDFIRE							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0.0034 % chance per year	0.00052	$6,000.69	$9,085,434.23	$17.63	$9,091,452.55	32.96	Relatively Low
***Annualized Frequency**: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.* ***Population**: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* ***Expected Annual Loss** scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2024)							

4.12.10 FEMA Hazard-Specific Risk Index Table

Table 4-65. San Bernardino County FEMA Hazard Specific Risk Index Table

SAN BERNARDINO COUNTY, CA FEMA HAZARD SPECIFIC RATINGS - WILDFIRE		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
33.03	Relatively High	Relatively Low
***Risk Index Scores**: are a quantitative rating calculated using data for only a single hazard type. Risk Index Scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.* ***Social Vulnerability Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).* ***Community Resilience Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).*		
Source: FEMA National Risk Index (2024)		

4.12.11 FEMA NRI Exposure Value Table

Table 4-66. City of Chino FEMA NRI Exposure Value Table

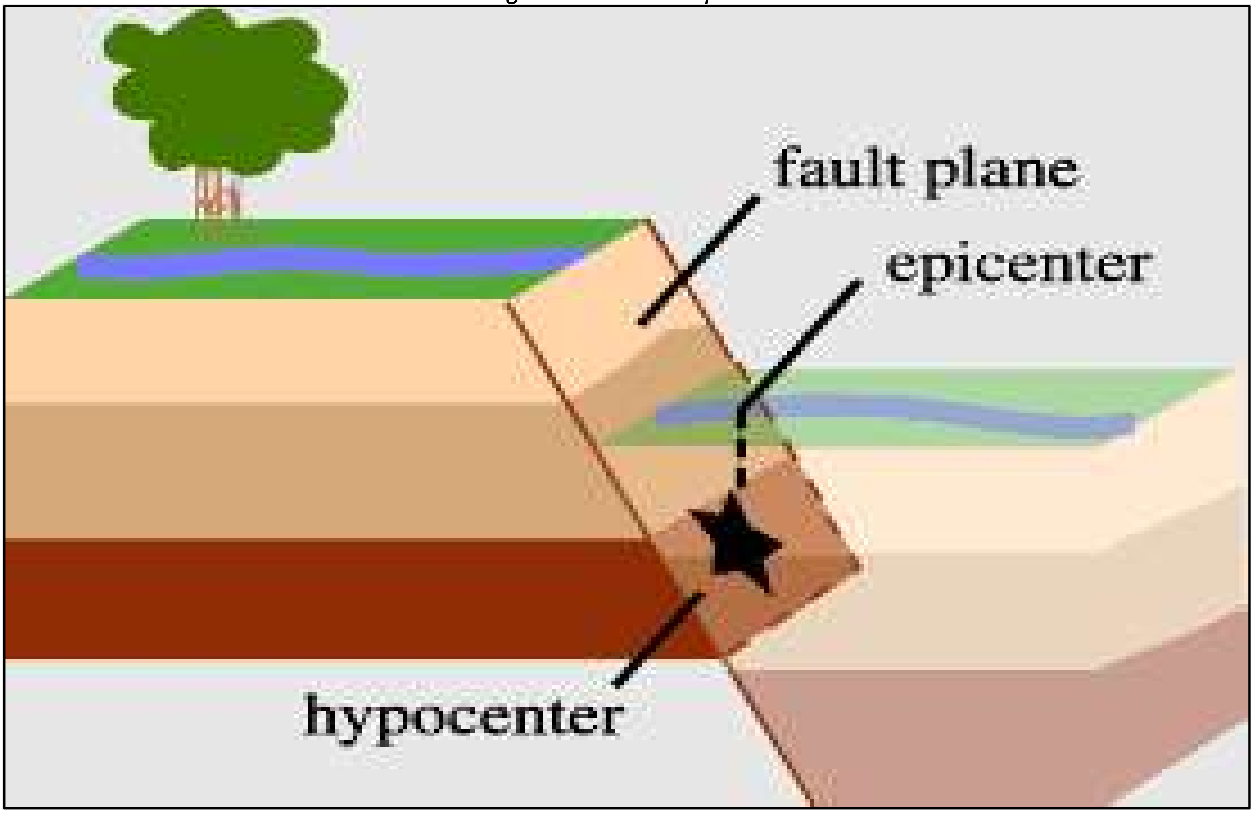
CITY OF CHINO, CA FEMA EXPOSURE VALUE TABLE - WILDFIRE					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
Wildfire	$67,023,036,032.49	$1,713,380,234.37	$65,270,452,520.11	5,626.7 6	$39,203,277.95
***Buildings**: Building exposure value is defined as the dollar value of the buildings determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible building exposure of an area (Census block, Census tract, or county) is its building value as recorded in Hazus 6.0, which provides 2022 valuations of the 2020 Census.* ***Population:** Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible population exposure of an area (Census block, Census tract, or county) is its population as recorded in Hazus 6.0. Population loss is monetized into a population equivalence value using a VSL approach in which each fatality or ten injuries is treated as $11.6 million of economic loss (2022 dollars).* ***Agriculture:** Agriculture exposure value is defined as the estimated dollar value of the crops and livestock determined to be exposed to a hazard according to a hazard type-specific methodology. This is derived from the USDA 2017 Census of Agriculture county-level value of crop and pastureland with 2018 values for the US territories. All dollar values are inflation-adjusted to 2022 dollars.*					
Source: FEMA National Risk Index (2024)					

4.13 Earthquake

4.13.1 Hazard Description

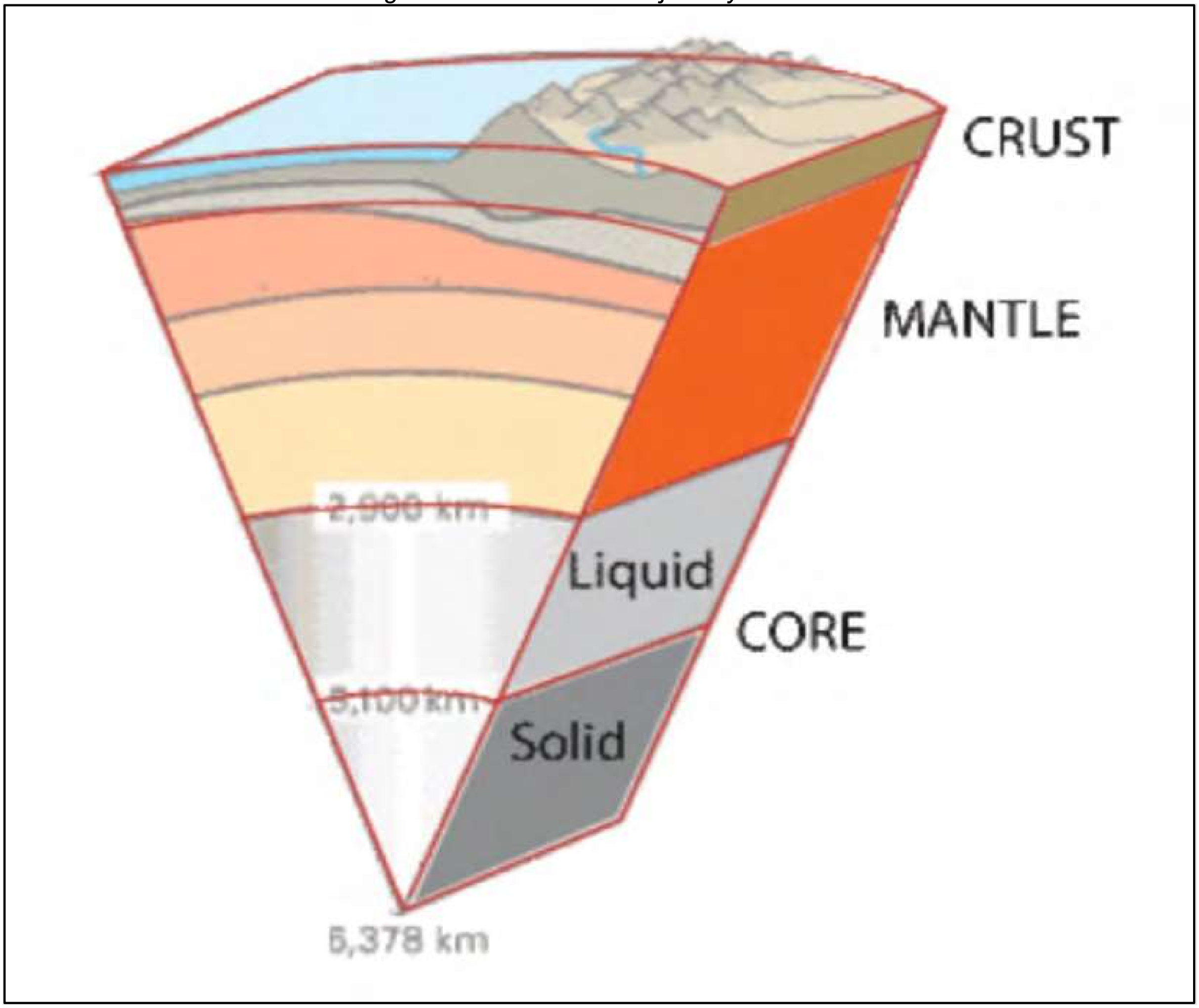
An earthquake is what happens when two blocks of the earth suddenly slip past one another. The surface where they slip is called the fault or fault plane. The location below the earth's surface where the earthquake starts is called the hypocenter, and the location directly above it on the surface of the earth is called the epicenter.

Figure 4.21. Earthquake



The earth has four major layers including the inner core, outer core, mantle, and crust. The crust and the top of the mantle make up a thin skin on the surface of our planet. But this skin is not all in one piece – it is made up of many pieces like a puzzle covering the surface of the earth. Not only that, but these puzzle pieces keep slowly moving around, sliding past one another, and bumping into each other. These are called puzzle pieces tectonic plates, and the edges of the plates are called the plate boundaries. The plate boundaries are made up of many faults, and most of the earthquakes around the world occur on these faults. Since the edges of the plates are rough, they get stuck while the rest of the plate keeps moving. Finally, when the plate has moved far enough, the edges unstick on one of the faults and there is an earthquake.

Figure 4.22. The Four Major Layers of Earth



Sometimes an earthquake has foreshocks. These are smaller earthquakes that happen in the same place as the larger earthquake that follows. Scientists can't tell that an earthquake is a foreshock until the larger earthquake happens. The largest, main earthquake is called the mainshock. Mainshocks always have aftershocks that follow. These are smaller earthquakes that occur afterwards in the same place as the mainshock. Depending on the size of the mainshock, aftershocks can continue for weeks, months, and even years after the mainshock.

4.13.2 Hazard Location

According to the 2023 State of California HMP, California has many faults with the potential to produce damaging earthquakes. In general, faults that slip the fastest over geologic time are more likely to produce earthquakes in the near future. More than 70 percent of California's population lives within 30 miles of a known fault where strong ground shaking could occur in the next 30 years.

Faults offshore of California are also capable of producing damaging earthquakes. The Cascadia Subduction Zone—a sizeable offshore fault system extending from Northern

California to British Columbia—can produce great earthquakes (magnitudes greater than 8.0) north of Cape Mendocino. An event on this offshore fault system can increase the tsunami risk.

4.13.3 Areas Susceptible to Earthquake Damage

The 2023 State of California HMP used three data sets to map susceptibility to damage from earthquakes. These data sets account for the primary causes of damage from earthquakes, including:

- NEHRP Soils Data: Earthquake vulnerability based on the presence of NEHRP Type D, E, and F soils (see Figure 4-30).
- Liquefaction Mapping: Earthquake vulnerability based on liquefaction susceptibility (see Figure 4-31). Liquefaction mapping data currently is not available statewide. However, where this data is available, it can provide increased resolution on the risk associated with earthquakes.
- Earthquake Shaking Potential: Earthquake vulnerability based on having more than a 2 percent chance in 50 years of shaking that exceeds 1 g (see Figure X).
- Earthquake-Induced Landslide Hazard Zones: Mapping of areas with a higher probability of earthquake-induced landslides, within which specific actions are mandated by California law prior to any development.
- Mapping indicates that the entire State is at risk of earthquakes, particularly along the coastline and the San Andreas Fault.

Figure 4.23. Significant Faults in Southern California

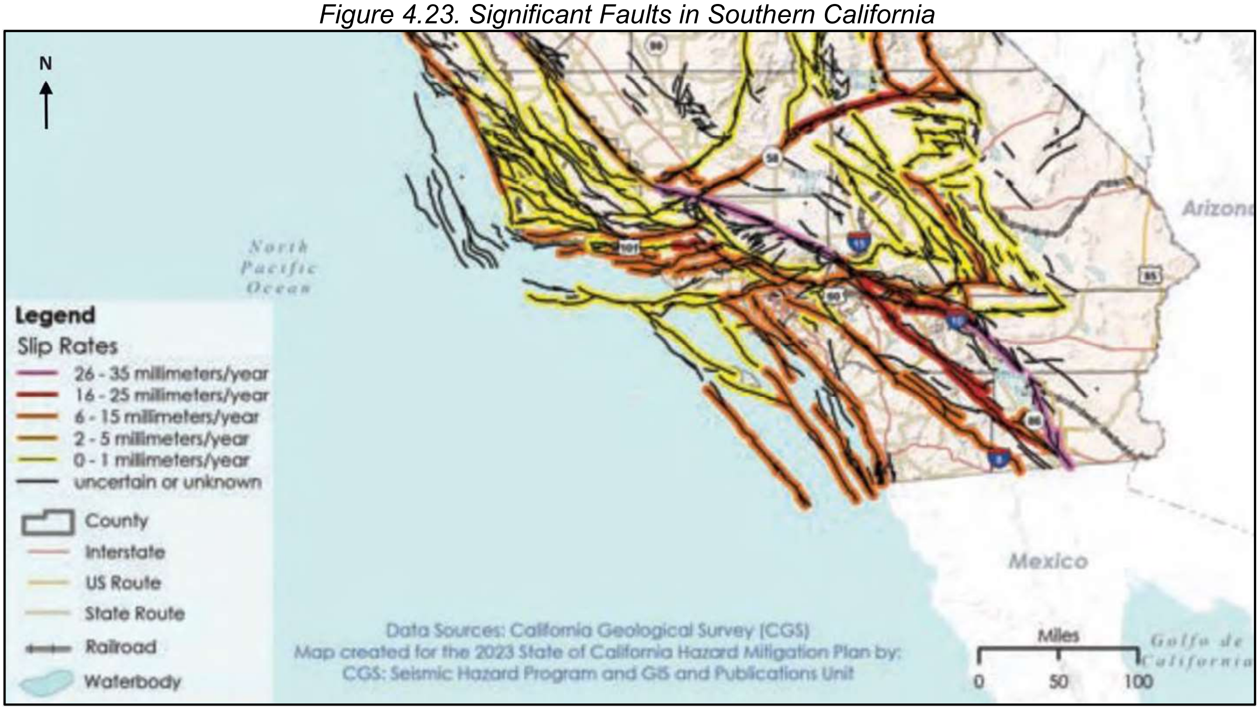


Figure 4.24. NEHRP Type D and Type E Soils in Southern California

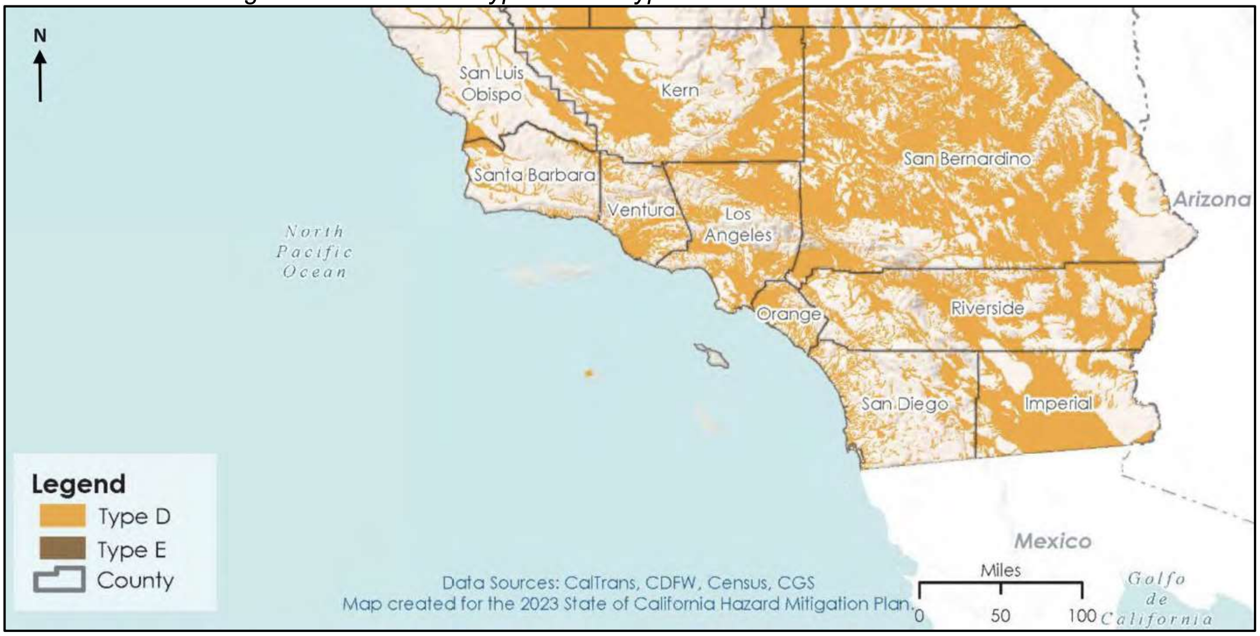


Figure 4.25. Liquefaction Zones

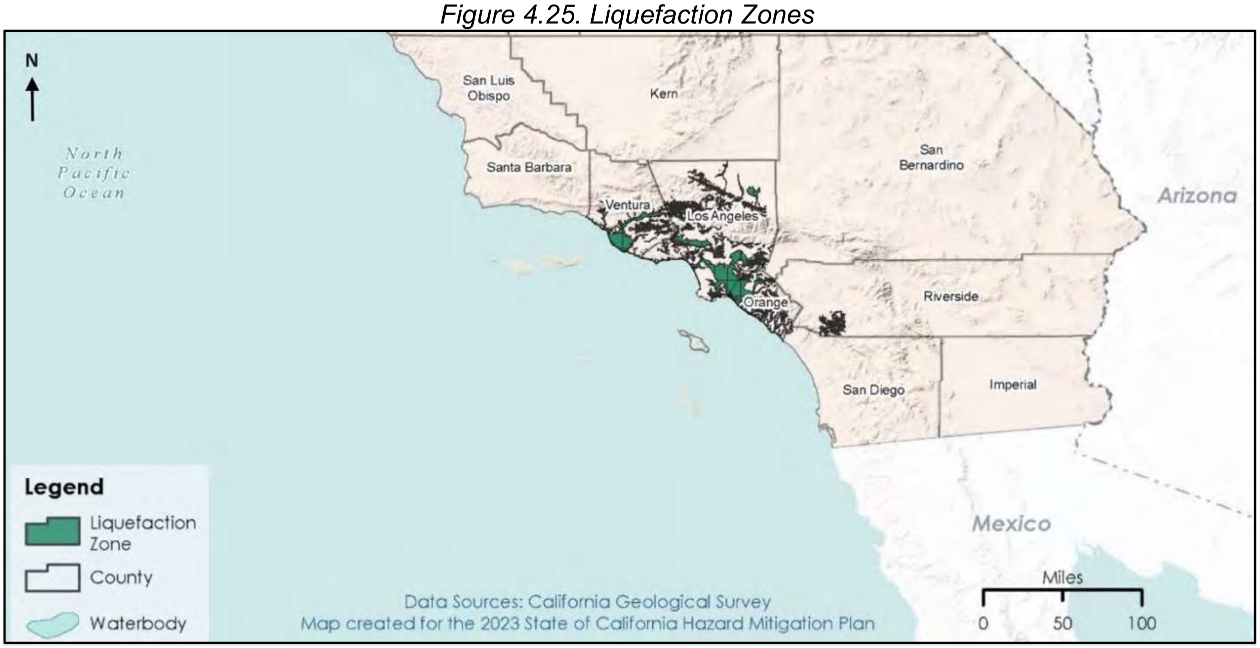
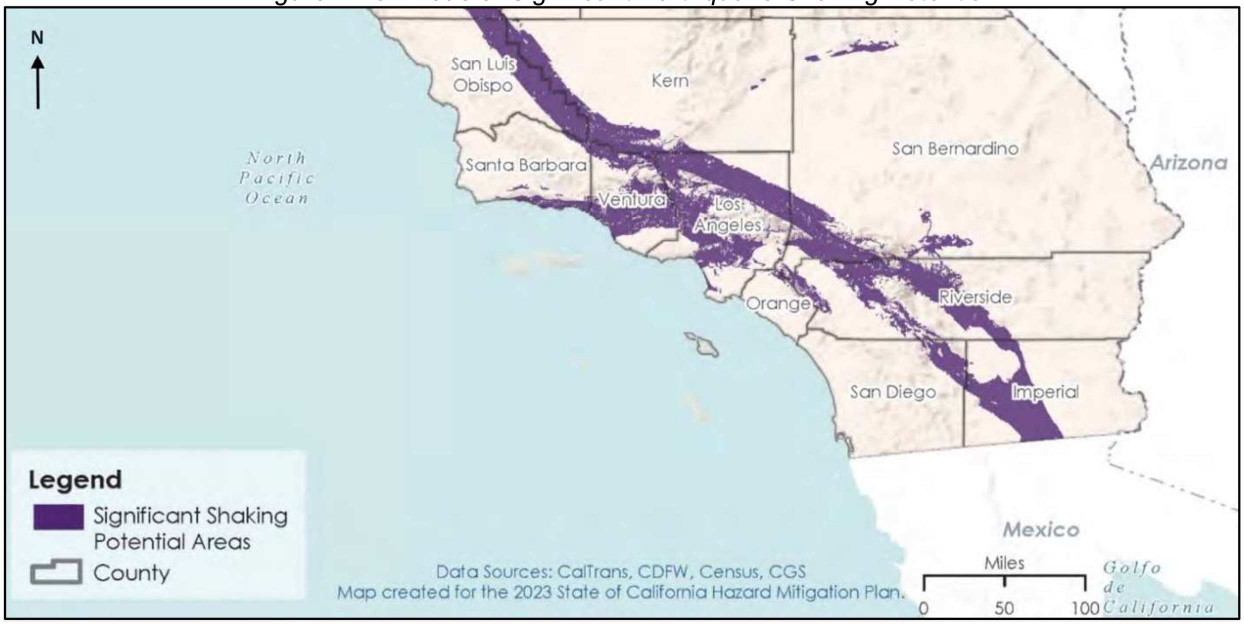


Figure 4.26. Areas of Significant Earthquake Shaking Potential



4.13.4 Hazard Extent/Intensity

The severity of an earthquake can be expressed in terms of both *intensity* and *magnitude*. However, the two terms are quite different, and they are often confused. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. It varies from place to place within the disturbed region depending on the location of the observer with respect to the earthquake epicenter. Magnitude is related to the amount of seismic energy released at the hypocenter of the earthquake. It is based on the amplitude of the earthquake waves recorded on instruments which have a common calibration. The magnitude of an earthquake is thus represented by a single, instrumentally determined value.

Earthquake strength has traditionally been measured using the Richter scale, developed by Charles Richter in 1935. The Richter scale went through numerous adjustments since its conception and was eventually replaced by the “Moment Magnitude Scale” for earthquakes larger than 3.5; however, most still refer to both scales as the Richter scale. The Richter magnitude scale, used as an indicator of the force of an earthquake, measures the magnitude, intensity, and energy released by an earthquake with seismographs. Each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value. It is important to note that the Richter Magnitude Scale is not used to express damage.

Table 4-67. The Richter Scale

THE RICHTER SCALE	
Magnitude	**Description**
< 2.0	Micro earthquakes not felt.
2.0 - 2.9	Minor earthquakes, generally not felt, but are recorded.
3.0 - 3.9	Minor earthquakes, often felt, but rarely cause damage.
4.0 - 4.9	Light earthquakes, noticeable shaking of indoor items, rattling noises, and significant damage is unlikely.
5.0 - 5.9	Moderate earthquakes can cause major damage to poorly constructed buildings over small regions, and possible slight damage to well-designed buildings.
6.0 - 6.9	Strong earthquakes can be destructive in areas up to about 99 miles across populated regions.
7.0 - 7.9	Major earthquakes can cause serious damage over larger regions.
8.0 - 8.9	Great earthquakes, can cause serious damage in regions several hundred miles across.
9.0 - 9.9	Great earthquakes, devastating in areas several thousands of miles across.
10 <	Massive earthquakes, never recorded, widespread devastation across vast regions.

The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally - total destruction. The Modified Mercalli (MM) Intensity Scale is the common intensity scale used in the United States. This scale is composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction. It does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects. The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the non-scientist than the magnitude because intensity refers to the effects actually experienced at that place.

The table below illustrates abbreviated descriptions of the 12 levels of Modified Mercalli Intensity Scale.

Table 4-68. Modified Mercalli Intensity Scale

MODIFIED MERCALLI INTENSITY SCALE	
Level of Intensity	**Observed Earthquake Effects**
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Felt quite noticeably by people indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations are similar to the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes and windows were broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage is great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.

IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage is great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures were destroyed; most masonry and frame structures were destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. The rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Earthquakes can trigger other types of ground failures which could contribute to the damage. These include landslides, dam failures, and liquefaction. In the last situation, shaking can mix groundwater and soil, liquefying and weakening the ground that supports buildings and severing utility lines. This is a special problem in floodplains where the water level is relatively high, and the soil is more susceptible to liquefaction.

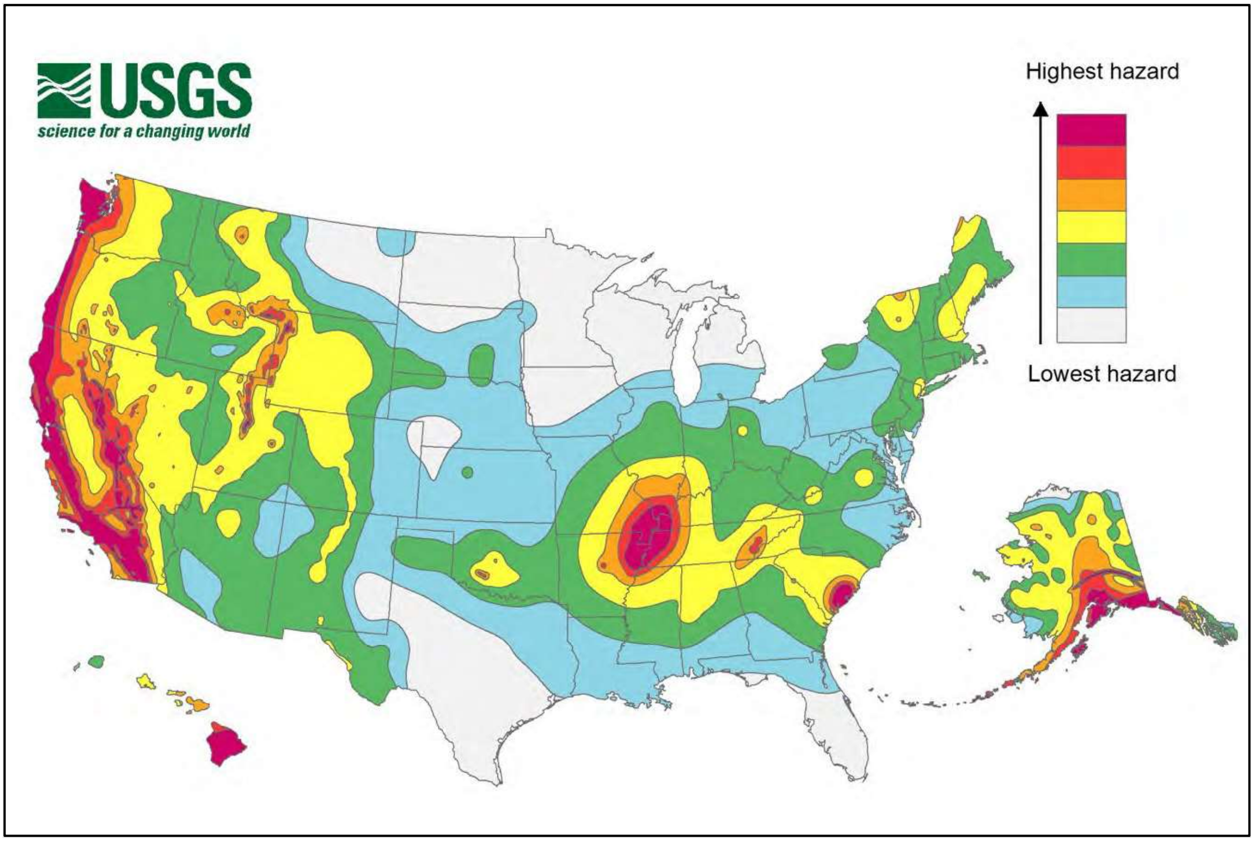
4.13.5 Probability and Frequency

Probability: The United States Geological Survey (USGS) determines the probability of earthquake events through a combination of historical earthquake data, geological and seismological research, and advanced modeling techniques. This process involves analyzing past earthquakes to understand patterns of occurrence, fault line activities, and the distribution of seismic activity across different regions. By studying the behavior of tectonic plates, including their movement and the stress accumulation along faults, scientists can assess where earthquakes are more likely to occur. The USGS also utilizes seismic hazard maps that depict the likelihood of various levels of earthquake shaking in different areas over specific time frames. These maps are based on models that incorporate the rates at which earthquakes occur in different areas and the expected ground shaking from those earthquakes.

In addition, the USGS employs probabilistic seismic hazard analysis (PSHA), a method that quantifies the likelihood of exceeding various levels of earthquake shaking in a given time period, considering the uncertainties inherent in predicting earthquake behavior. PSHA takes into account the location, rate, and magnitude of potential earthquakes, as well as how seismic waves will propagate through the Earth to affect particular locations. The analysis also incorporates the potential for soil amplification and other local effects that can influence ground shaking intensity.

Frequency: The figure below illustrates peak ground accelerations having a 2% probability of being exceeded in 50 years, for a firm rock site. The long-term national seismic hazard map is based on the most recent USGS models for the conterminous U.S. (2018), Hawaii (1998), and Alaska (2007). These models are based on seismicity and fault-slip rates and consider the frequency of earthquakes of various magnitudes. In California, the hazard may be greater than shown, because site geology may amplify ground motions.

Figure 4.27. Long-term National Seismic Hazard Map


USGS
science for a changing world
Highest hazard
Lowest hazard

4.13.6 Past Events

According to the 2023 State of California HMP, California has a long history of damaging earthquakes, and earthquake forecasts indicate a 93 percent chance that one or more major earthquakes (magnitude 7 or greater) will happen in the State in the 30 years following 2014.

4.13.7 Vulnerability and Impacts

Public Health and Life Safety: According to FEMA, earthquakes can impact life safety and public health in different ways. Some of the most common impacts are as follows:

- <u>Injuries and Loss of Life</u>: The violent shaking and structural damage caused by earthquakes can result in injuries and, in severe cases, loss of life. Falling debris, structural collapses, and ground ruptures can pose immediate risks to individuals in affected areas.
- <u>Structural Damage</u>: Earthquakes can cause extensive damage to buildings, homes, and infrastructure, making them unsafe for occupancy. This can lead to injuries, homelessness, and the need for temporary shelter.
- <u>Displacement</u>: Earthquake-affected individuals may be forced to evacuate their homes due to damage or the threat of aftershocks. This displacement can lead to overcrowding in emergency shelters and increased stress for affected individuals and families.
- <u>Mental Health Impact</u>: Earthquakes can have long-lasting psychological effects, including trauma, anxiety, and post-traumatic stress disorder (PTSD), which may require mental health support and counseling.
- <u>Strain on Healthcare Systems</u>: Earthquakes can overwhelm healthcare systems with an influx of injured individuals in need of medical attention. Hospitals and medical facilities may face challenges in providing care and resources.
- <u>Infrastructure Disruption</u>: Critical infrastructure, including roads, bridges, utilities, and communication networks, can be damaged, affecting emergency response capabilities and access to essential services.
- <u>Water Supply Contamination</u>: Ground shaking can damage water supply systems, leading to contamination of drinking water sources. This poses health risks and requires water treatment and distribution efforts.
- <u>Fire Hazards</u>: Earthquakes can cause gas leaks and damage to electrical systems, increasing the risk of fires. Fire outbreaks can lead to additional injuries, property damage, and air quality issues.
- <u>Aftershocks</u>: Aftershocks following the initial earthquake can further damage weakened structures, hinder response efforts, and prolong the risks to life safety and public health.

Property Damage and Critical Infrastructure: Generally, wood frame buildings and structures on solid ground fare best during an earthquake. Wood frame buildings are flexible enough to withstand ground shaking and swaying. Evaluations of recent earthquakes found that damage was primarily caused to:

- Unreinforced masonry structures.
- Older buildings with some degree of deterioration.
- Buildings without foundation ties.

- Multi-story structures with open or “soft” first floors.

Most building codes have standards related to the first three concerns. This means that the most threatened buildings are older ones (built before current codes), masonry ones, and taller ones with open first floors.

In addition to the building type, damage is related to the underlying soil. Buildings on solid ground fare better, while those on loose or sandy soils will suffer more from shaking. These can be found in floodplains. If there is enough water present, the shaking can liquefy the underlying soils, which removes the support under the foundation.

Figure 3-9 in the Community Profile illustrates the locations of critical facilities within the City of Chino.

A HAZUS analysis was conducted to examine the life safety and health impact to people during an earthquake incident. In this analysis, HAZUS estimates the number of people that could be injured or killed by an earthquake in the City of Chino.

The casualties are broken down into four (4) severity levels that describe the extent of the injuries and are described as follows:

- <u>Severity Level 1</u>: Injuries will require medical attention, but hospitalization is not needed.
- <u>Severity Level 2</u>: Injuries will require hospitalization but are not considered life-threatening
- <u>Severity Level 3</u>: Injuries will require hospitalization and can become life threatening if not promptly treated.
- <u>Severity Level 4</u>: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

The following table provides a summary of the casualties estimated by HAZUS for an earthquake.

Table 4-69. HAZUS Casualty Estimates

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.94	0.18	0.02	0.04
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	1.88	0.36	0.04	0.08
	Other-Residential	20.58	3.07	0.25	0.47
	Single Family	34.52	3.29	0.09	0.14
	Total	**58**	**7**	**0**	**1**
2 PM	Commercial	64.62	12.10	1.46	2.84
	Commuting	0.01	0.01	0.02	0.00
	Educational	17.69	2.93	0.31	0.61
	Hotels	0.00	0.00	0.00	0.00
	Industrial	13.82	2.62	0.31	0.61
	Other-Residential	7.04	1.08	0.09	0.17
	Single Family	9.68	0.95	0.03	0.04
	Total	**113**	**20**	**2**	**4**
5 PM	Commercial	46.04	8.60	1.04	1.99
	Commuting	0.14	0.18	0.31	0.06
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	8.64	1.64	0.20	0.38
	Other-Residential	7.74	1.18	0.10	0.18
	Single Family	13.03	1.28	0.04	0.06
	Total	**76**	**13**	**2**	**3**

Economy: According to FEMA, earthquake events can have profound and multifaceted economic impacts, affecting communities, businesses, and governments at all levels. Initially, earthquakes inflict direct damage to infrastructure, including buildings, roads, and bridges, leading to substantial repair and reconstruction costs. These costs not only strain public budgets but also divert resources from other vital community needs. Businesses experience significant disruptions, with some forced to cease operations temporarily or permanently, resulting in lost income, employment, and productivity. The ripple effects extend to the wider economy, as supply chains are disrupted, and consumer spending patterns shift in the aftermath of the disaster.

According to FEMA, earthquakes can undermine investor confidence and lead to declines in property values, especially in areas deemed at high risk for future seismic events. The insurance sector faces increased claims, which can impact the availability and cost of coverage for businesses and homeowners. Efforts to rebuild and recover from an earthquake often require substantial investment, which can stimulate economic activity in construction and related sectors but also highlight the need for improved resilience and preparedness strategies.

Changes in Development and Impact of Future Development: According to FEMA, earthquake events significantly influence changes in development and future planning strategies, primarily through the lens of enhancing resilience and safety in earthquake-prone areas. In the aftermath of significant seismic activity, there is often a reassessment of building codes and construction practices to reduce the vulnerability of structures to future earthquakes. This includes the adoption of more stringent engineering standards, the use of earthquake-resistant materials, and the incorporation of innovative design techniques that allow buildings and infrastructure to withstand seismic forces. Such measures are crucial in minimizing physical damage and ensuring the safety of occupants during subsequent earthquakes. Lastly, urban planning and zoning regulations may be revised to limit development in high-risk areas, such as fault zones and areas susceptible to soil liquefaction, further mitigating potential damage and loss of life (FEMA, 2024).

According to FEMA, earthquake events also impact long-term planning of communities, through higher building code standards and retrofitting existing structures to improve their earthquake resilience. Efforts to enhance public awareness and preparedness, including earthquake drills and the development of emergency response plans, become integral components of community planning.

Effects of Climate Change on Severity of Impacts: According to NOAA, the relationship between climate change and the severity of earthquake events is not direct, as earthquakes are primarily caused by geophysical processes related to the movement of tectonic plates beneath the Earth's surface. According to NOAA, earthquakes result from the buildup and release of energy along faults or by volcanic activity, processes that are generally considered to be independent of atmospheric conditions influenced by climate change.

4.13.8 FEMA NRI Expected Annual Loss Estimates

Table 4-70. City of Chino Expected Annual Loss Table

CITY OF CHINO CA FEMA NRI EXPECTED ANNUAL LOSS TABLE – EARTHQUAKE							
Annualized Frequency	**Population**	**Population Equivalence**	**Building Value**	**Agriculture Value**	**Total Value**	**Expected Annual Loss Score**	**Expected Annual Loss Rating**
0.0098% chance per year	0.83	$9,664,541.41	$47,900,631.4	N/A	$57,565,172.81	96.13	Relatively High
***Annualized Frequency**: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. **Population**: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. **Expected Annual Loss** scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: hazards.fema.gov/nri/expected-annual-loss*							
Source: FEMA National Risk Index (2024)							

4.13.9 FEMA Hazard-Specific Risk Index Table

Table 4-71. City of Chino FEMA Hazard Specific Risk Index Table

CITY OF CHINO, CA FEMA HAZARD SPECIFIC RATINGS – EARTHQUAKE		
Risk Index Score	**Social Vulnerability Rating**	**Community Resilience Rating**
96.07	Relatively High	Relatively Low
***Risk Index Scores**: are a quantitative rating calculated using data for only a single hazard type. Risk Index Scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value. **Social Vulnerability Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC). **Community Resilience Ratings**: are a qualitative rating that describe the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).*		
Source: FEMA National Risk Index (2024)		

4.13.10 FEMA NRI Exposure Value Table

Table 4-72. City of Chino FEMA NRI Exposure Value Table

CITY OF CHINO, CA FEMA EXPOSURE VALUE TABLE – EARTHQUAKE					
Hazard Type	**Total Value**	**Building Value**	**Population Equivalence**	**Population**	**Agriculture Value**
Earthquake	$1,343,572,557,379	$265,381,670,00	$1,317,238,000,000	113,555	N/A
Buildings: *Building exposure value is defined as the dollar value of the buildings determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible building exposure of an area (Census block, Census tract, or county) is its building value as recorded in Hazus 6.0, which provides 2022 valuations of the 2020 Census.* ***Population:*** *Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. The maximum possible population exposure of an area (Census block, Census tract, or county) is its population as recorded in Hazus 6.0. Population loss is monetized into a population equivalence value using a VSL approach in which each fatality or ten injuries is treated as $11.6 million of economic loss (2022 dollars).* ***Agriculture:*** *Agriculture exposure value is defined as the estimated dollar value of the crops and livestock determined to be exposed to a hazard according to a hazard type-specific methodology. This is derived from the USDA 2017 Census of Agriculture county-level value of crop and pastureland with 2018 values for the US territories. All dollar values are inflation-adjusted to 2022 dollars.*					
Source: FEMA National Risk Index (2024)					

OTHER HAZARDS OF CONCERN

Although FEMA does not require non-natural hazards for inclusion in a hazard mitigation plan, City of Chino wishes to rank and mitigate against a comprehensive list of hazard events that could impact the county. Due to the nature of non-natural hazards and the discretionary status regarding their inclusion, the following hazards of interest have been briefly and qualitatively assessed for public education and informing their inclusion within the hazard ranking and mitigation process:

- Civil Disturbance
- Cybersecurity Incident
- Facility Disaster
- Hazardous Materials Incident (Fixed, Transportation)
- Prolonged Power Outage
- Terrorism
- Transportation Incident (Air & Road)

4.14 Civil Disturbance

4.14.1 Hazard Definition

The FBI defines a civil disturbance as a collective act of public disorder or violence by a group of individuals which is aimed at challenging government authority or obstructing the functioning of governmental institutions. This can encompass a wide range of activities, including protests, riots, demonstrations, and other forms of public unrest. Civil disturbances are characterized by their potential to disrupt the peace and security of a community, potentially leading to harm to persons, damage to property, and a general state of chaos if not managed properly. Civil disturbances are often driven by social, economic, political, or environmental grievances, where participants seek to draw attention to their cause or demand change from governmental or societal structures. In cases where civil disturbances escalate to violence or criminal activities, law enforcement may intervene to restore order, protect lives and property, and uphold the rule of law.

4.14.2 Hazard Extent/Intensity

The FBI measures the extent or intensity of a civil disturbance through situational assessments, intelligence gathering, and analysis of the level of disruption caused. The extent of a civil disturbance is determined by several factors, including the number of participants, the geographic area affected, the duration of the event, and the presence of any violent activities or significant property damage. The intensity is further assessed by evaluating the level of aggression displayed, the use of weapons or destructive devices, and the response required by law enforcement and emergency services.

4.14.3 Past Events

Non reported

4.14.4 Probability

The FBI determines the probability of civil disturbance incidents through intelligence gathering, monitoring of social and political trends, and evaluation of specific triggers or events that could incite public unrest. This involves collecting and analyzing data from a wide range of sources, including law enforcement agencies, social media, public forums, and intelligence networks, to identify potential threats and assess the mood and sentiments of communities. The FBI also monitors upcoming events of political, social, or economic significance that might serve as catalysts for civil disturbances, such as elections, court decisions, or incidents of perceived injustice.

4.14.5 Vulnerability and Impacts

Health and Safety: According to the FBI, civil disturbance incidents can impact health and safety, posing both immediate and long-term risks to communities. In the short term, events can lead to injuries among participants, law enforcement personnel, and bystanders, resulting from physical confrontations, the use of crowd-control measures, or accidents in chaotic environments. Additionally, civil disturbances often result in the destruction of property, including homes, businesses, and public infrastructure, which can disrupt essential services such as healthcare, transportation, and access to food and water, further endangering public health and safety.

In the longer term, the impacts of civil disturbances can extend to the mental health and well-being of individuals and communities. The stress and trauma associated with experiencing or witnessing violence and destruction can lead to a range of psychological issues, including anxiety, depression, and post-traumatic stress disorder (PTSD). Finally, the disruption of community cohesion and trust in public institutions can have lasting effects, potentially hindering recovery efforts and resilience-building.

Property Damage and Critical Infrastructure: According to the FBI, civil disturbance incidents can impact property damage and critical infrastructure. Civil disturbance incidents can often lead to vandalism, looting, arson, and the destruction of buildings, vehicles, and storefronts, which can result in substantial financial losses for businesses and homeowners. The impact on critical infrastructure, such as utilities, transportation networks, emergency services, and communication systems, can disrupt essential services and pose serious challenges to public safety and the overall functioning of communities. Such disruptions can hinder emergency and law enforcement responses, complicating efforts to restore order and help those affected by the disturbance.

According to the FBI, the extent of property damage and infrastructure impact can vary widely depending on the scale and intensity of the civil disturbance, as well as the preparedness and response of law enforcement and emergency services. In the aftermath of such incidents, rebuilding and repairing damaged infrastructure and properties can be a lengthy and costly process, often requiring coordination between government agencies, private sector entities, and community organizations. The psychological impact on communities, including a sense of insecurity and decreased trust in public institutions, can also have lasting effects.

4.14.6 Economy

According to the FBI, civil disturbance incidents can impact the economy with immediate and long-term effects. In the short term, civil disturbance incidents can disrupt business operations, leading to significant losses in revenue, especially for small businesses that may not have the resources to recover quickly. The physical damage to property and infrastructure necessitates costly repairs and can deter future investment and tourism in the affected areas. Additionally, civil disturbances can strain public resources, as local and state governments may need to allocate significant funds towards law enforcement, emergency response, and rebuilding efforts, diverting funds from other public services and development projects.

In the long term, the economic impact of civil disturbances can extend beyond the immediate area of the incidents. The perception of instability can decrease investor confidence, potentially leading to a decline in investment at both local and national levels. Insurance premiums in affected areas may rise, imposing additional costs on businesses and property owners. Lastly, the disruption to supply chains during civil disturbances can have ripple effects on the broader economy, affecting industries and markets beyond the immediate region.

4.15 Cybersecurity Incident

4.15.1 Hazard Description

Cyber-attacks are “deliberate exploitation of computer systems, technology-dependent enterprises, and networks.” Cyber-attacks use malicious code to alter computer operations or data. The vulnerability of computer systems to attacks is a growing concern as people and institutions become more dependent upon networked technologies. The Federal Bureau of Investigation (FBI) reports that, “cyber intrusions are becoming more commonplace, more dangerous, and more sophisticated,” with implications for private- and public-sector networks.

Malware, or malicious software, can cause numerous problems once on a computer or network, from taking control of users’ machines to discreetly sending out confidential information. Ransomware is a specific type of malware that blocks access to digital files and demands a payment to release them. Hospitals, schools, state and local governments, law enforcement agencies, businesses, and even individuals can be targeted by ransomware. A 2017 study found ransomware payments over a two-year period totaled more than $16 million. Even if a victim is perfectly prepared with full offline data backups, recovery from a sophisticated ransomware attack typically costs far more than the demanded ransom. However, according to a 2016 study by Kaspersky Lab, roughly one in five ransomware victims who pay their attackers are still not able to retrieve their data.

Cyber spying or espionage is the act of illicitly obtaining intellectual property, government secrets, or other confidential digital information, and often is associated with attacks carried out by professional agents working on behalf of a foreign government or corporation.

According to cybersecurity firm Symantec, in 2016 “…the world of cyber espionage experienced a notable shift towards more overt activity, designed to destabilize and disrupt targeted organizations and countries.” A major data breach is when hackers gain access to large amounts of personal, sensitive, or confidential information and have become increasingly common. A 2018 report from the security firm Symantec found that more than seven billion identities have been exposed in data breaches over the last eight years. In addition to networked systems, data breaches can occur due to the mishandling of external drives.

Cyber-crime can refer to any of the above incidents when motivated primarily by financial gain or other criminal intent. The most severe type of attack is cyber terrorism, which aims to disrupt or damage systems to cause fear, injury, and loss to advance a political agenda.

Cyberattacks can be divided into two main categories: attacks against data, and attacks against physical infrastructure. Because our society is so dependent on technology, a large-scale cyberattack could overwhelm government and/or private-sector resources quickly, as well as threaten lives, property, the economy and national security.

Phishing is a technique employed in many of the above attacks and involves sending fraudulent emails purporting to be from known contacts or reputable companies to induce individuals to reveal personal information, such as passwords and credit card numbers, or to click on links that put the user at risk.

4.15.2 Hazard Location

Cyber disruptions are not central to one geographic area; they can occur anywhere within the City of Chino where technological systems exist or are utilized. A breach can originate at one computer and affect any other computer in the world. Targets include individual computers, networks, organizations, business sectors, or governments.

4.15.3 Hazard Extent/Intensity

The extent of a cybersecurity breach is dependent on various factors. These factors include the system that is attacked, protective measures put in place, training of the people involved, warning time, and the firewalls that exist to protect different levels of the system.

4.15.4 Probability and Frequency

Cyberattacks have increased nationwide in recent years, particularly targeting the energy sector, as well as the banking and finance sectors. Hackers have exploited vulnerabilities in company computer systems by distracting employees, interfering with Internet Security Providers (ISP), and diverting resources to steal proprietary information and personally identifiable information (PII). Small devices can wreak havoc on critical systems—some USB drives have been manufactured with viruses or become infected, spreading malware to multiple computers. Traditional cybersecurity measures such as firewalls, signature-based access controls, and anti-virus software are becoming increasingly antiquated, necessitating more advanced security strategies.

While specific data on the number of cyber incidents in Chino is not available, the probability of future cyberattacks remains high, given the increasing reliance on digital infrastructure.

Several local jurisdictions in California have been affected by ransomware attacks in recent years. In 2023, the San Bernardino County Sheriff's Department was hit by a ransomware attack, forcing the county to pay a $1.1 million ransom to regain access to its systems. The attack disrupted critical law enforcement operations, highlighting the vulnerabilities faced by public agencies.

Other high-profile ransomware incidents include:

- The City of Atlanta (2018), where recovery costs exceeded $2.6 million, significantly more than the initial $52,000 ransom demand.
- The City of Baltimore (2019), where a ransomware attack impacted email, voicemail, property tax portals, water bill and parking ticket systems, and delayed over 1,000 pending home sales.
- Orange County, North Carolina (2019), where a ransomware virus disrupted county services, including real estate transactions, marriage licenses, housing voucher processing, and tax bill verification.

4.15.5 Past Events

There have been no recorded cybersecurity events in the City of Chino.

4.15.6 Vulnerability and Impacts

Cyberattacks can have a wide range of impacts, ranging from minimal to significant, depending on if the County or its jurisdictions are the main target for the attack or if they are one of many targets. Some of these attacks may be malicious and can result in catastrophic damage to the nervous system of a community's cyber infrastructure. Back-up systems, redundancy, heightened awareness, integrity restoration, and recovery will provide means to adequately manage the consequence of an attack.

Direct Damage: Cyberattacks can inflict damage on physical systems by manipulating the technology supporting the built environment.

Economic Damage: Cyberattacks can inflict huge amounts of economic damage in many different ways. Cyberattacks targeting financial institutions (banks, stock markets, etc.) can directly impact the overall economy while other attacks may target individual businesses. Large scale cyberattacks can greatly affect the economy. Symantec reports that in the last three years, businesses have lost $3 billion due to phishing email scams alone. In an electronic-based commerce society, any disruption to daily activities can have disastrous impacts to the economy. It is difficult to measure the true extent of the impact.

4.16 Hazardous Materials Incident

4.16.1 Hazard Description

Hazardous materials (HAZMAT) are substances that, because of their chemical or physical characteristics, are hazardous to humans and living organisms, property, and the environment are regulated by the U.S. Environmental Protection Agency (EPA) and, when transported in commerce, by the U.S. Department of Transportation (DOT). The EPA regulations address “hazardous substances” and “extremely hazardous substances.”

The EPA chooses to specifically list hazardous substances and extremely hazardous substances rather than providing objective definitions. Hazardous substances, as listed, are generally materials that, if released into the environment, tend to persist for long periods and pose long-term health hazards for living organisms. They are primarily chronic rather than acute health hazards.

Regulations require that spills of these materials into the environment in amounts at or above their individual “reportable quantities” must be reported to the EPA. Extremely hazardous substances, on the other hand, while also generally toxic materials, are acute health hazards that, when released, are immediately dangerous to the life of humans and animals and can cause serious damage to the environment. There are currently 355 specifically listed extremely hazardous substances listed along with their individual threshold planning quantities (TPQ)

When facilities have these materials in quantities at or above the TPQ, they must submit “Tier II” information to appropriate state and/or local agencies to facilitate emergency planning.

DOT regulations provide the following definition for the term “hazardous material”: A hazardous material is “a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce” and has been designated as hazardous under section 5103 of federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions in part 173 of subchapter C of the same chapter.

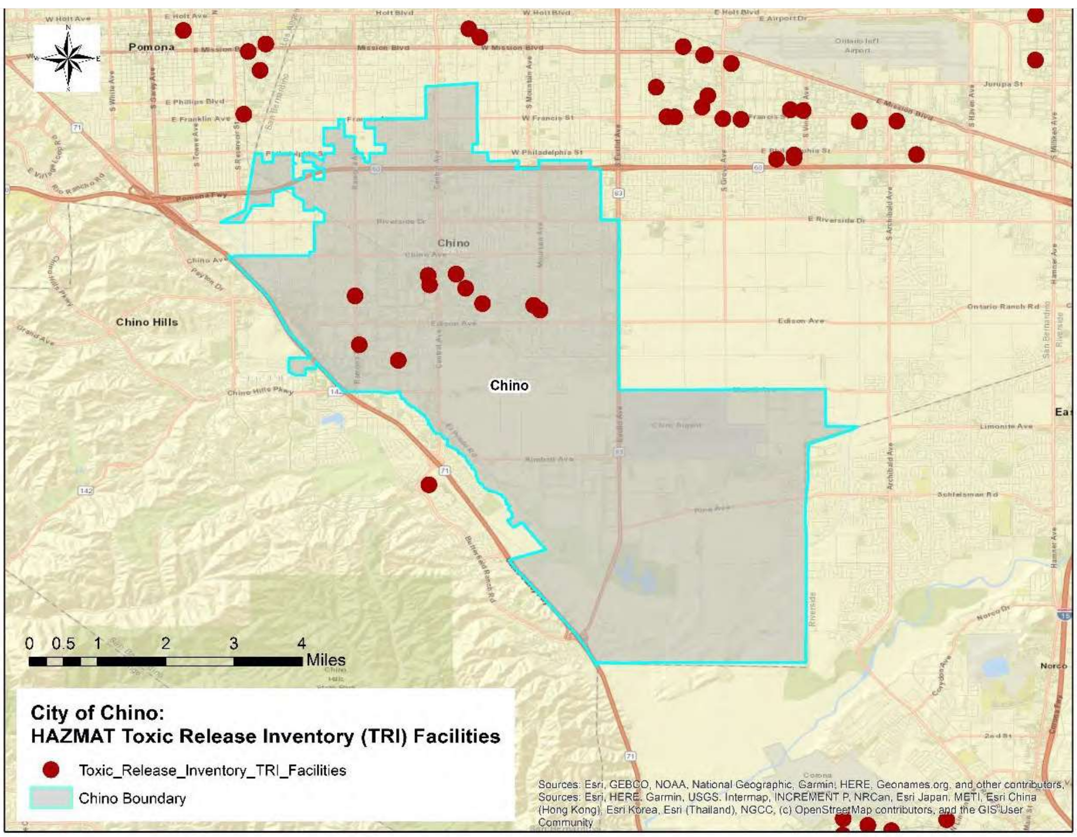
When a substance meets the DOT definition of a hazardous material, it must be transported under safety regulations providing for appropriate packaging, communication of hazards, and proper shipping controls.

In addition to EPA and DOT regulations, the National Fire Protection Association (NFPA) develops codes and standards for the safe storage and use of hazardous materials. These codes and standards are generally adopted locally and include the use of the NFPA 704 standard for communication of chemical hazards in terms of health, fire, instability (previously called “reactivity”), and other special hazards (such as water reactivity and oxidizer characteristics).

While somewhat differently defined by the above organizations, the term “hazardous material” may be generally understood to encompass substances that have the capability to harm humans and other living organisms, property, and/or the environment. There is also no universally accepted, objective definition of the term “hazardous material event.” A useful working definition, however, might be framed as “any actual or threatened uncontrolled release of a hazardous material, its hazardous reaction products, or the energy released by its reactions that poses a significant risk to human life and health, property, and/or the environment.”

4.16.2 Hazard Location

While a HAZMAT transportation incident could occur anywhere in the City of Chino, the figure below illustrates fixed HAZMAT sites located within the City of Chino.



4.16.3 Hazard Extent/Intensity

Diamond-shaped NFPA 704 signs ranking the health, fire, and instability hazards on a numerical scale from zero (least) to four (greatest) along with any special hazards are usually required to be posted on chemical storage buildings, tanks, and other facilities. Similar NFPA 704 labels may also be required on individual containers stored and/or used inside facilities.

The Environmental Protection Agency (EPA) uses several factors to assess the extent and intensity of HAZMAT or laboratory incidents. First, the EPA considers the type and quantity of hazardous materials involved in the incident, recognizing that different substances present varying risks to human health and the environment. Second, they assess the incident's location and geographic scope, determining whether it is localized to a laboratory, industrial facility, or if it has broader implications for densely populated areas or sensitive ecosystems.

Next, the EPA examines the release or exposure pathways to understand how hazardous materials are released and the potential routes of exposure to humans and wildlife. This includes evaluating whether the substances have become airborne, entered water bodies, or contaminated the soil. In addition, the agency investigates the immediate and long-term health and environmental effects stemming from the incident, encompassing the impact on air and water quality, ecosystems, and human health.

The response and cleanup measures taken during and after the incident play a pivotal role in assessing its extent and intensity. This involves evaluating the effectiveness of containment, control, and remediation efforts. Regulatory compliance is another crucial aspect, determining whether the incident involves non-compliance with environmental regulations and whether enforcement actions are necessary. The EPA also considers the impact on local communities, including evacuation orders, shelter-in-place advisories, public health consequences, and economic impacts. Lastly, the duration of the incident and the persistence of hazardous materials in the environment are taken into account to understand its intensity and the potential for prolonged consequences.

4.16.4 Probability and Frequency

Probability: The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) determines the probability of hazardous incidents through risk assessment, data analysis, and regulatory compliance monitoring. PHMSA employs risk assessment methodologies that consider the physical condition of pipelines, the nature of the materials transported, historical incident data, environmental conditions, and human factors. This analysis identifies potential vulnerabilities and the likelihood of incidents occurring. PHMSA also relies on extensive data collection from pipeline operators and hazardous materials handlers, including reports on incidents, safety violations, and maintenance activities. This data is analyzed to identify trends, assess risk levels, and prioritize safety measures.

Frequency: According to the US DOT Pipeline and Hazardous Materials Safety Administration, there have been 0 HAZMAT incidents recorded between 2019 and 2023 (1,862 days). This averages 0 incidents per day during this time and incidents annually.

4.16.5 Past Events

[Insert]

4.16.6 Vulnerabilities and Impacts

Life Safety and Public Health: According to the EPA, HAZMAT incidents can have substantial life safety and public health impacts. These impacts encompass immediate health risks due to exposure to hazardous materials, resulting in injuries, respiratory problems, chemical burns, or physical harm. In addition, long-term health effects may occur from prolonged exposure to contaminants, leading to respiratory diseases, cancers, and other chronic illnesses. Evacuations and displacement are often necessary in severe incidents, which can disrupt residents' lives, causing stress and mental health concerns. Contaminants released during such incidents can pollute air and water sources, affecting air quality and posing risks to communities through water contamination.

Next, soil and crops may become contaminated, impacting local agriculture and posing food safety risks. The need for emergency healthcare resources may overwhelm hospitals and healthcare facilities, affecting the availability of medical care for various health issues. The psychological impacts, such as fear and uncertainty, can result in stress, anxiety, and mental health challenges among affected individuals and communities.

Property Damage and Critical Infrastructure: HAZMAT incidents can result in significant property damage and critical infrastructure impacts. Property damage occurs when hazardous materials are released, leading to contamination and destruction of structures, both residential and commercial. The extent of property damage can be severe, particularly in cases of chemical spills, explosions, or fires.

Critical infrastructure, including water treatment facilities, power plants, transportation systems, and communication networks, can also be affected. Hazardous materials may contaminate water sources, disrupting water treatment plants and affecting the supply of clean water to communities. Power outages or damage to electrical infrastructure can result from fires or explosions, impacting energy supply and potentially causing additional safety risks. Transportation networks, including roads and bridges, can be compromised due to accidents or contamination, hindering access for emergency responders and the public.

Economy: HAZMAT incidents can result in costs associated with emergency response, containment, cleanup, and environmental remediation. The financial burden of addressing the incident and managing hazardous materials can also be substantial. These costs can include expenses related to deploying first responders, hazmat teams, and emergency services to the scene. This encompasses personnel, equipment, and resources necessary to contain and mitigate the incident promptly.

There are also costs related to cleaning up and decontaminating an affected area, which can involve the removal and disposal of hazardous materials. In addition, there can be financial repercussions, damage to research facilities, scientific equipment, and valuable experimental materials can be expensive to replace or repair.

Changes in Development and Impact of Future Development: Changes in development and future development can be impacted by HAMZAT incidents in several ways. First, such incidents may trigger a reassessment of environmental compliance and regulations in local laboratories and/or research facilities. This may lead to stricter oversight and increased regulatory requirements for handling hazardous materials and waste management, affecting the design and operation of future development projects.

Effects of Climate Change on Severity of Impacts: Changes in climate patterns can lead to extreme weather events such as hurricanes, floods, and wildfires, which can directly damage or disrupt HAZMAT storage facilities. For example, flooding can result in the release of hazardous materials from storage tanks or laboratories, posing significant risks to public health and the environment.

Climate change can also affect the transportation of hazardous materials. Increased temperatures can lead to heat-related transportation incidents, such as the overheating of vehicles carrying hazardous cargo, potentially causing leaks or accidents.

Lastly, changes in climate can alter the risk landscape by affecting the types and quantities of hazardous materials used in various industries. For example, changes in temperature and humidity levels can impact the stability of certain chemicals, making them more susceptible to accidental spills or reactions.

4.17 Prolonged Power Outage

4.17.1 Hazard Definition

An electric power outage (also power failure or power loss) is the loss of the electricity supply to a geographic area. The area of an outage (scale) can range from a single facility or neighborhood to a multi-state region. The length of the outage (scope) is determined by combination of factors to include the scale of the outage, weather, and redundant equipment and capacity.

A power outage can be described as a blackout if power is lost completely or as a brownout if the voltage level is below the normal minimum level specified for the system. The reasons for a power outage can, for instance, be a defect in a power station, damage to a power line or other part of the distribution system, a short circuit, or the overloading of electricity mains. “Load shedding” is a common term for a controlled way of rotating available generation capacity between various districts or customers, thus avoiding total wide area blackouts.

Power outages are particularly serious for hospitals and other critical facilities and operations. Our society is extremely reliant upon life-critical medical devices, communications, and electronic information all of which require reliable (uninterrupted) electric power.

The entire energy system is complex and consists of three major parts: generation, transmission, and distribution. The control and communication between these parts are extremely important as the failure of one part could disrupt the entire system. The energy system is reliant upon the following factors: continual maintenance, equipment replacement and redundancy, and additional high-load capacity. These factors have to be carefully balanced against operating cost and profit. These initiatives are expensive, but the costs cannot be readily pushed down to the consumer due to public pressure and opinion.

4.17.2 Hazard Location

This hazard affects every community in the City of Chino.

4.17.3 Hazard Extent/Intensity

Power outages in the City of Chino are typically isolated and limited to a short amount of time (less than six hours).

4.17.4 Probability and Frequency

The U.S. Department of Energy (DOE) determines the probability of prolonged power outages by analyzing the physical condition of infrastructure, such as power plants, transmission lines, and distribution networks, as well as the likelihood of extreme weather events, natural disasters, and human-induced threats that could lead to disruptions. The DOE also utilizes historical data on past outages, weather patterns, and infrastructure vulnerabilities to model potential scenarios and identify areas at higher risk of prolonged outages. Technological advancements and the integration of renewable energy sources are also considered, as they can influence the grid's adaptability and response to power demands and potential threats.

The DOE also collaborates with other federal agencies, state and local governments, and the private sector to gather comprehensive data on threats to the energy sector. This includes cybersecurity threats to the grid's operational technology systems, which are critical for maintaining power supply and distribution. By employing predictive analytics and risk assessment models, the DOE can estimate the likelihood and potential duration of power outages under various conditions.

4.17.5 Past Events

The City of Chino has experienced several power outages, though specific instances of prolonged outages have not been comprehensively detailed in public records. Southern California Edison (SCE) provides electric utility services to Chino and has reported outages in the area. Residents have reported various issues with outages, particularly during extreme weather events such as high winds and storms, which can lead to power interruptions lasting several hours or more.

In addition to weather-related outages, Chino is also subject to Public Safety Power Shutoffs (PSPS), a precautionary measure implemented by SCE to reduce wildfire risk during periods of extreme weather. PSPS events occur when strong winds, low humidity, and dry conditions increase the likelihood of wildfires, prompting SCE to temporarily shut off power in high-risk areas. While Chino is not in a designated high-fire-risk zone, PSPS events affecting surrounding areas may still have indirect impacts, including grid disruptions and strain on emergency services.

4.17.6. Vulnerability and Impacts

Public Health and Safety: According to the Centers for Disease Control and Prevention (CDC), prolonged power outages can have significant public health and safety impacts. One of the primary concerns is the loss of refrigeration, which jeopardizes the safety of stored food and vaccines, potentially leading to foodborne illnesses and disruption of essential medical services. Additionally, the lack of heating or cooling systems during extreme weather conditions can result in temperature-related health issues, including hypothermia during cold spells and heat-related illnesses during heatwaves. The absence of power also affects the functionality of medical devices, water treatment plants, and sewage systems, increasing the risk of medical emergencies and waterborne diseases.

Moreover, prolonged power outages can hinder communication and access to information, complicating emergency response efforts and public health advisories. The inability to charge electronic devices can leave individuals isolated, especially those who are vulnerable or require special care. The CDC also highlights the increased risk of accidents and injuries in the dark, including falls, burns from candles or generators, and carbon monoxide poisoning from improper use of alternative heating or power sources.

Property Damage and Critical Infrastructure: According to the DOE, prolonged power outages can lead to significant property damage and critically impact infrastructure systems. For residential and commercial properties, the absence of electrical power affects heating, cooling, and ventilation systems, potentially leading to water pipes freezing and bursting in cold weather or exacerbating heat-related deterioration and mold growth in warmer climates. Electronic devices and appliances may suffer damage from power surges when electricity is restored, and the lack of lighting and security systems increases the vulnerability of properties to theft and vandalism.

On a larger scale, critical infrastructure such as water treatment facilities, communication networks, transportation systems, and hospitals rely heavily on continuous power supply. Prolonged outages compromise the delivery of essential services, including public transportation, emergency response, healthcare services, and water supply, posing significant risks to public health and safety. Furthermore, the economic impact of outages on businesses and industries can be substantial, affecting local and national economies.

Economy: According to the DOE, prolonged power outages can impact the economy, affecting various sectors in both direct and indirect ways. Directly, businesses that rely on electric power for production, storage, and operations may experience significant losses due to halted operations, spoilage of perishable goods, and damage to sensitive equipment. The service sector, particularly those that depend on electronic transactions and digital communications, can also be severely disrupted. This immediate halt in business activities not only affects the revenue of individual companies but also impacts the wages of employees who may be unable to work during outages.

Indirectly, prolonged power outages can erode consumer confidence and deter investment, leading to broader economic repercussions beyond the immediate areas affected. Critical infrastructure failures, such as those in transportation, communication, and financial services, can disrupt supply chains and logistics, affecting local and national markets. The cumulative effect of these disruptions can contribute to economic downturns, particularly in regions where the economy is heavily reliant on industries vulnerable to power outages.

Changes in Development and Impact of Future Development: According to the DOE, prolonged power outages can impact changes in development and future development strategies, particularly in terms of enhancing resilience and sustainability in urban planning and infrastructure design. The experience of prolonged outages highlights the vulnerabilities in existing energy systems and underscores the need for integrating more resilient power solutions. This realization is driving a shift towards the development of smart grids, renewable energy sources, and microgrid technologies that can operate independently of the main grid during outages. Such advancements not only aim to minimize the impact of future power outages but also contribute to sustainable development goals by incorporating clean energy solutions. Lastly, the DOE emphasizes the importance of adaptive infrastructure that can withstand various disruptions, including power outages. This includes designing buildings and communities that are energy-efficient and capable of utilizing backup power systems such as solar panels and battery storage.

Effects of Climate Change on Severity of Impacts: There is no data illustrating the impact of climate change on the severity of prolonged power outages.

4.18 Terrorism

4.18.1 Hazard Description

The unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." This definition encompasses both domestic and international terrorism. Domestic terrorism is characterized by acts committed by individuals or groups without foreign direction, specifically within the territorial jurisdiction of the U.S., aimed at influencing the government or population. International terrorism involves violent acts or acts dangerous to human life that violate federal or state law and are intended to intimidate or coerce a civilian population, influence the policy of a government, or affect the conduct of a government by mass destruction, assassination, or kidnapping, and occur primarily outside the territorial jurisdiction of the U.S., or transcend national boundaries in terms of the means by which they are accomplished, the persons they appear intended to intimidate or coerce, or the locale in which their perpetrators operate or seek asylum.

4.18.2 Hazard Location

Terrorism could occur anywhere in the City of Chino. However, these types of incidents tend to occur in places significant public gatherings/events, as well as locations of (former) employment, or at schools/universities.

Table 4-73. Types of Vulnerable Soft Targets in the City of Chino, California

TYPES OF VULNERABLE SOFT TARGETS IN CHINO, CA	
Type of Location	**Examples and Description**
Schools and Educational Facilities	High-density areas with students and staff often lacking advanced security measures.
Shopping Malls and Retail Centers	Large, open spaces with high foot traffic, such as the Chino Spectrum Marketplace.
Entertainment Venues	Places like movie theaters, concert halls, and sports arenas where large crowds gather.
Healthcare Facilities	Hospitals and clinics that provide essential services but can be overwhelmed during disasters.
Public Parks and Recreational Areas	Open areas like Monte Vista Park and Liberty Park, which attract families and groups.

Note: The above list should not be considered inclusive, as terrorism or an active assailant incident could occur anywhere in the City of Chino.

4.18.3 Hazard Extent/Intensity

The Federal Bureau of Investigation (FBI) determines the extent and intensity of terrorism or active assailant events through a combination of investigative techniques, intelligence analysis, and collaboration with local, state, national, and international law enforcement and intelligence agencies. The extent of an event refers to its scale, including the geographical area affected, the number of individuals involved (both perpetrators and victims), and the impact on infrastructure and public services. The intensity involves the level of violence, the types of weapons used, and the duration of the event. The FBI assesses these factors through the collection and analysis of evidence from the scene, eyewitness accounts, surveillance footage, and intelligence reports. This information helps the FBI understand the motivations behind the attack, the methods of operation, and any affiliations with domestic or international terrorist organizations. Lastly, the FBI utilizes advanced forensic techniques and counterterrorism methodologies to evaluate the severity of these events. This includes examining the sophistication of the attack, the level of planning and coordination involved, and the potential for future threats.

4.18.4 Probability and Frequency

Probability: The FBI determines the probability of terrorism or active assailant events through intelligence gathering, analysis of past incidents, and ongoing monitoring of potential threats. This process includes scrutinizing communications and activities of individuals or groups that may pose a terrorist threat, analyzing trends and patterns in global and domestic terrorism, and assessing the security environment of specific locations or events that may be considered targets. The FBI also collaborates with local, state, federal, and international law enforcement and intelligence agencies to gather and share information, enhancing the comprehensiveness of threat assessments. The use of sophisticated technology and data analysis tools enables the FBI to sift through vast amounts of information to identify credible threats. Lastly, the FBI considers sociopolitical and economic factors that may influence the likelihood of terrorist activities or active assailant incidents. This approach allows the FBI to evaluate the motivations behind potential threats, the capability of individuals or groups to carry out an attack, and any indications of imminent action. Factors such as public events, political climates, and significant anniversaries also play a role in determining the probability of an event.

4.18.5 Past Events

There have been no known acts of terrorism in the City of Chino at the time of this 2025 Plan update.

4.18.6. Vulnerability and Impacts

Life Safety and Public Health: Terrorism incidents have profound impact on life safety and public health. These impacts include the loss of life, both directly through attacks and indirectly through the pervasive fear and emotional distress they induce. Additionally, physical injuries vary in severity among survivors, necessitating medical care and rehabilitation. Mental and emotional trauma is a pervasive outcome, leading to conditions like anxiety, depression, and PTSD among survivors and witnesses. Terrorism-induced displacement disrupts communities, contributing to challenges in accessing vital services. Public health concerns arise, including mass casualties, disease outbreaks, or contamination from chemical, biological, radiological, or nuclear materials. Furthermore, critical infrastructure may sustain damage, affecting public health and safety, and the economic aftermath may leave long-lasting impacts on local economies and businesses. Increased security measures may result from terrorist threats, impacting daily life, and social disruption and resource allocation may disrupt social cohesion and divert resources from other essential needs.

Property Damage and Critical Infrastructure: Terrorism incidents can cause extensive property damage and have significant critical infrastructure impacts. These impacts include the destruction or severe damage to buildings, including residential and commercial structures, leading to property losses. Additionally, vital transportation infrastructure, such as roads, bridges, airports, and public transit systems, may be targeted or affected, disrupting travel and trade. Disruptions can also extend to utilities, including power generation, water treatment, and communication systems, resulting in widespread power outages and water supply issues. Lastly, healthcare facilities (essential for addressing injuries and medical needs arising from acts of violence), may be damaged or rendered inoperable.

Economy: Terrorism incidents have a range of economic impacts. These impacts involve direct economic losses resulting from property damage, business disruption, and recovery expenses. Such incidents can curtail business activity due to reduced consumer confidence and decreased consumer spending, affecting various industries, especially those directly targeted. Furthermore, the fear and security concerns prompted by terrorism can deter tourists, leading to a decline in tourism revenue. Rebuilding and restoring damaged critical infrastructure, like transportation systems and utilities, can impose significant economic burdens, alongside the increased costs of security measures and insurance. Finally, economic consequences of terrorism can persist long-term, impacting overall economic growth, stability, and employment rates, with potential global economic repercussions and resource reallocation.

Changes in Development and Impact of Future Development: Terrorism incidents can have notable effects on changes in development and future development. These impacts encompass urban planning and infrastructure design, where concerns about security can lead to the incorporation of protective measures in building and infrastructure designs. This may include features like blast-resistant structures and advanced security systems. Property values and real estate dynamics can shift, with affected areas potentially experiencing decreased property values, while regions with enhanced security and reduced risk may become more appealing for development. Zoning regulations and land use policies may adapt to accommodate security considerations, potentially imposing restrictions on building heights, densities, and land use near critical infrastructure or known targets. Active assailant incidents can influence economic investments, attracting businesses and investors to areas with improved security measures. Lastly, communities may invest in resilience measures, such as emergency preparedness and infrastructure upgrades, to mitigate future incidents' impact. These factors, in turn, can lead to displacement and relocation, influencing development patterns and dynamics.

Effects of Climate Change on Severity of Impacts: There is no data illustrating the impact of climate change on the severity of terrorist incidents.

4.19 Transportation Incident

4.19.1 Hazard Description

According to FEMA, the definitions of an air transportation incident and a road/highway incident are as follows:

An **air transportation incident** involves any significant event related to aircraft operation that affects public safety and may result in injury, loss of life, or property damage. This includes accidents and emergencies such as:

- Crashes and collisions involving commercial, private, or military aircraft.
- Mid-air collisions.
- Runway incursions or excursions.
- Engine failures and fires in-flight or on the ground.
- Hijackings and terrorist attacks involving aircraft.

A **road/highway incident** pertains to any significant event on roadways that poses a threat to public safety, potentially resulting in injuries, fatalities, or property damage. These incidents can include:

- Traffic accidents involving passenger vehicles, trucks, motorcycles, or bicycles.
- Multi-vehicle pileups.
- Pedestrian accidents.
- Roadway hazards such as debris, spills, or adverse weather conditions causing dangerous driving environments.

- Infrastructure failures, such as bridge collapses or road cave-ins.

4.19.2 Hazard Location

A transportation incident could occur on anywhere in the City of Chino; however, several major thoroughfares facilitate vehicular and aviation traffic, including:

1. **California State Route 60 (SR-60):**
   - This major east-west highway connects Chino with other parts of the Inland Empire and Los Angeles County. It is heavily trafficked and prone to accidents and congestion.
2. **California State Route 71 (SR-71):**
   - Running north-south, SR-71 links Chino with cities to the north and south, including Pomona and Corona. It is a key commuter route and sees significant traffic, making it susceptible to incidents.
3. **Central Avenue:**
   - A primary north-south arterial road in Chino, Central Avenue is crucial for local traffic and commercial transportation. It intersects with SR-60 and experiences high traffic volumes.
4. **Euclid Avenue (California State Route 83):**
   - Another important north-south route, Euclid Avenue connects Chino to Ontario and other nearby communities. It is a significant corridor for both local and regional traffic.
5. **Riverside Drive:**
   - Running east-west, Riverside Drive is a vital roadway for local traffic, connecting residential and commercial areas within Chino.
6. **Chino Airport Vicinity:**
   - Located on the southwest side of Chino, the areas around Chino Airport are directly vulnerable to incidents involving small aircraft that operate out of this general aviation airport.
7. **SR-60 and SR-71 Near Chino Airport:**
   - These highways run relatively close to Chino Airport, increasing the risk of aircraft incidents affecting these thoroughfares, particularly in the event of takeoff or landing emergencies.
8. **Euclid Avenue (SR-83):**
   - As it passes near the Chino Airport, Euclid Avenue is another route potentially impacted by aircraft-related incidents.

4.19.3 Hazard Extent/Intensity

According to the U.S. Department of Transportation (USDOT), the extent and intensity of a major transportation incident are measured through a combination of quantitative and qualitative assessments, focusing on factors such as the severity of the impact on human life, infrastructure damage, and disruption to the transportation network. Quantitative measures include the number of fatalities and injuries, the extent of damage to vehicles and infrastructure (such as roads, bridges, and railways), and the duration of service disruptions. These metrics provide a concrete assessment of the immediate impact of the incident.

Qualitatively, the intensity of a transportation incident is also evaluated based on the broader implications for the transportation system and public safety, including the potential for environmental harm, economic losses due to disrupted travel and cargo movement, and the psychological impact on the affected communities and first responders. The incident's complexity, such as the involvement of hazardous materials or the need for specialized response teams, further characterizes its intensity.

4.19.4 Probability and Frequency

Probability: The USDOT measures the probability of major transportation incidents by analyzing historical data, risk assessment models, and predictive analytics across various modes of transportation, including highways, railways, aviation, and maritime. This involves examining past incident records to identify patterns, frequencies, and common factors contributing to accidents, such as vehicle malfunctions, human error, environmental conditions, and infrastructure vulnerabilities. By integrating this data with current transportation trends and emerging technologies, USDOT can estimate the likelihood of future incidents.

USDOT employs risk assessment methodologies that consider the complex interplay of variables affecting transportation safety including traffic volume, weather patterns, regulatory compliance, and the state of transportation infrastructure. Predictive analytics tools and simulation models are used to forecast potential scenarios and their probabilities, taking into account changes in policy, technology, and usage patterns.

4.19.5 Past Events

While the City of Chino has not experienced major aviation accidents, there have been notable incidents at Chino Airport. On June 15, 2024, during a Father's Day event hosted by the Yanks Air Museum, a vintage twin-engine Lockheed 12A Electra Junior crashed shortly after takeoff, resulting in the tragic loss of two pilots.

Another incident occurred on April 22, 2019, when a Northrop N-9MB aircraft crashed shortly after takeoff from Chino Airport during a test flight. The sole pilot on board was fatally injured.

4.19.6. Vulnerability and Impacts

Public Health and Safety: According to the USDOT, major transportation incidents can impact public health and safety impacts. In the immediate aftermath, there can be direct physical harm to individuals involved, including fatalities and injuries ranging from minor to life-altering. The psychological impact on survivors, first responders, and witnesses can also be profound, potentially leading to post-traumatic stress disorder (PTSD), anxiety, and depression. Moreover, incidents involving hazardous materials can pose additional health risks through exposure to toxic substances, potentially affecting both the immediate area and broader environment, leading to long-term health issues for the surrounding populations.

Beyond the immediate effects, major transportation incidents can disrupt critical infrastructure and public services, affecting access to healthcare, emergency services, and utilities. This disruption can exacerbate public health challenges, especially in communities with limited resources or in cases where the transportation system plays a vital role in the delivery of medical supplies and food. The economic impact, including lost productivity and the cost of medical care and rehabilitation for injured individuals, further contributes to the incident's societal toll.

Property Damage and Critical Infrastructure: According to the USDOT, a major transportation incident can result in significant property damage and critically impact infrastructure, with immediate and long-term consequences. Immediate impacts include the destruction or severe damage to vehicles, roadways, bridges, railway tracks, and nearby buildings or structures. Such incidents can compromise the structural integrity of transportation infrastructure, leading to closures, detours, and extensive repair or reconstruction efforts. In cases involving hazardous materials, the incident can also cause environmental damage, contaminating land and water sources and necessitating costly cleanup operations.

The long-term impacts on critical infrastructure can disrupt transportation networks and services, affecting local and regional economies. The interruption of supply chains and commerce, combined with the resource-intensive recovery and rebuilding processes, can strain public and private sector finances. Furthermore, the loss of or damage to critical infrastructure can undermine public confidence in transportation safety and efficiency, potentially deterring investment and development in affected areas.

Economy: According to the USDOT, a major transportation incident impacts the economy, both at the local and national levels. In the immediate aftermath, such incidents disrupt transportation networks, leading to delays and detours that affect the delivery of goods and services. This disruption can result in significant economic losses for businesses, particularly those reliant on just-in-time delivery systems, and can lead to increased operational costs due to the need for rerouting and additional logistics planning. Moreover, if critical infrastructure is damaged, the costs associated with repairs and rebuilding can be substantial, drawing financial resources away from other planned investments or services. The economic impact is further compounded by potential decreases in consumer and investor confidence, especially if the incident raises concerns about the safety and reliability of the transportation system.

In the long term, major transportation incidents can lead to broader economic implications, including impacts on tourism, property values, and investment in affected areas. If the public perceives an area as unsafe or prone to disruptions, it may deter tourists and investors, leading to a decline in economic activity and growth. Lastly, the incident may prompt regulatory changes and increase safety requirements for transportation operators, leading to higher compliance costs that could be passed on to consumers.

Changes in Development and Impact of Future Development: According to the USDOT, major transportation incidents can impact changes in development and future development, particularly in terms of safety regulations, infrastructure resilience, and urban planning. Major transportation incidents often prompt a reevaluation of existing transportation policies, leading to the implementation of stricter safety standards and the adoption of new technologies designed to prevent accidents. For example, a major incident might accelerate the deployment of advanced monitoring and emergency response systems or encourage the development of infrastructure capable of withstanding extreme conditions. These changes aim to enhance the safety and efficiency of transportation systems, potentially shaping the direction of future transportation projects and investments.

Additionally, major transportation incidents can spur innovation in urban planning and sustainable development. In response to the vulnerabilities exposed by such incidents, there may be increased emphasis on integrating transportation modes and developing multi-modal transportation hubs that offer greater flexibility and redundancy. This approach can improve system resilience and reduce the impact of future incidents.

Effects of Climate Change on Severity of Impacts: There is no data illustrating the impact of climate change on the severity of transportation incidents.

Part IV: Capability Assessment

CHAPTER 5 CAPABILITY ASSESSMENT

The City of Chino does not have a dedicated Emergency Management Department; however, hazard mitigation planning efforts are led by the Emergency Services Coordinator, who is dedicated to Emergency Management.

5.1 Preventative Measures

Preventative activities keep problems related to natural hazards from escalating and ensure new developments have reduced vulnerability to hazards. The following examples of preventative measures are usually carried out by building, planning, zoning, and/or code enforcement officials:

- Floodplain Mapping and Data
- Open Space Preservation
- Floodplain Regulations
- Erosion Setbacks
- Planning and Zoning
- Stormwater Management
- Drainage System Maintenance
- Building Codes

The information within this Chapter largely focuses on building codes, planning and zoning, stormwater runoff, floodplain management, water quality protection, and soil erosion control.

5.1.1 Building Codes

Updating and adopting new building codes, as well as addressing the effectiveness of these codes, can be one of the best ways to conduct mitigation. When properly designed and constructed, many buildings can withstand the impacts of high winds, a flood, or a tornado. The City of Chino works with various versions of the International Codes published by the International Code Council, Inc. (ICC). These codes include:

- International Building Code (IBC)
- International Residential Code (IRC)
- International Fire Code (IFC)
- International Mechanical Code (IMC)
- International Fuel Gas Code (IFGC)
- International Existing Building Code (IEBC)
- International Wildland-Urban Interface Code (IWUIC)
- International Property Maintenance Code (IPMC)
- International Swimming Pool and Spa Code (ISPSC)
- International Zoning Code (IZC)

5.1.2 Code Administration

Enforcement of code standards is critical to hazard mitigation. Adequate inspections are necessary during the construction process to ensure that builders understand and implement the requirements. The Building Code Effectiveness Grading Schedule (BCEGS) is a national program used by the insurance industry to determine how well new construction is protected from wind, earthquakes, and other non-flood hazards. Similar to the Community Rating System (CRS) and the fire insurance rating scheme, building permit programs are reviewed and scored. A Class 1 community receives the highest rating, while a Class 10 community represents the most basic level of compliance.

The City of Chino adopts updated Building Code versions every three years as part of California's triennial code adoption cycle. The next scheduled update will occur in January 2026, when the City of Chino will adopt the 2025 Building Code version.

Training of code officials is also essential for effective code enforcement. The BCEGS rating for a community is influenced by the level of training and certification among code officials and inspectors. Courses offered through building code associations help local officials stay updated on seismic, wind, and flood hazard standards, ensuring consistent application of regulations to enhance community resilience.

The table below lists building code adoptions in use within the City of Chino.

Table 5-74. Building Codes used in the City of Chino, CA

	Building Code Residential	Building Code Commercial
City of Chino	2022 California Residential Code 2021 International Residential Code	2022 California Building Code 2021 International Building Code

5.1.3 Planning and Zoning

Planning and zoning activities, such as land use plans, transportation plans, subdivision ordinances, zoning code and economic re-development plans, can be used to direct development away from hazardous areas. For example, comprehensive land use plans can designate floodplains and wetlands as areas for open space, wetlands, or low-density residential. The table below shows the City of Chino’s adopted comprehensive plans, zoning ordinances, and subdivision ordinances. The table also highlights communities where flood or other hazards are addressed or could be improved.

Table 5-75. City of Chino Planning and Land Use Ordinances

Community	Comp Plan	Mitigation and/or Hazards Included in Comprehensive Plan	Capital Improvement Plan	Mitigation and/or Hazards Included in Capital Improvement Plan	Flood hazards or drainage provisions in Subdivision Ordinance	Requirement to bury utilities in Subdivision Ordinance
City of Chino	Yes	Geologic hazards, including earthquakes, ground failure and subsidence and slope instability Flooding and dam failure Wildland fires Hazardous materials and waste Airport operations Disaster and terrorism preparedness Climate Change	Yes	Arterial Highways Local Streets Traffic Signal Modification/ Installation Sewer/ Storm Drain Water Various Landscape Improvements	Title 19 I of subdivision ordinance	19.07.170

5.1.4 Comprehensive Plans

Comprehensive Plans are the primary tools used by communities to address future development. They can reduce future flood-related damages by indicating open space or low-density development within floodplains and other hazardous areas. Natural hazards should be emphasized in specific land use recommendations.

5.1.5 Capital Improvement Plans (CIP)

The City of Chino utilizes a CIP to guide major public expenditures over a multi-year period. The CIP encompasses a wide range of projects aimed at maintaining and enhancing the community's infrastructure, including roadways, water and sewer lines, and public facilities. The program is administered by the Public Works Engineering Division, which oversees the planning, design, bidding, construction inspection, and project management functions for City-sponsored CIP projects. The CIP is developed with input from City departments and citizen groups and is adopted by the City Council based on identified needs. Funding for these projects comes from various sources, such as the General Fund, Community Development Block Grants (CDBG), Measure I, SB 1, and other local and federal grants (City of Chino, 2025).

CHAPTER 6: MITIGATION GOALS

The mitigation strategy includes the development of goals and prioritized hazard mitigation actions. Goals are long-term policy statements and global visions that support the mitigation strategy.

6.1 Community Priorities

The following topics were identified by the planning team to be of priority for the City of Chino:

- Life Safety
- Public Health
- Critical Infrastructure Maintenance and Protection
- Public Information and Warning
- Public Outreach, Education, and Awareness
- Equitable outcomes for underserved communities and socially vulnerable populations
- Inter-governmental Coordination
- Public-Private Partnerships
- Repetitive Loss Properties
- Climate Change

6.2 Goals and Guidelines

6.2.1 Mitigation Goals

The following goals (shown in order of importance) were developed by the planning team for the purpose of guiding and directing the Plan in accordance with governmental requirements, community priorities, and changing circumstances. These goals were compared with San Bernardino County Plans to ensure aligning viewpoints are used.

Goal 1. Life Safety: Prioritize the health and safety of City of Chino residents from the impacts of natural hazards.

Goal 2. Preventative Actions: Reduce risks through regulations, including building codes, limiting development within hazardous areas, and integrating mitigation strategies into local planning or capital improvement projects.

Goal 3. Property Protection. Reduce exposure to hazards through building or parcel-specific activities, such as structure/building acquisition, and protecting critical infrastructure and community lifelines within the City of Chino by identifying and reducing impacts of natural hazards through activities such as floodproofing and retrofitting.

Goal 4. Emergency Services. Reduce impacts of natural hazards by building response and recovery capabilities that are implemented during a disaster.

Goal 5. Structural Projects. Minimize the impacts of natural hazards on key structures within the City of Chino through the implementation of mitigation projects, such as detention basins, tornado shelters, advanced warning systems, etc.

6.2.2 Mitigation Guidelines

The following guidelines were developed by the planning team for purpose of achieving the goals and to facilitate the development of hazard mitigation action items in Chapter 7:

- **Guideline 1.** Prioritize hazard mitigation projects on the hazards that pose the greatest threat to the community.
- **Guideline 2**. Promote public education strategies for the community around the need to take steps to protect themselves, their families, and their property.
- **Guideline 3**. Create and foster public-private partnerships and relationships with leaders from underserved communities to accomplish hazard mitigation activities and equitable outcomes for all communities, including underserved communities and socially vulnerable populations.
- **Guideline 4**. Encourage interdepartmental and multi-jurisdictional collaboration and shared resources when developing and conducting hazard mitigation exercises and projects.
- **Guideline 5**. Strive to improve and expand communication/coordination between public works and emergency services before, during, and after a disaster response.
- **Guideline 6**. Seek County, State, and Federal support for mitigation projects

Chapter 7: MITIGATION ACTION PLAN

The findings, conclusions, and recommendations presented in Chapters 1 through 6 of the City of Chino All-Hazard Mitigation Plan have been collated into this Action Plan. This chapter outlines actionable steps that the City of Chino will take to reduce risks associated with natural hazards and enhance community resilience. The guidelines and goals developed by the Workgroup, presented in Chapter 6, set the context for these actions. The following action items align with the six mitigation areas outlined by the Federal Emergency Management Agency (FEMA) within their Community Rating System (CRS) Program. This Action Plan establishes a comprehensive direction for the City regarding natural hazard mitigation, incorporating an awareness of local risks, resources, and needs, and planning a clear path forward.

The Action Plan also reflects the feedback gathered from public surveys, public meetings, and stakeholder engagement. Surveys conducted at different stages of the planning process, along with feedback from public meetings and stakeholder reviews, were analyzed to ensure that community concerns and suggestions were addressed. Upon analyzing Survey 1 against Survey 2, as well as incorporating input from meetings and reviews, we were able to determine which actions the public found strong and favorable, and conversely, which actions they found wanting. Based on this analysis and comprehensive feedback, adjustments were made to the final actions presented in this chapter. This integration of public and stakeholder input ensures the plan meets the needs and priorities of the community. A summary report and all related surveys and feedback are available in the appendix for further reference.

Integration with Existing Plans

The 2025 City of Chino All-Hazard Mitigation Plan (HMP) is crafted to coexist and coordinate with existing city plans, promoting a unified mitigation strategy without requiring amendments to those plans. Through collaboration with relevant departments and stakeholders, the HMP seeks to align its actions with existing frameworks while drawing from their objectives and resources to inform feasible mitigation efforts. This voluntary integration aims to complement Chino's broader resilience goals. The table below outlines key plans identified during the planning process and their potential coordination with the HMP:

Plan	Potential HMP Contribution	HMP Utilization

2025 General Plan	Offers risk findings (e.g., flood, wildfire vulnerabilities) for potential inclusion in Safety and Land Use Elements to reduce hazard exposure.	Incorporates growth objectives to ensure mitigation actions align with development goals.
Emergency Operations Plan (EOP)	Provides strategies (e.g., backup power for facilities) that could enhance response capabilities if deemed suitable by EOP administrators.	Uses facility inventories and operational data to shape practical mitigation actions.
Capital Improvement Program (CIP)	Suggest projects (e.g., Euclid Avenue Bridge, storm drains) for consideration in infrastructure priorities as funding permits.	Draws from funding timelines to prioritize and schedule actionable mitigation projects.

This coordinated approach, guided by input from the Steering Committee, stakeholders the City of Chino's LEPC leverages existing plans to strengthen Chino's mitigation efforts without mandating changes, fostering a resilient community through voluntary alignment.7.1 Mitigation Action Plan

The Action Plan helps to prioritize mitigation initiatives according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The action plan also provides the framework for how the proposed projects and initiatives will be implemented and administered over the next five years.

7.1.1 Mitigation Strategy/Action Timeline Parameters

While the preference is to provide definitive project completion dates, this is only possible for some mitigation strategies/actions. Therefore, the parameters for the timeline (Projected Completion Date) are as follows:

- **Short-term**—To be completed in one to five years
- **Long-term**—To be completed in greater than five years
- **Ongoing**—Currently being implemented under existing programs but without a definite completion date

7.1.2 Mitigation Strategy/Action Benefit Parameters

Benefit ratings are defined as follows:

- **High**—The project will provide an immediate reduction of risk exposure for life and property.

- **Medium—**The project will have a long-term impact on reducing risk exposure for life and property, or the project will provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term.

7.1.3 Mitigation Strategy/Action Estimated Cost Parameters

While the preference is to provide definitive costs (dollar figures) for each mitigation strategy/action, this is only possible for some mitigation strategies/action. Therefore, the estimated costs for the mitigation initiatives identified in this Plan are identified as high, medium, or low, using the following ranges:

- **High—**Existing funding will not cover the project's cost; implementation would require new revenue through an alternative source (e.g., bonds, grants, and fee increases).
- **Medium—**The project could be implemented with existing funding but would require a re-apportion of the budget or a budget amendment, or the project cost would have to be spread over multiple years.
- **Low—**The project could be funded under the existing budget. The project is part of or can be part of a current ongoing program.

7.1.4 Mitigation Strategy/Action Prioritization Process

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) grant program. A less formal approach was used because some projects may not be implemented for multiple years, and associated costs and benefits could change dramatically. Therefore, a review of the apparent benefits versus the evident cost of each project was carried out. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

The priorities are defined as follows:

- **High—**A project that addresses numerous goals or hazards, has benefits that exceed the cost, has funding secured or is an ongoing project, and meets eligibility requirements for the HMGP or BRIC grant program. High-priority projects may be completed in the short term (1 to 5 years).
- **Medium—**A project that addressed multiple goals and hazards, with benefits that exceed costs, and for which funding has not been secured but is grant eligible under HMGP, BRIC, or other grant programs. The project can be completed in the short term once funding is secured. Medium-priority projects will become high-priority projects once funding is secured.
- **Low—**A project that will address a few or no goals, mitigate the risk of one or a few hazards, has benefits that do not exceed the costs or are challenging to quantify, for which funding has not been secured, that is not eligible for HMGP or BRIC grant funding, and for which the timeline for completion is long term. Low-priority projects may qualify for other grant funding sources from other programs.

For many of the strategies identified in this action plan, the participating jurisdictions may seek financial assistance under HMA programs, most requiring detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define “benefits” according to parameters that meet the goals and objectives of this Plan.

7.2 Mitigation Projects

Listed below are the projects that were developed to address the risks posed. It should be noted that this Plan serves only to recommend mitigation measures. Implementing these recommendations depends on adopting this Plan by the City of Chino City Council. It also depends on the cooperation and support of the designated offices responsible for each action item. In addition, each community was encouraged to include additional community-specific action/project items.

A summary of the previous plan’s action items through the final annual report, along with the mitigation activities communities completed to achieve each action item, can be found in Appendix E.

Participating jurisdictions agreed upon six mitigation actions that apply to the entire planning area. These shared actions, some of which address all hazards, help to meet the following requirement: “Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? Does the plan include one or more action(s) per jurisdiction for each hazard identified within the risk assessment?” In addition to the six mitigation measures that apply citywide, most communities identified additional mitigation actions unique to their jurisdiction. The following table summarizes the jurisdictions’ mitigation measures in relationship to the hazards addressed in the risk assessment. The total number of mitigation measures by hazard include the existing/ongoing actions identified in Appendix E, some of which were identified and remain listed as All-Hazard measures from the previous plan update.

XX = City of Chino Action(s) | **X** = Organization-Specific Action(s)

Table 7-76. Participating Organization's Mitigation Strategies and Natural Hazard Alignment

	Organization	Drought	Flooding	Severe Summer Storms	Severe Winter Weather	Wildfire	Earthquake	Landslide	Invasive Species
XX	City of Chino	5	12	13	10	9	10	4	4
X	Chino Valley Fire District					1			

Table 7-77. Participating Organization's Mitigation Strategies and Manmade Hazard Alignment

	Organization	Civil Disturbance	Cybersecurity Incident	Facility Disaster	HAZMAT Incident	Prolonged Power Outage	Terrorism	Transportation Incident	All Hazards
XX	City of Chino	1	1	3	4	1	2	2	6

7.3 Mitigation Action Plan & Projects for the City of Chino

The projects in this section considered the countywide coordination through the City of Chino.

Action 7.3.1

Mitigation Project: Update the City's HAZMAT Response Plan. Ensure that appropriate emergency funding is available.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	City wide	City of Chino Police/Emergency Management	Chino Valley Fire District. San Bernardino County Fire Dept. Hazardous Materials Response Team	High	Ongoing	Low to Medium
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3,4	HAZMAT, Terrorism, Civil Disturbance		High		High	City, County, State
Action/Implementation Plan and Project Description:						

Action 7.3.2

Mitigation Project: Develop and maintain a list of CUPA facilities throughout the City						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	City of Chino	City of Chino Police/Emergency Management	Chino Valley Fire / San Bernardino County Fire (CUPA)	Medium	Ongoing	Low
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3,5	HAZMAT		High		High	Local Budget
Action/Implementation Plan and Project Description:						
Utilize existing databases of CUPA facilities through city and state resources, develop master list at the city level and maintain on annual basis.						

Action 7.3.3

Mitigation Project: Evaluate and adopt Cal Fire ‘Fire Hazard Severity Map, if needed.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2026-2027	City of Chino	City of Chino Police/Emergency Management	Chino Valley Fire District	Medium	Ongoing	Low
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,3,5	Wildfire		Medium		Medium	Local budget
Action/Implementation Plan and Project Description:						
Review and evaluate existing Cal Fire mapping technologies and adopt accordingly for the city.						

Action 7.3.4

Mitigation Project: Adopt/Implement Ready, Set, Go program – Awareness if needed						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025/2026	City of Chino	City of Chino Police/Emergency Management	Chino Valley Fire District	Medium	Ongoing	Low
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3,5	Wildfire		Medium		Medium	Local Budget / Cal Fire Wildfire Prevention Grant
Action/Implementation Plan and Project Description:						
Review adopt and implement program if valid throughout the city.						

Action 7.3.5

Mitigation Project: Vegetation Management program – requires clearance and abatement of vegetation as it relates to creating defensible space.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	City of Chino	Chino Valley Fire District	City of Chino	High	Ongoing	Medium
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3	Wildfire		High		High	Local Budget / Cal Fire Wildfire Prevention Grant / HMGP
Action/Implementation Plan and Project Description:						
Ensure all critical facilities are required to clear and maintain vegetation management areas associated with defensible space.						

Action 7.3.6

Mitigation Project: Construct the Euclid Avenue Bridge Project from Pine Avenue to SR-71 to allow motorist and goods movement during rain and flooding events in the area.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	Voting District 3	City of Chino Public Works	City of Ontario, City of Eastvale, SBCTA, City of Chino Hills	High	Ongoing	High
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3,4,5	Flooding, Severe Summer Storms, HAZMAT, Transportation Incident (Road & Air)		High		High	Local, State, and Federal Funding including BRIC
Action/Implementation Plan and Project Description:						

Action 7.3.7

Mitigation Project: Research / Purchase backup generators or other types of resources to provide backup power to City facilities (example water sites) to provide water to the community during a major catastrophic event.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	City wide	City of Chino Police/Emergency Management	Others who can assist	High	Long Term / Ongoing	High
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
2,4,5	Earthquake, Facility Disaster, Severe Summer Storms, Cyber threat, Power Outages, Severe Winter Weather		High		High	Local funding as well as any grant opportunities which may arise including HMGP and BRIC
Action/Implementation Plan and Project Description:						
Review critical facilities and prioritize based on functional needs, determine appropriate locations and size/specifications. Apply for available funding opportunities.						

Action 7.3.8

Mitigation Project: Construct the Line H Storm Drain Project to prevent high water levels during rain events. The new storm drain line, along Quality Way and easement properties, will connect to the Prado Lake.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2023	Voting District 3	City of Chino Public Works	-	High	Ongoing	High
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3,4,5	Flooding, Severe Summer Storms, Severe Winter Weather		High		High	Local funding and any other funding sources which may come up including HMGP and BRIC
Action/Implementation Plan and Project Description:						
Line H						

Action 7.3.9

Mitigation Project: Construct the Line I Storm Drain Project to prevent high water levels during rain events. The project commences in the City of Ontario and the new storm drain line, along Euclid Avenue, will connect to the Prado Lake.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2023	Voting District 3	City of Chino Public Works	City of Ontario, County of San Bernardino	High	Ongoing	High
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3,4,5	Flooding, Severe Summer Storms, Severe Winter Weather		High		High	Local funding and cost sharing by City of Ontario and San Bernardino County
Action/Implementation Plan and Project Description:						
Line I						

Action 7.3.10

Mitigation Project: Construct the Pine Avenue Bridge connection from Euclid Avenue to SR-71 freeway. This will allow another connection to SR-71 for motorist and goods movement.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	Voting District 3	City of Chino Public Works	City of Ontario, City of Eastvale, SBCTA, City of Chino Hills	High	Ongoing	High
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3,4,5	Flooding, Severe Summer Storms, HAZMAT, Transportation (Road & Air)		High		High	Local, State, and Federal Funding including HMGP and BRIC
Action/Implementation Plan and Project Description:						

Action 7.3.11

Mitigation Project: Construct the San Antonio Avenue Storm Drain Project to prevent high water levels during rain events. The project commences in the City of Ontario and the new storm drain line will connect to the existing Sultana Cypress storm drain channel.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	Voting District 2	City of Chino Public Works	City of Ontario	High	Ongoing	High
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3,4,5	Flooding, Severe Summer Storms, Severe Winter Storms		High		High	Local funding and cost sharing by City of Ontario
Action/Implementation Plan and Project Description:						

Action 7.3.12

Mitigation Project: Prepare an Urban Forest Management Plan to provide the City a roadmap to install trees and planting that can be resistant to extreme heat and provide tree species which can help in reducing greenhouse gas emissions, and are wind resistant.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	Voting District All	City of Chino Police/Emergency Management	Chino Fire District	Medium	Long Term	Medium
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
2,3,4,5	Severe Summer Storms, Drought		High		High	Local and state, Cal Fire
Action/Implementation Plan and Project Description:						

Action 7.3.13

Mitigation Project: Retrofit roofs of city buildings as needed						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	City wide	City of Chino Police/Emergency Management	City Managers Office -	Medium	Ongoing	Low
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
2,3,4	Facility Disaster, Severe Summer Storms, Severe Winter Weather		High		High	Local Budget, HMGP and BRIC -
Action/Implementation Plan and Project Description:						
Hardening/retrofitting of critical facility roofs throughout the city as needed based on a review of structures and vulnerabilities. Apply for grant funding where appropriate as needed.						

Action 7.3.14

Mitigation Project: Seismically Retrofit city buildings constructed prior to 2000						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Support Agency**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2025	City wide	City of Chino Police/Emergency Management	City Managers Office -	Medium	Short Term	Medium
Applicable Goal(s)	**Hazard(s) Mitigated**		**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
1,2,3	Earthquake, Facility Disaster		Medium		Medium	HMGP, BRIC -
Action/Implementation Plan and Project Description:						
Hardening/seismic retrofitting of critical facilities throughout the city as needed based on a review of structures and vulnerabilities. Apply for grant funding where appropriate as needed.						

The Local Emergency Planning Committee (LEPC) will continue to monitor, evaluate, and update the Plan, specifically focusing on progress towards each action item within the All-Hazard Mitigation Plan (Plan). While the LEPC itself is not a new concept, its role in taking over the monitoring of the HMP is a new process for the City of Chino. The LEPC will dedicate one meeting annually to discuss the report's findings, progress each community has made, issues each community has experienced, and proposed projects. The annual meeting shall also give the LEPC the opportunity to discuss revisions/amendments needed to this Plan.

Developing an annual report and meeting annually to discuss progress keeps the LEPC involved in the Plan maintenance process, formalizes the maintenance process, and provides a level of accountability to work toward accomplishing the action items within the Plan. The City of Chino Emergency Services Coordinator and staff assigned shall be responsible for coordinating and overseeing the development of the annual report and its associated meeting. In addition, to continue to encourage community participation, annual meetings shall be open to the public and a public comment period shall be incorporated into each meeting.

Per the Federal Emergency Management Agency (FEMA), this Plan shall be updated every five years. Again, City of Chino departments and staff assigned shall be responsible for coordinating and overseeing the next Plan update. City of Chino coordination shall be overseen by the City of Chino Emergency Services Coordinator. In addition, it is recommended that the next 5-year update be conducted over the process of one to two years. This will provide the LEPC ample time to meet, develop drafts, involve the public, coordinate with stakeholders, and finalize the Plan.

This chapter describes the Plan maintenance process for the City of Chino.

8.1 Formal Review Process

The Plan will be reviewed on an annual basis by the LEPC to determine the effectiveness of programs and to reflect changes that may affect mitigation priorities. The Emergency Services Coordinator or designee will be responsible for contacting the LEPC and organizing the review. The LEPC will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan. The LEPC will review the goals and action items to determine their relevance to changing situations in the county as well as changes in Federal policy and to ensure they are addressing current and expected conditions. The LEPC will also review the risk assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. The organizations responsible for the various action items will report on the status of the projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised or removed.

The Emergency Services Coordinator or designee will be responsible for ensuring the updating of the Plan. The coordinator or designee will also notify all holders of the Plan and affected stakeholders when changes have been made. Every five years, the updated

Plan will be submitted to Cal OES and to the Federal Emergency Management Agency for review and approval.

8.2 Continued Public Involvement

The City of Chino and the LEPC are dedicated to involving the public directly in the review and updates of the Plan. The public will have the opportunity to provide input into Plan revisions and updates. Copies of the Plan will be kept by appropriate county departments and outside agencies.

Public meetings will be held when deemed necessary by the LEPC. The meetings will provide a forum where the public can express concerns, opinions, or new alternatives that can then be included in the Plan. The LEPC, and specifically Emergency Services Coordinator, will be responsible for using county resources to publicize the public meetings and maintain public involvement.

To further facilitate continued public involvement in the planning process, the City of Chino will ensure that:

- The Emergency Services Coordinator will keep a copy of the Plan on hand at their office for review and comment by the public. The Plan will also be maintained on their website.
- A public meeting will be held annually to provide the public with a forum for discussing concerns, opinions, and ideas with the LEPC.
- Mitigation flyers or mailings that contain mitigation activities and actions that promote reducing damages and risks of natural hazards are developed.

8.3 Monitoring, Evaluation, and Updating the Plan

To ensure the All-Hazard Mitigation Plan continues to provide an appropriate path for risk reduction throughout the City of Chino, it is necessary to regularly evaluate and update it. The LEPC will be responsible for monitoring the status of the Plan and gathering appropriate parties to report the status of mitigation actions. The LEPC will convene on an annual basis to determine the progress of the identified mitigation actions. The LEPC will also be an active participant in the next Plan update. As the All-Hazard Mitigation Plan matures, new stakeholders, specifically those stakeholders and organizations that represent underserved populations and groups in the city, will be identified and encouraged to join the existing LEPC.

The Emergency Services Coordinator is responsible for contacting LEPC members and organizing the annual meeting. The LEPC's responsibilities include:

- Annually reviewing each goal to determine its relevance and appropriateness.
    - Monitor and evaluate the mitigation strategies in this Plan to ensure the document reflects current hazard analyses, development trends, code changes and risk analyses and perceptions.

- Ensure the appropriate implementation of annual status reports and regular maintenance of the Plan.
- Create future action plans and mitigation strategies. These should be carefully assessed and prioritized using benefit-cost analysis (BCA) methodology that FEMA has developed.
- Ensure the public is invited to comment and be involved in mitigation plan updates.
- Ensure that the city complies with all applicable Federal statutes and regulations during the periods for which it receives grant funding, in compliance with 44 CFR.
- Reassess the Plan considering any major hazard event. The LEPC will convene within 45 days of any major event to review all applicable data and to consider the risk assessment, Plan goals, and action items given the impact of the hazard event.
- Review the Plan in connection with other plans, projects, developments, and other significant initiatives.
- Coordinate with appropriate municipalities and authorities to incorporate regional initiatives that transcend the boundaries of the county.
- Update the Plan every five years and submit it for FEMA approval.
- Amend the Plan whenever necessary to reflect changes in State or Federal laws and statutes required in 44 CFR.

8.3.1 The Five-Year Action Plan

This section outlines the implementation agenda that the LEPC should follow five years following adoption of this Plan, and then every five years thereafter. The LEPC is responsible for ensuring the All-Hazard Mitigation Plan is updated every five years.

The LEPC will consider the following action plan for the five-year planning cycle. It should be noted that the schedule below can be modified as necessary and does not include any meetings and/or activities that would be necessary following a disaster event (which would include reconvening the LEPC within 45 days of a disaster or emergency to determine what mitigation projects should be prioritized during the community recovery).

If an emergency meeting of the LEPC occurs, this proposed schedule may be altered to fit any new needs.

Year 0:

- **2025:** Update City of Chino All-Hazard Mitigation Plan, including a series of meetings & public meetings. Submit 2025 All-Hazard Mitigation Plan for FEMA approval.
- **2025:** Work on mitigation actions. The Emergency Services Coordinator will stay in contact with lead departments and municipalities to keep tabs on project status.

Year 1:

- **January 2025 – December 2025:** Work on mitigation actions. The Emergency Services Coordinator will stay in contact with lead departments and municipalities to keep tabs on project status. Encourage Plan integration efforts.
- **Fall/Winter 2025:** Reconvene LEPC for an annual meeting. Discuss opportunities for mitigation plan integration with other planning documents. Discuss recent hazards. Update the status of projects. Hosting a public meeting.

Year 2:

- **January 2026 – December 2026:** Work on mitigation actions. The Emergency Services Coordinator will stay in contact with lead departments and municipalities to keep tabs on project status. Encourage Plan integration efforts.
- **Fall/Winter 2026:** Reconvene LEPC for an annual meeting. Discuss opportunities for mitigation plan integration with other planning documents. Discuss recent hazards. Update the status of projects. Hosting a public meeting.

Year 3:

- **January 2027 – December 2027:** Work on mitigation actions. The Emergency Services Coordinator will stay in contact with lead departments and municipalities to keep tabs on project status. Encourage Plan integration efforts.
- **Summer/Fall 2027:** Apply for Building Resilient Infrastructure and Communities or Hazard Mitigation Grant Program funds to update the next iteration of the mitigation plan.
- **Fall/Winter 2027:** Reconvene LEPC for an annual meeting. Discuss opportunities for mitigation plan integration with other planning documents. Discuss recent hazards. Update the status of projects. Hosting a public meeting.

Year 4:

- **January 2028 – December 2028:** Work on mitigation actions. The Emergency Services Coordinator will stay in contact with lead departments and municipalities to keep tabs on project status. Encourage Plan integration efforts. Update 2025 All-Hazard Mitigation Plan, including a series of meetings & public meetings.

Year 5:

- **2029:** Submit 2029 All-Hazard Mitigation Plan for FEMA approval. Repeat.

8.4 Annual Natural Hazard Mitigation LEPC Planning Meetings

During each annual LEPC meeting, the LEPC will be responsible for a brief evaluation of the 2025 All-Hazard Mitigation Plan and to review the progress on mitigation actions.

8.4.1 Plan Evaluation

To evaluate the Plan, the LEPC should answer the following questions:

- Are the goals still relevant?
- Is the risk assessment still appropriate, or has the nature of the hazard and/or vulnerability changed over time?
- Are current resources appropriate for implementing this Plan?
- Have lead agencies participated as originally proposed?
- Has the public been adequately involved in the process? Are their comments being heard?
- Have city departments and participating jurisdictions been integrating mitigation into their planning documents?

If the answer to each of the above questions is “yes,” the Plan evaluation is complete. If any questions are answered with a “no,” the identified gap must be addressed.

8.4.2 Review of Mitigation Actions

Once the Plan evaluation is complete, the LEPC will review the status of the mitigation actions. To do so, the LEPC should answer the following questions:

- Have the mitigation actions been implemented as planned?
- Have outcomes been adequate?
- What problems have occurred in the implementation process?

8.4.3 Meeting Documentation

Each annual LEPC meeting must be documented, including the Plan evaluation and review of mitigation actions. This may be done by survey or other means, as appropriate.

8.5 Implementation through Existing Programs

Hazard mitigation practices must be incorporated within existing plans, projects, and programs. Therefore, the involvement of all departments, private non-profits, private industry, and appropriate jurisdictions is necessary to find mitigation opportunities within existing or planned projects and programs. To execute this, the Local Emergency Planning Committee (LEPC) will assist and coordinate resources for the mitigation actions and provide strategic outreach to implement mitigation actions that meet the requirements.

Integration with Existing Plans in Plan Maintenance

The City of Chino will maintain the 2025 Hazard Mitigation Plan (HMP) by coordinating with existing city plans through a collaborative process led by the LEPC, without requiring amendments to those plans. This voluntary approach aims to sustain the HMP's relevance by aligning its actions with ongoing city efforts during annual reviews and five-year updates. The table below outlines key plans and their potential coordination with the HMP maintenance process, encouraging a unified strategy to enhance Chino's resilience:

Plan	Potential HMP Contribution	HMP Utilization
2025 General Plan	Provides updated risk data (e.g., flood, earthquake vulnerabilities) for potential consideration in Safety and Land Use Elements during reviews.	Incorporates evolving growth objectives to keep mitigation actions consistent with development priorities.
Emergency Operations Plan (EOP)	Offers strategies (e.g., facility enhancements) that could refine response protocols if deemed suitable by EOP administrators during updates.	Uses updated facility data and response insights to adjust mitigation actions as needed.
Capital Improvement Program (CIP)	Suggested projects (e.g., storm drains, bridges) for consideration in infrastructure planning as funding allows, reviewed annually by the LEPC.	Draws from CIP funding schedules to refine project timelines and prioritize mitigation efforts.

This coordinated maintenance process, supported by LEPC collaboration with relevant departments, encourages alignment with existing plans as opportunities arise. By reviewing these plans annually and during the five-year update cycle, the HMP can remain a complementary tool for Chino's resilience without imposing changes, leveraging stakeholder input to sustain its effectiveness

Appendix A: Public Involvement Activities and Documentation

Below are samples of public information and public involvement activities that were used during the development of the *City of Chino All-Hazard Mitigation Plan*, including:

- Survey Results
- Public Meeting Announcements / News Releases
- Outreach Activities
- Public Meeting Photos

Organization	Date	Outreach Activity	Method of Sharing
City of Chino	8/12/24	*Public Input Wanted for Local Hazard Mitigation Plan* Press Release	Email Distribution List and Website
City of Chino	8/13/24	Hazard Mitigation Workshop Invitation	Facebook/Instagram
City of Chino	8/15/24	Presentation at Faith Based Collaborative	Presentation
City of Chino	8/16/24	LHMP Video Workshop Invite	Facebook/Instagram
City of Chino	8/21/24	Chino Link – Article inviting residents to LHMP workshops	Email Distribution List and Website
City of Chino	8/29/24	Hazard Mitigation Survey Invitation	Facebok/Instagram
Chino Valley Chamber of Commerce	9/4/24	Presentation at Business at Breakfast meeting	Gave quick presentation on the local hazard mitigation plan update efforts and how to get involved
City of Chino	9/7/24	Community outreach booth at Chino Cares Emergency Preparedness Fair	Outreach booth encouraging people to take the survey
City of Chino	9/9/24	Hazard Mitigation Survey Invitation	Facebook/Instagram
City of Chino	10/1/24	*Make Your Voice Heard on the Local Hazard Mitigation Plan* Press Release	Email Distribution List and Website
Chino Valley Fire District	10/5/24	Community outreach booth at Chino Valley Fire District Open House	Outreach booth encouraging people to take the survey
City of Chino	10/3/24	Hazard Mitigation Workshop Invitation	Facebook/Instagram

City of Chino	10/11/24	Hazard Mitigation Workshop Invitation	Facebook/Instagram
City of Chino	10/14/24	Hazard Mitigation Survey and Workshop Invitation	Facebook/Instagram
City of Chino	10/17/24	Hazard Mitigation Workshop Reminder	Facebook/Instagram
City of Chino	10/26/24	Community outreach booth at Chino Police Department Open House	Outreach booth encouraging people to take the survey
City of Chino	11/1/24	Presentation during Community Emergency Response Team (CERT) Basic Training	Presentation
City of Chino	11/9/24	Community outreach booth at Bark Around Ayala Park	Outreach booth encouraging people to take the survey
City of Chino	11/14/24	Hazard Mitigation Survey Invitation	Facebook/Instagram
City of Chino		www.cityofchino.org/LHMP	website

A.1 Survey

Community Survey Results Aug-Oct 2024

Survey Overview

The City of Chino conducted a comprehensive community survey as part of the Hazard Mitigation Planning process to gather public input on hazard concerns, priorities, and mitigation preferences. The survey was designed to identify which hazards residents consider most threatening to their community and to understand their personal level of preparedness and interest in participating in future mitigation efforts.

Survey Distribution and Outreach: The City implemented an extensive outreach campaign to ensure broad community participation. The survey was:

- Featured prominently on the City of Chino's official website
- Promoted through all city social media channels
- Published in local newspaper
- Distributed to key stakeholders with requests to share with their constituents

- Made available to all attendees at public meetings, with staff assistance provided for completion

This multi-faceted approach ensured the survey reached a diverse cross-section of the community, including residents, business owners, community organizations, and other stakeholders with interests in Chino's resilience and safety.

Survey Participation: Total 175

- Complete Responses: 90.4%
- Partial Responses: 9.6%

Community Connection

Respondents were asked to identify their connection to the City of Chino. Many respondents had multiple connections to the community.

Connection to Chino	Percentage
Live in Chino	73.9%
Work in Chino	24.3%
Frequently visit Chino	24.3%
Attend school in Chino	6.1%
None of the above	2.6%

Hazard Rankings

Respondents were asked to rank 15 potential hazards from most concerning to least concerning. The following table shows the overall ranking based on cumulative scores, with higher scores indicating greater concern.

Rank	Hazard	Score
1	Earthquake	1,422
2	Prolonged Power Outage	1,190
3	Cyber Threat	1,018
4	Flooding (Riverine & Flash)	983

Rank	Hazard	Score
5	Wildfire	976
6	Hazardous Materials Incident	970
7	Severe Summer Storms	969
8	Facility Disaster	914
9	Transportation Incident (Road & Air)	899
10	Terrorism	786
11	Drought	765
12	Civil Disturbance	744
13	Severe Winter Weather	534
14	Invasive Species	497
15	Landslide	489

Single Most Concerning Hazard

When asked to identify the ONE hazard that concerned them the most, respondents overwhelmingly selected earthquakes.

Hazard	Percentage
Earthquake	59.1%
Prolonged Power Outage	9.6%
Cyber Threat	7.8%
Wildfire	7.8%
Flooding (Riverine & Flash)	3.5%
Severe Summer Storms	2.6%
Transportation Incident (Road & Air)	2.6%

Hazard	Percentage
Terrorism	2.6%
Drought	2.6%
Facility Disaster	1.7%

Hazards Considered NOT Significant

Respondents were also asked to identify hazards they felt were NOT significant concerns for the community.

Hazard	Percentage
Severe Winter Weather	20.0%
Earthquake	18.3%
Invasive Species	13.9%
Landslide	10.4%
Flooding (Riverine & Flash)	8.7%
Facility Disaster	7.0%
Terrorism	5.2%
Civil Disturbance	4.3%

Primary Concerns Regarding Chosen Hazard

Respondents were asked about their primary concern regarding their chosen hazard.

Primary Concern	Percentage
Safety of family and self	73.9%
Disruption to daily life	13.0%
Property damage	6.1%
Environmental impact	3.5%

Primary Concern	Percentage
Job/income loss	1.7%
Other	1.7%

Anticipated Personal Impact

Respondents were asked about the most likely outcome they would personally experience if their chosen hazard event were to occur.

Expected Impact	Percentage
Significant personal impact (evacuation, property damage, extended utility loss)	27.8%
Moderate disruption to daily life	20.9%
Catastrophic impact (loss of home, severe injury, loss of life)	17.4%
Major life disruption (injury, long-term displacement, job loss)	14.8%
Minor inconvenience	10.4%
Unsure/Don't know	8.7%

Resource Prioritization

When asked how limited resources should be prioritized, respondents were almost evenly split:

Priority Approach	Percentage
Hazards that occur most frequently, even if less severe	55.7%
Hazards with potential for most significant damage, even if less frequent	44.3%

Interest in Future Participation

Respondents were asked about their interest in participating in future phases of the hazard mitigation planning process.

Level of Interest	Percentage
Interested but would like more information first	40.4%

Level of Interest	Percentage
Prefer to stay informed but not actively participate	31.6%
Would like to be actively involved	21.9%
Not interested in further participation	11.4%

Key Findings and Implications

1. **Earthquake Preparedness is a Top Priority**: With nearly 60% of respondents identifying earthquakes as their primary concern, earthquake preparedness and mitigation should be a significant focus of the HMP.
2. **Infrastructure Resilience is Essential**: The high ranking of power outages and cyber threats indicates community concern about critical infrastructure vulnerability. The HMP should address resilience of these systems.
3. **Personal Safety is the Primary Motivation**: With 73.9% of respondents citing safety of family and self as their primary concern, messaging about hazard preparedness should emphasize personal safety benefits.
4. **Balanced Approach to Resource Allocation**: The nearly even split on resource prioritization suggests the HMP should address both frequent hazards and those with catastrophic potential.
5. **Community Engagement Potential**: With over 60% of respondents expressing interest in staying involved or learning more, there is a strong foundation for continued community engagement throughout the HMP process.

Executive Summary

The community survey results provide valuable insights into the concerns, priorities, and preferences of Chino residents regarding hazard mitigation. This analysis identifies key strategic recommendations that the steering committee should consider incorporating into the Hazard Mitigation Plan update to ensure it effectively addresses community needs and concerns.

Priority Action Areas

1. Earthquake Resilience and Preparedness

Key Finding: Earthquakes represent the overwhelming concern for Chino residents (59.1% identified it as their primary concern), and the hazard ranked highest in overall priority scoring.

Strategic Recommendations:

- Develop targeted earthquake mitigation strategies for both public infrastructure and private properties
- Create comprehensive earthquake preparedness programs specifically designed for Chino's building stock and geological conditions
- Establish clear evacuation routes and emergency shelter locations specifically for earthquake scenarios
- Develop specialized outreach materials focusing on home earthquake safety measures (securing furniture, water heaters, etc.)
- Consider incentive programs for seismic retrofitting of vulnerable structures
- Partner with local businesses to ensure continuity of essential services following an earthquake
- Develop neighborhood-based earthquake response teams and regular community drills

2. Critical Infrastructure Protection

Key Finding: The second and third highest concerns (prolonged power outages and cyber threats) both relate to infrastructure vulnerability.

Strategic Recommendations:

- Conduct a comprehensive vulnerability assessment of Chino's power distribution systems
- Develop backup power systems for critical facilities and vulnerable populations
- Create a coordinated cyber-security strategy for city infrastructure systems
- Establish clear protocols for emergency communications during extended power outages
- Partner with utility companies to prioritize grid hardening in vulnerable areas
- Investigate microgrid opportunities for critical facilities

- Develop public cooling/warming centers with backup power for vulnerable populations
- Create public education campaigns about preparing for extended power outages

3. Family Safety-Focused Communication and Programs

Key Finding: 73.9% of respondents identified safety of family and self as their primary concern.

Strategic Recommendations:

- Redesign existing preparedness materials to emphasize family safety benefits
- Develop family emergency plan templates tailored to Chino's specific hazards
- Create child-friendly preparedness materials for schools and families
- Establish neighborhood-based support networks for vulnerable residents
- Implement a vulnerable population registry to prioritize assistance during emergencies
- Develop multi-lingual emergency preparedness materials reflecting Chino's diverse community
- Create age-appropriate preparedness programs for all segments of the population

4. Balanced Mitigation Strategy

Key Finding: Community is almost evenly split between prioritizing frequent hazards (55.7%) and catastrophic but less frequent hazards (44.3%).

Strategic Recommendations:

- Develop a two-tiered mitigation approach that addresses both types of hazards
- Create clear metrics for evaluating and comparing different types of hazard risks
- Establish transparent criteria for resource allocation decisions
- Identify mitigation strategies that concurrently address multiple hazard types
- Develop phased implementation plans that balance immediate and long-term risks
- Identify "no-regrets" strategies that provide benefits regardless of which hazards occur

- Establish clear monitoring and evaluation protocols to track effectiveness of both approaches

5. Enhanced Community Engagement

Key Finding: Over 60% of respondents expressed interest in being actively involved or learning more about the HMP process.

Strategic Recommendations:

- Develop ongoing engagement mechanisms beyond the planning phase
- Create a hazard mitigation citizen advisory committee
- Establish regular public forums to provide updates on implementation progress
- Develop a transparent tracking system for mitigation actions visible to the public
- Create volunteer opportunities for community members in mitigation projects
- Establish neighborhood-level preparedness coordinators
- Partner with community organizations to expand outreach capacity
- Develop a multi-platform communications strategy to maintain community engagement

Implementation Considerations

Resource Allocation Strategy

Based on the survey results, the steering committee should consider a hazard mitigation funding allocation that:

- Dedicates significant resources to earthquake preparedness and resilience (≈30-40%)
- Allocates substantial funding to critical infrastructure protection (≈20-30%)
- Supports family-focused preparedness programs (≈15-20%)
- Maintains flexibility to address both frequent and catastrophic hazards (≈10-15%)
- Funds ongoing community engagement and education (≈10-15%)

Measuring Success

The HMP should include specific metrics to evaluate success based on community priorities:

- Reduction in earthquake vulnerability for both public and private structures
- Improved resilience of critical infrastructure systems
- Increased household preparedness levels
- Broader community participation in preparedness activities
- Reduction in expected damage and recovery time from priority hazards

Potential Partnerships

Based on the survey results, the steering committee should consider developing partnerships with:

- Local utility companies for infrastructure resilience
- School districts for family and youth preparedness
- Business community for economic resilience
- Healthcare providers for vulnerable population support
- Neighborhood associations for localized implementation
- Faith communities for community outreach
- Local media for public awareness campaigns

Conclusion

The survey results provide clear direction for the HMP update. By focusing on earthquake resilience, critical infrastructure protection, family safety, a balanced mitigation approach, and enhanced community engagement, the plan can effectively address the priorities and concerns of Chino residents. These recommendations provide a framework for developing a more resilient community that is prepared for both the most likely and most severe hazards it faces.

Survey B: CITY OF CHINO HAZARD MITIGATION PLAN

Community Survey Results Oct-Dec 2024

Survey Overview

The City of Chino conducted a comprehensive community survey as part of the Hazard Mitigation Planning process to gather public feedback on proposed mitigation actions. This survey was designed to evaluate whether the mitigation strategies identified by the city adequately address the hazards identified in the first survey and to gauge community support for specific actions.

Survey Distribution and Outreach: The City implemented an extensive outreach campaign to ensure broad community participation. The survey was:

- Featured prominently on the City of Chino's official website
- Promoted through all city social media channels
- Published in local newspapers
- Distributed to key stakeholders with requests to share with their constituents
- Made available to all attendees at public meetings, with staff assistance provided for completion

This multi-faceted approach ensured the survey reached a diverse cross-section of the community, including residents, business owners, community organizations, and other stakeholders with interests in Chino's resilience and safety.

Survey Participation:

- Complete Responses: 100%
- Total Respondents: 113

Respondent Background

Previous Involvement in Hazard Mitigation Planning

Previous Involvement	Percentage
Yes	24.1%
No	75.9%

Familiarity with Chino's Hazard Mitigation Efforts

Level of Familiarity	Percentage
Very familiar	10.3%
Somewhat familiar	31.0%
Not very familiar	27.6%
Not at all familiar	31.0%

Adequacy of Mitigation Actions by Hazard Type

All Hazards

Rating	Percentage
Very Adequate	28.6%
Somewhat Adequate	7.1%
Adequate	39.3%
Somewhat Inadequate	14.3%
Very Inadequate	7.1%
None Applicable	3.6%

Earthquakes

Rating	Percentage
Very Adequate	17.2%
Somewhat Adequate	10.3%
Adequate	51.7%
Somewhat Inadequate	17.2%
Very Inadequate	0.0%
None Applicable	3.4%

Flooding

Rating	Percentage
Very Adequate	13.8%
Somewhat Adequate	17.2%
Adequate	51.7%
Somewhat Inadequate	10.3%
Very Inadequate	3.4%
None Applicable	3.4%

Severe Summer Storms

Rating	Percentage
Very Adequate	13.8%
Somewhat Adequate	27.6%
Adequate	41.4%
Somewhat Inadequate	10.3%
Very Inadequate	3.4%
None Applicable	3.4%

Wildfire

Rating	Percentage
Very Adequate	21.4%
Somewhat Adequate	7.1%
Adequate	50.0%
Somewhat Inadequate	10.7%
Very Inadequate	3.6%

Rating	Percentage
None Applicable	7.1%

Drought

Rating	Percentage
Very Adequate	10.3%
Somewhat Adequate	27.6%
Adequate	41.4%
Somewhat Inadequate	13.8%
Very Inadequate	3.4%
None Applicable	3.4%

Cyber Threats

Rating	Percentage
Very Adequate	7.1%
Somewhat Adequate	28.6%
Adequate	39.3%
Somewhat Inadequate	21.4%
Very Inadequate	0.0%
None Applicable	3.6%

Prolonged Power Outage

Rating	Percentage
Very Adequate	3.6%
Somewhat Adequate	32.1%
Adequate	35.7%

Rating	Percentage
Somewhat Inadequate	14.3%
Very Inadequate	7.1%
None Applicable	7.1%

Hazardous Materials Incidents

Rating	Percentage
Very Adequate	10.3%
Somewhat Adequate	17.2%
Adequate	55.2%
Somewhat Inadequate	6.9%
Very Inadequate	3.4%
None Applicable	6.9%

Transportation Incidents

Rating	Percentage
Very Adequate	20.7%
Somewhat Adequate	20.7%
Adequate	44.8%
Somewhat Inadequate	6.9%
Very Inadequate	3.4%
None Applicable	3.4%

Disobedient Acts

Rating	Percentage
Very Adequate	17.2%

Rating	Percentage
Somewhat Adequate	13.8%
Adequate	37.9%
Somewhat Inadequate	20.7%
Very Inadequate	6.9%
None Applicable	3.4%

Facility Disasters

Rating	Percentage
Very Adequate	22.2%
Somewhat Adequate	11.1%
Adequate	44.4%
Somewhat Inadequate	14.8%
Very Inadequate	3.7%
None Applicable	3.7%

Support for Specific Mitigation Actions

Drought Mitigation Actions

Mitigation Action	Support (Yes)
Local Drought Ordinance	85.7%
Urban Water Management Plan	89.3%
Retrofit Water Supply Systems	96.4%
Turf Replacement Program	75.0%

Urban Flooding Mitigation Actions

Mitigation Action	Support (Yes)
Updated Flood Management Code	85.2%

Facility Disaster Mitigation Actions

Mitigation Action	Support (Yes)
Upgrade City Facilities HVAC Systems	100.0%
Solar Power and Battery Backup	85.7%

Severe Summer Storms Mitigation Actions

Mitigation Action	Support (Yes)
Cooling Centers for Extreme Heat Events	92.9%
Social Media Alerts for Severe Weather	85.7%

Fire Mitigation Actions

Mitigation Action	Support (Yes)
Vegetation and Weed Abatement Program	92.9%

All Hazards Mitigation Actions

Mitigation Action	Support (Yes)
CERT (Community Emergency Response Team) Training	89.3%

Cyber Threat Mitigation Actions

Mitigation Action	Support (Yes)
Cybersecurity Training for City Staff	82.1%
Dual Redundancy for Cyber Systems	92.9%

Perception of Balance in Mitigation Planning

Prevention vs. Preparedness

Rating	Percentage
Good balance	81.5%
Not enough focus	7.4%
Unsure	11.1%

Response vs. Recovery

Rating	Percentage
Good balance	85.2%
Not enough focus	3.7%
Unsure	11.1%

Short-term vs. Long-term Solutions

Rating	Percentage
Good balance	77.8%
Not enough focus	7.4%
Unsure	14.8%

Effectiveness of Mitigation Strategy Types

Infrastructure Improvements

Rating	Percentage
Very effective	50.0%
Moderately effective	35.7%
Slightly effective	14.3%

Building Codes and Zoning Regulations

Rating	Percentage
Very effective	32.1%

Rating	Percentage
Moderately effective	50.0%
Slightly effective	14.3%
Not at all effective	3.6%

Public Education and Awareness Programs

Rating	Percentage
Very effective	39.3%
Moderately effective	35.7%
Slightly effective	25.0%

Emergency Response Planning

Rating	Percentage
Extremely effective	3.6%
Very effective	39.3%
Moderately effective	42.9%
Slightly effective	14.3%

Natural Resource Protection

Rating	Percentage
Very effective	33.3%
Moderately effective	48.1%
Slightly effective	18.5%

Respondent Demographics

Length of Association with Chino

Duration	Percentage
More than 10 years	46.0%
1-5 years	29.0%
6-10 years	14.0%
Not associated with Chino	11.0%

Key Findings and Implications

1. **Adequacy of Current Mitigation Actions**: Most respondents rated the city's mitigation actions as "Adequate" across all hazard categories, with the highest adequacy ratings for Hazardous Materials Incidents (55.2% rated as "Adequate").
2. **Areas Needing Improvement**: Cyber Threats and Prolonged Power Outages received the highest combined "Somewhat Inadequate" and "Very Inadequate" ratings (21.4% and 21.4% respectively), suggesting that these areas may need further attention and enhancement in the mitigation strategies.
3. **Strong Support for Proposed Actions**: Most proposed mitigation actions received high approval ratings (75-100%), indicating broad community support for the city's planned initiatives. The upgrade of city facilities' HVAC systems received unanimous support (100%).
4. **Balanced Approach Perception**: Over 75% of respondents felt the city maintains a good balance across multiple dimensions of mitigation planning, including prevention vs. preparedness (81.5%), response vs. recovery (85.2%), and short-term vs. long-term solutions (77.8%).
5. **Infrastructure Priority**: Half of all respondents (50%) rated infrastructure improvements as "Very effective" mitigation strategies, the highest rating among all strategy types, suggesting that infrastructure investment should be a priority.
6. **Limited Familiarity with Hazard Mitigation**: A majority of respondents (58.6%) were either "Not very familiar" or "Not at all familiar" with the city's hazard mitigation efforts, indicating a need for improved public education and engagement about existing mitigation strategies.
7. **New Participant Involvement**: With 75.9% of respondents indicating they had not previously been involved in hazard mitigation planning, this survey reached many new voices, which is important for comprehensive community input.

8. **Long-term Community Perspective**: Nearly half (46%) of respondents have been associated with Chino for more than 10 years, providing valuable long-term perspective on the city's hazards and mitigation needs.
9. **Areas of Geographic Focus**: Several areas were identified as needing focused attention, including areas around dairies (flooding concerns), the Prado Dam area, and Euclid Avenue.
10. **Strong Foundation for Implementation**: With high approval ratings for most mitigation actions and positive perception of the city's balanced approach, there is a strong foundation for successful implementation of the Hazard Mitigation Plan.

Executive Summary

The Mitigation Actions Survey provides valuable insights into how the community perceives the adequacy of Chino's proposed hazard mitigation strategies. This document outlines specific, actionable recommendations for the steering committee to enhance existing mitigation actions and address perceived gaps in the current strategy.

These strategic recommendations are derived directly from the community feedback and aim to build on the existing foundation of mitigation strategies while addressing areas that need improvement. The survey results indicate that while most mitigation actions are viewed as adequate, there are specific areas—particularly cyber threats and power outage resilience—that require additional focus.

The recommendations focus particularly on:

1. **Enhancing cyber threat and power outage resilience** - The two areas identified as having the most inadequate mitigation measures
2. **Strengthening earthquake preparedness** - The hazard with the highest overall priority from the first survey
3. **Optimizing infrastructure investments** - The strategy type rated as most effective by the community
4. **Improving public awareness** - Addressing the limited familiarity with current mitigation efforts
5. **Targeting specific geographic areas** - Addressing concerns about particular locations in Chino

Priority Action Areas

1. Cyber Threat Mitigation Enhancement

Key Finding: 21.4% of respondents rated current cyber threat mitigation actions as "Somewhat Inadequate" - the highest percentage in this category for any hazard. While cybersecurity training (82.1%) and dual redundancy (92.9%) received good support, respondents specifically noted that more infrastructure updates are needed beyond training.

Strategic Recommendations:

- **Comprehensive Cyber Security Program**
  - Develop a city-wide cyber security strategic plan that goes beyond current staff training
  - Implement multi-factor authentication across all critical city systems
  - Establish regular third-party penetration testing and vulnerability assessments
  - Create a cyber incident response plan with clearly defined roles and procedures
- **Critical Infrastructure Protection**
  - Implement network segmentation to isolate critical infrastructure systems
  - Develop dedicated security protocols for SCADA and operational technology systems
  - Establish backup systems that are fully isolated from primary networks
  - Create redundant communication channels for emergency operations
- **Community Cyber Resilience**
  - Develop public education programs on cyber security for residents and local businesses
  - Create information sharing mechanisms with local businesses on emerging cyber threats
  - Establish a community cyber incident reporting system
  - Partner with local IT professionals to create volunteer cyber response teams

2. Power Outage Resilience Improvement

Key Finding: 21.4% of respondents rated prolonged power outage mitigation measures as inadequate, while only 3.6% rated them as "Very Adequate" - the lowest for any hazard.

Strategic Recommendations:

- **Critical Facility Power Resilience**
    - Expand backup power beyond current plans to include all emergency shelters
    - Implement renewable energy + battery storage at key facilities rather than generators alone
    - Develop microgrids for critical infrastructure clusters
    - Create redundant power systems with multiple fuel sources
- **Vulnerable Population Protection**
    - Establish neighborhood resilience hubs with backup power in multiple locations
    - Develop a medical needs registry for priority restoration and support
    - Create a mobile power resource deployment plan to serve vulnerable residents
    - Partner with healthcare providers to ensure continuity of care during outages
- **Community Resilience**
    - Expand community education on prolonged outage preparation
    - Develop a volunteer network for welfare checks during extended outages
    - Create incentive programs for residential backup power systems
    - Establish clear protocols for emergency services during extended outages

3. Earthquake Resilience Enhancement

Key Finding: While 51.7% rated earthquake mitigation measures as "Adequate," this hazard was identified as the top concern in the first survey, warranting comprehensive attention.

Strategic Recommendations:

- **Infrastructure Resilience**
    - Accelerate seismic retrofitting schedule for city buildings

  - Expand retrofit focus beyond city buildings to include critical private infrastructure
  - Develop more robust backup systems for water infrastructure post-earthquake
  - Implement enhanced building codes for new construction
- **Response Capacity**
  - Expand CERT training to create neighborhood-level response teams
  - Pre-position emergency supplies in multiple locations throughout the city
  - Develop specialized earthquake response protocols for all city departments
  - Create mutual aid agreements specific to earthquake response
- **Recovery Planning**
  - Develop detailed pre-disaster recovery planning
  - Establish temporary housing solutions for displaced residents
  - Create business continuity guidance for local businesses
  - Develop debris management plans

4. Drought Mitigation Optimization

Key Finding: Very strong support for drought mitigation actions (75-96.4% approval) provides an opportunity to build on community support and expand these popular initiatives. Retrofit Water Supply Systems received near-universal support (96.4%).

Strategic Recommendations:

- **Expand Successful Programs**
  - Scale up the highly-supported retrofit water systems program (96.4% approval)
  - Enhance the urban water management plan with more specific implementation measures
  - Strengthen the turf replacement program with additional incentives and resources

  - Develop phase-in schedule for drought-resistant landscaping at all city properties

- **Water Infrastructure Resilience**
  - Accelerate implementation of water system efficiency improvements
  - Develop redundant water supply agreements with neighboring jurisdictions
  - Expand recycled water infrastructure for non-potable uses
  - Implement advanced leak detection and water monitoring systems

- **Community Engagement**
  - Create demonstration water-wise gardens at public facilities
  - Develop school education programs focused on water conservation
  - Implement a citizen water conservation reporting system
  - Establish community recognition programs for water conservation efforts

5. Public Awareness Enhancement

Key Finding: 58.6% of respondents were either "Not very familiar" or "Not at all familiar" with the city's hazard mitigation efforts.

Strategic Recommendations:

- **Comprehensive Communication Strategy**
  - Develop a dedicated hazard mitigation website with clear explanations of current efforts
  - Create accessible summaries of mitigation actions for each hazard type
  - Implement regular social media updates on mitigation progress
  - Establish a quarterly hazard preparedness newsletter

- **Education Programs**
  - Develop a "Hazard Ready Chino" public awareness campaign
  - Create age-appropriate educational materials for schools
  - Implement multilingual outreach materials
  - Establish regular community workshops on specific hazards

- **Progress Reporting**
    - Create a transparent tracking system for mitigation action implementation
    - Develop an annual "State of Preparedness" report for the community
    - Implement a dashboard showing mitigation project status
    - Host annual town halls to present mitigation progress

6. Infrastructure Investment Prioritization

Key Finding: Infrastructure improvements were rated as "Very effective" by 50% of respondents - the highest effectiveness rating among all mitigation strategy types.

Strategic Recommendations:

- **Critical Infrastructure Investment**
    - Prioritize the most highly-rated infrastructure projects from the survey
    - Focus on multi-benefit infrastructure projects that address multiple hazards
    - Develop transparent timelines and progress tracking for major infrastructure projects
    - Create infrastructure resilience standards that exceed minimum requirements
- **Building Code Enhancement**
    - Review and update building codes to address emerging climate-related risks
    - Create incentives for exceeding minimum code requirements for hazard resistance
    - Implement expedited permitting for projects that incorporate enhanced resilience measures
    - Develop educational materials explaining the safety benefits of building codes
- **Innovative Infrastructure Approaches**
    - Implement green infrastructure solutions that provide multiple benefits
    - Develop resilient infrastructure demonstration projects
    - Create public-private partnerships for critical infrastructure enhancements

  - Establish infrastructure monitoring systems to detect potential failures before they occur

7. Specific Area Focus

Key Finding: Respondents identified several specific areas that need focused mitigation attention, including dairy areas (flooding concerns), the Prado Dam area, and Euclid Avenue.

Strategic Recommendations:

- **Area-Specific Mitigation Plans**
  - Conduct detailed risk assessments for the specifically identified areas
  - Develop customized mitigation strategies for each high-risk area
  - Implement enhanced monitoring systems in vulnerable locations
  - Create area-specific outreach to residents and businesses
- **Dairy Area Flood Mitigation**
  - Conduct comprehensive hydrological assessment of dairy areas
  - Develop enhanced stormwater management systems specific to agricultural runoff
  - Implement early warning systems for potential flooding
  - Create specialized evacuation plans for livestock and residents
- **Prado Dam Area Protection**
  - Partner with Army Corps of Engineers on dam safety and flood control
  - Develop detailed inundation mapping and evacuation plans
  - Implement enhanced early warning systems
  - Create public education specific to dam-related hazards
- **Euclid Avenue Corridor Enhancement**
  - Identify specific vulnerabilities along this key transportation route
  - Develop infrastructure redundancy to maintain this critical corridor

  - Implement specialized emergency response plans for incidents along the corridor
  - Create business continuity planning specific to businesses along Euclid Avenue

Implementation Framework

Implementation Prioritization

Based on the survey results, the following implementation priorities are recommended:

1. **Immediate Priority (0-12 months)**
   - Enhance cyber security protocols and education
   - Expand backup power capabilities at critical facilities
   - Accelerate seismic retrofitting for highest-risk facilities
   - Launch expanded public awareness campaign
2. **Medium Priority (1-2 years)**
   - Implement neighborhood resilience hubs
   - Expand water conservation infrastructure
   - Develop comprehensive recovery planning
   - Create the community advisory committee structure
3. **Ongoing Priority**
   - Continuous public education and engagement
   - Regular mitigation action assessment and adjustment
   - Expansion of volunteer opportunities
   - Transparent progress reporting

Strategic Integration with First Survey Results

The recommended enhancements align with and address the priorities identified in the first community survey:

- **Earthquake Focus**: The strong support for seismic retrofitting (rated "Adequate" by 51.7%) reinforces earthquake preparedness as a priority

- **Infrastructure Resilience**: The identified need for enhanced cyber and power outage mitigation directly addresses critical infrastructure vulnerabilities
- **Family Safety**: The strong support for CERT training (89.3%) and cooling centers (92.9%) supports the family safety priority
- **Balanced Approach**: The positive perception of the city's current balance between short and long-term solutions (77.8% satisfied) validates the recommended approach

Measuring Success

Implementation should include specific metrics to track progress:

- **Effectiveness Measures**
  - Reduction in vulnerability scores for critical facilities
  - Increased redundancy in critical systems
  - Decreased recovery time estimates for major events
  - Expanded coverage of mitigation actions across the community
- **Community Engagement Measures**
  - Increased awareness of hazard mitigation efforts (target: 75% aware)
  - Growth in volunteer participation
  - Increased community feedback on mitigation actions
  - Higher ratings for mitigation adequacy in future surveys

Conclusion

The mitigation actions survey provides valuable insights into community perceptions of Chino's hazard mitigation strategies. While most mitigation actions are perceived as adequate, there are clear opportunities to enhance cyber threat and power outage resilience, strengthen earthquake preparedness, expand successful drought initiatives, and improve public awareness and engagement.

By implementing these strategic recommendations, the City of Chino can build upon its existing mitigation foundation while addressing identified gaps and leveraging strong community support for specific initiatives. These enhancements will create a more resilient Chino that is better prepared for the full spectrum of hazards identified in the community surveys.

Correlation Analysis: Survey 1 Concerns vs. Survey 2 Mitigation Actions

City of Chino Hazard Mitigation Plan

Executive Summary

This analysis evaluates how effectively the mitigation actions presented in Survey 2 address the hazard concerns and priorities identified in Survey 1. Overall, the steering committee has successfully aligned most proposed mitigation actions with community concerns, particularly for the highest-priority hazards. However, some gaps remain in specific areas that warrant additional attention.

The strongest alignments are in earthquake preparedness, flooding mitigation, and severe summer storms, where proposed actions directly address community concerns. Areas needing further development include cyber threat and power outage resilience, which received lower adequacy ratings despite being high-priority concerns.

This correlation analysis provides guidance for finalizing the Hazard Mitigation Plan to ensure it comprehensively addresses the community's most pressing concerns while building on the strong foundation of mitigation actions that already have community support.

Priority Hazard Correlation Analysis

1. Earthquake (Ranked #1 in Survey 1)

Survey 1 Findings:

- Ranked as the top hazard concern with the highest overall score (1,422)
- 59.1% of respondents identified it as their primary concern
- 73.9% cited safety of family and self as their primary concern regarding hazards

Survey 2 Mitigation Actions:

- Reconstruct/replace aging infrastructure
- Expand water wells/treatment facilities
- Construct new groundwater facilities
- Backup Power for City Facilities
- Seismically Retrofit City Buildings
- CERT training for Earthquake preparedness/response

Correlation Analysis:

- **Alignment Rating: STRONG**
- The proposed mitigation actions directly address core earthquake concerns, particularly structural resilience through seismic retrofitting
- CERT training aligns with the family safety priority identified in Survey 1
- The focus on critical infrastructure protection addresses potential service disruptions identified as concerns

Community Response:

- 51.7% of respondents rated earthquake mitigation actions as "Adequate"
- 17.2% rated actions as "Very Adequate" and 10.3% as "Somewhat Adequate"
- 17.2% rated actions as "Somewhat Inadequate," indicating room for improvement

Gap Analysis:

- While infrastructure is well-addressed, there could be more emphasis on household-level preparation given the high concern for family safety
- Additional focus on post-earthquake recovery planning may be needed

2. Prolonged Power Outage (Ranked #2 in Survey 1)

Survey 1 Findings:

- Ranked as the second highest hazard concern (score: 1,190)
- 9.6% identified it as their primary concern
- Associated with significant or catastrophic personal impacts by many respondents

Survey 2 Mitigation Actions:

- Backup Power for City Facilities
- Solar Power and battery backup

Correlation Analysis:

- **Alignment Rating: MODERATE**
- The proposed actions address facility-level resilience but are limited in scope

- Less emphasis on community-wide power resilience or vulnerable population support

Community Response:

- Only 3.6% rated power outage mitigation actions as "Very Adequate" - the lowest for any hazard
- 35.7% rated actions as "Adequate"
- 21.4% rated actions as inadequate (combined "Somewhat" and "Very")

Gap Analysis:

- More comprehensive power resilience strategies are needed, particularly for residential areas
- Additional focus on vulnerable populations during extended outages
- Greater emphasis on redundant systems and microgrids

3. Cyber Threat (Ranked #3 in Survey 1)

Survey 1 Findings:

- Ranked as the third highest hazard concern (score: 1,018)
- 7.8% identified it as their primary concern
- Associated with potential service disruptions and security concerns

Survey 2 Mitigation Actions:

- Backup Power for City Facilities
- Dual redundancy for cyber systems
- Training of staff; test phishing

Correlation Analysis:

- **Alignment Rating: MODERATE**
- Training and redundancy address basic cyber preparedness
- Limited focus on comprehensive cyber security infrastructure

Community Response:

- 21.4% rated cyber threat mitigation as "Somewhat Inadequate" - the highest percentage for any hazard
- Only 7.1% rated actions as "Very Adequate"
- 82.1% supported cybersecurity training, but respondents noted infrastructure updates are also needed

Gap Analysis:

- More comprehensive cyber security infrastructure investments needed
- Greater focus on critical system protection beyond training
- Need for community-wide cyber resilience strategies

4. Flooding (Ranked #4 in Survey 1)

Survey 1 Findings:

- Ranked fourth in hazard concerns (score: 983)
- 3.5% identified it as their primary concern
- Particularly important in specific geographic areas (e.g., dairy areas)

Survey 2 Mitigation Actions:

- Replace storm drain systems
- Magnolia Channel Improvements
- San Antonio Avenue Storm Drain Project
- Euclid Avenue Bridge Project
- Pine Avenue Bridge Connection Project
- Line H Storm Drain Project
- Line I Storm Drain Project
- Updated Ordinance (Flood Management Code)

Correlation Analysis:

- **Alignment Rating: STRONG**
- Comprehensive set of specific infrastructure projects addressing flood risks

- Both structural and regulatory approaches included
- Geographic-specific projects addressing local concerns

Community Response:

- 51.7% rated flooding mitigation actions as "Adequate"
- 31.0% rated actions as "Very" or "Somewhat Adequate"
- 85.2% supported the Updated Flood Management Code

Gap Analysis:

- Some specific areas (dairy regions) may need more customized attention
- Additional focus on green infrastructure for flood mitigation could be beneficial

5. Wildfire (Ranked #5 in Survey 1)

Survey 1 Findings:

- Ranked fifth in hazard concerns (score: 976)
- 7.8% identified it as their primary concern
- Associated with potential evacuation and property damage

Survey 2 Mitigation Actions:

- Adopt/Implement Ready, Set, Go Program
- Fire Hazard Severity Map Adoption
- Vegetation Management Program
- Vegetation and weed abatement program

Correlation Analysis:

- **Alignment Rating: STRONG**
- Balanced approach combining planning, mapping, and physical mitigation
- Includes both prevention and response preparation
- Vegetation management directly addresses primary fire risk factors

Community Response:

- 50.0% rated wildfire mitigation actions as "Adequate"

- 28.5% rated actions as "Very" or "Somewhat Adequate"
- 92.9% supported the Vegetation and Weed Abatement Program

Gap Analysis:

- Could benefit from more evacuation planning specific to wildfire scenarios
- Additional focus on wildland-urban interface areas

Additional Hazard Correlations

Severe Summer Storms (Ranked #7 in Survey 1)

Survey 2 Mitigation Actions:

- Multiple storm drain projects
- Urban Forest Management Plan
- Cooling centers for extreme heat
- Social media alerts for severe weather

Correlation Analysis:

- **Alignment Rating: STRONG**
- Addresses both infrastructure resilience and public health concerns
- Includes communication strategies for early warning
- 92.9% supported cooling centers for extreme heat events

Drought (Ranked #11 in Survey 1)

Survey 2 Mitigation Actions:

- Multiple water conservation and efficiency measures
- Urban Water Management Plan
- Turf replacement program
- Retrofit water supply systems

Correlation Analysis:

- **Alignment Rating: VERY STRONG**
- Comprehensive suite of drought mitigation strategies

- High community support (75-96.4% approval)
- Addresses both infrastructure and behavior change

Cross-Cutting Themes

1. Family Safety Priority

Survey 1 Finding:

- 73.9% of respondents cited safety of family and self as primary concern

Survey 2 Response:

- CERT training programs (89.3% support)
- Cooling centers for vulnerable populations (92.9% support)
- Early warning systems for various hazards
- Emergency response planning rated "very effective" by 39.3%

Correlation Analysis:

- **Alignment Rating: STRONG**
- Multiple actions focus on protecting residents' safety
- Community-based training programs empower family-level preparedness

2. Balanced Mitigation Approach

Survey 1 Finding:

- Community split on prioritizing frequent hazards (55.7%) vs. catastrophic but infrequent hazards (44.3%)

Survey 2 Response:

- 81.5% felt the city maintains a good balance between prevention and preparedness
- 85.2% approved of balance between response and recovery
- 77.8% supported balance between short and long-term solutions

Correlation Analysis:

- **Alignment Rating: STRONG**

- Proposed actions reflect balanced approach between different time horizons and frequencies
- Strategy types include both preventive and response-oriented measures

3. Community Engagement

Survey 1 Finding:

- 62.3% interested in participating or learning more about mitigation planning

Survey 2 Response:

- Public education and awareness programs rated "very effective" by 39.3%
- 89.3% supported CERT training programs
- Limited familiarity with current efforts (58.6% not very or not at all familiar)

Correlation Analysis:

- **Alignment Rating: MODERATE**
- Strong support for existing engagement programs
- Gap remains in awareness of current mitigation efforts

Strategic Gaps Requiring Additional Focus

1. **Cyber Resilience Infrastructure**: While training is addressed, more comprehensive cyber security infrastructure investment is needed given the high priority of this hazard.
2. **Power Resilience Beyond Facilities**: Expand power outage mitigation beyond city facilities to include neighborhood resilience hubs and vulnerable population support.
3. **Geographical Focus Areas**: Specific areas identified by respondents (dairy regions, Prado Dam area, Euclid Avenue) need customized mitigation strategies.
4. **Public Awareness Enhancement**: Despite good mitigation actions, familiarity with these efforts remains low, indicating a need for improved communication.
5. **Evacuation Planning**: Several hazards would benefit from more specific evacuation planning and communication systems.

Recommendations for Strengthening Alignment

1. **Enhance Cyber and Power Infrastructure Resilience**
    - Develop more comprehensive cyber security infrastructure beyond training
    - Implement neighborhood-level power resilience strategies
    - Create specific plans for vulnerable populations during infrastructure failures
2. **Expand Geographic-Specific Mitigation**
    - Develop customized plans for identified high-risk areas
    - Create area-specific public education and outreach materials
    - Implement specialized monitoring systems for location-specific hazards
3. **Improve Public Awareness of Mitigation Actions**
    - Develop clear, accessible explanations of current mitigation efforts
    - Create a central information hub for all hazard mitigation activities
    - Implement regular community updates on mitigation progress
4. **Strengthen Household-Level Preparedness**
    - Expand CERT training with neighborhood-specific components
    - Develop family preparedness guides customized for Chino's highest-priority hazards
    - Create incentive programs for household mitigation actions
5. **Develop Comprehensive Evacuation Planning**
    - Create hazard-specific evacuation protocols and communication systems
    - Develop specialized plans for facilities serving vulnerable populations
    - Implement regular evacuation drills and exercises

Conclusion

The steering committee has successfully addressed many of the highest-priority hazard concerns identified in Survey 1, with particularly strong alignment in earthquake, flooding, wildfire, and drought mitigation strategies. The community generally perceives the city's approach to balancing different aspects of hazard mitigation as appropriate.

However, gaps remain in several key areas, particularly cyber threats and power outage resilience, which received lower adequacy ratings despite being high-priority concerns. Additionally, while specific mitigation actions have strong support, overall awareness of the city's hazard mitigation efforts remains limited.

By addressing these gaps and strengthening the identified areas, the Hazard Mitigation Plan can more comprehensively address the community's concerns while building on the strong foundation of mitigation actions that already have significant community support.

A.2 Public Meeting Announcements / News Releases

https://www.championnewspapers.com/news/article_b0d5475c-616a-11ef-ac60-9fe227b275c2.html

FEATURED

Seniors provide input on Chino's hazard mitigation plan

By Sinclair Andruska
Aug 24, 2024

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Fern and Pine avenues were two of several streets that flooded during the torrential rains that pummeled Chino Valley in February.
Champion photo by Josh Thompson

Several residents enjoying their afternoon at the Chino Senior Center on Monday decided to drop into the auditorium where the City of Chino was holding a Local Hazard Mitigation Plan (LHMP) meeting.

There they sat at tables where large posters with a list of hazards and natural disasters were displayed as part of an interactive activity to inspire discussion about which hazards created the most concern.

Earthquakes seemed to be the top worry for the approximately dozen residents in the room.

The purpose of the meeting, led by consultant Daniel Martin of Integrated Solutions Consulting, was to gather input on which hazards and mitigation actions should be prioritized in the LHMP.

This plan must be updated every five years for the city to receive state and federal grants, including FEMA grants, in the event of a declared disaster.

As part of the public outreach, a survey asking residents to choose from a list of hazards and rank them from most to least concerning has been made available at cityof chino.org/lhmp.

According to the survey, hazards that could impact Chino are earthquakes, floods, severe weather, wildfires, power outages, terrorism, facility disasters, and dam and levee failures.

In the 2018 LHMP, the top four hazards listed by the planning team were earthquakes, floods, terrorism, and climate change.

Mr. Martin said there are simple things that can be done to mitigate hazards, such as elevating buildings out of floodplains and implementing building codes.

"We're repairing a lot of the same damages over and over," he said.

Planning mitigation strategies before a disaster can break the cycle of damage, reconstruction, and repeated damage, he said.

Press Release – 8/12/24: Public Input Wanted for Local Hazard Mitigation Plan

Discussion among participants steered from potential disasters Chino faces to questions of a more personal nature.

Jose Ruvalcaba, who experienced the 1989 Whittier Narrows earthquake, said crime is more of a concern to him than the disasters listed in the presentation.

Kathy Olivas said she is concerned about noise from airplanes flying to and from the Ontario International Airport.

She is also worried about trees falling on cars in her neighborhood during high-wind events.

Mobility issues were a concern for one resident who said she is considering keeping an emergency kit with food and water in the pouch of her walker in case she cannot access the kit in her home during a disaster.

Chino Police Emergency Preparedness Coordinator Denise School said seniors can get more information on specific topics and concerns related to emergency preparedness by taking courses offered by the city such as the Community Emergency Response Team (CERT) training and Listos, a Spanish-language disaster preparedness course.

The meeting was one of three held in Chino this week to discuss the LHMP.

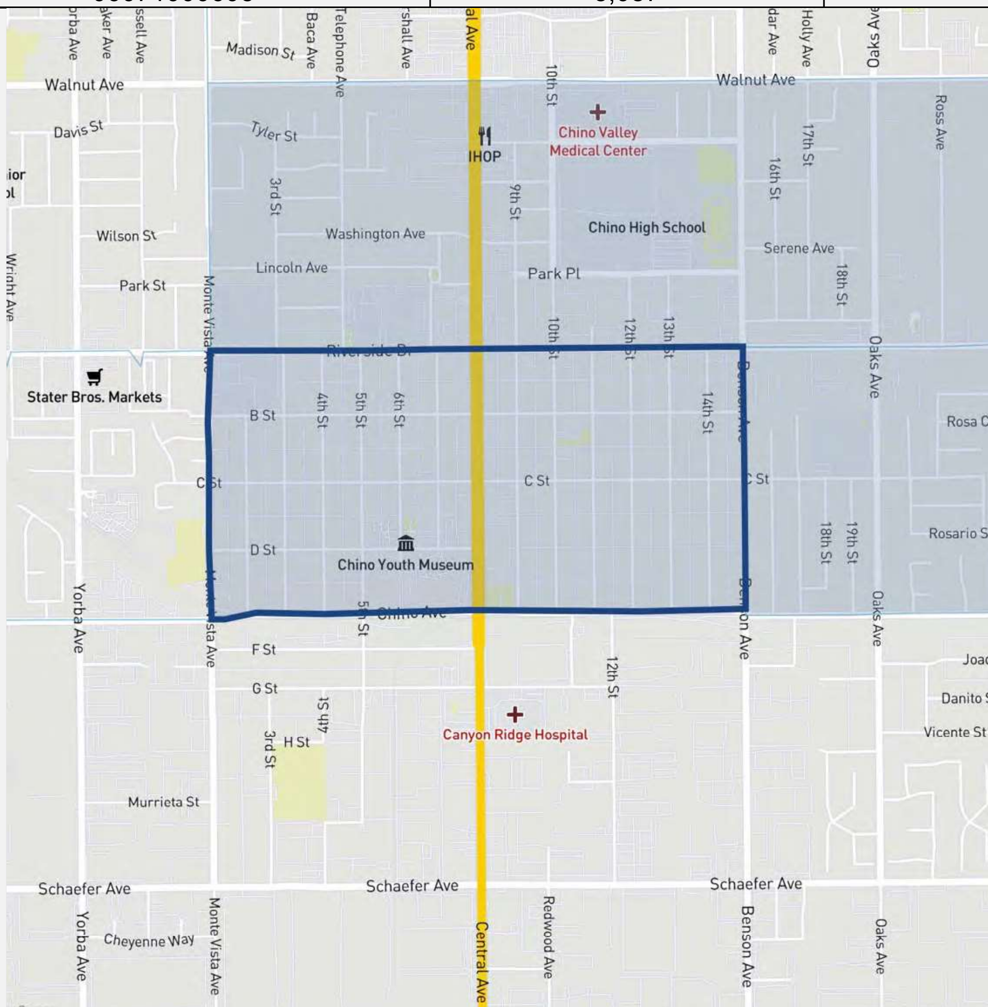
(City of Chino News Release (constantcontact.com))

Press Release – 10/1/24: Make Your Voice Heard on the Local Hazard Mitigation Plan (City of Chino News Release (constantcontact.com))

Chino Valley Champion Article – 8/17/24: Chino and Chino Hills seek input for Local Hazard Mitigation Plan (Chino and Chino Hills seek input for Local Hazard Mitigation Plan | News | championnewspapers.com)

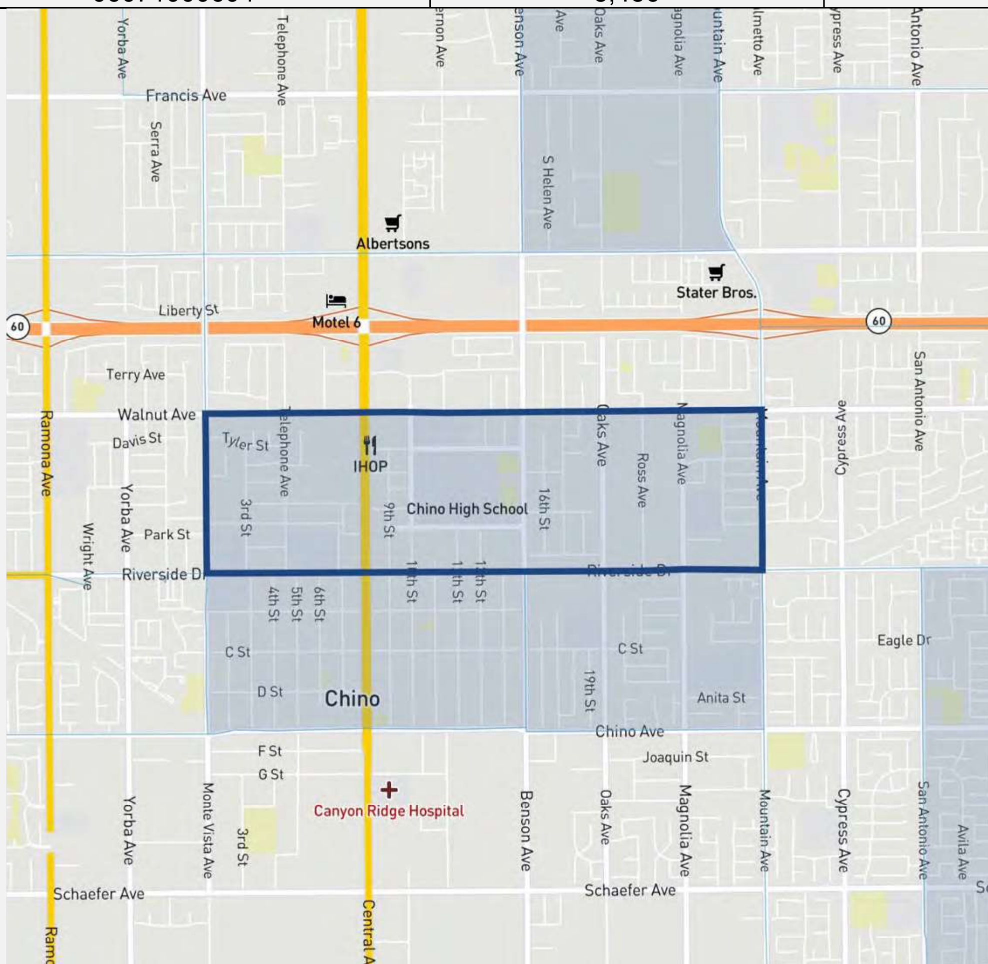
Appendix B: Disadvantaged Community Maps

CITY OF CHINO, CA		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL - CENSUS TRACT ANALYSIS		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
06071000605	5,087	YES



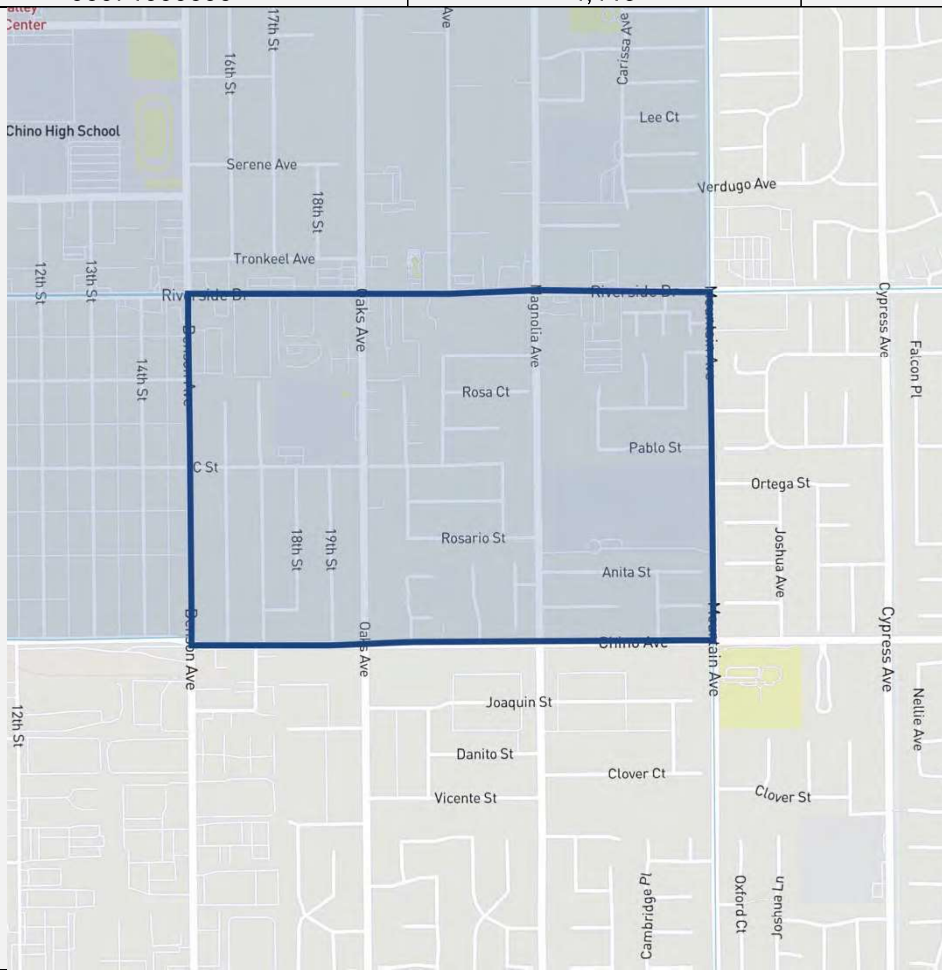
BURDEN	DESCRIPTION AND REPORTED DATA
Energy	*Level of inhalable particles, 2.5 micrometers or smaller (98th)*
Legacy Pollution	*Count of hazardous waste facilities within 5 kilometers (93rd)*
Transportation	*Amount of diesel exhaust in the air (93rd)*
Source: U.S. Council on Environmental Quality – Climate & Economic Justice Screening Tool (2024)	

CITY OF CHINO, CA		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL - CENSUS TRACT ANALYSIS		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
06071000604	5,436	NO



BURDEN	DESCRIPTION AND REPORTED DATA
Workforce Development	*Share of households where no one over age 14 speaks English very well (91st)*
High School Education	*Percent of people ages 25 years or older whose high school education is less than a high school diploma (20%)*
Source: U.S. Council on Environmental Quality – Climate & Economic Justice Screening Tool (2024)	

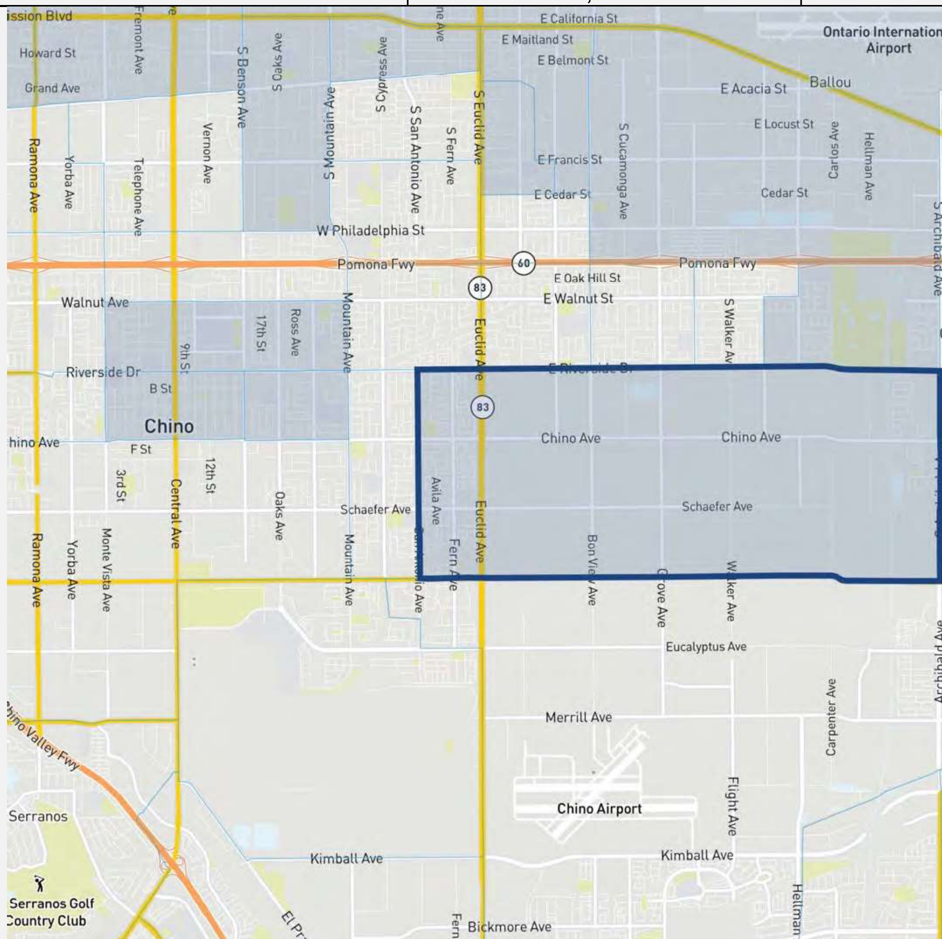
CITY OF CHINO, CA		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL - CENSUS TRACT ANALYSIS		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
06071000606	4,119	NO



BURDEN	DESCRIPTION AND REPORTED DATA
Workforce Development	*Share of households where no one over age 14 speaks English very well (93rd)*
High School Education	*Percent of people ages 25 years or older whose high school education is less than a high school diploma (25%)*

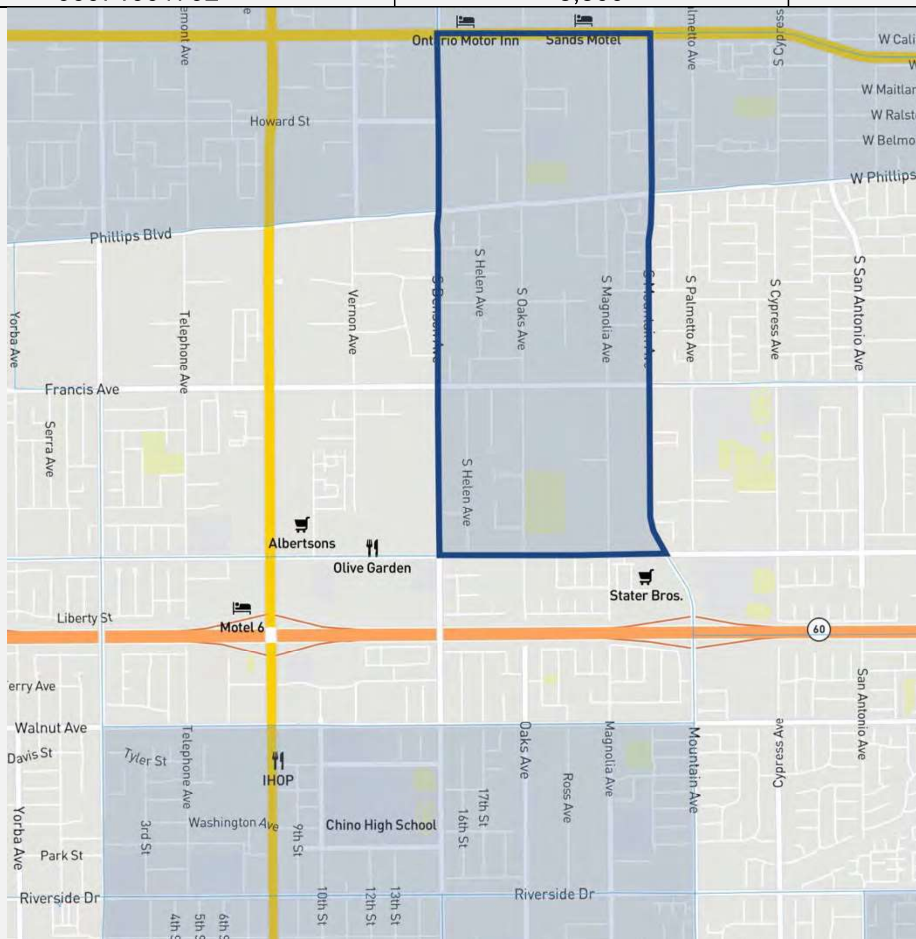
Source: U.S. Council on Environmental Quality – Climate & Economic Justice Screening Tool (2024)

CITY OF CHINO, CA		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL - CENSUS TRACT ANALYSIS		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
06071001905	6,981	NO



BURDEN	**DESCRIPTION AND REPORTED DATA**
Workforce Development	*Share of households where no one over age 14 speaks English very well (91st)*
High School Education	*Percent of people ages 25 years or older whose high school education is less than a high school diploma (13%)*
Source: U.S. Council on Environmental Quality – Climate & Economic Justice Screening Tool (2024)	

CITY OF CHINO, CA		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL - CENSUS TRACT ANALYSIS		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
06071001702	5,300	NO



BURDEN	DESCRIPTION AND REPORTED DATA
Unemployment	*Number of unemployed people as a part of the labor force (91st)*
High School Education	*Percent of people ages 25 years or older whose high school education is less than a high school diploma (19%)*

Source: U.S. Council on Environmental Quality – Climate & Economic Justice Screening Tool (2024)

APPENDIX C: HAZMAT Incidents

CITY OF CHINO, CA								
US DOT HAZARDOUS MATERIALS INCIDENTS (2014-2024)								
Identification Number	Date Of Incident	Incident City	Carrier Reporter Name	Mode Of Transportation	Commodity Long Name	Hazardous Class	Fatalities	Total Damages

APPENDIX D: Previous Mitigation Action Status Update

Action ID	Action Title/Description	Hazard(s) Mitigated	Lead Agency	Address Existing or Future Development	Priority	Related Goal	2025 Status
All Hazards 1.1	Develop and implement the "Chino Cares" program which includes educating the public and asking them to pledge their commitment to preparedness.	All Hazards	City of Chino Police Emergency Management	Both	Medium	1, 3	Ongoing
Earthquake 1.1	Reconstruct or replace aging infrastructure where needed.	Earthquake	City of Chino City Manager	Both	High	2	Ongoing
Earthquake 1.2	City shall consider constructing new or expanding existing water wells and ground water treatment facilities in order to support new development	Earthquake;	City of Chino Public Works	Both	High	1	Ongoing
Flooding 1.1	City shall reconstruct or replace storm drain systems as needed	Flood	City of Chino Police Emergency Management	Existing	Medium	1	Ongoing
Anti-Terrorism 1.1	Continue to train and educate officers and citizens in terrorism-related topics and strategies for prevention. AT Action 1.2 Identify and catalog the critical facilities within the City of Chino utilizing CalCOP (California Common Operating Picture)	Terrorism	City of Chino Police Emergency Management	NA	Medium	2	Ongoing

Climate Change 1.1	Continue implementing the energy conservation and efficiency measures identified in the City of Chino Climate Action Plan	Climate Change	City of Chino Police Emergency Management	Both	Medium	1	
All Hazards 1.2	Educating residents and businesses on personal, family, and business preparedness through presentations, fairs, brochures, and video presentations on the local cable access channel.	All Hazards	City of Chino Police Emergency Management	NA	Low	2	Ongoing
All Hazards 1.3	The City will continue to maintain its current relationships with community stakeholders and seek to develop new relationships including stronger relationships with local businesses.	All Hazards	City of Chino Police Emergency Management	NA	Low	3	Ongoing
All Hazards 1.4	Providing training to City employees in the areas of NIMS, SEMS, EOC Operations, Shelter Management, and personal preparedness. Ongoing: a “Disaster Academy” was developed for all City employees and takes place several times per year; EOC training and Shelter Operations	All Hazards	City of Chino Police Emergency Management	Both	Medium	3	Ongoing

	training occur on a regular basis.						
All Hazards 1.5	The City will continue to enhance its readiness by conducting periodic exercises of EOC responders, first responders, and other City employees. Regular table top exercises have already been made a part of weekly Executive Management Team meetings as well as Police Department Management Team meetings. A functional exercise is planned for 2011 for the West End Mobile Field Force using a local prison	All Hazards	City of Chino Police Emergency Management	Both	Medium	3	Ongoing
Earthquake 1.3	Construction of new groundwater wells and groundwater treatment facilities: To increase the City's water supply capability.	Earthquake	City of Chino Public Works	Future development	High	1	Ongoing Lack of Funding
Flooding 1.2	Magnolia Channel Improvements	Flood	City of Chino Public Works	Existing	Low	1	Ongoing Lack of funding

APPENDIX E: Resolutions of Adoption

Resolutions will be included upon approval and adoption of the Plan.