Siskiyou County
Planning Commission Staff Report
May 21, 2025

Agenda Item Number 2
Amendment of the Seismic Safety and Safety Element of the Siskiyou County General Plan (GPA-25-01)

Applicant: Siskiyou County
Office of Emergency Services (OES)

Project Summary The Siskiyou County Office of Emergency Services is requesting that the Siskiyou County General Plan Safety Element be amended to incorporate the 2025 Local Hazard Mitigation Plan (LHMP). Adoption of this general plan amendment will satisfy Assembly Bill 2140, which requires that a current LHMP be incorporated into the General Plan in order for the County to be eligible for cost share reimbursement from the State, following a disaster event.

Location: The project encompasses all unincorporated areas of Siskiyou County, California. The project area, which totals approximately 6,322 square miles, is roughly centered on Section 17 of Township 44 North, Range 7 West of the Mount Diablo Meridian.

General Plan: (All - County Wide)

Zoning: (All - County Wide)

Exhibits:

A. Draft Resolution PC 2025-010
A Resolution of the Siskiyou County Planning Commission Recommending the Board of Supervisors Adopt the 2025 Local Hazard Mitigation Plan and Amend the General Plan Seismic Safety and Safety Element to Incorporate the 2025 Local Hazard Mitigation Plan
B. FEMA Final Approval Eligibility Letter, Dated April 14, 2025
C. 2025 Local Hazard Mitigation Plan
D. 1975 General Plan Seismic Safety and Safety Element

Background

Disaster Mitigation Act of 2000 (DMA)

The United States Congress passed the Disaster Mitigation Act (DMA) of 2000 to provide funding assistance to counties for pre- and post- hazard mitigation projects following a disaster. In order to receive federal hazard mitigation funding from the Federal Emergency Management Agency (FEMA), the County must develop and adopt a FEMA-approve local hazard mitigation plan.

A Local Hazard Mitigation Plan (LHMP) generally expires five years after its approval. To remain effective, a LHMP must be reviewed and revised at least every five years to ensure that it is up to date and relevant. This update allows jurisdictions to identify and add more mitigation actions, as needed.

The County has been out of compliance with this federal requirement since the last LHMP expired several years ago and is currently not eligible to receive hazard mitigation funding assistance from the federal government. In order to regain eligibility for federal disaster mitigation funding a new LHMP must be adopted.

Siskiyou County Office of Emergency Services (OES) has completed development of the 2025 Local Hazard Mitigation Plan which is scheduled to go before the Board of Supervisors for possible adoption on June 3, 2025. In April 2025, FEMA informed the County that the 2025 LHMP is eligible for final approval by FEMA pending its formal adoption by the Board of Supervisors and all participating jurisdictions. Planning staff has determined that incorporation of the LHMP into the Safety Element is not inconsistent with the County’s General Plan.

Staff is currently working on a comprehensive General Plan update, including an update to the General Plan Safety Element. Staff will be presenting the updated 2025 Safety Element to the Planning Commission in a separate agenda item. As such, this staff report only pertains to the adoption and incorporation of the 2025 LHMP into the 1975 Seismic Safety and Safety Element of the Siskiyou County General Plan for Assembly Bill 2140 compliance.

Assembly Bill 2140 of 2006 (AB 2140)

The County is typically responsible for 25% of the cleanup and recovery cost following a disaster event. However, pursuant to AB 2140, the County may be eligible for cost share reimbursement from the State for up to 25% of a disaster recovery project’s total cost, provided that the County has incorporated a FEMA-approved LHMP into its General Plan.

The County has been out of compliance with AB 2140 since the last LHMP expired several years ago and is currently not eligible for state cost share reimbursement. In order to regain eligibility for AB 2140 state cost share reimbursement, the County must incorporate a FEMA-approved LHMP into the Siskiyou County General Plan.

Incorporation of the previous 2018 LHMP into the General Plan Seismic Safety and Safety Element was last done on February 19, 2020.

The more recent 2025 LHMP is scheduled to go before the Board of Supervisors for possible adoption and incorporation into the General Plan on June 3, 2025.

Siskiyou County OES is seeking a recommendation from the Planning Commission to the Board of Supervisors advising adoption and incorporation of the 2025 LHMP into the General Plan Seismic Safety and Safety Element so that the County can be eligible for federal and state disaster relief and mitigation funding.

Analysis

1. If the 2025 LHMP is not adopted by the Board of Supervisors, the County will remain ineligible to receive FEMA disaster mitigation funding.
2. If the 2025 LHMP is not incorporated into the General Plan Seismic Safety and Safety Element, the County will remain ineligible for AB 2140 state cost share reimbursement following a disaster event.

Environmental Review

This project is statutorily exempt from the California Environmental Quality Act (CEQA) pursuant to CEQA Guidelines Section 15061(b)(3), which states that "A project is exempt from CEQA if: [t]he activity is covered by the common sense exemption that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA." The project is exempt pursuant to CEQA Guidelines Section 15061(b)(3) because it will only add informational language to the General Plan and will not have any direct or indirect impacts on the environment.

Comments

A Notice of Public Hearing was published in the Siskiyou Daily News on May 7, 2025. No comments have been received as of the writing of this report.

Planning Staff Recommendations

- Adopt Resolution PC 2025-010 taking the following actions:
    - Recommend the Board of Supervisors determine the project to be statutorily exempt from the California Environmental Quality Act (CEQA) in accordance with CEQA Guidelines Section 15061(b)(3), the *"common sense exemption"*; and
    - Recommend that the Board of Supervisors approve and adopt the 2025 Local Hazard Mitigation Plan, and
    - Recommend that the Board of Supervisors incorporate the 2025 Local Hazard Mitigation Plan into the Siskiyou County General Plan 1975 Seismic Safety and Safety Element.

Suggested Motion

I move that we adopt Resolution PC 2025-010, a resolution of the Planning Commission of the County of Siskiyou, State of California, recommending that the Board of Supervisors:

1. Determine the Project exempt from CEQA,
2. Adopt the 2025 Local Hazard Mitigation Plan, and
3. Incorporate the 2025 Local Hazard Mitigation Plan into the Siskiyou County General Plan 1975 Seismic Safety and Safety Element.

Preparation

Prepared by the Siskiyou County Planning Division. J. Phelps. For project specific information or to obtain copies for your review, please contact:

Hailey Lang, Deputy Director of Planning
Siskiyou County Planning Division
806 S. Main Street
Yreka, California 96097

Resolution PC 2025-010

A RESOLUTION OF THE SISKIYOU COUNTY PLANNING COMMISSION RECOMMENDING THE BOARD OF SUPERVISORS ADOPT THE 2025 LOCAL HAZARD MITIGATION PLAN AND AMEND THE GENERAL PLAN SEISMIC SAFETY AND SAFETY ELEMENT TO INCORPORATE THE 2025 LOCAL HAZARD MITIGATION PLAN

Whereas, the County recognizes the substantial threat posed by natural hazards to people and property within the community; and

Whereas, the County has not adopted a current Local Hazard Mitigation Plan (LHMP) and is not eligible for Federal Emergency Management Agency (FEMA) disaster mitigation grant funding until a LHMP has been adopted; and

Whereas, the County has prepared an updated LHMP dated February 2025 ("2025 LHMP") on file with the Siskiyou County Office of Emergency Services; and

Whereas, FEMA has reviewed and determined that the County's 2025 LHMP is eligible for final approval pending its adoption by the Board of Supervisors; and

Whereas, the County typically is responsible for 25% of a disaster recovery project's total cost but under Assembly Bill 2140 (Gov't Code Section 8685.9), the County is eligible to be considered for cost share reimbursement from the State for up to 25% of a disaster recovery project's total cost if the County has incorporated a LHMP into its General Plan; and

Whereas, the County has not incorporated a current LHMP into its General Plan and is not eligible for cost share reimbursement from the State until a current LHMP has been incorporated into the General Plan; and

Whereas, the County recognizes the need for compliance with state and federal law to remain eligible for federal disaster mitigation grant funding and State cost share reimbursement; and

Whereas, the Siskiyou County Planning Commission conducted a public hearing on May 21, 2025, on the proposed General Plan amendment for the inclusion of the following language as a first page to the General Plan Seismic Safety and Safety Element:

> "In compliance with AB 2140 (2006), the 2025 Siskiyou County Local Hazard Mitigation Plan (LHMP) is herein incorporated and made a part of the Seismic Safety and Safety Element of the Siskiyou County General Plan.
>
> 2025 LOCAL HAZARD MITIGATION PLAN

The 2025 Local Hazard Mitigation Plan (LHMP) for the Siskiyou County planning area was developed in accordance with the Disaster Mitigation Act of 2000 (DMA 2000) and followed FEMA's Local Hazard Mitigation Plan guidance. The LHMP incorporates a process where hazards are identified and profiled, the people and facilities at risk are analyzed, and mitigation actions are developed to reduce or eliminate hazard risk. The implementation of these mitigation actions, which include both short and long-term strategies, involve planning, policy changes, programs, projects, and other activities.

To view the 2025 LHMP in its entirety please visit:

https://www.siskiyoucounty.gov/emergencyservices/page/local-hazard-mitigation-plan"; and

Whereas, on May 21, 2025, the Chair of the Planning Commission opened the duly noticed public hearing on the General Plan Amendment (GPA-25-01) to receive testimony both oral and written, following which the Chair closed the public hearing, and the Commission discussed the project prior to reaching its decision; and

Whereas, following the public hearing the Commission found the project exempt from the California Environmental Quality Act (CEQA) pursuant to CEQA Guidelines Section 15061(b)(3) and determined the project to be consistent with the Siskiyou County General Plan.

Now, Therefore, Be It Resolved that the Planning Commission finds the adoption of the 2025 local Hazard Mitigation Plan to be exempt from CEQA pursuant to Section 15061(b)(3) of the CEQA Guidelines.

Be It Further Resolved that the Planning Commission recommends that the Board of Supervisors adopt the January 2025 Local Hazard Mitigation Plan and amend the General Plan Seismic Safety and Safety Element to incorporate the 2025 Local Hazard Mitigation Plan by adding the language proposed above.

It is Hereby Certified that the foregoing Resolution PC 2025-010 was duly Adopted on a motion by Commissioner ________________________ and seconded by Commissioner ___________________________ at a regular meeting of the Siskiyou County Planning Commission held on the 21st day of May 2025, by the following vote:

Ayes:

Noes:

Absent:

Abstain:

Siskiyou County Planning Commission

____
Jeff Fowle, Chair

Witness, my hand and seal this 21st day of May 2025.

____
Hailey Lang, Secretary of the Commission

U.S. Department of Homeland Security
FEMA Region 9
1111 Broadway, Suite 1200
Oakland, CA 94607-4052

FEMA

April 14, 2025

Bryan Schenone
Director
Siskiyou County Office of Emergency Services
1312 Fairlane Road
Yreka, CA 96097

Dear Bryan Schenone:

The Federal Emergency Management Agency (FEMA) has completed its review of the 2025 Siskiyou County Hazard Mitigation Plan and has determined that the plan is eligible for final approval, pending its formal adoption by Siskiyou County and all participating jurisdictions. Please refer to the enclosed list of jurisdictions currently considered Approvable Pending Adoption (APA).

Formal adoption documentation must be submitted to FEMA Region 9 by at least one participating jurisdiction within one calendar year from the date of this letter. If no adoption is received within that timeframe, the plan must be updated and resubmitted for review.

FEMA will issue formal approval of the plan upon receipt of the adoption documentation. Once approved, all other participating jurisdictions must adopt the plan within five calendar years of the approval date. Adoption of the plan is required to maintain eligibility for funding under FEMA's Hazard Mitigation Assistance (HMA) programs. All funding requests will be evaluated individually based on the specific eligibility criteria and requirements of the applicable HMA program.

Please note that while mitigation plans may include additional content to meet Element H: Additional State Requirements or other local objectives, FEMA's APA status does not constitute review or approval of any content exceeding FEMA's standard mitigation planning requirements.

If you have any questions regarding the planning or review processes, please contact the FEMA Region 9 Hazard Mitigation Planning Team at fema-r9-mitigation-planning@fema.dhs.gov.

Sincerely,

Alison Kearns
Planning and Implementation Branch Chief
Mitigation Division
FEMA Region 9

Enclosures (2)
Siskiyou County Plan Review Tool, dated April 14, 2025
Status of Participating Jurisdictions, dated April 14, 2025

cc: Robyn Fennig, State Hazard Mitigation Officer, California Governor's Office of Emergency Services
Victoria LaMar-Haas, Hazard Mitigation Planning Chief, California Governor's Office of Emergency Services

Status of Participating Jurisdictions as of April 14, 2025

Jurisdictions – Adopted and Approved

#	Jurisdiction	Adoption Receipt Date

Jurisdictions – Approvable Pending Adoption

#	Jurisdiction
1	Siskiyou County
2	City of Dorris
3	City of Dunsmuir
4	City of Etna
5	City of Ft. Jones
6	City of Montague
7	City of Mt. Shasta
8	City of Tulelake
9	City of Weed
10	City of Yreka
11	Happy Camp CSD
12	Lake Shastina CSD
13	McCloud CSD

EXHIBIT B

February 2025

Siskiyou County, California
Local Hazard Mitigation Plan Update

Encompassing:
Dorris
Dunsmuir
Etna
Fort Jones
Happy Camp Community Services District
Lake Shastina Community Services District
McCloud Community Services District
Montague
Mt. Shasta
Tulelake
Weed
Yreka

Prepared By:
BOLDplanning

EXHIBIT C

Table of Contents

Section 1 – Introduction, Assurances, Incorporation, and Adoption 1

1.1 Introduction 1

1.2 Assurances 1

1.3 Authorities 2

1.4 Hazard Mitigation Plan Incorporation and Integration 2

1.5 Adopting Jurisdictions 5

1.6 Plan Adoption 5

Section 2 – Documentation of the Planning Process 6

2.1 Guiding Principle 6

2.2 Planning Process 6

2.3 Project Timeline 7

2.4 2025 Plan Organization 7

2.5 2025 Plan Update 8

2.6 Hazard Mitigation Planning Equity 9

2.7 Mitigation Planning Committee 11

2.8 Participating Stakeholders 12

2.9 Coordinating Stakeholders 13

2.10 Community Outreach 14

2.11 Planning Meetings 17

2.12 Planning Document Resources 18

2.13 Technical Resources 19

Section 3 – Regional Profile and Development Trends 20

3.1 Introduction 20

3.2 County Map 20

3.3 Population Data 20

3.4 Socially Vulnerable and At-Risk Populations 22

3.5 Regional Population Migration 25

3.6 Housing Data 26

3.7 Valuation Data 29

3.8 School District Data 29

3.9 Critical Facilities and Infrastructure 31

3.10 Historic Places 48

3.11 Economic Conditions 49

3.12 Physical Setting and Land Cover 53

3.13 Regional Infrastructure Development 55

3.14 Agricultural Data 59

EXHIBIT C

3.15 Regional Climate ... 62
3.16 Potential Impacts of Climate Change ... 63
Section 4 –Capability Assessment ... 64
4.1 Introduction ... 64
4.2 Administrative and Technical Capabilities ... 64
4.3 Regulation of Development ... 65
4.4 Jurisdictional Plans ... 72
4.5 Financial Capabilities ... 73
4.6 Community-Based Classifications and Hazard Education Programs ... 74
4.7 Special Districts Mitigation Capabilities ... 76
4.8 Jurisdictional Compliance with NFIP ... 80
4.9 Challenges and Opportunities for Capability Improvement ... 83
Section 5 – Hazard Identification and Risk Assessment ... 85
5.1 Introduction ... 85
5.2 Declared Federal Disasters ... 85
5.3 Identified Potential Hazards ... 88
5.4 Hazard Planning Significance ... 90
5.5 Hazard Occurrence and Assessment Data ... 93
5.6 Jurisdictional Critical Facilities, Assets, and Community Lifelines ... 94
5.7 Hazard Profiles ... 94
5.8 Dam Failure ... 95
5.9 Drought ... 127
5.10 Earthquake ... 148
5.11 Extreme Heat ... 176
5.12 Flood ... 189
5.13 Landslide ... 223
5.14 Severe Weather ... 236
5.15 Subsidence ... 261
5.16 Volcanic Activity ... 274
5.17 Wildfire ... 289
Section 6 – Mitigation Strategy ... 328
6.1 Introduction ... 328
6.2 Goals and Objectives ... 328
6.3 Review and Creation of Hazard Mitigation Actions ... 329
6.4 Prioritization of Mitigation Actions ... 331
6.5 Mitigation Action Funding Sources ... 332
6.6 Previously Identified Jurisdictional Mitigation Actions ... 336

EXHIBIT C

6.7 Completed Hazard Mitigation Actions 336
6.8 Jurisdictional Hazard Mitigation Actions 337
6.9 Mitigation Action Implementation and Monitoring 338
Section 7 – Plan Maintenance 341
7.1 Introduction 341
7.2 Plan Maintenance Responsibilities 341
7.3 Plan Review Meetings 341
7.4 Plan Monitoring and Situational Change 342
7.5 Post-Disaster Review 342
7.6 Plan Evaluation 342
7.7 Plan Updates 343
7.8 Continued Public Involvement 344

List of Appendices

A Participating Jurisdiction Adoption Documentation and FEMA Region IX Approval Documentation
B Community Feedback
C Critical Facility Details
D Jurisdictional Mitigation Actions

EXHIBIT C

List of Commonly Used Acronyms

Acronym	Meaning
BRIC	Building Resilient Infrastructure and Communities
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	California Governor's Office of Emergency Services
EAL	Expected Annual Loss
CRS	Community Rating System
CSD	Community Services District
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
LHMP	Local Hazard Mitigation Plan
MPC	Mitigation Planning Committee
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration
NRI	National Risk Index
NWS	National Weather Service
RAPT	Resilience Analysis and Planning Tool
SCOES	Siskiyou County Office of Emergency Services
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
WUI	Wildland/Urban Interface

Section 1 – Introduction, Assurances, Incorporation, and Adoption

1.1 Introduction

Hazard mitigation is commonly defined as sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects. Hazard mitigation planning provides communities with a roadmap to aid in the creation and revision of policies and procedures, and the use of available resources, to provide long-term, tangible benefits to the community. A well-designed hazard mitigation plan provides communities with realistic actions that can be taken to reduce potential vulnerability and exposure to identified hazards.

This multi-jurisdictional Local Hazard Mitigation Plan (LHMP) update was prepared to provide sustained actions to eliminate or reduce risk to people and property from the effects of natural and man-made hazards. This plan documents Siskiyou County and its participating jurisdictions planning process and identifies applicable hazards, vulnerabilities, and hazard mitigation strategies. This plan will serve to direct available community and regional resources towards creating policies and actions that provide long-term benefits to the community. Local and regional officials can refer to the plan when making decisions regarding regulations and ordinances, granting permits, and funding capital improvements and other community initiatives.

Specifically, this hazard mitigation plan was developed to:

- Update the previous Siskiyou County LHMP
- Build for a safer future for all citizens
- Foster cooperation for planning and resiliency
- Identify, prioritize, and mitigate against hazards
- Assist with sensible and effective planning and budgeting
- Educate citizens about hazards, mitigation, and preparedness
- Comply with relevant federal requirements
- Address future climate change considerations

This plan has been designed to be a living document, a document that will evolve to reflect changes, correct any omissions, and constantly strive to ensure the safety of all citizens.

1.2 Assurances

In an effort to reduce natural disaster losses, the United States Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act). DMA 2000 amended the Stafford Act by repealing the previous Mitigation Planning section (409) and replacing it with a new Mitigation Planning section (322). Section 322 of the DMA makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for Federal mitigation grant funds. This LHMP was prepared to meet the requirements of the DMA 2000, as defined in regulations set forth by the Interim Final Rule (44 Code of Federal Regulations (CFR) Part 201.6).

All adopting jurisdictions certify that they will comply with all applicable Federal statutes and regulations during the periods for which they receive grant funding, in compliance with 44 CFR 13.11(c), and will amend this plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

This LHMP was prepared to comply with all relevant requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended by the Disaster Mitigation Act of 2000. This plan complies with all the relevant requirements of:

- Code of Federal Regulations (44 CFR) pertaining to hazard mitigation planning
- Federal Emergency Management Agency (FEMA) planning directives and guidelines
- Interim final, and final rules pertaining to hazard mitigation planning and grant funding
- Relevant presidential directives

EXHIBIT C

- Office of Management and Budget circulars
- Any additional and relevant federal government documents, guidelines, and rules.

Additionally, this LHMP has been completed to address all State of California recommendations and requirements concerning hazard mitigation planning and the requirements of FEMA's Local Mitigation Planning Policy Guide that went into effect April 19, 2023.

1.3 Authorities

The LHMP relies on the authorities given to participating jurisdictions by its citizens and encoded in local and state law. This plan is intended to be consistent with all policies and procedures that govern activities related to the mitigation programing and planning. In all cases of primacy, State of California and local laws, statutes, and policies will supersede the provisions of the plan.

1.4 Hazard Mitigation Plan Incorporation and Integration

This hazard mitigation plan is an overarching document that is both comprised of, and contributes to, various county and local codes, plans, reports, and studies. The integration of these can provide the following community benefits:

- Align community goals, objectives, and prime concerns
- Avoid lost opportunities
- Eliminate duplication of effort

Siskiyou County and participating jurisdictions will continue to actively work on incorporating elements of this hazard mitigation plan into any relevant plan, code or ordinance revision or creation. Whenever possible, Siskiyou County and participating jurisdiction will use existing plans, policies, procedures, and programs to aid in the implementation of identified hazard mitigation actions.

On a local level, hazard mitigation plans can be integrated into various planning documents and initiatives to ensure a comprehensive and coordinated approach to reducing the impact of hazards. Future local level plans where hazard mitigation strategies will be integrated include:

- **General Plans:** Helps guide long term community development to ensure future resilience against identified hazards.
- **Comprehensive Land-Use Plans:** Helps guide the development and zoning decisions in a way that minimizes vulnerability to hazards. This includes avoiding construction in high-risk areas and encouraging resilient building practices.
- **Emergency Operations Plans:** Contributes to detailing specific actions to be taken before, during, and after disasters to reduce vulnerability and enhance community resilience.
- **Climate Action Plans:** Can help address both short-term hazards and long-term climate-related risks. This includes considerations for extreme temperatures and changes in precipitation patterns.
- **Transportation Plans:** Helps ensure the resilience of transportation infrastructure to hazards such as floods, and earthquakes. This may involve designing infrastructure to withstand extreme weather events.
- **Infrastructure Master Plans:** Contributes to the design, construction, and maintenance of critical infrastructure, such as water supply systems, roads, bridges, and utility networks.
- **Community Development Plans:** Helps ensure that new development projects align with hazard resilience goals. This may involve establishing building codes that prioritize hazard-resistant construction.
- **Open Space and Recreation Plans:** Provides for the consideration of green infrastructure and open spaces for flood control, wildfire buffers, and other hazard mitigation purposes.

Specifically, the following detail where the previous Siskiyou County LHMP was utilized for jurisdictional plans:

EXHIBIT C

- **Siskiyou County:** Siskiyou County General Plan Update (in progress), 2023-2031 Housing Element, Siskiyou Climate Collaborative Climate Resiliency Plan (in progress)
- **Dorris:** April 2024 6th Cycle Housing Element of the Dorris General Plan
- **Dunsmuir:** April 2024 6th Cycle Housing Element of the Dunsmuir General Plan, City of Dunsmuir June 2023 Zoning Code, City of Dunsmuir 2024 Active Transportation Plan
- **Etna:** 2024 City of Etna Circulation Element Update, 2024 Open Space and Conservation Element Update
- **Fort Jones:** Town of Fort Jones 2024 – 2031 Housing Element
- **Montague:** 2021 Community-Inspired Resilience Plan
- **Mt. Shasta:** 2023-2031 Housing Element Update
- **Tulelake:** 2023 6th Cycle Housing Element of the Tulelake General Plan
- **Weed:** City of Weed 2023 – 2031 Housing Element
- **Yreka:** 2022 Circulation Element of the General Plan, 2023 Housing Element of the General Plan. Yreka 2044 General Plan (in progress)
- **Happy Camp Community Services District (CSD):** Board Policies, Chapter 1, General Provisions and Chapter 3, Administration
- **Lake Shastina CSD**: 2021 Public Protection Classification update
- **McCloud Community CSD:** 2019 Five Year Strategic Plan

As a best practice, Siskiyou County and all participating jurisdictions will ensure that both this LHMP and their general plans will meet the following:

- **California Assembly Bill 2140:** Encourages, but does not legally require, local governments to adopt their LHMP into the safety element of their general plan. If this adoption is completed, the eligible jurisdiction may be considered for part of all its local-share costs on eligible Public Assistance funding to be provided by the State through the California Disaster Assistance Act for federal-grant-funded post-disaster projects.
- **Senate Bill 379 (2015)**: Requires general plans and LHMPs to include climate adaptation and resiliency strategies. The climate adaptation language needs to include goals, policies, and objectives based on a vulnerability assessment, as well as implementation measures.

Integrating hazard mitigation with FEMA programs and initiatives provides many benefits to Siskiyou County and participating jurisdictions. These benefits include a streamlined planning and funding process for hazard mitigation projects, enhanced community resilience from the leveraging of federal programs to create a holistic approach to resilience, broad based data sharing allowing for an improved understating of community risk, and enhanced funding opportunities where jurisdictions can leverage multiple sources of federal funding to implement hazard mitigation actions. Programs currently being integrated into the LHMP include:

National Flood Insurance Program (NFIP):

- NFIP: The NFIP is a federal program, managed by FEMA, which exists to provide flood insurance for property owners in participating communities, to improve floodplain management practices, and to develop maps of flood hazard areas.
- Community Rating System (CRS): NFIP's CRS incentivizes communities to go beyond minimum floodplain management standards to reduce flood risk. Communities earn CRS points for implementing flood hazard mitigation activities, which can result in lower flood insurance premiums for residents. Hazard mitigation planning can guide communities in adopting flood-specific measures that qualify for CRS points.
- Building Standards: NFIP policies encourage communities to adopt and enforce building standards to minimize flood damage. By integrating hazard mitigation planning, communities can identify and prioritize infrastructure improvements that meet or exceed NFIP standards, especially in areas vulnerable to flooding.
- Floodplain Management Plans: Developing comprehensive floodplain management plans as part of hazard mitigation planning can support NFIP compliance while addressing risks specific to community needs.

EXHIBIT C

Hazard Mitigation Assistance Grants

- Planning Support: FEMA's Hazard Mitigation Assistance grant programs provide funding for hazard mitigation plans. These plans can help identify, prioritize, and implement mitigation projects that reduce risk and align with FEMA's overall resilience goals.
- Eligible Project Types: Hazard Mitigation Assistance grants fund a variety of projects (e.g., retrofitting infrastructure, elevating buildings, property acquisitions) that can align with community-specific hazard mitigation goals. By aligning local hazard mitigation strategies with eligible project types, communities can maximize available funding to address critical risks.
- Funding Integration with Local Mitigation Projects: Communities can leverage Hazard Mitigation Assistance grants to implement local mitigation projects that align with broader hazard mitigation goals. For example, using funds to reduce flood risk in NFIP-insured properties or for innovative infrastructure resilience projects.

Threat and Hazard Identification and Risk Assessment (THIRA)

- Comprehensive Risk Identification: THIRA provides a structured approach for communities to identify and prioritize their risks based on a full spectrum of hazards. Integrating hazard mitigation planning with THIRA enables communities to address multi-hazard risks with targeted mitigation strategies.
- Capability Targets Alignment: THIRA also helps communities identify capability gaps and set targets for resilience. Hazard mitigation plans can use these targets to outline mitigation actions that align with capability-building priorities, such as improving emergency response infrastructure or fortifying lifeline systems.
- Unified Risk and Capability Assessments: By integrating hazard mitigation planning with the THIRA process, communities can develop a more cohesive picture of their risk and capability needs, allowing for more focused and impactful use of FEMA resources across initiatives.

Integration of hazard mitigation into these various plans ensures that resilience efforts are embedded in the broader fabric of community development. Coordination and collaboration among different sectors and stakeholders are essential for the successful implementation of hazard mitigation strategies on the local level. Plan incorporation and integration is crucial for creating a cohesive and coordinated approach to address various aspects of hazard mitigation. All participating jurisdictions utilize similar internal procedures for plan incorporation and integration. The following represent utilized methods:

- **Cross-Referencing:** Identify and cross-reference relevant sections of different plans and policies. This involves explicitly noting connections between the goals, strategies, and actions outlined in one plan with those in others.
- **Consistency Checks:** Conduct consistency checks to ensure that the language, objectives, and strategies in different plans and policies align with each other.
- **Joint Planning Committees:** Establish joint planning committees or task forces that involve representatives from different departments or agencies responsible for various plans (for example, the MPC). These committees facilitate communication, collaboration, and the coordination of planning efforts across sectors.
- **Collaborative Workshops and Meetings:** Organize collaborative workshops and meetings to bring together stakeholders involved in different planning processes (as seen in the planning meetings for the LHMP). These forums provide an opportunity for stakeholders to share information and discuss common goals.
- **Alignment with State and Regional Plans:** Ensure that local plans align with broader regional and state plans. This involves considering regional and state priorities and incorporating them into local planning efforts to create a harmonized approach to development.
- **Data Sharing and Analysis:** Share relevant data among planning efforts and conduct joint data analysis. This helps in creating a common understanding of the challenges and opportunities, facilitating evidence-based decision-making across different plans.
- **Unified Implementation Strategies:** This involves identifying common actions and initiatives that contribute to the achievement of multiple goals outlined in various plans.

EXHIBIT C

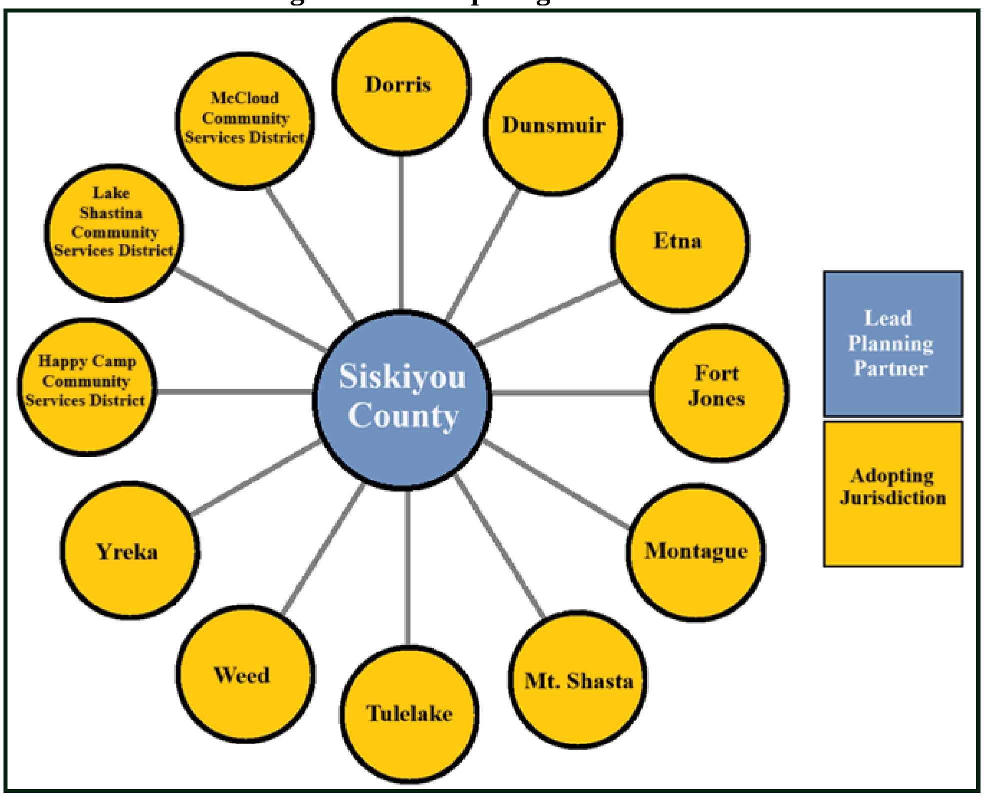
1.5 Adopting Jurisdictions

In order to have an approved hazard mitigation plan, DMA 2000 requires that each jurisdiction participate in the planning process. Each jurisdiction choosing to participate in the development of the plan was required to meet detailed participation requirements, which included the following:

- Participation in planning meetings
- Provision of information to support the plan development
- Identification of relevant mitigation actions
- Review and comment on plan drafts
- Fostering the public input process
- Adoption of the LHMP

Based on the above criteria, the following jurisdictions participated in the planning process:

Figure 1: Participating Jurisdictions



1.6 Plan Adoption

As per the California Governor's Office of Emergency Services (Cal OES) recommendations, this plan was submitted to Cal OES and FEMA Region IX prior to adoption (approval pending adoption protocol). This methodology allows for a single plan adoption by participating jurisdictions in the event of plan revisions during the review and approval process. Upon review and approved pending adoption status by FEMA Region IX, adoption resolutions will be signed by the participating jurisdictions. FEMA approval documentation and jurisdictional adoption resolutions may be found in Appendix A.

Administration and oversight of the hazard mitigation program is the responsibility of the Siskiyou County Office of Emergency Services (SCOES). The plan will be reviewed annually and will be updated every five years, or as required by changing hazard mitigation regulations or guidelines.

EXHIBIT C

Section 2 – Documentation of the Planning Process

2.1 Guiding Principle

The guiding principle for the creation and utilization of this LHMP is as follows:

- Through partnerships among local jurisdictions, identify and reduce the vulnerability to natural hazards to protect the health, safety, quality of life, environment and economy of the diverse communities within Siskiyou County.

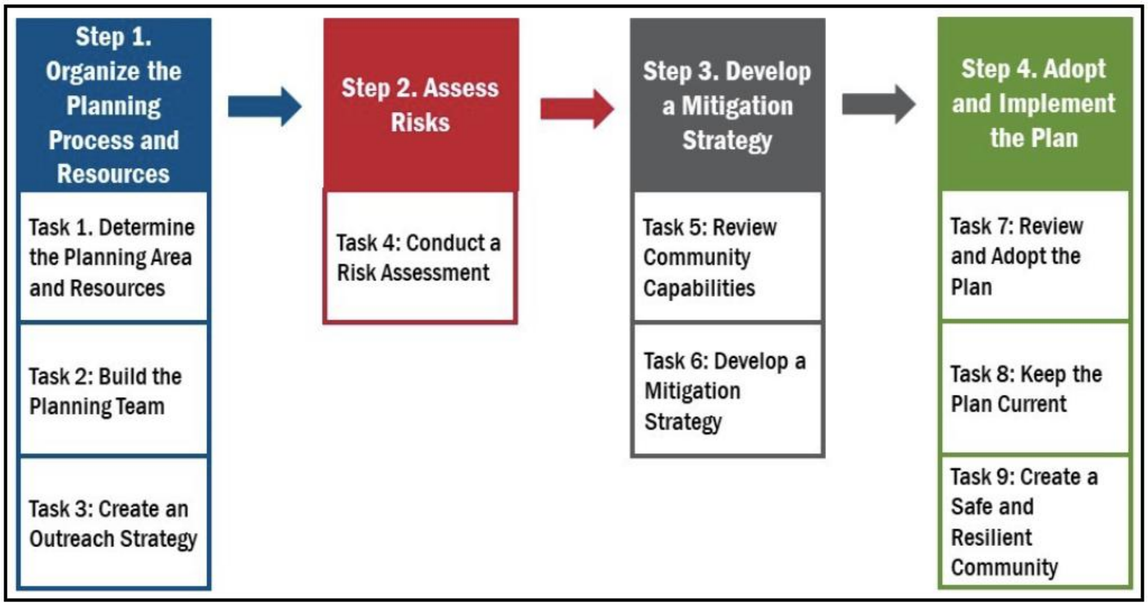
2.2 Planning Process

The process established for this planning effort is based on the Disaster Mitigation Act of 2000 planning and update requirements and the FEMA associated guidance for local hazard mitigation plans (Local Mitigation Planning Policy Guide (FP 206-21-0002), effective April 19, 2023). To accomplish this, the following planning process methodology was followed:

- Inform, invite, and involve other mitigation plan stakeholders throughout the state, including federal agencies, state agencies, regional groups, businesses, non-profits, underserved communities, and local emergency management organizations.
- Creation of a planning committee to establish and guide the planning process.
- Develop the planning and project management process, including methodology, review procedures, details about plan development changes, interagency coordination, planning integration, and the organization and contribution of stakeholders.
- Creation of a multi-pronged outreach strategy to engage stakeholders.
- Conduct a thorough review of all relevant current and historic planning efforts.
- Conduct a review of all related and relevant state and local plans for integration and incorporation.
- Collect data on all related state plans and initiatives, local plans' hazard risk, local plans' mitigation strategies and actions, critical facilities and community lifelines, flood plains, Repetitive Loss/Severe Repetitive Loss properties, hazard events, on-going and completed mitigation actions, and mitigation program changes since the development of the previous plan.
- Complete a risk and vulnerability assessment using data from the FEMA and other federal and state agency resources. Analyses were conducted at the state level, county by county, of state-owned facilities, and county by county drawing on local assessments.
- Develop and update the capability assessment of Siskiyou County and all participating jurisdictions.
- Develop a comprehensive mitigation strategy effectively addressing Siskiyou County's hazards and mitigation program objectives. This included reviewing pre and post disaster policies and programs, identifying objectives and goals, identifying mitigation actions and projects, and assessing mitigation actions and projects.
- Determination and implementation of a plan maintenance cycle, including a timeline for plan upgrades and improvements.

The following figure summarizes these steps:

Figure 2: Planning Process



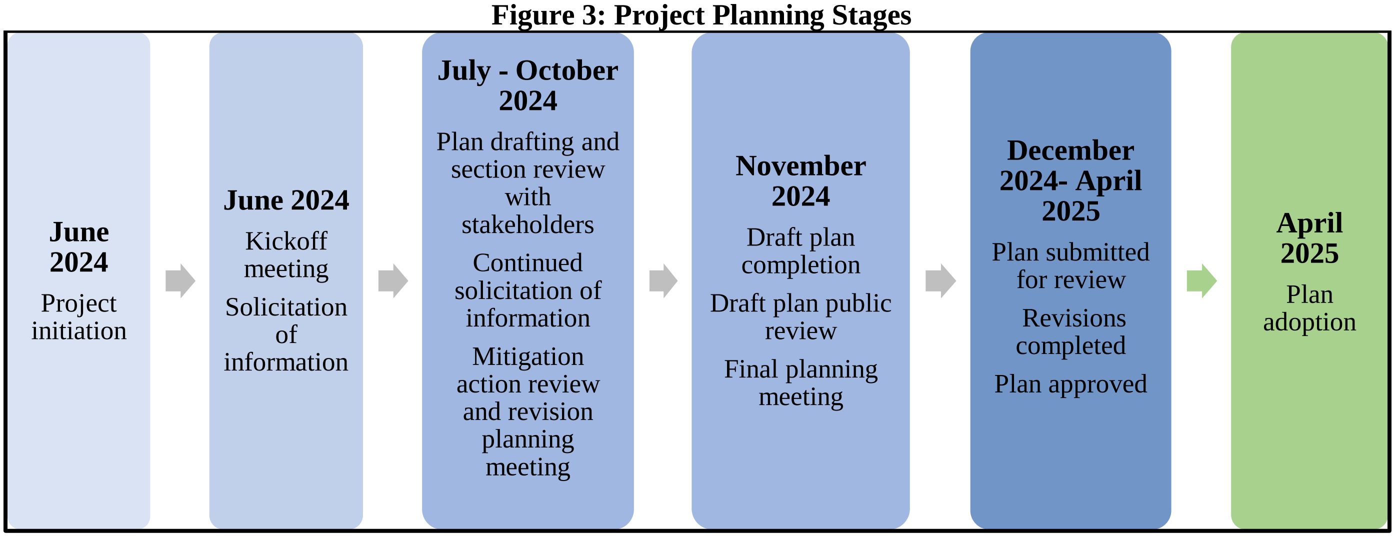
Source: FEMA

Additionally, this LHMP utilized Appendix M. Basics of Local Mitigation Planning of the 2023 California State Hazard Mitigation Plan Volume 2 for planning guidance. Appendix M includes a catalog of best practices and resources that can be leveraged during plan development and helps ensure that the required elements in the FEMA Region 9 Local Hazard Mitigation Plan Review Tool are met.

2.3 Project Timeline

The Siskiyou County LHMP review and revision process began in June 2024, with the first public meeting held in June 2024. The following figure indicates the planning stages completed as part of this process:

Figure 3: Project Planning Stages



2.4 2025 Plan Organization

This LHMP is both a reference document and an action plan. It has information and resources to educate readers and decision-makers about hazard events and related issues and a comprehensive strategy that participating jurisdictions, stakeholders, and community members can follow to improve resilience. This LHMP is composed of the following sections:

- **Section 1 - Introduction, Assurances, Incorporation, and Adoption:** Details the regulatory framework for plan development, participating jurisdictions, how the plan will be incorporated into other planning mechanisms, and adoption requirements.
- **Section 2 – Planning Process:** Outlines the steps taken to complete this LHMP, consideration of planning equity, the people involved in its creation, strategies to invite public participation, and technical and planning resources utilized in completing this plan.
- **Section 3 - Regional Profile and Development Trends:** Details demographic information, vulnerable populations, critical facility and community lifeline information, agricultural data, and a discussion of climate change parameters.
- **Section 4 – Capability Assessment:** Provides a comprehensive evaluation of existing abilities to effectively mitigate hazards and manage disaster risks. This assessment involves analyzing the community's current resources, policies, programs, and systems to determine how well it can implement mitigation strategies.
- **Section 5 - Hazard Identification and Risk Assessment:** Describes the hazards that can impact the planning area, including extent, previous occurrences, changing conditions, and vulnerabilities.
- **Section 6 - Mitigation Strategy:** Outlines the specific actions, policies, and projects designed to reduce or eliminate the risks and impacts of hazards on a community. These strategies are developed based on the findings from the hazard identification and risk assessment phases and are tailored to address the unique vulnerabilities and capabilities of the community.
- **Section 7 - Plan Maintenance:** Summarizes plan maintenance responsibilities, monitoring and update requirements, and opportunities for continued public involvement.
- **Appendices:** Provides supplementary detailed information and supporting documents. The appendices serve to enhance the main content by offering further clarification, data, and documentation that support the planning process and implementation.

2.5 2025 Plan Update

In undertaking this planning effort, Siskiyou County and all participating jurisdictions determined that wide variances in planning format and data do not allow for effective continuous planning. To provide planning continuity every effort was made during this plan update to adhere as closely as possible to elements of the previous LHMP. As such, the level of analysis and detail included in this risk assessment is cumulative, allowing participating jurisdictions to have a robust base to further mold and improve their mitigation strategies over the next five years.

As part of this planning effort, each section of the previous mitigation plan was reviewed based on current and available data. The plan was reviewed against the following elements:

- Compliance with the current regulatory environment
- Completeness of data
- Correctness of data
- Capability differentials
- Current regional environment

Based on the above criteria, each section of the previous LHMP was revised as required. In addition to data revisions, the format and sequencing of the previous plan was updated for ease of use and plan clarity. Key updated elements from the previous LHMP include:

- Integration of the 2050 Siskiyou County General Plan.
- Expanded definition and discussion of underserved communities and vulnerable populations.
- Updated goals and objectives, including a new goal and objectives.
- Updated critical facilities and community lifelines list.
- Expanded detailing of historic hazard occurrences.
- Updated mapping using newly available data.

EXHIBIT C

- Updated county and jurisdictional capabilities assessment.
- Updated mitigation actions, including progress on previous actions.

Participating jurisdictions hazard mitigation priorities have remained consistent for all participating jurisdictions since the last plan update. These priorities include a continued focus on reducing vulnerabilities, enhancing resilience, and addressing risks associated with natural hazards. Stakeholders remain committed to strengthening community preparedness, protecting critical infrastructure, and minimizing potential losses through collaborative strategies and long-term planning.

2.6 Hazard Mitigation Planning Equity

Planning equity refers to the principle of fairness and justice in planning and development processes. It emphasizes the equitable distribution of resources, opportunities, and benefits among all members of a community, particularly those who have historically been marginalized or disadvantaged. The concept of planning equity recognizes that planning decisions can have significant impacts on different groups of people and aims to ensure that these decisions promote social justice and inclusiveness. It involves addressing spatial inequalities, such as disparities in access to housing, transportation, public services, green spaces, and employment opportunities.

Planning equity entails involving diverse stakeholders in decision-making processes, including community members, advocacy groups, and underrepresented populations. It seeks to empower marginalized communities by giving them a voice in shaping the development and planning policies that directly affect their lives.

Planning equity and hazard mitigation planning are closely related, as both aim to create more resilient and inclusive communities. As part of this planning effort, the following intersections were considered between planning equity and hazard mitigation planning:

- **Vulnerability Assessment:** Planning equity recognizes that certain communities, particularly marginalized and disadvantaged populations, may be more vulnerable to hazards due to social, economic, and environmental factors. When conducting a vulnerability assessment as part of hazard mitigation planning, it is important to consider equity issues and identify areas or groups that may experience disproportionate impacts.
- **Engaging Marginalized Communities:** Planning equity emphasizes the inclusion and participation of diverse stakeholders, including marginalized communities, in decision-making processes. In hazard mitigation planning it is crucial to engage these communities to understand their unique needs, concerns, and perspectives regarding hazards.
- **Addressing Social Disparities:** Hazard mitigation planning can help address social disparities by considering the unequal distribution of resources and opportunities in the context of hazards. This can involve implementing mitigation measures that specifically target vulnerable populations, such as affordable housing in safer areas or improved access to emergency services and transportation for underserved communities.
- **Equitable Distribution of Resources:** Planning equity promotes the equitable distribution of resources, and this principle can be applied to hazard mitigation planning. It involves ensuring that mitigation measures and investments are allocated fairly, with consideration given to communities that have historically received less attention or investment. This can help reduce existing disparities and enhance the resilience of marginalized communities.

EXHIBIT C

By integrating planning equity into hazard mitigation planning, it becomes possible to develop strategies and actions that not only reduce the risks associated with hazards but also promote social justice, inclusivity, and resilience for all members of the community.

As part of this planning process, participating jurisdictions, planners, and stakeholders considered potential inequities and encouraged the participation of potentially vulnerable citizens and communities. This process began with recognizing that disparities exist within the region, including health outcomes and living conditions for people of color, people with disabilities, and historically disadvantaged communities. It was recognized that these populations may be at greater risk to the hazards identified in this plan and may be limited in their ability to adapt, respond, and recover if an event were to occur.

As recommended in FEMA's "Guide to Expanding Mitigation," Siskiyou County took a whole community approach to this planning effort, including:

- Inviting historically underserved populations to participate in the planning and decision-making processes
- Inviting faith based and community organizations, nonprofit groups, schools, and academia to be plan stakeholders

These equity partners were contacted directly by SCOES via phone and email and were invited to kickoff and review planning meetings. Additionally, these partners were provided with a draft copy of the LHMP for review and comment, and their valuable feedback further strengthened the plan. The following table identifies our equity partners who actively engaged in the LHMP planning effort:

Table 1: Equity Partners

Equity Partner	Representative and Title	Description
Siskiyou County Health and Human Services Agency	Sarah Collard, Ph.D., Agency Director	Provides a wide range of social services, mental health services, alcohol and drug treatment services, public health services, emergency preparedness and income assistance.
Siskiyou County Social Services Division	Sarah Collard, Ph.D., Agency Director	Administers all of the basic public assistance programs which include Medi-Cal, CalFresh, CalWORKs, and General Assistance, Child Protective Services program, In-Home Supportive Services program, the Adult Protective Services program, and the Public Guardian/Public Conservator program. We believe in collaboration and in working with our county-wide network of Family Resource Centers, which increases our ability to reach out to our community and more effectively connect in the large rural area that Siskiyou County encompasses.
Siskiyou Community Resource Collaborative	Ken Palfini, President	Provides a collaborative network of services and support that strengthen the ability of children, youth, adults and families to live healthy and productive lives, which builds their capacity to contribute to the well-being of themselves, their families, and communities. Work is led by a network of family/community resource centers, coordinating and integrating supportive services between a range of organizations including churches, county agencies, healthcare providers, schools, service clubs, nonprofit organizations and governments
NorCal Homeless Continuum of Care	Maddelyn Bryan, Co-Chair	A consortium of individuals and organizations with the common purpose of planning a housing and services system for people who are homeless.
Disability Action Center	Wendy Longwell, Voice Options Member	A private, non-profit corporation founded in 1980 to meet specific needs of people with disabilities living in northern California. DAC assists people with disabilities to achieve and/or maintain their independence.

EXHIBIT C

Table 1: Equity Partners

Equity Partner	Representative and Title	Description
Community Organized Relief Effort	Joshua Bien, Program Manager	A humanitarian organization that brings immediate relief and recovery to underserved communities across the globe.
Karuk Tribe	Darrell Frost, Emergency Manager	The mission of the Karuk Tribe is to promote the general welfare of all Karuk people, to establish equality and justice for our tribe, to restore and preserve Tribal traditions, customs, language and ancestral rights, and to secure to ourselves and our descendants the power to exercise the inherent rights of self-governance. Currently the Karuk Tribe has an approved Tribal Mitigation Plan.
Planning and Service Area 2 Agency on Aging	Teri Gabriel, Executive Director	A Joint Powers agency providing aging and adult services in Lassen, Modoc, Shasta, Siskiyou, and Trinity Counties, and charged with creating a unique system of service delivery which will best meet the specific needs of the older adults and adults with functional impairments within their communities. All Area Agencies share a common mission of preserving independence, dignity, and choice to enable our populations to "age-at-home" and prevent premature institutionalization.
Far Northern Regional Center	Travis McIvor, Emergency Coordinator	Serves persons with developmental disabilities in a nine-county area (Butte, Shasta, Modoc, Trinity, Glenn, Lassen, Plumas, Tehama and Siskiyou).
Quartz Valley Indian Reservation	Mary Benedict, Tribal Administrator	The Quartz Valley Indian Community of the Quartz Valley Reservation of California is a sovereign, federally recognized Tribe in rural western Siskiyou County.

As many of these equity partners serve all jurisdictions within Siskiyou County, they were leveraged to reach our underserved and isolated communities by providing them with the LHMP and all surveys relating to this plan. All feedback comments, both written and verbal, were incorporated into the fabric of this plan as appropriate to ensure compliance with planning requirements for all participating jurisdictions.

2.7 Mitigation Planning Committee

Project initiation began with the selection of a Mitigation Planning Committee (MPC), consisting of the Siskiyou County Emergency Manager and representative staff from both Siskiyou County and participating jurisdictions. From project inception to completion, the MPC was notified at each major plan development milestone through a combination of meetings and electronic communication.

In general, all MPC members were asked to participate in the following ways:

- Attend and participate in meetings
- Help establish project operating procedures and timelines
- Review planning elements and drafts
- Shepherd the plan adoption process

Members of the MPC were also asked to assist with the following:

- **Providing Localized Risk Assessment Data:** Contribute specific data and information about local hazards, vulnerabilities, and risks that are unique to their jurisdiction.
- **Identifying Mitigation Actions:** Help identify and prioritize mitigation actions that are most relevant to their jurisdiction.

- **Coordinating with Stakeholders:** Act as liaisons between the MPC and their respective stakeholders, including vulnerable communities, community members, local businesses, and other governmental agencies. This ensures that the plan reflects the concerns and needs of all relevant parties.
- **Ensuring Compliance and Integration:** Ensure that the mitigation strategies and actions proposed in the LHMP align with existing local plans, ordinances, and regulations. This integration helps to streamline implementation and ensures that the LHMP supports broader community goals.
- **Securing Resources and Funding:** Help identify potential resources, including funding opportunities, that can support the implementation of mitigation actions.
- **Reviewing and Updating the Plan:** After the initial development of the LHMP, MPC members are typically involved in regular reviews of the plan. This includes monitoring progress on mitigation actions, evaluating the effectiveness of strategies, and making necessary adjustments based on new data or changing conditions.
- **Public Engagement and Education:** Play a crucial role in engaging the public and educating community members about the LHMP and its importance.

By fulfilling these roles, MPC members help ensure that the LHMP is well-rounded, locally relevant, and effectively implemented across the entire planning area. Their involvement is key to the plan's success in reducing risks and enhancing community resilience to hazards. The following table represents members of the MPC:

Table 2: MPC Members

Jurisdiction	Department	Name	Title	Adopting Jurisdiction
Siskiyou County	Office of Emergency Services	Bryan Schenone	Emergency Manager	Yes
Siskiyou County	Office of Emergency Services	Owen Cabo Dal Molin	Disaster Services Coordinator	Yes
Siskiyou County	Office of Emergency Services	Adam Heilman	OES Support	Yes
Dorris	City Clerk	Joanna Wymant	Deputy City Clerk	Yes
Dorris	City of Dorris Planning	Richard Tinsman	Contract City Planner	Yes
Dunsmuir	City of Dunsmuir	Stephen Decatur	Resilience Specialist	Yes
Etna	City of Etna	Cliff Munson	Mayor	Yes
Etna	City of Etna Planning	Richard Tinsman	Contract City Planner	Yes
Fort Jones	Fire Department	Joseph Hess	Fire Chief	Yes
Happy Camp CSD	Happy Camp CSD	Jasmine Borgatti	Chief Resiliency Officer	Yes
Lake Shastina CSD	Lake Shastina CSD Police	Will Bullington	Chief of Police	Yes
McCloud CSD	McCloud CSD	Amos McAbier	General Manager	Yes
Montague	City Clerk	David Dunn	City Administrator	Yes
Montague	City of Montague Planning	Richard Tinsman	Contract City Planner	Yes
Mt. Shasta	Planning Department	Jeff Mitchem	Planning Director	Yes
Tulelake	Police Department	Jose Fiscal	Chief Resiliency Officer	Yes
Tulelake	City of Tulelake Planning	Richard Tinsman	Contract City Planner	Yes
Weed	City Manager	Steven Baker	Interim City Manager	Yes
Yreka	Planning	Sarah Chaffee	Resilience Planner	Yes
Yreka	Planning	Juliana Lucchesi	Assistant City Manager	Yes

2.8 Participating Stakeholders

Siskiyou County acknowledges that effective hazard mitigation planning should involve a diverse group of stakeholders, including government agencies, private sector entities, private non-profit organizations, quasi-governmental authorities, and special districts. The coordination and cooperation of these stakeholders assists with all aspects of plan development, including:

- Data collection
- Hazard and risk analysis
- Capability assessment
- Mitigation action review, revision, and development
- Plan implementation

These participating stakeholders, who serve, assist, and welcome citizens from all jurisdictions withing Siskiyou County, were contacted directly by SCOES via phone and email during the entirety of the planning process concerning plan progress and meeting information (including remote meeting login information and in person meeting address and time when applicable). Many of these stakeholders were a consistent presence at planning meetings. The following table details our participating stakeholders:

Table 3: Participating Stakeholders

Name	Title	Jurisdiction or Agency	Meeting Attendance/ Direct Communication
Scott Porter	Hazard Mitigation Planner	California Department of Transportation	Yes
Roger Lucas	Hazard Mitigation Planner	California Department of Transportation	Yes
Julie Titus	Consultant	Community Wildfire Planning and Mitigation	Yes
Mark Dibelka	Missioner for Disaster Resilience	Episcopal Diocese of Northern California	Yes
Ann-Marie Moser	EMS Coordinator	Fairchild Medical Center	Yes
Elizabeth Pulatie	Director of Nursing	Mercy Mt. Shasta Hospital	Yes
Steven Bryan	Program Director	Mt. Shasta Community Resource Center	Yes
George Jennings	Executive Director	Ore-Cal Resource Conservation and Development Area Council	Yes
John Golay	Executive Director	Rescue Ranch Yreka (animal rescue)	Yes
Trenton Quirk	Paramedic	Sierra-Sacramento Valley EMS Agency	Yes
Glenn Shockency	Deputy Director	Siskiyou County Building Department	Yes
Jodi Aceves	Senior Deputy Ag Commissioner	Siskiyou County Department of Agriculture	Yes
Cynthia Billingsley	Victim Services Coordinator	Siskiyou County District Attorney	Yes
Giselle Nova	Joint Coordinator	Siskiyou County Firesafe Council	Yes
Hailey Lang	Planning Director	Siskiyou County Planning	Yes
Aaron Stutz	Public Health Officer	Siskiyou County Public Health	Yes
Sage M. Milestone	Public Information Specialist	Siskiyou County Sheriff Department	Yes
Alex Carter	Council Member	Yreka Fire Safe Council	Yes

Emphasis was placed on inviting and engaging local building departments (Section 4.3) and local level departments with potential mitigation roles (Section 4.2) who played a critical role in creating and reviewing this LHMP. Their expertise was used to help identify local vulnerabilities and develop building-related mitigation measures. Additionally, jurisdictional NFIP coordinators played a key role in mitigation planning at the community level (Section 4.8). These coordinators were actively engaged and for their expertise on flood risk, mitigation strategies, and NFIP compliance. Outreach to these stakeholders was also carried out through MPC members to ensure compliance with planning requirements for all participating jurisdictions.

2.9 Coordinating Stakeholders

Coordinating stakeholders have information and resources that are important to the planning process, but do not participate fully in the planning process. While not all of these organizations attended meetings, each was actively courted through website enquires and calls to provide information, data, and feedback as necessary and as related to their areas of expertise. The following provides a list of all coordinating stakeholders involved in the development of this LHMP:

- California Department of Forestry and Fire Protection (CAL FIRE)
- California Department of Transportation

- California Department of Water Resources
- Karuk Tribal Emergency Management Office
- Sierra-Sacramento Medical Services Agency
- McConnel Foundation
- The Episcopal Diocese of Northern California
- Fairchild Medical Center
- Fire Safe Council
- Ore-Cal Resource Conservation and Development Area Council
- College of the Siskiyous
- Siskiyou County Flood Control and Water Conservation District
- Del Norte County Emergency Services
- Humboldt County Emergency Services
- Modoc County Office of Emergency Services
- Shasta County Office of Emergency Services
- Siskiyou County Fire Safe Council
- Trinity County Office of Emergency Services
- Klamath County, Oregon Office of Emergency Management
- Lake County, Oregon Office of Emergency Management
- Yreka Water Department
- Montague Water Conservation District

A special thank you goes out to the following participatory stakeholders who aided in the development of this plan through the sharing of resources and through the provision of expert commentary during planning meetings:

- Mike Baker, Facilities Director, Fairchild Medical Center
- Bianca Garza, Member and Author, Mount Shasta Bioregional Ecology Center
- Cliff Munson, CEO, Siskiyou Golden Fairgrounds
- Patricia Grantham, Coordinator, Siskiyou Prescribed Burn Association/Shasta Valley Resource Conservation District
- Greg Roath, Staff, Siskiyou Unit Chief, California Department of Forestry and Fire Protection
- Suzanne Brady, Public Information Officer, California Department of Forestry and Fire Protection
- Ronna Bowers, Regional Coordinator, California Department of Water Resources
- Alyse Briody, Staff, California Department of Water Resources
- William Ehorn, Staff, California Department of Water Resources
- Scott Porter, District 2 Maintenance Manager I, California Department of Transportation
- Roger Lucas, District 2 Maintenance Manager II, California Department of Transportation
- Roger Matthews, Area Superintendent, California Department of Transportation
- James Phelps, Cal OES Support, Cal OES

2.10 Community Outreach

> ***Public Meeting Comment:***
> *Thank you including our community.*

As part of the overall planning process, the public (defined as any person(s) living or working within Siskiyou County and/or any person with a vested interest in the long-term resilience of the county) was provided with numerous opportunities to contribute and comment on the creation and adoption of the plan. These opportunities included:

- A standalone webpage concerning all hazard mitigation activities, survey links, and meeting information.
- Advertised meeting invitations.
- Online surveys

- Comment period upon completion of draft plan

All open public meetings were held at easily accessible community locations. As many participating jurisdictions and citizens have limited communications capabilities, meeting notices were placed in high visibility locations and our MPC was asked to conduct a word-of-mouth campaign concerning the planning process to include as many participants as possible.

Along with public meetings, and to help generate community interest and participation, a parallel online outreach strategy was undertaken. This allowed remote and underserved communities to participate fully in the process without having to travel long distances. Information concerning the hazard mitigation planning process, along with links to public surveys, links to meeting presentations, and recorded copies of meetings were provided. Both www.co.siskiyou.ca.us/emergencyservices/page/local-hazard-mitigation-plan and www.readysiskiyou.gov provided this information.

Figure 4: Siskiyou County Hazard Mitigation Webpage

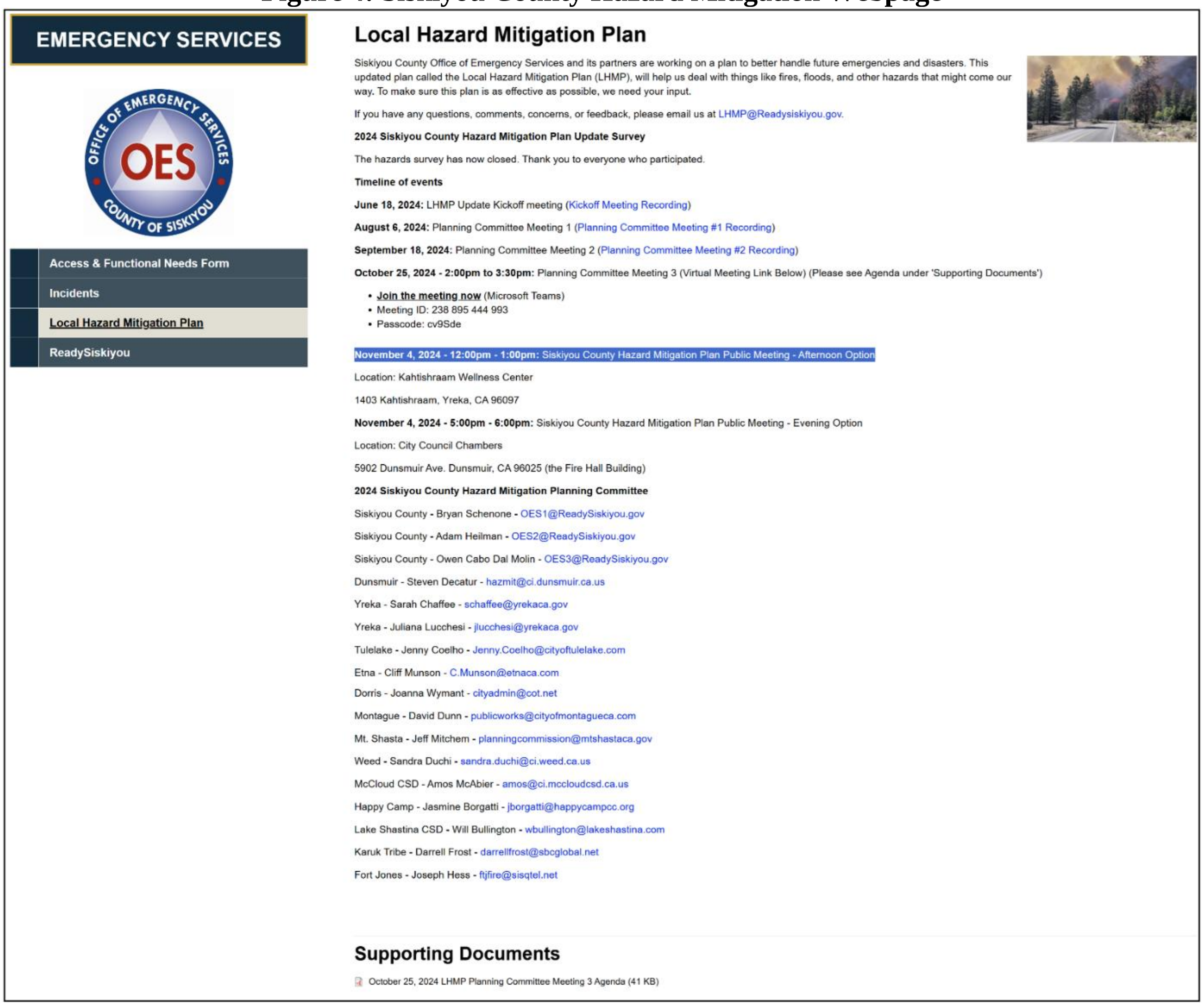
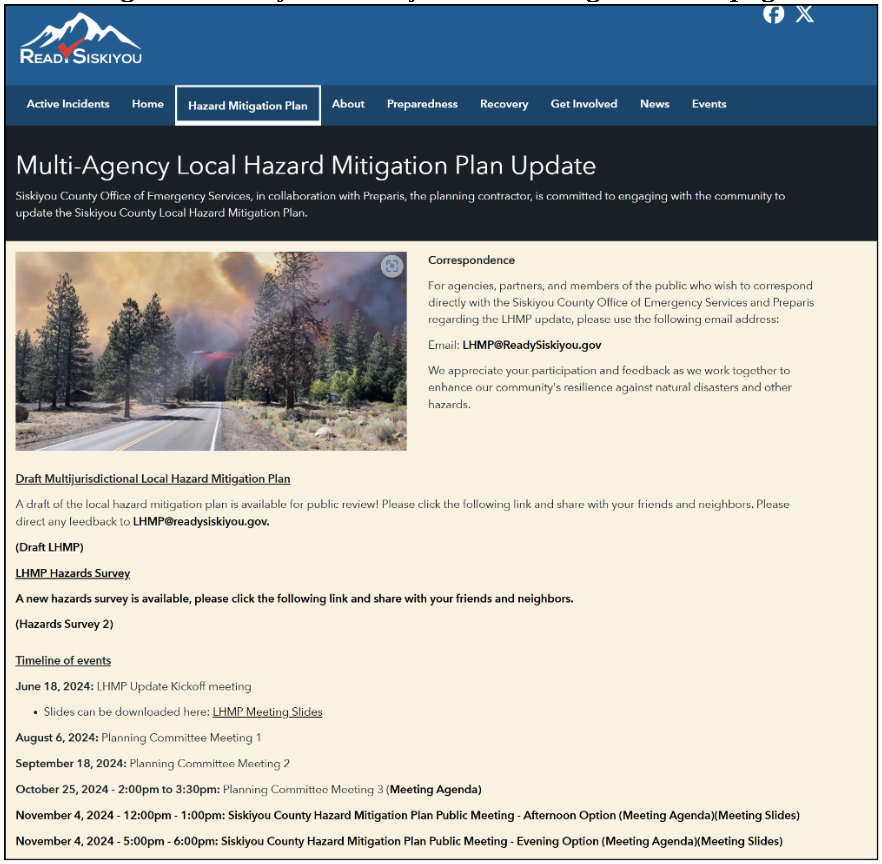


EXHIBIT C

Figure 5: Siskiyou County Hazard Mitigation Webpage



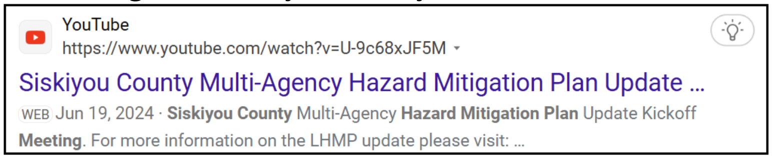
Participating jurisdictions utilized jurisdictional Facebook and social media accounts to keep their citizens up to date on the process and to provide links to information, meetings and surveys, The following is an example from the City of Yreka:

Figure 6: City of Yreka Facebook

EXHIBIT C

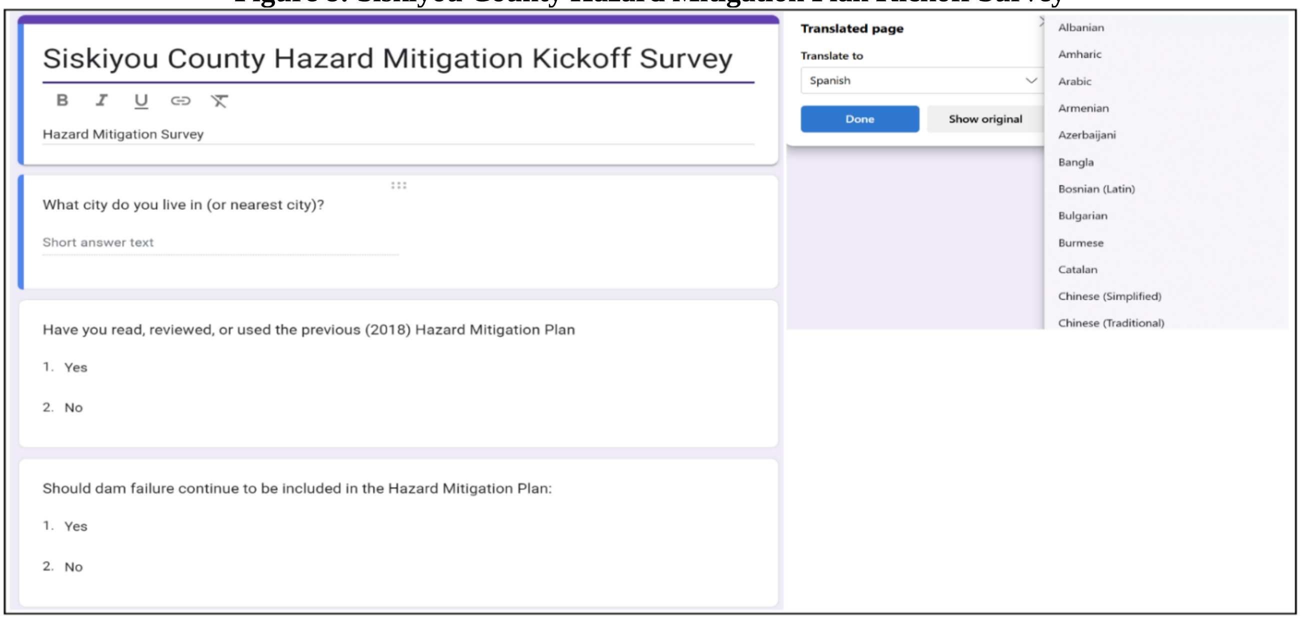
The SCOES YouTube channel was used to provide access to all meetings to those unable to attend or those who could not take time from work or childcare to watch live.

Figure 7: Siskiyou County YouTube Channel



Additionally, throughout the planning process numerous public surveys were released to allow community members to provide feedback and input on the LHMP update using a series of guided questions and open comment fields. The surveys used Google's auto translate feature to provide a host of languages to complete the forms.

Figure 8: Siskiyou County Hazard Mitigation Plan Kickoff Survey



Input from the general public provided the MPC with a clearer understanding of local concerns, helped confirm identified hazards, helped shape proposed mitigation actions, and provided elected officials with a guide and tool to set local, regional, and ordinances and regulations. This public outreach effort was also an opportunity for adjacent jurisdictions and entities to be involved in the planning process. Additionally, as citizens were made more aware of potential hazards and the local process to mitigate against their impacts, it was believed that they would take a stronger role in making their homes, neighborhoods, schools, and businesses safer from the potential effects of natural hazards. Comments and feedback from the surveys are both incorporated in this LHMP and are included in Appendix B.

2.11 Planning Meetings

Numerous in-person meetings were conducted for the 2025 LHMP update. All of the meetings were held in a publicly accessible location and advertised as open to the public through posts on the above-mentioned websites and social media platforms. These meeting were conducted to discuss the mitigation planning process as well as gain public support and input for the plan update. The following is a brief synopsis of those meetings.

- **LHMP Update Kick-Off and Public Information Meeting – June 18, 2024:** Siskiyou County hosted a kick-off meeting for the MPC, stakeholders, and the public. The meeting was used to present the general structure and timeline for the LHMP process, discuss jurisdictional participation requirements, present data concerning changing demographics and development, review and discuss identified hazards that could impact the region, and present next steps. During the meeting, MPC members, plan stakeholders, and the public were invited to voice any concerns, ask questions, and provide input on the mitigation plan update. Additionally, MPC members were tasked with collecting contact information and advised of future data collection requirements such as hazard history, facility information, and other pertinent information from participating jurisdictions.

- **LHMP Goals and Objectives Review Meeting – August 6, 2024:** Siskiyou County had an open to the public virtual planning meeting to discuss the revision of goals and objectives for the 2024 LHMP.
- **CAL OES Planning Meeting, August 23, 2024:** An online meeting with Cal OES Victoria LaMar-Haas with Cal OES to discuss revised FEMA review requirements, the shape of the LHMP, and best practices for planning.
- **LHMP Plan, Capability, Hazard, and Mitigation Strategy Review Meeting, September 18, 2024:** Siskiyou County had a virtual planning meeting for MPC members. Attendees engaged in a discussion concerning the status of the LHMP, plan formatting changes, identified hazards, and a discussion of the review, revision, and creation of hazard mitigation action items.
- **LHMP MPC Meeting, October 25, 2024:** Siskiyou County held a virtual planning meeting for MPC members to review the draft final hazard mitigation plan, including hazards, mitigation actions, and jurisdictional capabilities. Attendees also discussed the format and parameters of the next public meeting.
- **LHMP Public Review Meeting, November 4, 2024:** Siskiyou County hosted two open public final plan review meetings for all stakeholders and the public. At the meeting, MPC members, jurisdictional representatives, plan stakeholders, and the public were invited to voice any concerns, ask questions, and provide input on the mitigation plan update. Additionally, members of the public were invited to review a draft copy of the LHMP update posted to jurisdictional and county websites for two weeks prior to the final meeting, and prior to its submission to FEMA Region IX.
- **Cal OES LHMP Pre-Review, November 25, 2024:** This meeting was held to allow for a discussion of the pre-review notes for the Siskiyou County LHMP with Victoria LaMar-Haas , Ivan Cintron, and Judy Newton with Cal OES. The meeting resulted in LHMP modifications and additions to strengthen the plan.
- **Final MPC Meeting, December 2, 2024:** A final meeting was conducted with MPC members to answer any final questions, review the final steps for plan submission to Cal OES and FEMA, and discuss expected timelines and next steps.

2.12 Planning Document Resources

The hazard mitigation plan is an overarching document that is both composed of, and contributes to, other jurisdictional plans. In creating this plan, all the planning documents identified below were consulted and reviewed, often extensively. In turn, when each of these other plans is updated, they will be measured against the contents of the LHMP.

Below is a list of the various planning efforts, sole or jointly administered programs, and documents reviewed and included in this hazard mitigation plan. While each plan can stand alone, their review and functional understanding was pivotal in the development of this plan and further strengthens and improves a jurisdiction’s resilience to disasters.

- **2018 Siskiyou County Hazard Mitigation Plan:** The previous LHMP has been reviewed and is incorporated throughout this plan per FEMA requirements.
- **2023 California State Hazard Mitigation Plan:** Completed by the Cal OES, this plan was utilized to provide a framework for hazard mitigation, set a baseline for standards and practices, and as a resource for information.
- **2023 California State Hazard Mitigation Plan Appendix M: Basics of Local Mitigation Planning:** This appendix was referenced and leveraged for best practices in the development of this LHMP.
- **2024 Siskiyou County General Plan and Jurisdictional General and Comprehensive Plans:** Every city and county in California is required by law to adopt and maintain a general plan, which is the local government’s long-term framework for future growth and development. All specific plans, subdivisions, public works projects, and zoning decisions must be consistent with the general plan. These plans, which include the goals and policies upon which the jurisdictions base land use decisions, provided background information on the jurisdiction, information on risk and vulnerabilities, and a review of existing mitigation related policies.
- **2019 Community Wildfire Protection Plan - Siskiyou County Addendum:** Created in collaboration with local governments, fire departments, and relevant stakeholders to address the risk of wildfire in the county. The primary goals are to enhance wildfire preparedness, reduce the risk of wildfire to life, property, and critical infrastructure, and improve community resilience.

- **2022 Siskiyou Unit Strategic Fire Plan**: This plan reflects CAL FIRE Siskiyou Unit's focus on fire prevention and suppression activities to protect lives, property, and natural resources. Please note that Siskiyou County is in a Cooperative Fire Protection Agreement with the CAL FIRE for the provision of fire protection services
- **2011 Siskiyou County Land Development Manual Update, Second Edition:** A strategic framework used to guide the growth and development of land within the county. This plan outlines how land should be used and developed to improve economic growth, environmental sustainability, and quality of life.
- **Jurisdictional Groundwater Sustainability Plans**: There are four medium priority basins in Siskiyou County; Butte, Scott, Shasta and Tulelake. These plans are used to help achieve sustainable management of these basins.
- **2023 Siskiyou County Emergency Operations Plans:** This plan is used to develop procedures for the protection of personnel, equipment, and critical records to help determine existing established policies that ensure the continuity of government and essential services during and after disasters.
- **Jurisdictional Planning and Zoning Documents and Ordinances:** Planning and zoning ordinances are tools used by local governments to regulate land use and development within their jurisdictions. These ordinances are essential for implementing a community's land development plan and ensuring orderly development. These documents were reviewed, assessed, and cataloged to compile each participating jurisdiction's capabilities.

2.13 Technical Resources

A variety of technical resources during plan development. These technical resources were instrumental in completing an accurate vulnerability and risk assessment, and include:

- **FEMA Digital Flood Insurance Rate Maps**: FEMA's National Flood Hazard Layer data was instrumental in mapping floodplain locations and estimating potential flood impacts and loss estimates.
- **FEMA National Risk Index (NRI):** An online mapping application that identifies communities most at risk to natural hazards. The mapping service visualizes natural hazard risk metrics and includes data about expected annual losses from natural hazards, social vulnerability, and community resilience. The NRI's interactive web maps are at the county and Census tract level and are made available via GIS services for custom analyses.
- **FEMA Resilience Analysis and Planning Tool (RAPT):** FEMA and Argonne National Laboratory created RAPT to support state, local, tribal, territorial analysis in identifying focus areas for building resilience, response, and recovery capabilities. RAPT is a geographic information system web map tool with clickable layers of community resilience indicators, infrastructure locations, and hazard data.
- **Homeland Infrastructure Foundation-Level Data (HIFLD):** A program managed by the U.S. Department of Homeland Security that provides authoritative geospatial data.
- **National Oceanic and Atmospheric Administration (NOAA)/National Centers for Environmental Information (NCEI):** Provided weather data and historical events occurrence data.
- **U.S. Army Corps of Engineers:** Provided dam and flood control data.
- **U.S. Department of Agriculture (USDA):** Provided drought and agricultural data.
- **U.S. Geological Survey (USGS):** Provided geologic hazard occurrence and probability data.
- **National Weather Service (NWS):** Provided meteorological and storm event occurrence and probability data.
- **Cal-Adapt:** Provides essential data and tools for climate adaptation planning, building resiliency, and fostering community engagement.
- **U.S. Drought Monitor:** Provided drought occurrence and intensity data.
- **California Geological Society:** Provided data about Siskiyou County's geology and seismology.
- **FEMA Map Service Center:** The official public source for flood hazard information in support of the NFIP.
- **United States Census Bureau:** Data concerning populations, socially vulnerable populations, and housing.
- **Cal OES:** LHMP planning guidance and technical support.
- **CAL FIRE FRAP:** CAL FIRE's Fire and Resource Assessment Program.
- **California State Geoportal:** Geospatial information used for hazard mapping and data analysis.

As needed, additional technical resources are noted in the relevant hazard section.

EXHIBIT C

Section 3 – Regional Profile and Development Trends

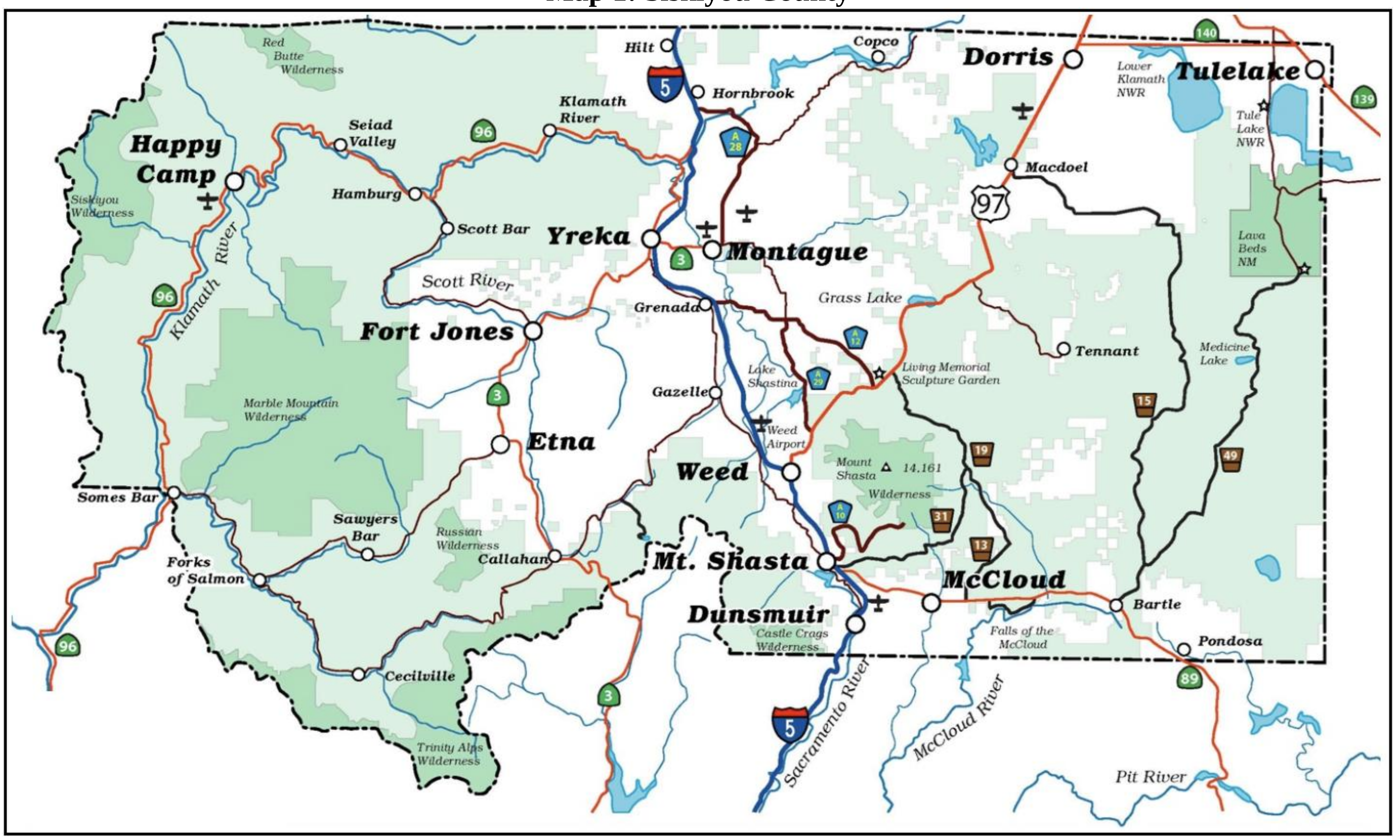
3.1 Introduction

Data concerning development trends and conditions is of great importance in determining regional and local risk and vulnerability to identified hazards, especially in locations which are susceptible to identified hazards. In general, any increase in population or development in hazard susceptible areas tends to increase both the risk and the vulnerability to that hazard. As such, the information presented in this chapter details relevant population and building statistics for Siskiyou County and participating jurisdictions. This data will then be used to determine and refine potential hazard vulnerability in succeeding sections.

3.2 County Map

The following map details the locations of Siskiyou County and participating jurisdictions:

Map 1: Siskiyou County



3.3 Population Data

The following table, and associated charts, present population data for Siskiyou County and participating jurisdictions:

Table 4: Siskiyou County Population Data

Jurisdiction	Population			Percentage Population Change 2000-2020	Total Land Area (Sq. Mi.)	Population Density
	2000	2010	2020			
Siskiyou County	44,301	44,690	43,516	-1.8%	6,347	7
Dorris	902	920	860	-4.7%	0.7	1,194
Dunsmuir	1,915	1,729	1,870	-2.3%	1.7	1,075
Etna	800	748	755	-5.6%	0.8	944
Fort Jones	660	520	578	-12.4%	0.6	963
Happy Camp CSD	-	-	1,879	-	12.3	153

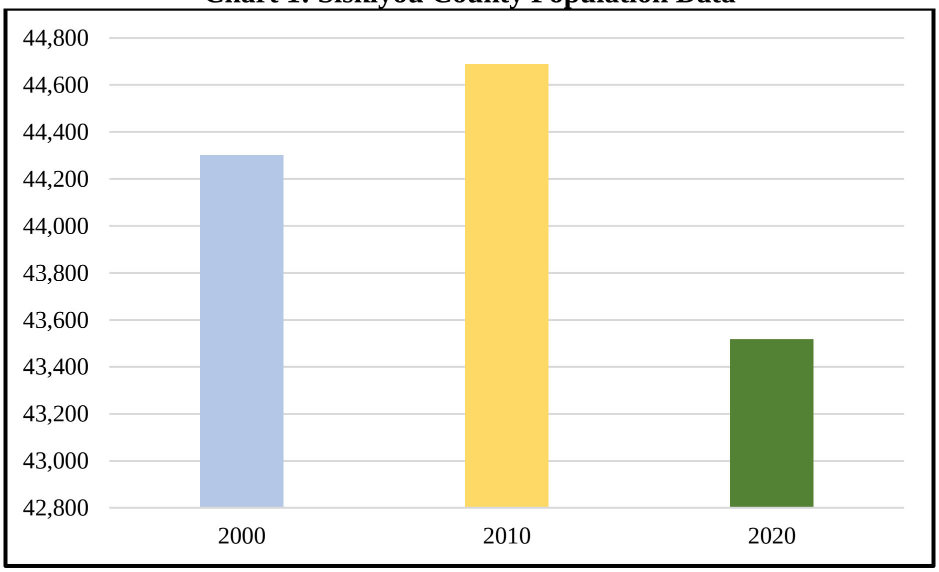
EXHIBIT C

Table 4: Siskiyou County Population Data

Jurisdiction	Population			Percentage Population Change 2000-2020	Total Land Area (Sq. Mi.)	Population Density
	2000	2010	2020			
Lake Shastina CSD	-	-	2,401	-	5.0	480
McCloud CSD	-	-	1,279	-	2.5	512
Montague	1,525	1,472	1,484	-2.7%	1.8	829
Mt. Shasta	3,566	3,480	3,250	-8.9%	3.8	862
Tulelake	1,009	1,005	839	-16.8%	0.4	2,208
Weed	2,970	2,981	2,662	-10.4%	4.8	556
Yreka	7,442	7,542	7,589	2.0%	10.1	751

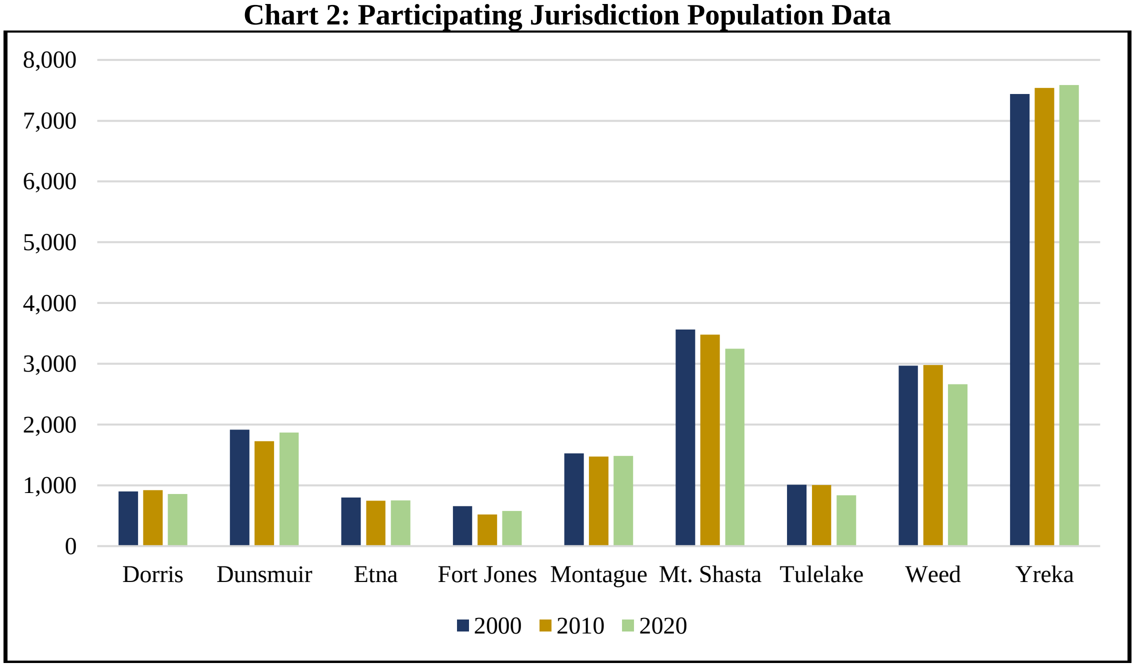
Source: US Census Bureau
-: Data unavailable

Chart 1: Siskiyou County Population Data



Source: US Census Bureau

Chart 2: Participating Jurisdiction Population Data



Source: US Census Bureau

EXHIBIT C

3.4 Socially Vulnerable and At-Risk Populations

As a subset of the population data, Siskiyou County has socially vulnerable and at-risk populations, populations that may have difficulty with medical issues, poverty, extremes in age, and communications due to language barriers. Several principles may be considered when discussing potentially at-risk populations, including:

- Not all people who are considered at risk are at risk
- Outward appearance does not necessarily mark a person as at risk
- The hazard event will, in many cases, affect at risk populations in differing ways

The National Response Framework defines at risk populations as "populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to maintaining independence, communication, transportation, supervision, and medical care."

***Public Comment:** I have concerns around evacuation planning, protecting vulnerable populations during hazardous events.*

Identifying socially vulnerable populations is a cornerstone of effective hazard mitigation planning because it helps ensure that all community members are protected. Socially vulnerable groups often face heightened challenges in preparing for, responding to, and recovering from disasters. By recognizing these populations, future mitigation efforts can design targeted interventions, such as accessible evacuation routes, culturally appropriate communication strategies, and prioritized resource distribution, to reduce risks and improve outcomes. Addressing social vulnerabilities also fosters equity, ensuring that no group bears a disproportionate share of a disaster's impacts.

The following tables presents information on potential at risk populations within Siskiyou County and participating jurisdictions using 2020 census data:

Table 5: Siskiyou County Socially Vulnerable and At-Risk Population Data

Jurisdiction	Population Age Five and Under	Population Age 75+	Population Speaking Language Other Than English	Population Living Below Poverty Level	Persons with a Disability, Under the Age of 65
Siskiyou County	2,232	10,983	4,134	7,354	4,226
Dorris	71	60	281	176	61
Dunsmuir	294	107	112	301	161
Etna	101	60	0	118	47
Fort Jones	25	40	21	135	26
Happy Camp CSD	63	201	218	395	417
Lake Shastina CSD	289	332	167	190	377
McCloud CSD	0	196	35	170	376
Montague	93	61	132	255	187
Mt. Shasta	78	426	130	598	206
Tulelake	123	66	450	351	40
Weed	80	282	256	870	451
Yreka	486	584	736	1,715	773

Source: US Census Bureau

Table 6: Siskiyou County Socially Vulnerable and At-Risk Populations as Percentage of Total Population

Jurisdiction	Percentage of Population Age Five and Under	Percentage of Population Age 75+	Percentage of Population Speaking Language Other Than English	Percentage of Population Living Below Poverty Level	Percentage of Persons with a Disability, Under the Age of 65
Siskiyou County	5.1%	25.2%	9.5%	16.9%	9.7%
Dorris	8.3%	7.0%	32.7%	20.5%	7.1%

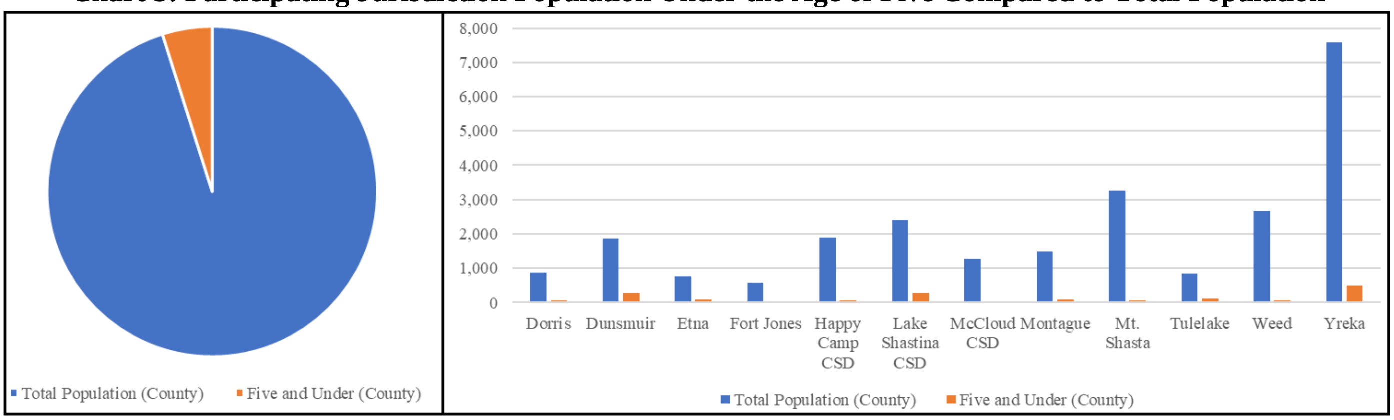
Table 6: Siskiyou County Socially Vulnerable and At-Risk Populations as Percentage of Total Population

Jurisdiction	Percentage of Population Age Five and Under	Percentage of Population Age 75+	Percentage of Population Speaking Language Other Than English	Percentage of Population Living Below Poverty Level	Percentage of Persons with a Disability, Under the Age of 65
Dunsmuir	15.7%	5.7%	6.0%	16.1%	8.6%
Etna	13.4%	7.9%	0.0%	15.6%	6.2%
Fort Jones	4.3%	6.9%	3.6%	23.4%	4.5%
Happy Camp CSD	3.4%	10.7%	11.6%	21.0%	22.2%
Lake Shastina CSD	12.0%	13.8%	6.9%	7.9%	15.7%
McCloud CSD	0.0%	15.3%	2.7%	13.3%	29.4%
Montague	6.3%	4.1%	8.9%	17.2%	12.6%
Mt. Shasta	2.4%	13.1%	4.0%	18.4%	6.3%
Tulelake	14.7%	7.9%	53.6%	41.8%	4.8%
Weed	3.0%	10.6%	9.6%	32.7%	16.9%
Yreka	6.4%	7.7%	9.7%	22.6%	10.2%

Source: US Census Bureau
-: Data unavailable

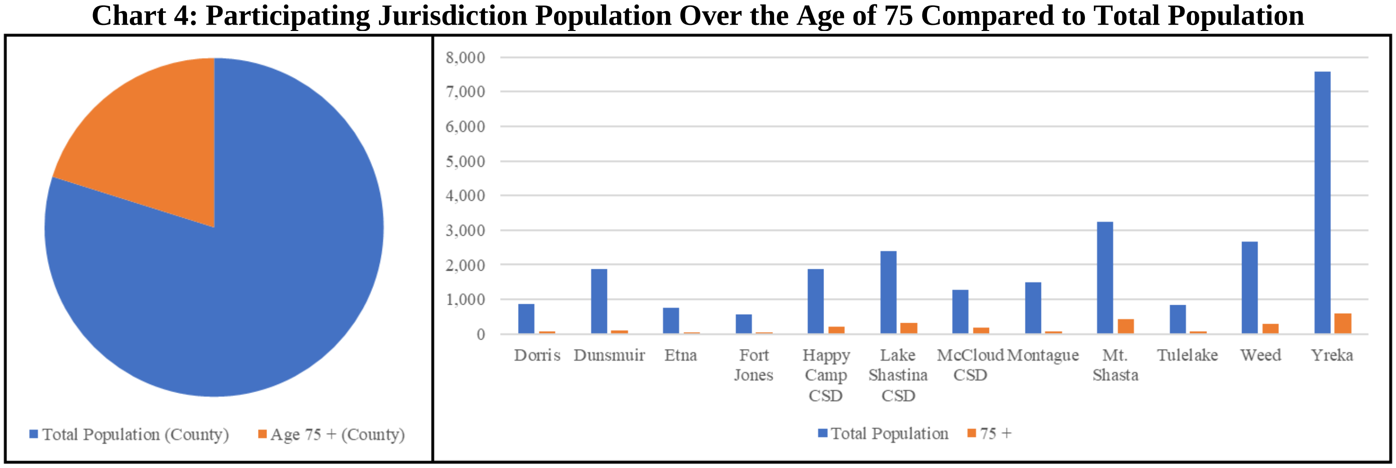
The following charts, developed using Census data, illustrate potentially at-risk populations within Siskiyou County.

Chart 3: Participating Jurisdiction Population Under the Age of Five Compared to Total Population



Source: U.S. Census Bureau

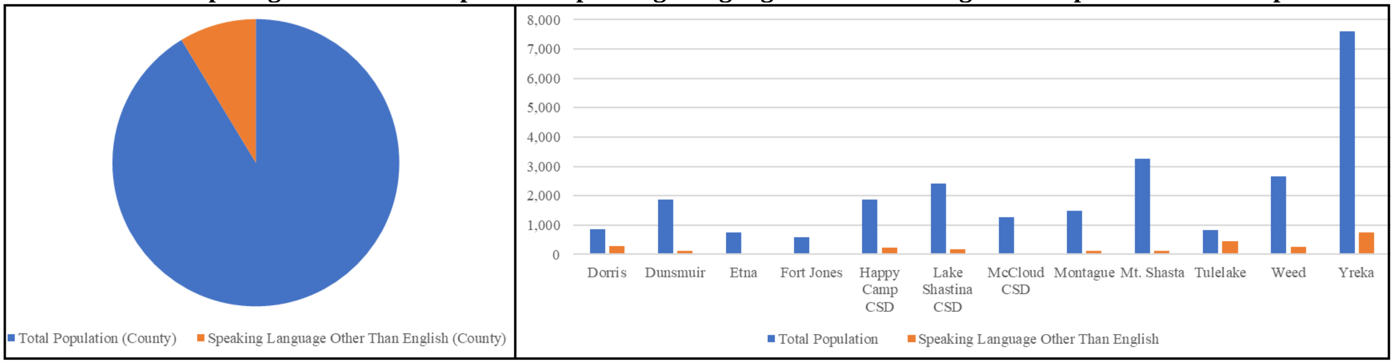
Chart 4: Participating Jurisdiction Population Over the Age of 75 Compared to Total Population



Source: U.S. Census Bureau

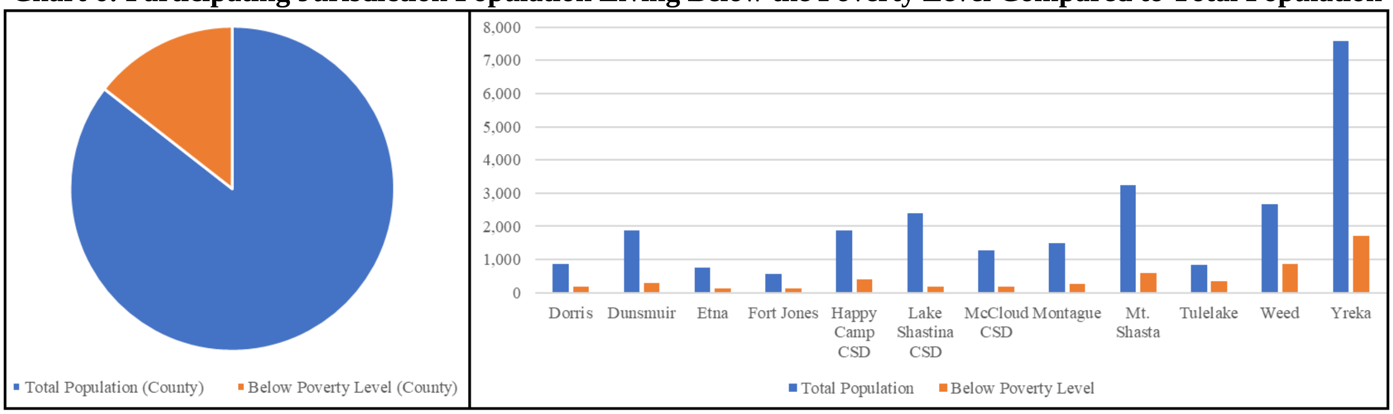
EXHIBIT C

Chart 5: Participating Jurisdiction Population Speaking Language Other than English Compared to Total Population



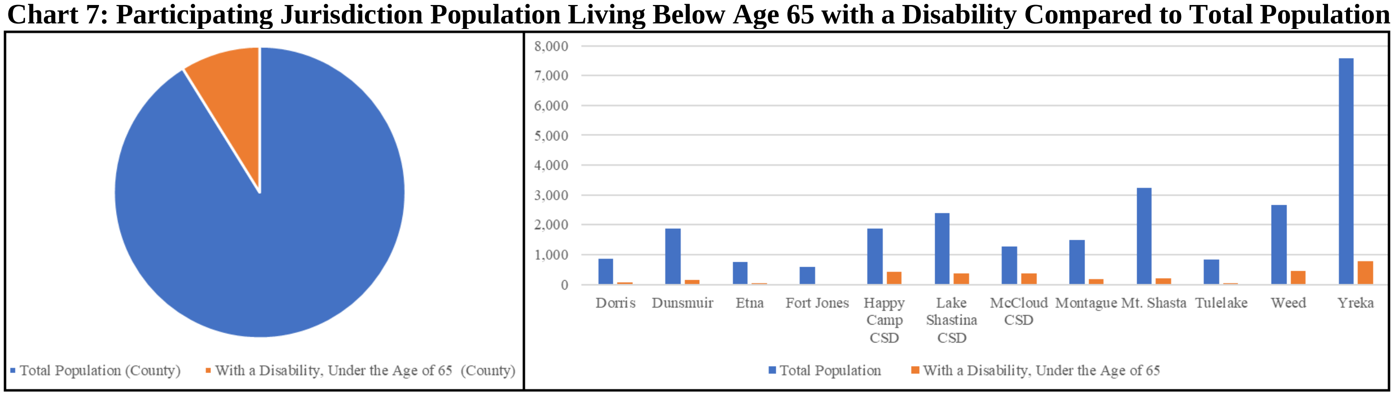
Source: U.S. Census Bureau

Chart 6: Participating Jurisdiction Population Living Below the Poverty Level Compared to Total Population



Source: U.S. Census Bureau

Chart 7: Participating Jurisdiction Population Living Below Age 65 with a Disability Compared to Total Population

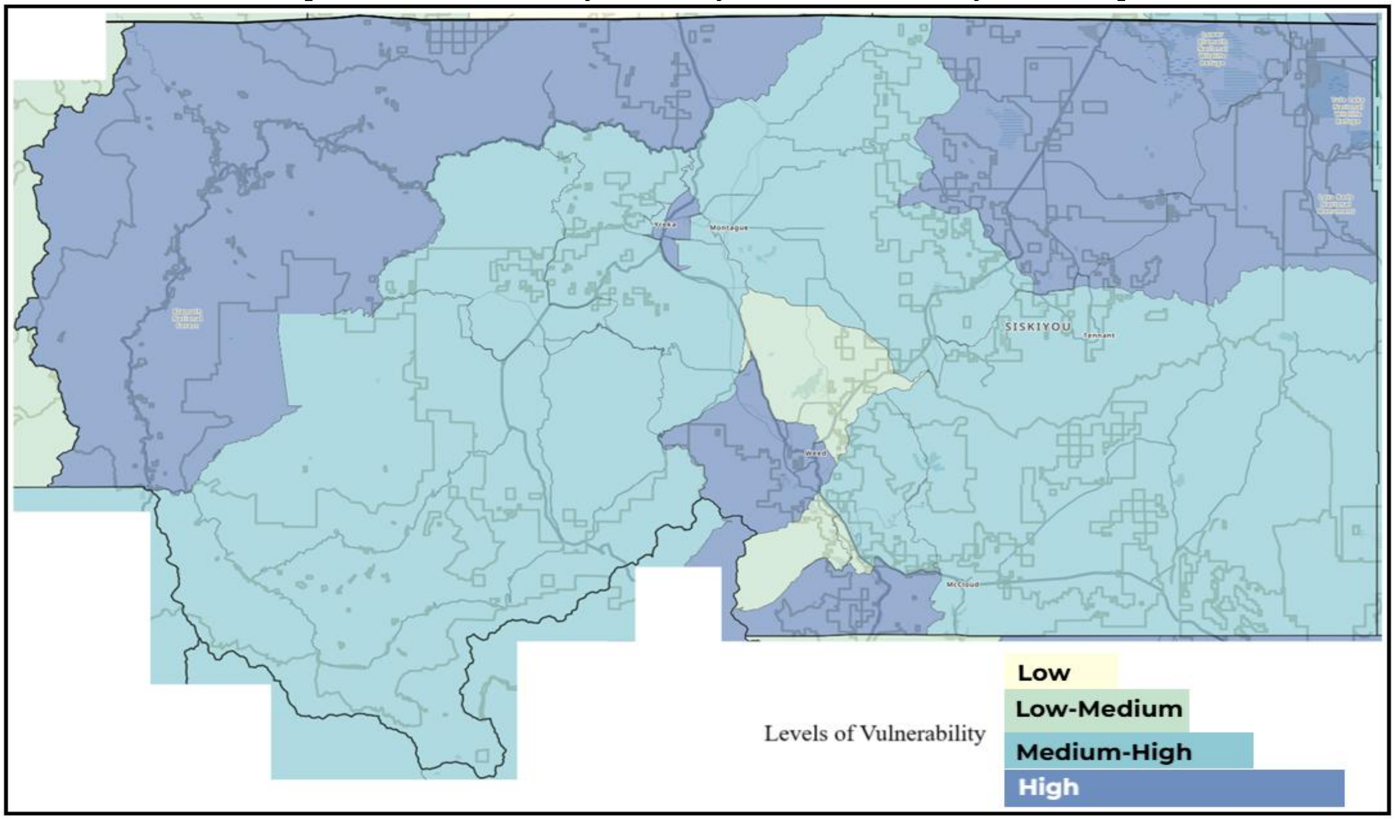


Source: U.S. Census Bureau

The Centers for Disease Control's Social Vulnerability Index Map shows the relative social vulnerability of communities based on factors such as socioeconomic status, household composition, disability, minority status, language, housing type, and transportation access. This map highlights areas where populations may have increased difficulty preparing for, responding to, and recovering from the impacts of hazard events. The following map helps identify vulnerable populations that may require additional resources and targeted support during mitigation planning and response efforts. By integrating this data, participating jurisdictions can prioritize investments, tailor outreach strategies, and ensure equitable distribution of resources to reduce disaster impacts on those most at risk.

EXHIBIT C

Map 2: FEMA CDC Siskiyou County Social Vulnerability Index Map



Source: CDC

Concerning potentially vulnerable populations, Planning and Service Area 2 Agency on Aging has identified the following that would help both the elderly, and those working with the elderly, mitigate impacts from hazard events:

- Enhanced emergency preparedness and response planning, including hazard specific drill, needs recognition, and communication protocols.
- Upgrading facility infrastructure for resilience through both structural reinforcement and flood and fire prevention upgrades.
- Hazard education tailored for seniors through workshops, customized education materials, and accessible education materials.
- Climate adaptation measures for heat and cold exposure, including temperature-controlled shelters and health monitoring.

A Community Disaster Resilience Zone is a designated area that has been identified as particularly vulnerable to natural disasters and other hazards. The goal of establishing such zones is to focus resources, planning efforts, and mitigation strategies on areas that need the most support to improve their resilience to disasters. These zones are typically selected based on factors such as the frequency and severity of past disasters, the level of community vulnerability, and the potential impact of future events. Communities designated as Community Disaster Resilience Zone can receive increased financial and technical assistance to plan and implement resilience projects. For example, they are eligible for Building Resilient Infrastructure and Communities grant funds at an increased federal cost share of up to 90%, relative to the baseline of up to 75%. As of this plan, no communities within Siskiyou County have received this designation.

3.5 Regional Population Migration

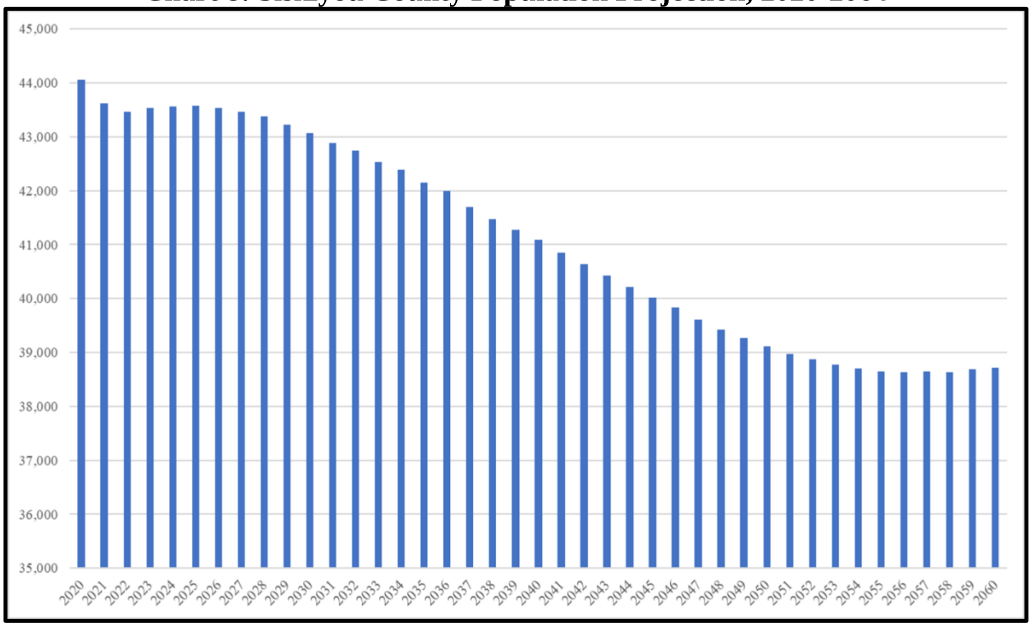
Siskiyou County is experiencing consistent population decline as people increasingly migrate from rural areas to urban centers. This transformation reflects broader demographic trends witnessed across the United States. Demographic research indicates that this migration is occurring due to the following factors:

EXHIBIT C

- **Economic Opportunity:** A primary driver of the population movement from rural to urban areas is the quest for better economic prospects. Urban centers such as Sacramento offer a diverse range of employment opportunities in sectors like manufacturing, healthcare, finance, and technology. These opportunities often come with higher wages and better access to educational and healthcare facilities compared to rural areas.
- **Access to Education and Training:** Urban centers are often home to educational institutions, including colleges, universities, and vocational schools. Young people from rural areas often migrate to these urban settings to pursue higher education and vocational training.

The rural-to-urban population movement has significant implications for Siskiyou County. Communities may experience declining populations, school closures, and reduced economic activity. The following chart, using data from the State of California Department of Finance Population Projects publication, indicates a decreasing population for Siskiyou County through 2060.

Chart 8: Siskiyou County Population Projection, 2020-2064



Source: State of California Department of Finance

3.6 Housing Data

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. The following table and associated chart, using data from the U.S. Census, present occupied housing unit information for Siskiyou County.

Table 7: Siskiyou County Housing Data

Jurisdiction	2000		2010		2020		2000 - 2020	
	Total	Occupied	Total	Occupied	Total	Occupied	Numeric Change, Total Units	Percent Change, Total Units
Siskiyou County	21,947	18,556	23,910	19,505	22,929	19,219	982	4.5%
Dorris	411	355	414	364	365	318	-46	-11.2%
Dunsmuir	1,168	856	1,110	763	1,091	798	-77	-6.6%
Etna	367	337	359	323	355	315	-12	-3.3%
Fort Jones	338	318	344	304	330	302	-8	-2.4%
Happy Camp CSD	-	-	-	-	1,083	830	-	-
Lake Shastina CSD	-	-	-	-	1,264	1,063	-	-

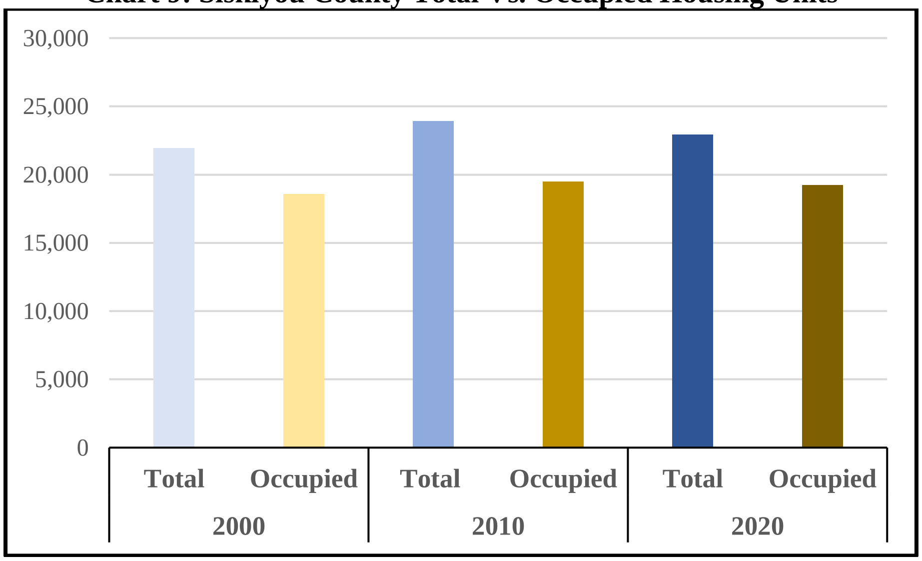
EXHIBIT C

Table 7: Siskiyou County Housing Data

Jurisdiction	2000		2010		2020		2000 - 2020	
	Total	Occupied	Total	Occupied	Total	Occupied	Numeric Change, Total Units	Percent Change, Total Units
McCloud CSD	-	-	-	-	1,103	667	-	-
Montague	613	575	633	576	569	518	-44	-7.2%
Mt. Shasta	1,827	1,672	1,895	1,664	1,906	1,662	79	4.3%
Tulelake	453	352	437	347	361	283	-92	-20.3%
Weed	1,283	1,172	1,299	1,273	1,281	1,131	-2	-0.2%
Yreka	3,321	3,113	3,675	3,394	3,668	3,368	347	10.4%

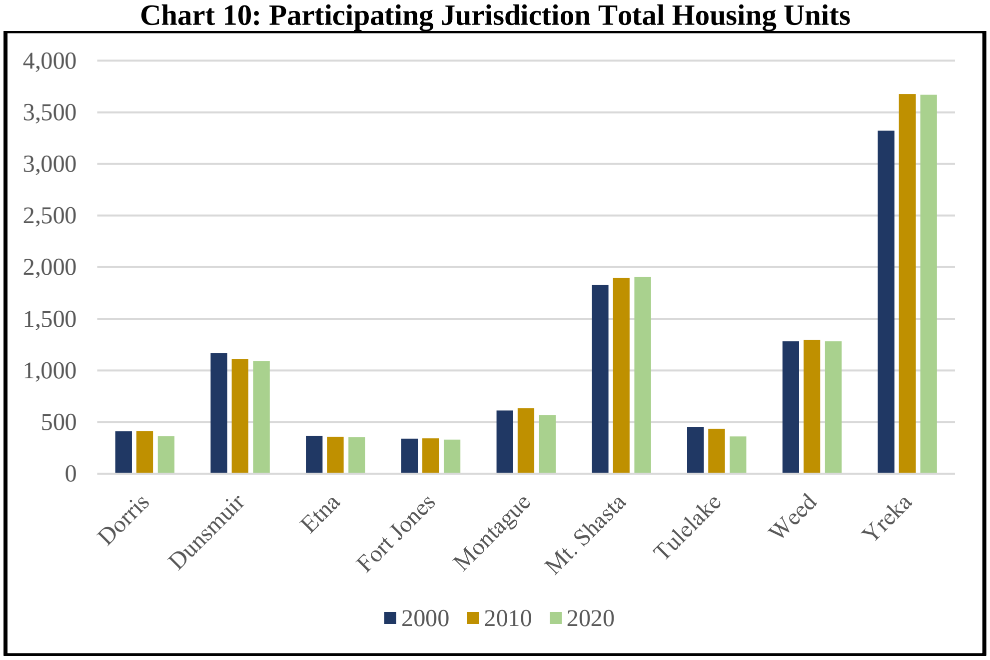
Source: US Census Bureau
-: Data unavailable

Chart 9: Siskiyou County Total Vs. Occupied Housing Units



Source: US Census Bureau

Chart 10: Participating Jurisdiction Total Housing Units



Source: US Census Bureau

EXHIBIT C

Of particular concern when considering housing data is mobile home residences. Data from the NOAA National Severe Storms Laboratory reports that people living in mobile homes are especially at risk for injury and death as even anchored mobile homes can be seriously damaged when winds gust over 80 miles per hour. Additionally, study data from Michigan State University reported that the two biggest factors related to wind event fatalities were housing quality (measured by mobile homes as a proportion of housing units) and income level. When a tornadic wind strikes, a county with double the number of mobile homes as a proportion of all homes will experience 62% more fatalities than a county with fewer mobile homes, according to the study data. The following indicates the percentage of mobile homes for each Siskiyou County participating jurisdiction:

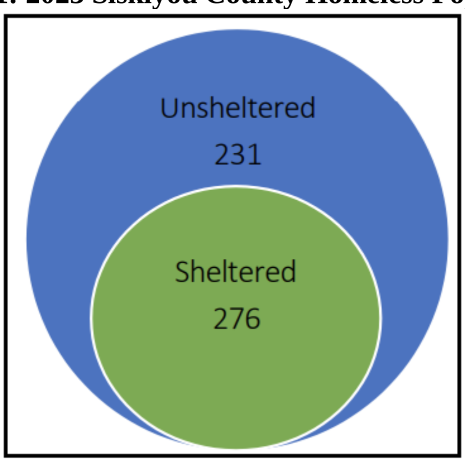
Table 8: Siskiyou County Mobile Home Data

Jurisdiction	2000		2010		2020		2000 - 2020	
	Total	Percentage of Total Housing Units	Total	Percentage of Total Housing Units	Total	Percentage of Total Housing Units	Numeric Change	Percentage of Housing Unit Change
Siskiyou County	2,892	13.2%	3,443	14.4%	2,218	9.7%	-674	-3.9%
Dorris	52	12.7%	99	24.0%	39	10.7%	-13	-2.0%
Dunsmuir	24	2.1%	18	1.6%	8	0.7%	-16	-1.4%
Etna	37	10.1%	36	10.1%	24	6.8%	-13	-3.3%
Fort Jones	48	14.2%	52	15.0%	46	13.9%	-2	-0.3%
Happy Camp CSD	-	-	-	-	-	-	-	-
Lake Shastina CSD	-	-	-	-	-	-	-	-
McCloud CSD	-	-	-	-	-	-	-	-
Montague	77	12.6%	77	12.1%	38	6.7%	-39	-5.9%
Mt. Shasta	39	2.1%	34	1.8%	12	0.6%	-27	-1.5%
Tulelake	50	11.0%	21	4.9%	9	2.5%	-41	-8.5%
Weed	49	3.8%	40	3.1%	44	3.4%	-5	-0.4%
Yreka	211	6.4%	125	3.4%	188	5.1%	-23	-0.7%

Source: US Census Bureau
-: Data unavailable

The 2023 NorCal Continuum of Care Siskiyou County, Homelessness, Point-in-Time Count indicates that Siskiyou County has 507 homeless people:

Chart 11: 2023 Siskiyou County Homeless Population



Source: 2023 NorCal Continuum of Care Point in Time Report

As indicated by the following table, the number of homeless people in the county has increased by 112% from 2019 to 2023:

EXHIBIT C

Table 9: Siskiyou County Homeless Population, 2019 - 2023

Sheltering Status	2019	2023	Change, 2019 – 2023
Sheltered	47	231	392%
Unsheltered	192	276	44%
Total	239	507	112%

Source: NorCal Continuum of Care, Point-in Time Reports, 2022

3.7 Valuation Data

FEMA's Hazus is a nationally standardized risk modeling methodology that uses GIS-based data to identify areas with high risk for natural hazards. Hazus also details the valuation of all buildings within a county. Hazus estimates that:

- There are 25,608 building in the county
- These building have an aggregate total replacement value of $11,613,000,000
- 59.0% of these building are residential in nature
- 17.1% of these buildings are commercial in nature
- 13.2% of these buildings are industrial in nature

The Siskiyou County Assessor's Office was contacted to determine if a valuation of properties was available for participating jurisdictions. It was determined that, due to the reporting format of available data, determining valuations for each jurisdiction was not feasible. As such, data on building valuation for participating jurisdictions was sourced from the FEMA NRI by Census tract, presented in the following table:

Table 5: Participating Jurisdiction Building Valuation

Jurisdiction	Census Tract	Building Valuation
Dorris	06093000200	$545,174,609
Dunsmuir	06093001100	$570,579,766
Etna	06093000800	$836,879,852
Fort Jones	06093000600	$450,242,973
Happy Camp CSD	06093001300	$787,608,233
Lake Shastina CSD	06093000902	$606,046,811
McCloud CSD	06093001200	$551,904,846
Montague	06093000300	$998,151,764
Mt. Shasta	06093001003	$1,238,867,583
Tulelake	06093000100	$408,977,078
Weed	06093000901	$1,222,583,958
Yreka	06093000703	$603,767,687

Source: FEMA NRI

3.8 School District Data

Children are among the most vulnerable populations during disasters, requiring special consideration in preparedness and response efforts. A community with high school enrollment typically has a significant portion of its population dependent on schools for safety, education, and emergency support during crises. Additionally, disruptions to education during disasters can have long-term impacts on children's well-being and development. Communities with higher school enrollment may face increased challenges in ensuring the safety and continuity of education during hazard events, making it essential to prioritize schools in mitigation planning and resource allocation.

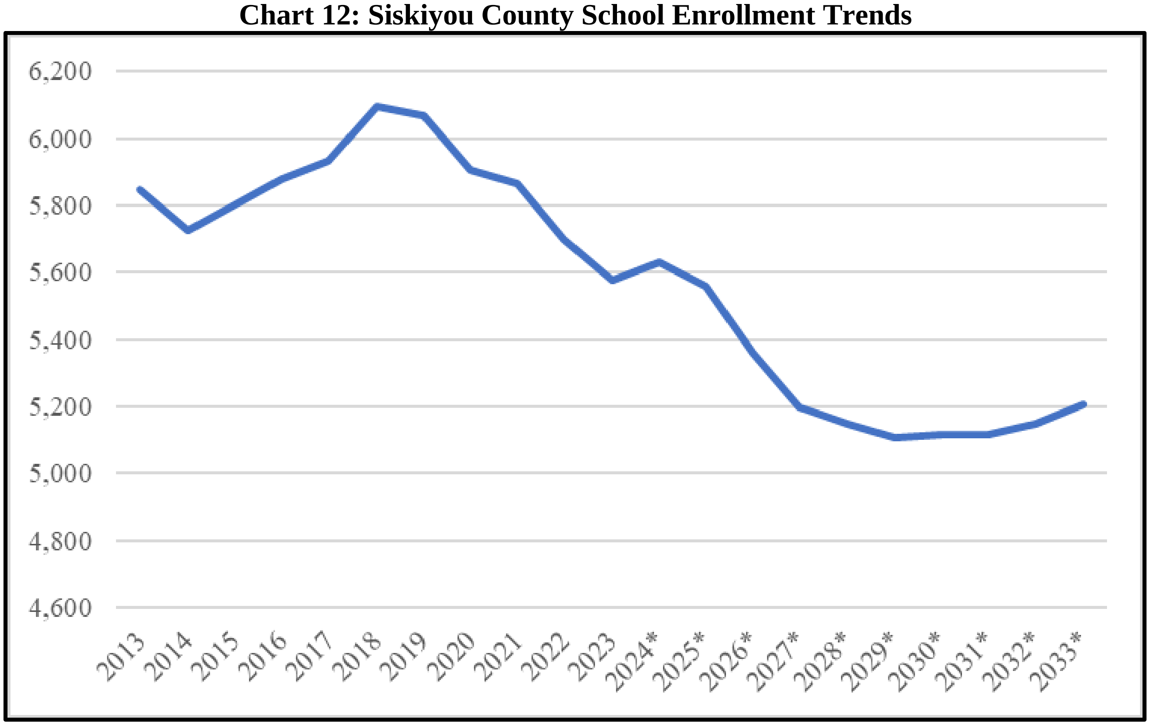
The following table presents school enrollment information from the California Department of Finance for school years 2013 through 2033:

Table 10: Siskiyou County School Enrollment Information

Year	Enrollment
2013	5,847
2014	5,727
2015	5,804
2016	5,879
2017	5,933
2018	6,096
2019	6,066
2020	5,905
2021	5,865
2022	5,697
2023	5,578
2024 (projected)	5,630
2025 (projected)	5,556
2026 (projected)	5,358
2027 (projected)	5,198
2028 (projected)	5,148
2029 (projected)	5,109
2030 (projected)	5,115
2031 (projected)	5,114
2032 (projected)	5,146
2033 (projected)	5,204

Source: California Department of Finance

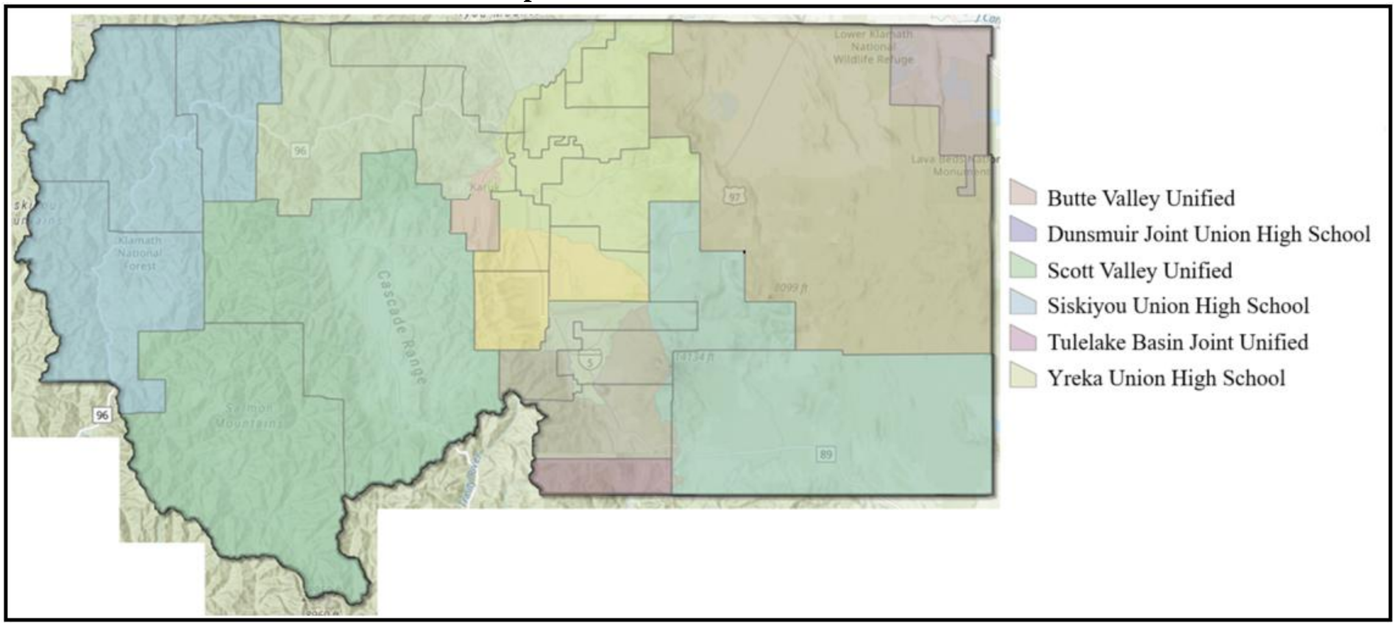
Chart 12: Siskiyou County School Enrollment Trends



Source: California Department of Finance
Note: * indicates projected data

The following map details school district boundaries within Siskiyou County:

Map 3: School District Boundaries



Source: Siskiyou County GIS

3.9 Critical Facilities and Infrastructure

Critical facilities have a net positive value on the community as they contribute to the public good by facilitating the basic functions of society. These locations help maintain order, public health, education, and help the economy function. Additionally, components are integral to disaster response and recovery operations. The following is a list of considered critical facilities for this LHMP:

- Communication facilities
- Fire facilities
- Government facilities
- Law enforcement facilities
- Medical facilities
- Schools

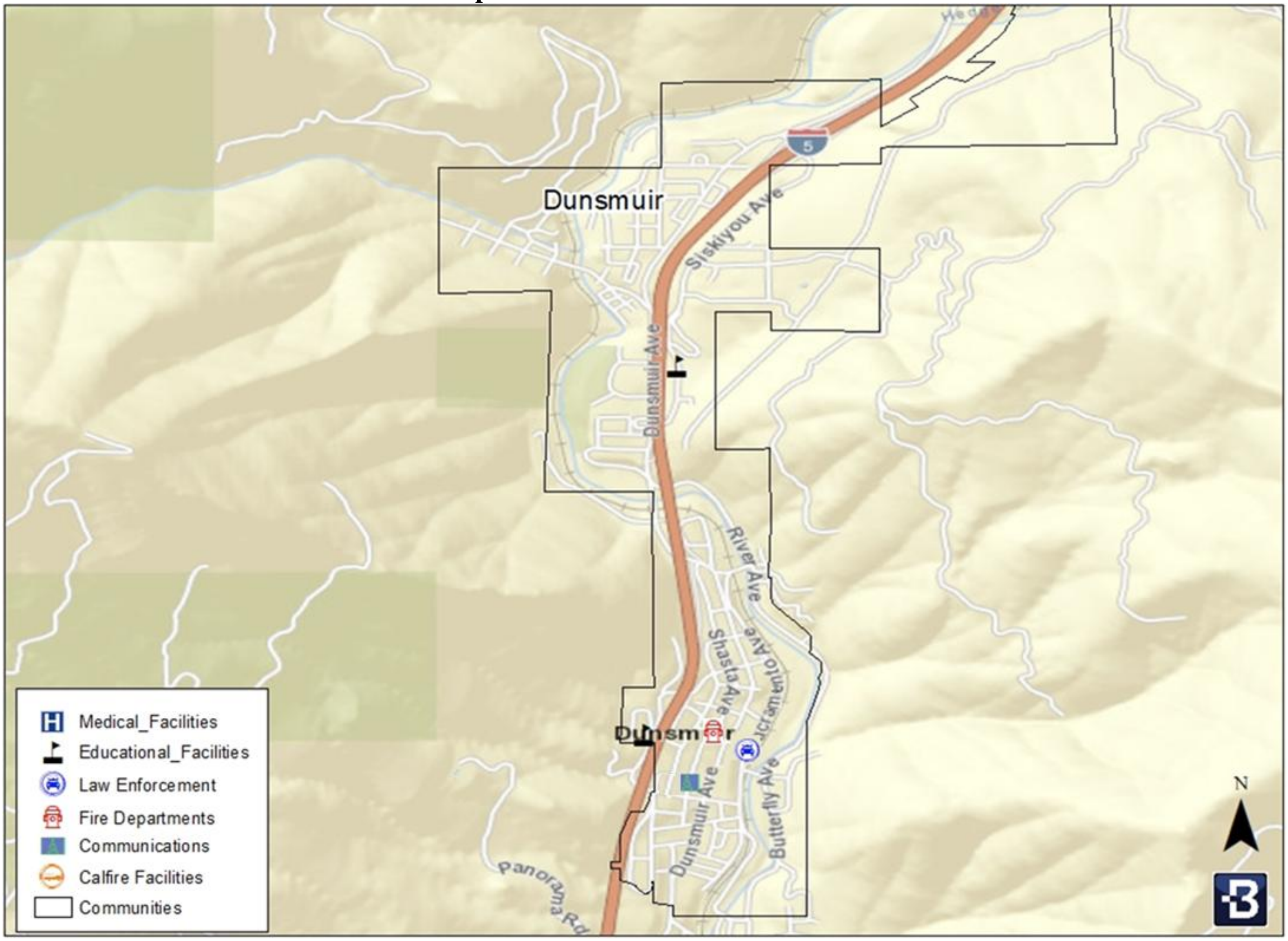
The following maps break down critical facility locations by jurisdiction:

Map 4: Dorris Critical Facilities

Source: Siskiyou County and BOLDplanning

EXHIBIT C

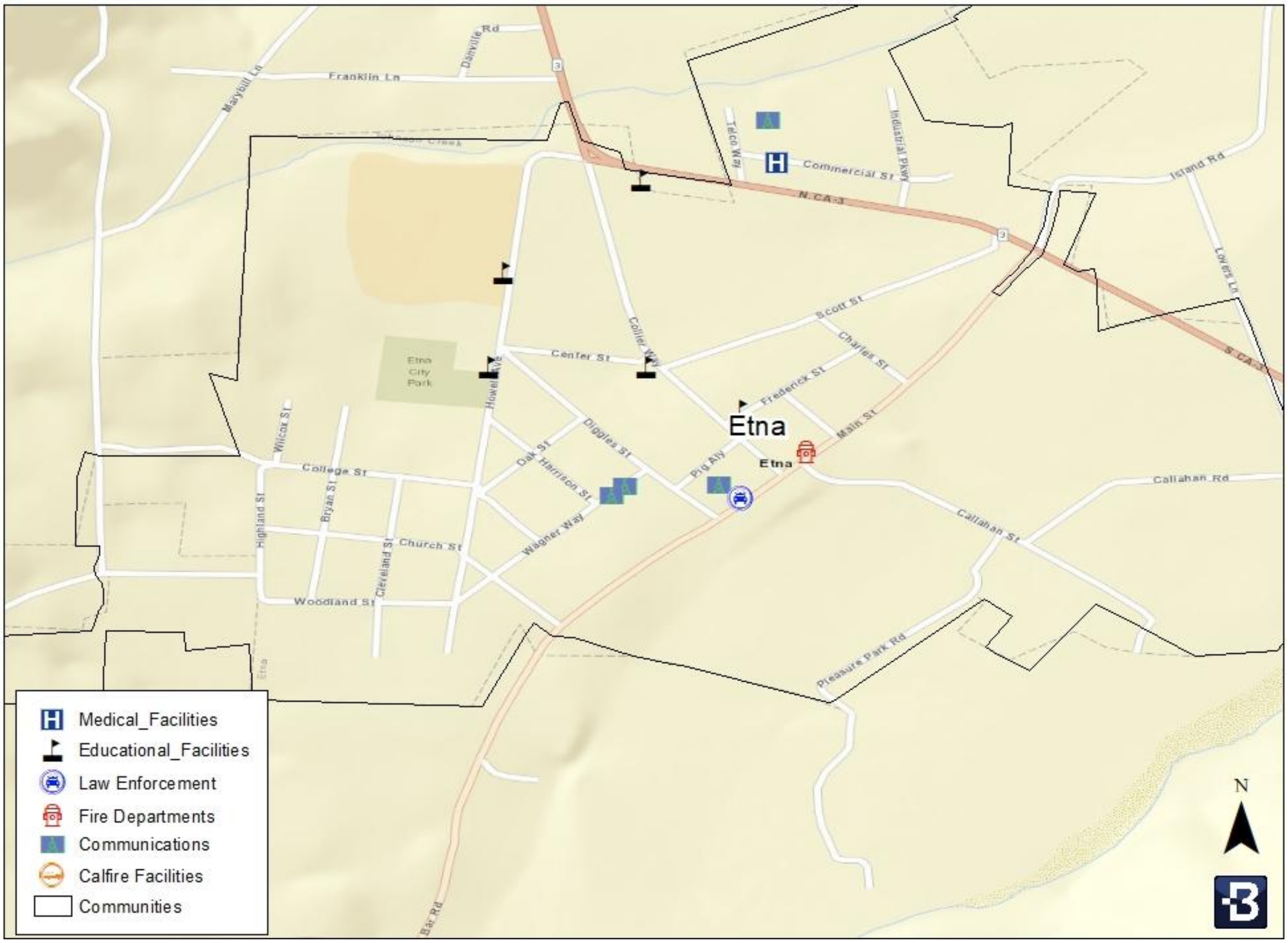
Map 5: Dunsmuir Critical Facilities



Source: Siskiyou County and BOLDplanning

EXHIBIT C

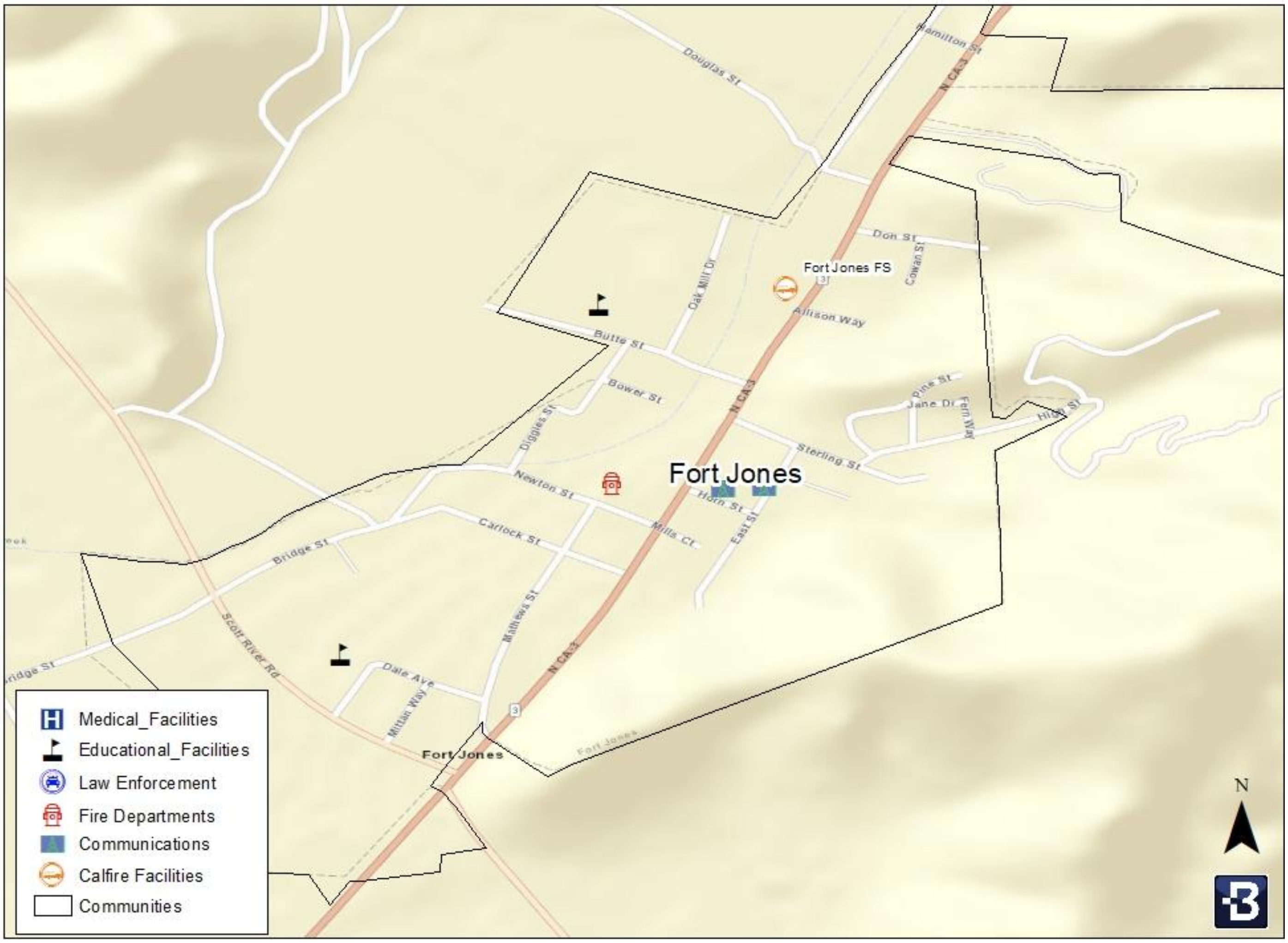
Map 6: Etna Critical Facilities



Source: Siskiyou County and BOLDplanning

EXHIBIT C

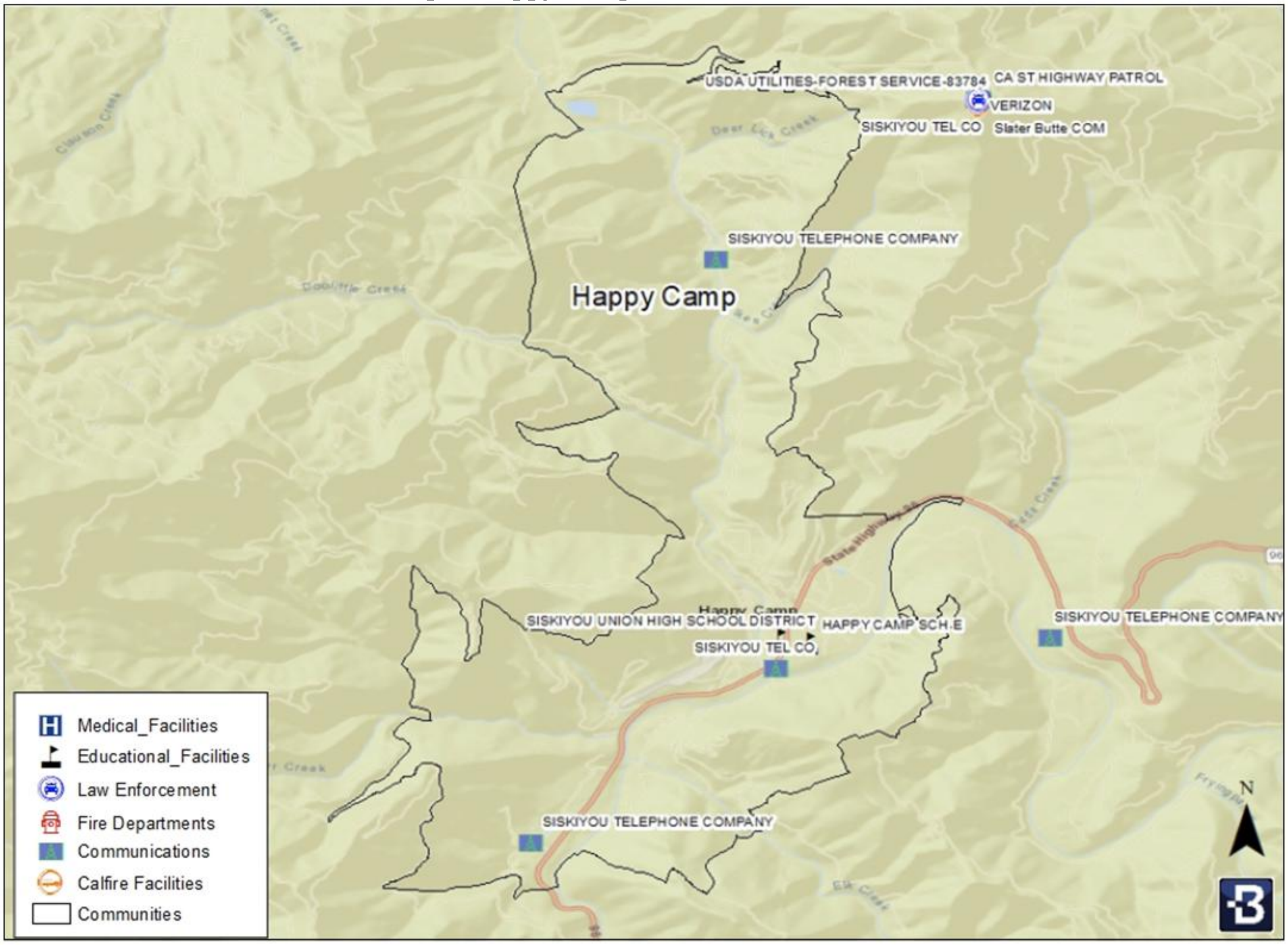
Map 7: Fort Jones Critical Facilities



Source: Siskiyou County and BOLDplanning

EXHIBIT C

Map 8: Happy Camp CSD Critical Facilities



Source: Siskiyou County and BOLDplanning

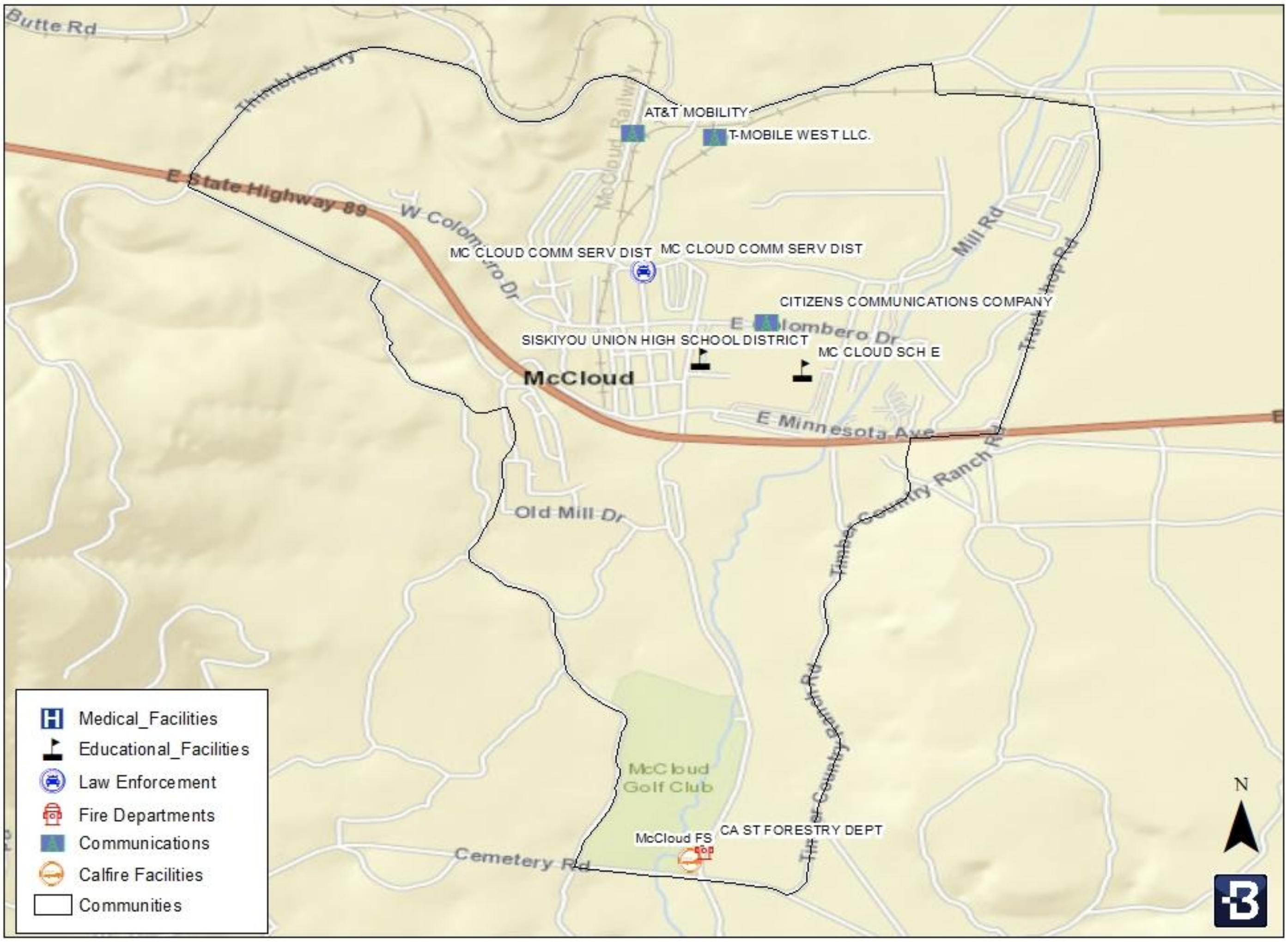
EXHIBIT C

Map 9: Lake Shastina CSD Critical Facilities

Source: Siskiyou County and BOLDplanning

EXHIBIT C

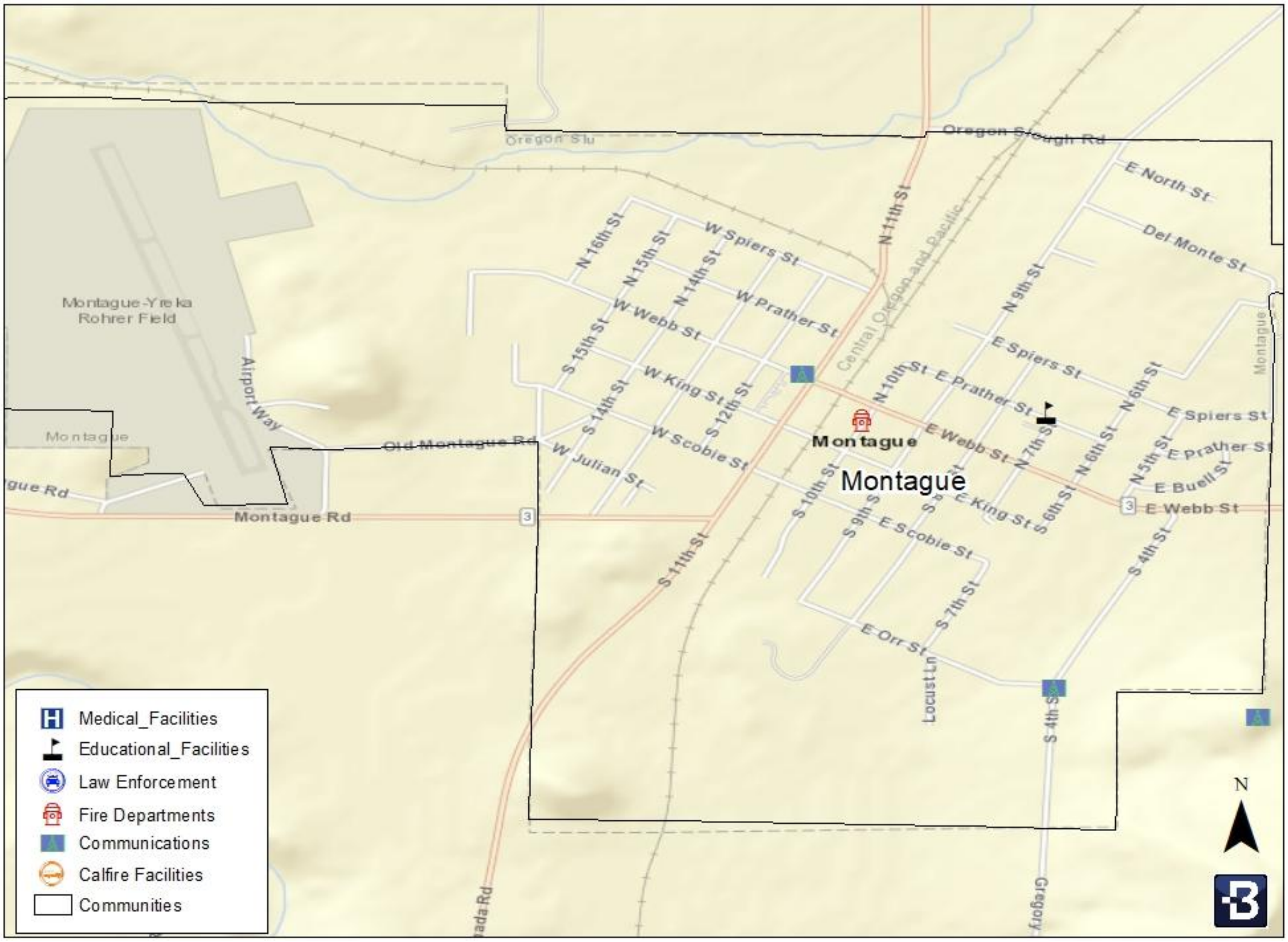
Map 10: McCloud CSD Critical Facilities



Source: Siskiyou County and BOLDplanning

EXHIBIT C

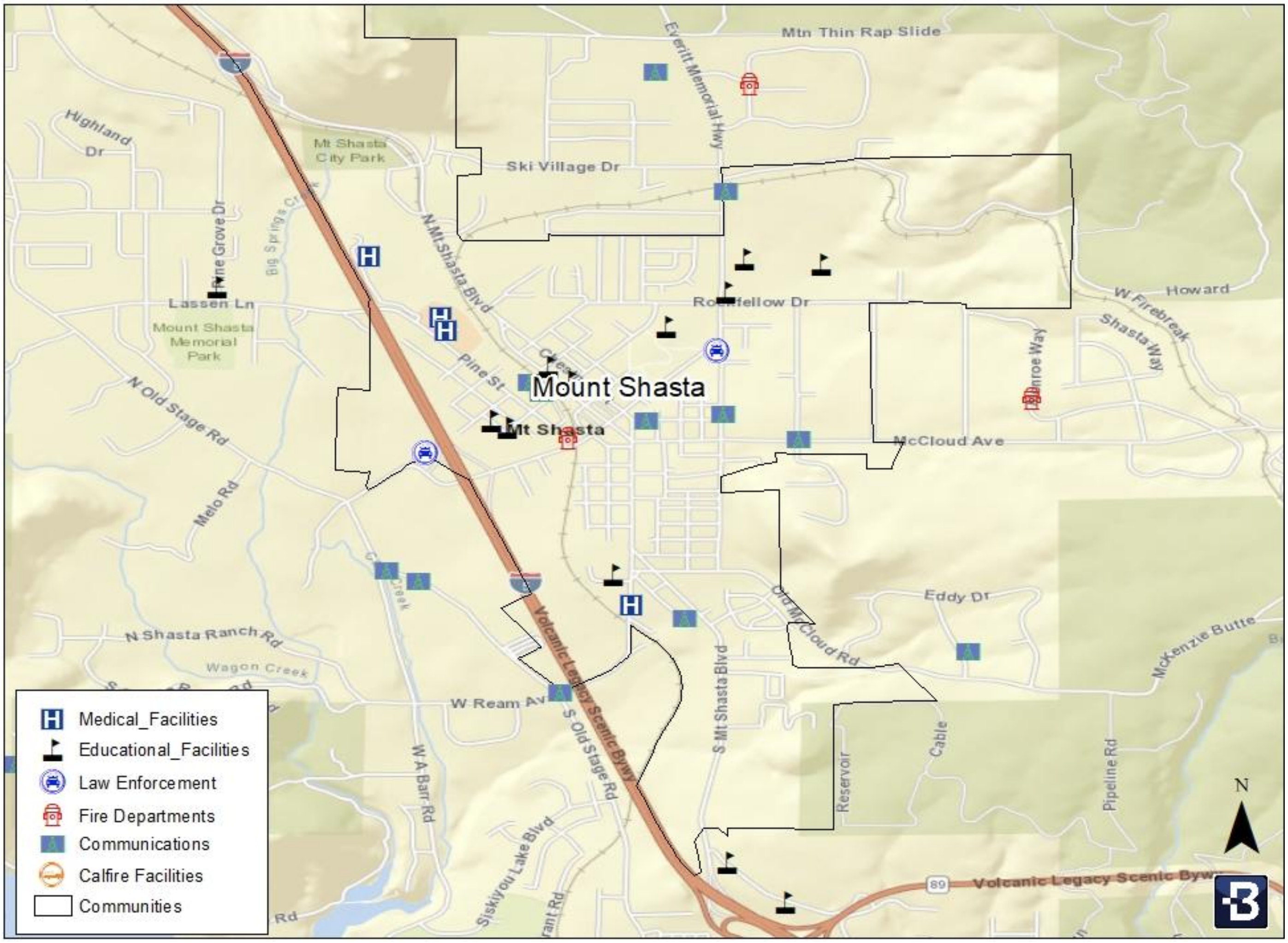
Map 11: Montague Critical Facilities



Source: Siskiyou County and BOLDplanning

EXHIBIT C

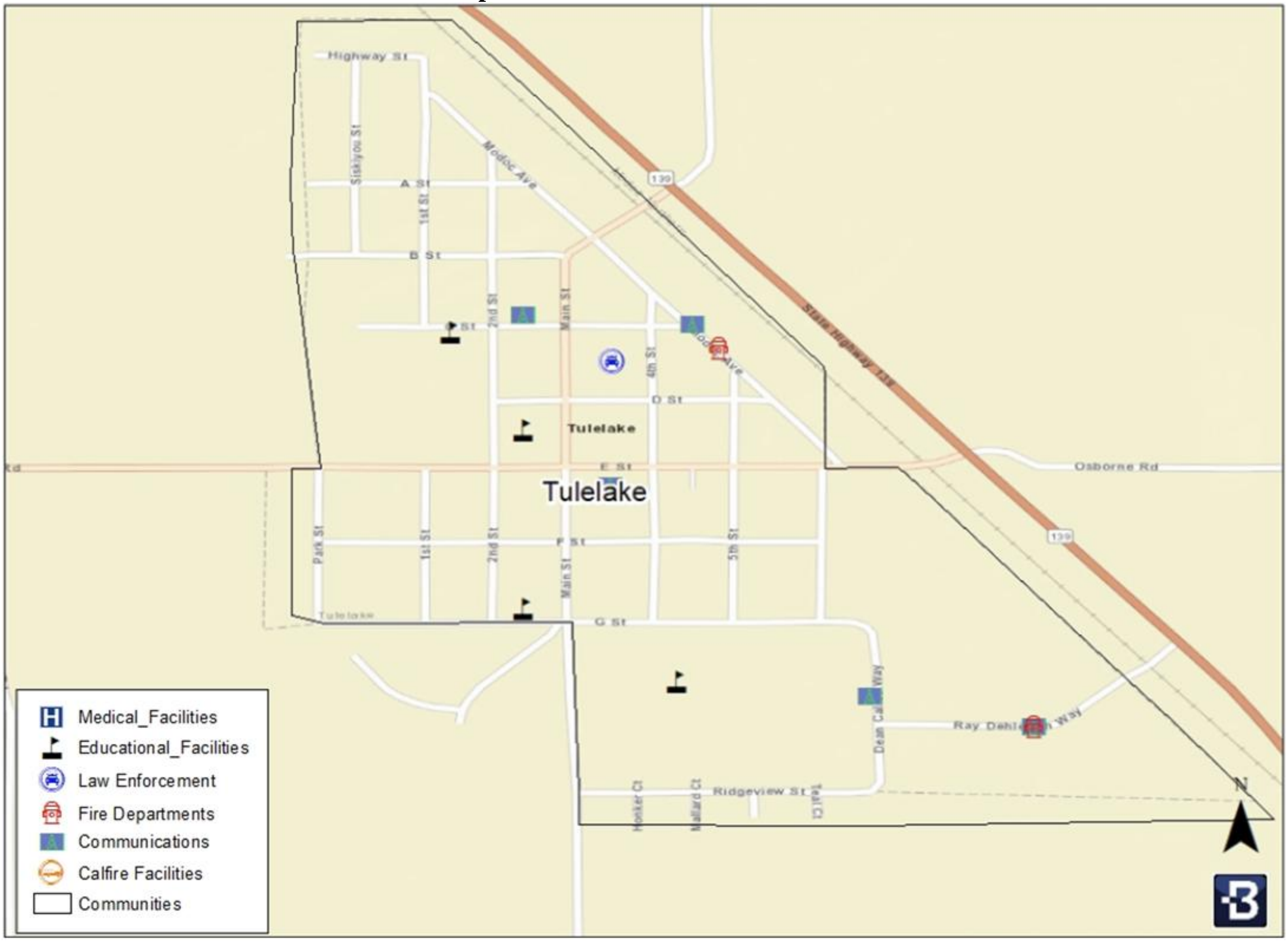
Map 12: Mount Shasta Critical Facilities



Source: Siskiyou County and BOLDplanning

EXHIBIT C

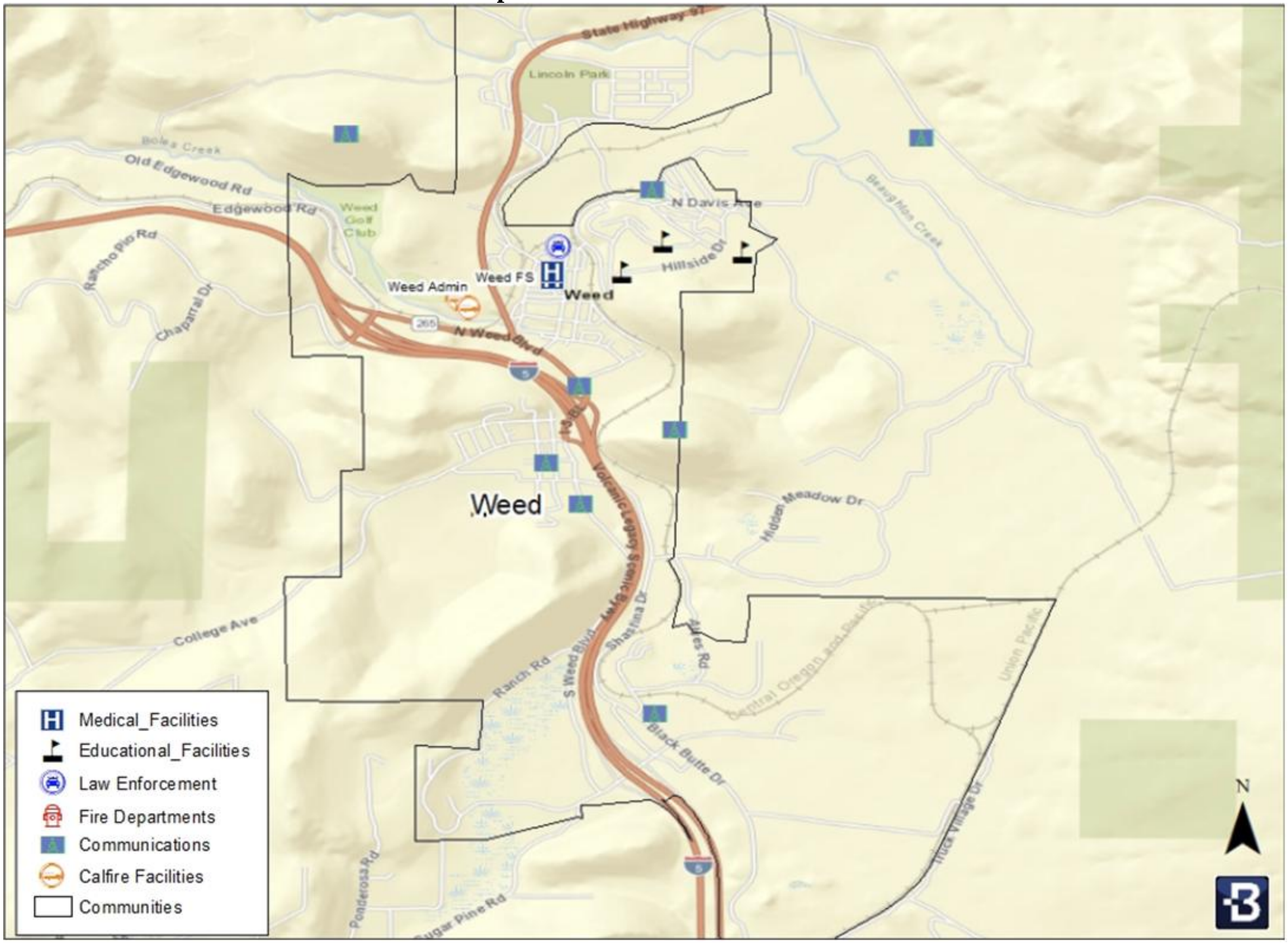
Map 13: Tulelake Critical Facilities



Source: Siskiyou County and BOLDplanning

EXHIBIT C

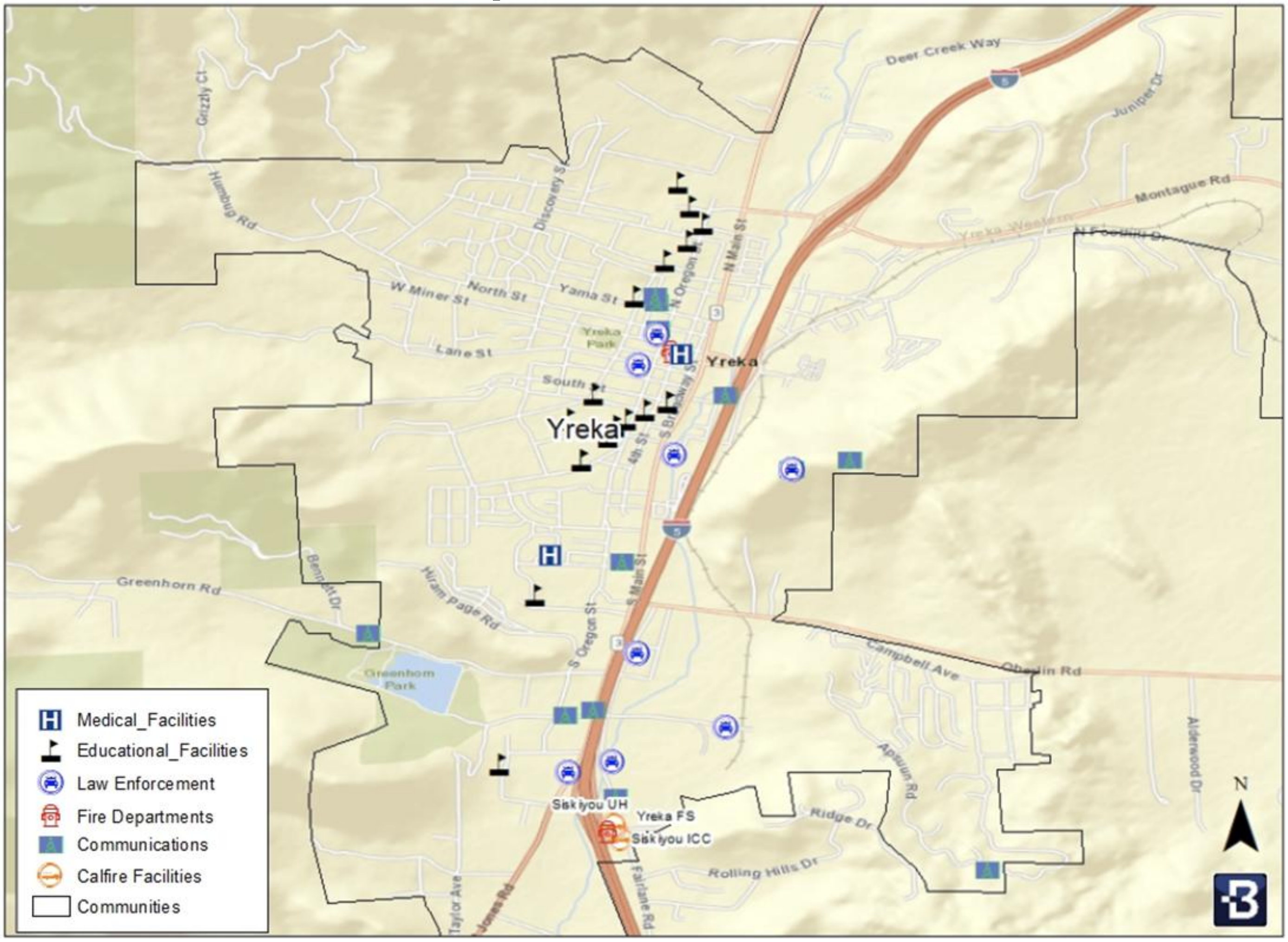
Map 14: Weed Critical Facilities



Source: Siskiyou County and BOLDplanning

EXHIBIT C

Map 15: Yreka Critical Facilities

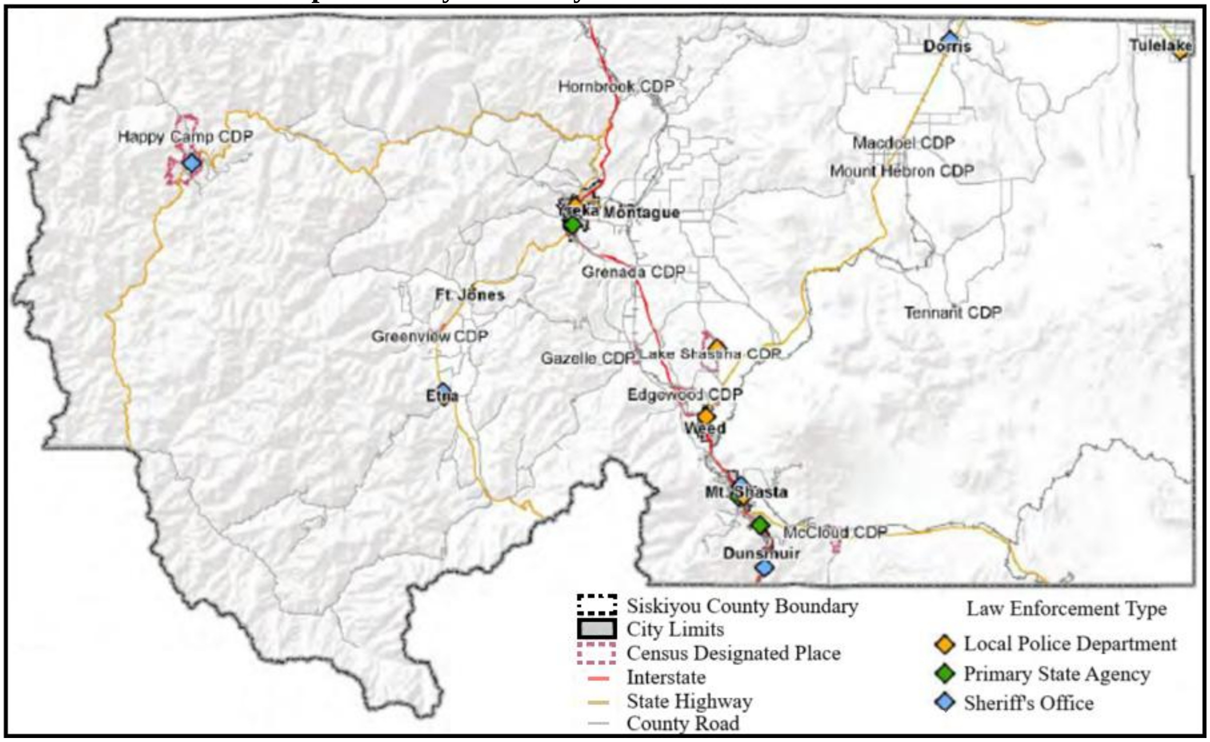


Source: Siskiyou County and BOLDplanning

Along with local police stations in Mt. Shasta, Tulelake, Weed, and Yreka, the Siskiyou County Sheriff's Department has five patrol stations throughout the county. The following maps detail the locations of the facilities, and the radius of coverage:

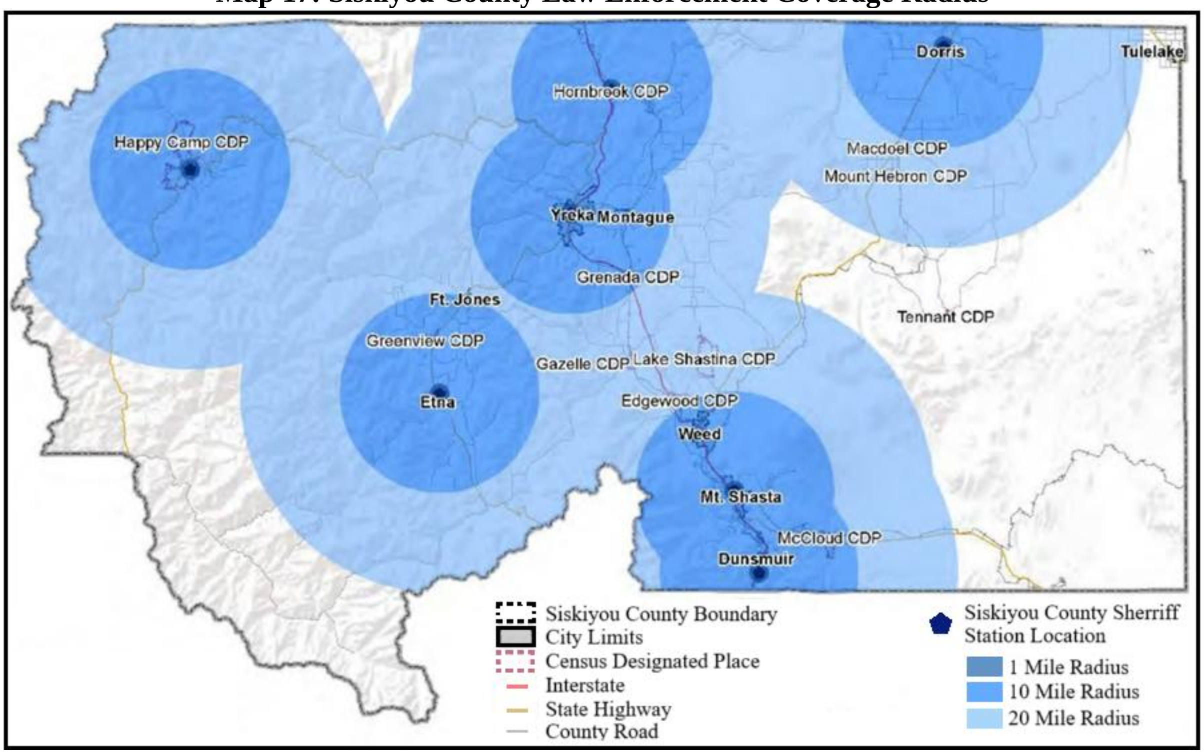
EXHIBIT C

Map 16: Siskiyou County Law Enforcement Facilities



Source: Siskiyou County General Plan

Map 17: Siskiyou County Law Enforcement Coverage Radius

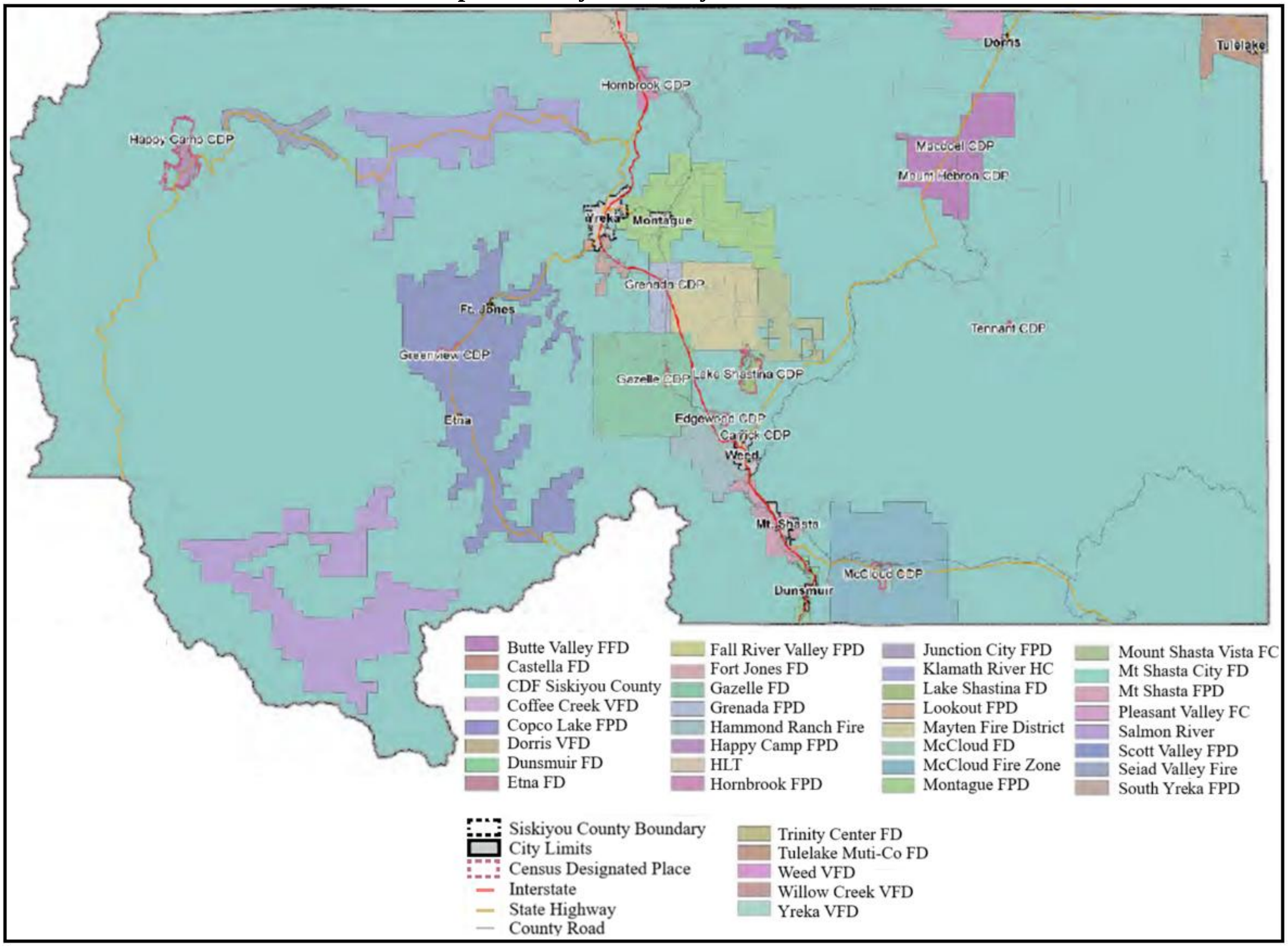


Source: Siskiyou County General Plan

Given the rural and sparsely inhabited nature of large portions of Siskiyou County, many of the fire departments and fire districts are operated by volunteer firefighting teams and funded through community fundraising. The following map details the location of Fire Districts within Siskiyou County:

EXHIBIT C

Map 18: Siskiyou County Fire Districts



Source: Siskiyou County General Plan

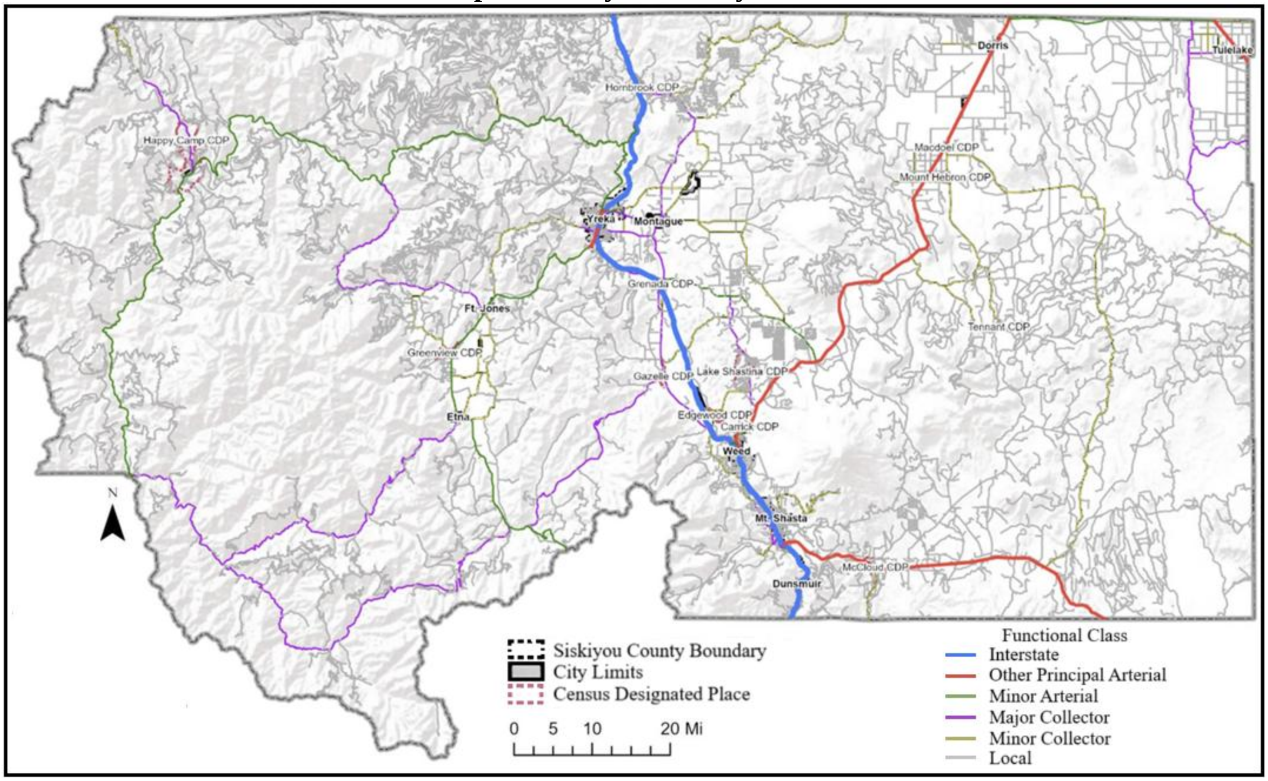
Critical infrastructure refers to the essential systems, assets, and services that are vital for the functioning of society and the economy. These infrastructures are necessary for public safety, economic stability, and quality of life. If disrupted or destroyed, the impacts could be severe, affecting the community's ability to function. The following is a list of considered critical infrastructure:

- Airports
- Bridges
- Communications
- Energy generation and regulation
- Roads
- Water and wastewater treatment

As of 2021, Siskiyou County contains 2,918 miles of maintained public roads. Responsibility for them is shared between the governments of cities, the county, the state, federal agencies, and other state agencies. The majority of public roads within the county are maintained by Siskiyou County and federal agencies. These roads account for 49.4% and 32.6% respectively, of the total road network within the county as of 2021.The following map details road type and location:

EXHIBIT C

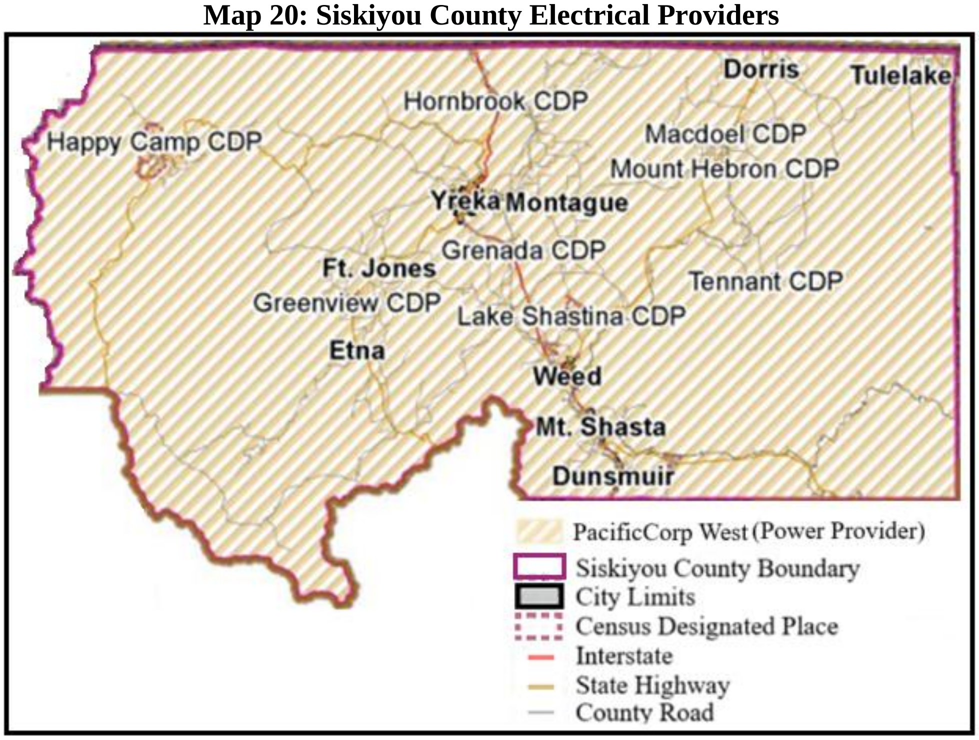
Map 19: Siskiyou County Roads



Source: Siskiyou County General Plan

Electrical utilities in Siskiyou County and all participating jurisdictions are provided by PacificCorp Energy, as detailed in the following map:

Map 20: Siskiyou County Electrical Providers



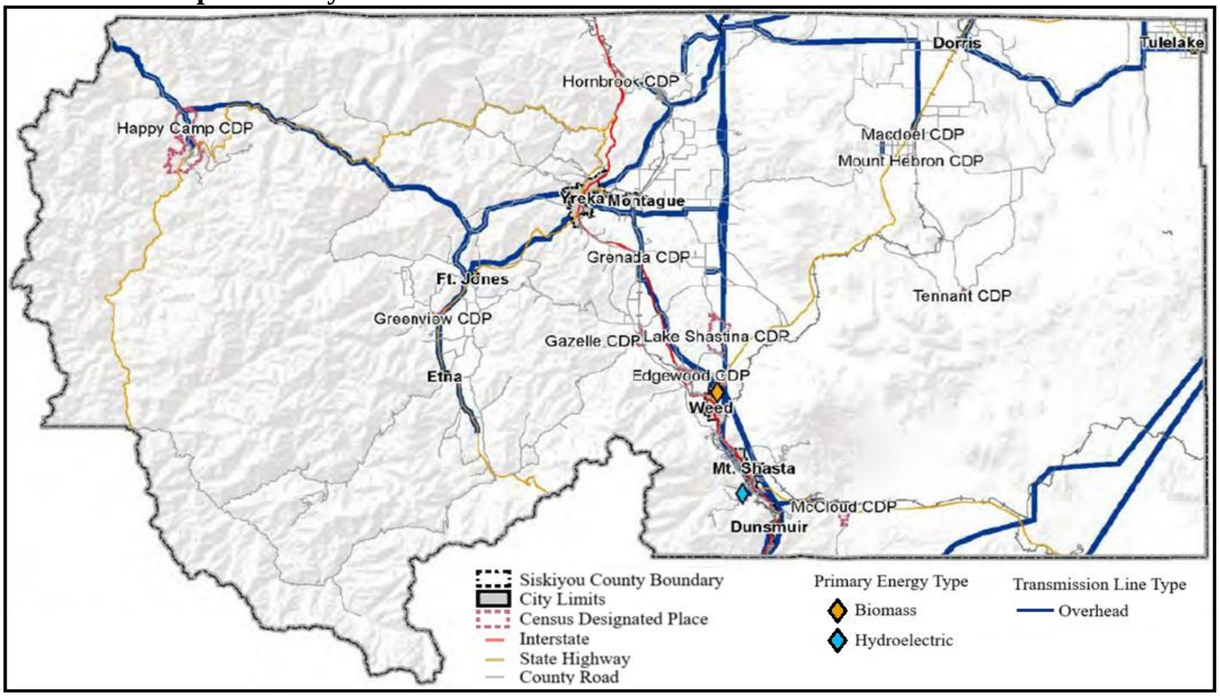
Source: Siskiyou County General Plan

All of the electrical energy generated in Siskiyou County is renewable energy. However, the capacity for generation has dropped as in 2024 Copco Dam 2, and Iron Gate Dam (all of which were hydroelectric dams) were removed, This

EXHIBIT C

leaves one hydroelectric dam in operation (Box Canyon Dam). The following map details electrical generation and transmission infrastructure:

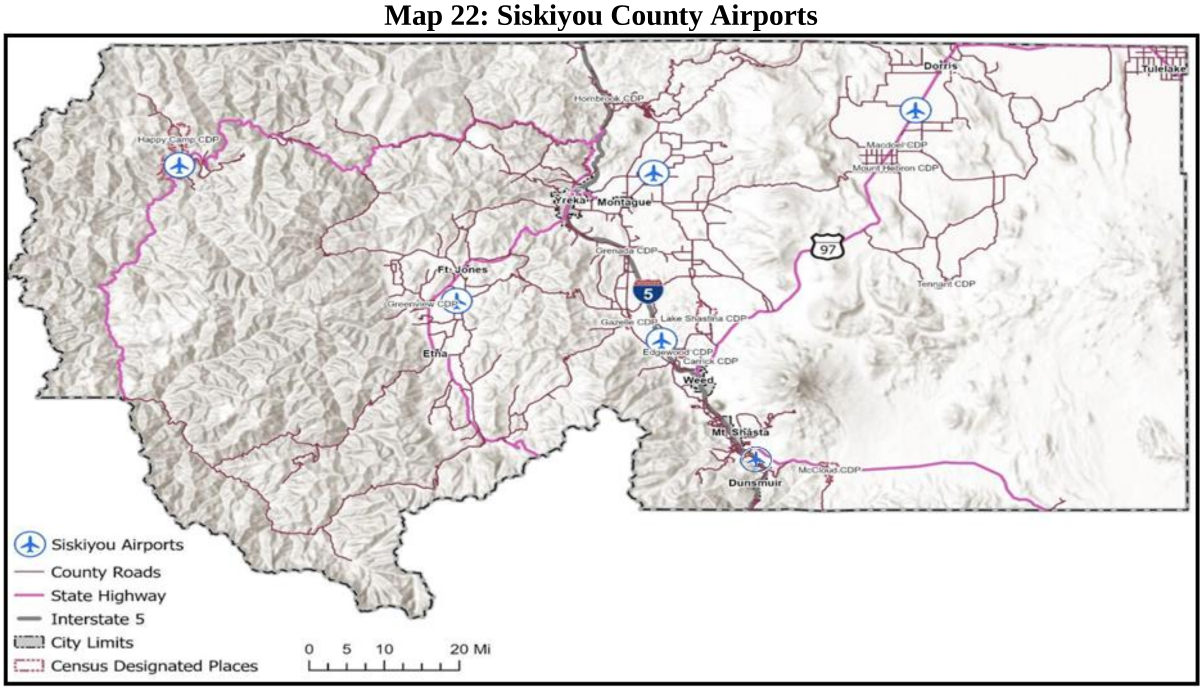
Map 21: Siskiyou Electrical Generation and Transmission Infrastructure



Source: Siskiyou County General Plan

Siskiyou County currently has four public-use general aviation airports, and one airport operated by the U.S National Forest Service (Happy Camp). The following map details the locations of these airports:

Map 22: Siskiyou County Airports



Source: Siskiyou County General Plan

Data from FEMA's Hazus-MH indicates the following for critical infrastructure:

EXHIBIT C

Table 11: Critical Infrastructure

Type	Number	Replacement Value
Airport and Runways	5	$74,595,800
Road Bridges	416	$702,742,600
Road Segments	80	$3,149,209,400
Railway Bridges	71	$403,990,000
Railway Segments	141	$637.016,500
Energy Generation and Regulation	2	$289,295,600
Communications	8	$944,000
Water and Wastewater Treatment Facilities	2	$343,903,600
Water and Wastewater Distribution Lines	Not reported	$613,792,900

Source: FEMA Hazus-MH

As available, further jurisdictional critical facility information may be found in Appendix C - Critical Facility Details. Additional critical infrastructure mapping may be found in subsequent hazard analysis sections, as appropriate.

3.10 Historic Places

Historic buildings are generally more vulnerable to natural hazards due to their age, materials, and construction methods. These structures were often built before modern building codes and may lack the structural reinforcements required to withstand hazards. Additionally, the materials used in historic buildings, like old brick, wood, or mortar, may have deteriorated over time, further reducing their resilience.

Preserving historic buildings poses unique challenges in hazard mitigation because retrofitting or upgrading them to meet modern safety standards must balance maintaining their historical integrity. This vulnerability underscores the importance of integrating historic preservation with hazard mitigation planning, ensuring that these culturally significant structures are protected while minimizing risks to public safety. For cultural and historic locations within Siskiyou County the following resources were consulted:

- **National Register of Historic Places**: The official list of the United States' historic properties deemed worthy of preservation for their significance in American history, architecture, archaeology, engineering, or culture. Administered by the National Park Service under the Department of the Interior, it includes districts, sites, buildings, structures, and objects. Established by the National Historic Preservation Act of 1966, the register seeks to recognize and protect cultural heritage. While listing does not impose restrictions on private property, it provides eligibility for preservation incentives.
- **California Register of Historical Resources:** The state's official list of properties recognized for their historical, cultural, architectural, or archaeological significance to California's heritage. Established in 1992, it is managed by the California Office of Historic Preservation and serves as a counterpart to the National Register of Historic Places. The register includes resources such as buildings, sites, structures, objects, and historic districts that are important at the local, state, or national levels. Properties listed in or eligible for the National Register are automatically included, and other properties can qualify based on specific state criteria. Inclusion in the California Register provides recognition, protections under the California Environmental Quality Act, and eligibility for certain preservation incentives.
- **California Historical Landmarks:** Officially designated sites, buildings, structures, or places recognized for their significance in California's history. Administered by the California Office of Historic Preservation, the program highlights resources that have made significant contributions to the state's heritage, including sites associated with key events, individuals, or developments. To qualify, a landmark must meet criteria demonstrating statewide historical importance and usually be at least 50 years old. Designated landmarks receive inclusion in the California Register of Historical Resources.

The following table details properties and locations in Siskiyou County and participating jurisdictions listed on these registers.

Table 12: Siskiyou County Historic Places

Location	Jurisdiction	National Register	California Register	California Historic Landmark
Camp Tulelake	Tulelake	x		
Canby's Cross-1873	Tulelake		x	x
Captain Jack's Stronghold	Tulelake	x	x	x
Davis Cabin	Yreka		x	
Dunsmuir Historic Commercial District	Dunsmuir			
Edgewood Store	Edgewood	x	x	
Emigrant Trail Crossing Of Present Highway	Weed		x	x
Falkenstein, Lewis, House	Yreka	x	x	
Forest House	Yreka	x		
Fort Jones House	Fort Jones	x	x	x
Fort Jones United Methodist Church	Fort Jones		x	
Frogtown	Yreka		x	
Guillem'S Graveyard	Tulelake		x	x
Harlow, William, Cabin	Seiad Valley	x	x	
Henley-Hornbrook Cemetery	Hornbrook		x	
Hospital Rock Army Camp Site	Tulelake	x	x	
Hotel MacDoel	MacDoel	x	x	
Little Shasta School District	Montague			
Lower Klamath National Wildlife Refuge	Dorris	x	x	
McCloud Hotel	McCloud		x	
McCloud	McCloud	x	x	
Montague United Methodist Church	Montague		x	
Sawyers Bar Catholic Church	Sawyers Bar	x	x	
Schonchin Butte Fire Lookout	Tulelake	x		
Shasta Inn Weed Lumber Company Boarding House	Weed	x	x	
Site Of Fort Jones	Fort Jones		x	
Spring School	Yreka		x	
Strawberry Valley Stage Station	Mt Shasta		x	x
Tacitus Ryland Arbuckle Grave Site	Callahan		x	
Thomas-Wright Battle Site	Tulelake	x	x	
Upper Klamath River Stateline Archaeological District	Beswick	x		
West Miner Street-Third Street Historic District	Yreka	x	x	x
White's Gulch Arrastra	Sawyers Bar	x	x	
Wildcat Creek Miner's Cabin	Yreka		x	
Yreka Carnegie Library	Yreka	x	x	

Source: National Register of Historic Places, California Register of Historical Resources, California Historical Landmarks

Both the California Environmental Quality Act and the National Environmental Policy Act recognize that properties over 50 years old are potentially historic resources, as they meet the age criterion for National Register eligibility. This triggers additional scrutiny to determine their historical significance and ensure that actions affecting them are carefully planned to protect cultural heritage.

3.11 Economic Conditions

U.S. Census Bureau data from the 2018-2022 American Community Survey 5-Year Estimates indicates the following concerning Siskiyou County employment:

Table 13: Jobs Held by Siskiyou County Residents, by Type of Worker, 2022

Employment Type	Workers
Private for-profit wage and salary workers	9,298
Private not-for-profit wage and salary workers	1,466
Government workers	4,087

Table 13: Jobs Held by Siskiyou County Residents, by Type of Worker, 2022

Employment Type	Workers
Self-employed	1,665
Unpaid family workers	107

Source: U.S. Census Bureau, 2018-2022 American Community Survey 5-Year Estimates

U.S. Census data provides key insights into the working-age population actively participating in the economy. This data helps measure the labor force participation rate, a critical economic indicator reflecting the proportion of the eligible population contributing to the workforce. It excludes certain groups, such as retirees, students, or those not seeking employment, giving a clearer picture of economic engagement and workforce trends.

Table 14: Population in Labor Force

Jurisdiction	Population over 16	In Labor Force	Employed	Unemployed
Siskiyou County	35,756	17,922	16,597	1,325
Dorris	642	365	342	23
Dunsmuir	1,446	804	744	60
Etna	541	288	254	34
Fort Jones	453	222	188	34
Happy Camp CSD	700	306	213	93
Lake Shastina CSD	2,313	1,109	1,020	89
McCloud CSD	792	354	329	25
Montague	1,299	810	754	56
Mt. Shasta	2,837	1,450	1,401	49
Tulelake	559	227	213	14
Weed	2,134	1,056	966	90
Yreka	5,785	3,088	2,868	220

Source: U.S. Census Bureau, 2018-2022 American Community Survey 5-Year Estimates

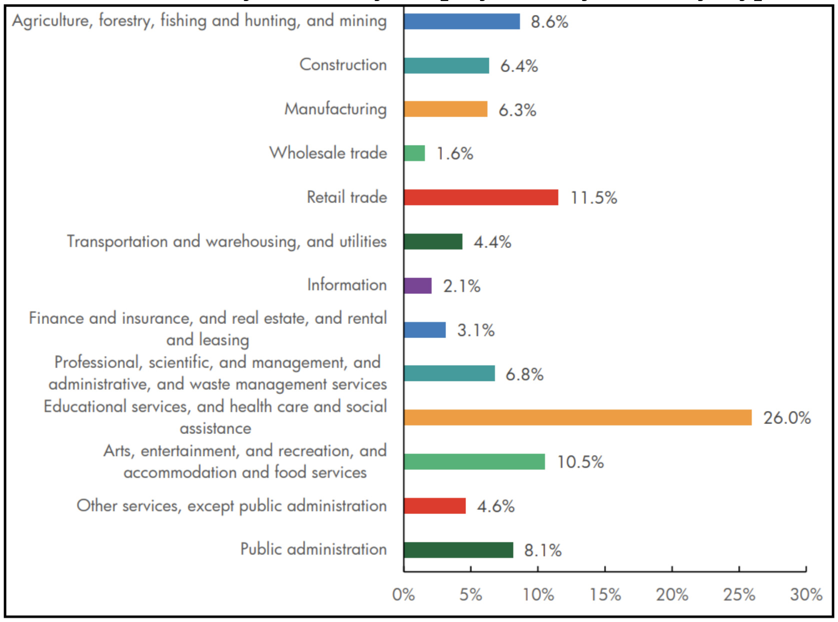
Between 2014 and 2022, the number of employed Siskiyou County residents grew by 398 workers, equating to a compounded annual growth rate of 0.3%, lower than 1.3% growth experienced across the state during this period. Siskiyou County saw the greatest job growth in the following industries:

- Transportation, warehousing, and utilities (205 workers added)
- Arts, tourism, recreation, and food services (141 workers added)
- Agriculture and mining (87 workers added).

Residents of Siskiyou County are mostly employed in a wide variety of professions, and the following chart provides a breakdown of employment by category:

EXHIBIT C

Chart 13: Siskiyou County Employment by Industry Type



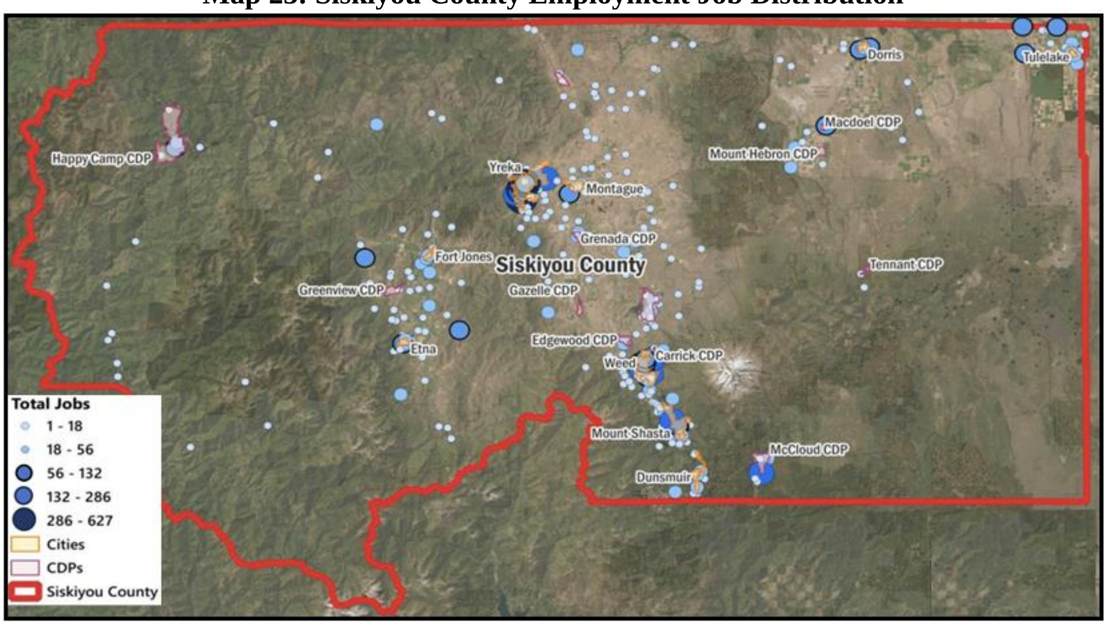
Source: U.S. Census Bureau, Siskiyou County 2025 General Plan

Data from the California Employment Development Department indicates that in the northern California 10-county region (including Siskiyou County), the largest projected growth rates between 2020 and 2030 are in the following major industry sectors:

- Leisure and hospitality (25.1%)
- Other personal services (14.0%)
- Educational services (private), health care, and social assistance sectors (13.6%)

The following map, using data from the U.S. Census Bureau, shows the distribution of jobs throughout Siskiyou County:

Map 23: Siskiyou County Employment Job Distribution



Source: U.S. Census Bureau, Siskiyou County General Plan

EXHIBIT C

According to the Siskiyou County 2022-23 budget, the largest source of revenue for Siskiyou County's General Fund was aid from other government organizations. The following table shows the summary of revenue sources for the Siskiyou County General Fund for the Fiscal Year 2022-23.

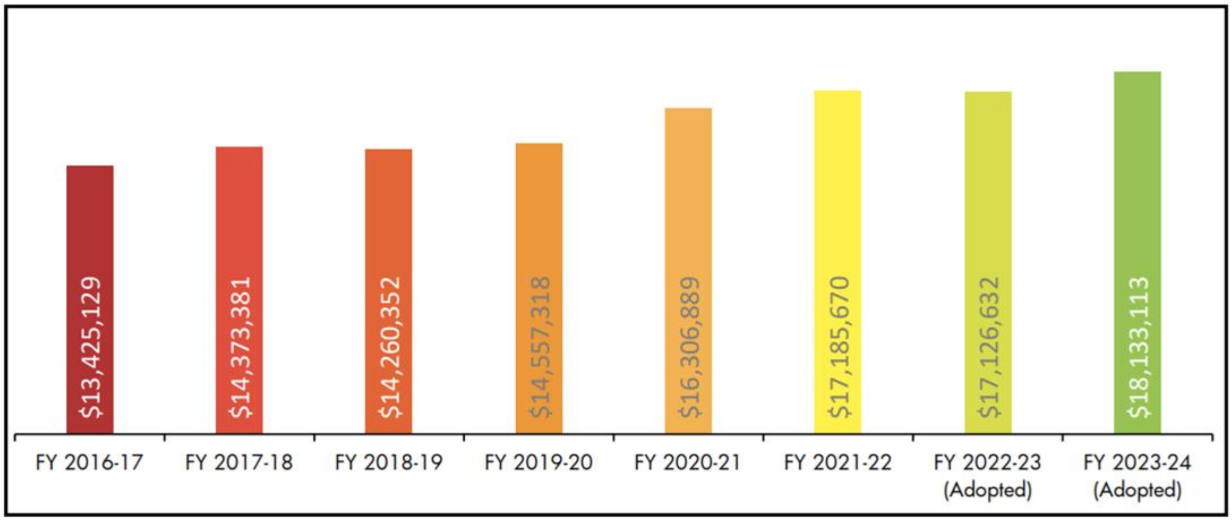
Table 15: General Fund Revenue Summary, by Type of Worker, 2022

Revenue Source	Amount	Percentage of Total Revenue
Aid from Other Governments	$19,488,273	31.4%
Other Financing Services	$17,992,448	29.0%
Taxes	$17,126,632	27.6%
Charges for Services	$5,066,344	8.2%
Fines	$1,263,900	2.0%
Licenses and Permits	$748,835	1.2%
Other	$293,948	0.4%

Source: Siskiyou County 2022-2023 budget

Tax revenues have generally risen during the past few years in Siskiyou County and participating jurisdictions, reflecting the relative health of the county's economy. However, the predicted future decline of Siskiyou County's population base in the coming years is likely to have an impact on tax revenue. The following chart shows revenues from taxes from 2016-17 through 2023-2024.

Chart 14: Revenue from Taxes, 2016 - 2024



Source: Siskiyou County

Community activities of value are initiatives that promote engagement, collaboration, and well-being within a community. These activities may include volunteer programs, cultural festivals, educational workshops, and recreational events that foster connections among residents and enhance the quality of life. They often address local needs, celebrate diversity, and build a sense of shared identity and purpose, contributing to a more resilient and vibrant community. The following is a brief list of notable activities of value throughout the county:

- **Dunsmuir:** The Dunsmuir Steampunk Festival, River and Rail Brewfest
- **Etna:** Trails End Music Festival
- **Fort Jones:** Fort Jones Fall Festival
- **Happy Camp CSD:** Bigfoot Jamboree
- **Mt. Shasta:** Mt. Shasta Blackberry Festival
- **Montague:** Montague Hot Air Balloon Fair, Montague Freedom Festival
- **Tulelake:** Tulelake-Butte Valley Fair
- **Yreka:** Siskiyou Golden Fair

EXHIBIT C

3.12 Physical Setting and Land Cover

The Siskiyou County region has a complex geologic history of folding, faulting, uplifting, sedimentation, volcanism and erosion. The primary bedrock in Siskiyou County includes igneous, or volcanic, rocks, with an array of surficial alluvial and colluvial deposits. Considerable marble, sandstone and limestone deposits exist throughout the County, many of which have been mined for minerals or road materials. The county features three major geomorphic provinces:

- **Klamath Mountains:** Characterized by rugged topography with jagged peaks and ridges that extend 6,000 to 8,000 feet above sea level. In the western Klamath Range, an irregular drainage pattern is incised into the Klamath peneplain, an uplifted plateau. The uplift has left successive benches exposing gold bearing gravel on the canyon walls. This geomorphic province is considered to be a northern extension of the Sierra Nevada.
- **Cascade Range:** A chain of volcanoes and mountains from Washington, through Oregon and into California. In Siskiyou County, this province is dominated by Mt. Shasta, a glacier covered volcanic peak that rises 14,162 feet above sea level and is the second highest active volcano in the Cascade Range. The broad and relatively flat Medicine Lake Volcano is one of the largest shield volcanoes in the Cascade Range.
- **Modoc Plateau:** A broad volcanic table that ranges from 4,000 to 6,000 feet above sea level. The plateau consists of a thick accumulation of basaltic lava flows and tuff layers and numerous small volcanic cones. The Modoc Plateau is dissected by several north-south fault lines.

With a diverse landscape, the soils in Siskiyou County range from simple to the most complex. Alluvium and terrace deposits, primarily composed of sand, silt, clay and gravel, are prevalent in the lowlands and flat riverine valleys. The intermountain valleys and foothills contain alluvial soils and terrace deposits. The mountainous areas consist of hearty soils from a variety of lithic parent materials, including sedimentary, metamorphic and igneous rocks. Mapping units in the Natural Resources Conservation Service's soil survey for Siskiyou County, Central Part describe the prevailing soils and include information about parent rock material, soil depth, erosion and slope.

Soil erosion in Siskiyou County occurs as a result of intensive land use, wind and water erosion. Erosion may be most severe where urbanization, development, recreational activities, logging and intensive agricultural practices take place. Extreme rainfall events, lack of vegetative cover, fragile soils and steep slopes combine to accelerate erosion. Agricultural crops are subject to the erosive forces of water, and hillside grazing pastures have been strained by reduced root structure due to years of drought conditions. With proper drainage construction and landscaping techniques, these altered soils may return to pre-construction stability and condition.

The County is drained by the Sacramento River in the south, the Klamath River in the north and the Salmon River in the west. The Klamath River winds an irregular course from the Cascade Range through the Klamath Mountains. Numerous watercourses drain the snow-capped peaks of the Cascade Range. Lakes, marshes and slow-moving streams meander across the relatively flat Modoc Plateau.

Land use in a region has a profound and lasting impact on future development. The way land is allocated and utilized can shape the economic, social, and environmental aspects of a region for decades. Land use affects that can impact future development include:

- **Economic Development:** Land use decisions influence the location and type of economic activities in a region. Zoning regulations that encourage the development of industrial zones can attract manufacturing businesses, while zoning for commercial and residential areas can promote retail and housing development. These decisions can have long-term implications for job creation, revenue generation, and overall economic health.
- **Transportation and Infrastructure:** Land use planning is closely tied to transportation infrastructure. The location of roads and other transportation facilities is determined in part by land use decisions. Well-planned land use can lead to efficient transportation networks, reducing congestion, and improving mobility. Poorly planned land use, on the other hand, can result in traffic congestion and increased infrastructure costs.
- **Housing and Urbanization:** Land use policies influence the availability and affordability of housing in a region. Zoning regulations, for example, can determine the density of residential areas and the types of housing

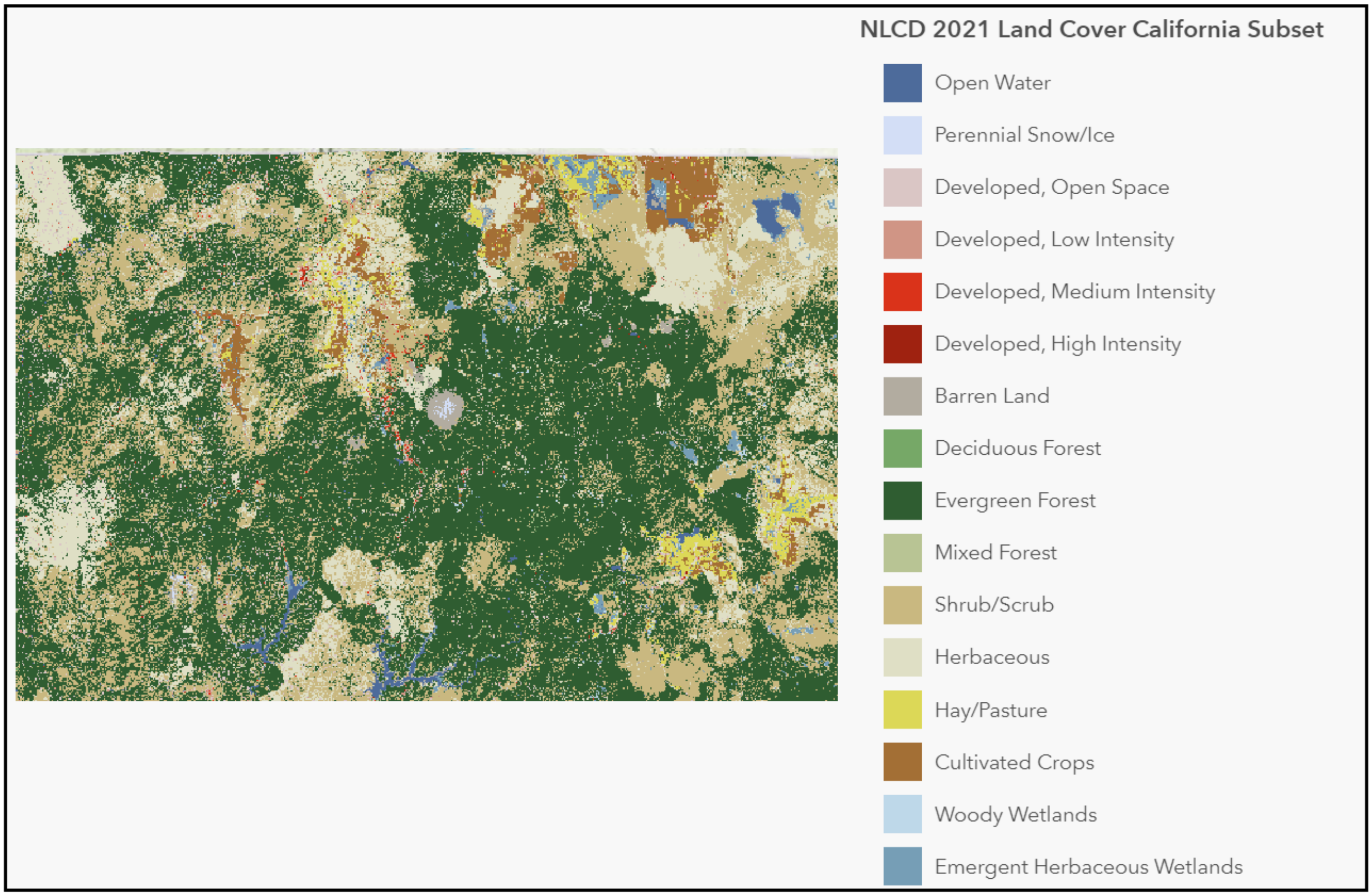
EXHIBIT C

permitted. Inadequate or restrictive land use policies can lead to housing shortages and higher costs, while well-planned policies can support diverse housing options and affordability.

- **Resilience to Climate Change:** Land use planning plays a critical role in a region's ability to adapt to climate change. Smart land use decisions can reduce vulnerability to natural disasters, such as flooding and wildfires, by avoiding high-risk areas and implementing resilient building codes and infrastructure.
- **Long-Term Costs:** Land use decisions can affect the long-term costs of development. Efficient land use planning can reduce the need for costly infrastructure extensions and maintenance, while inefficient or sprawling development can strain municipal budgets.

As indicated by the following map from the USGS 2021 Nation Land Cover Database, land cover in Siskiyou County consists largely of shrub/scrub and evergreen forests, with no large cities or urban areas and large rural areas:

Map 24: Siskiyou County Land Cover



Source: USGS 2021 Nation Land Cover Database

Rural areas tend to retain their rural nature over time, but there are several factors that can influence the evolution of these areas, including:

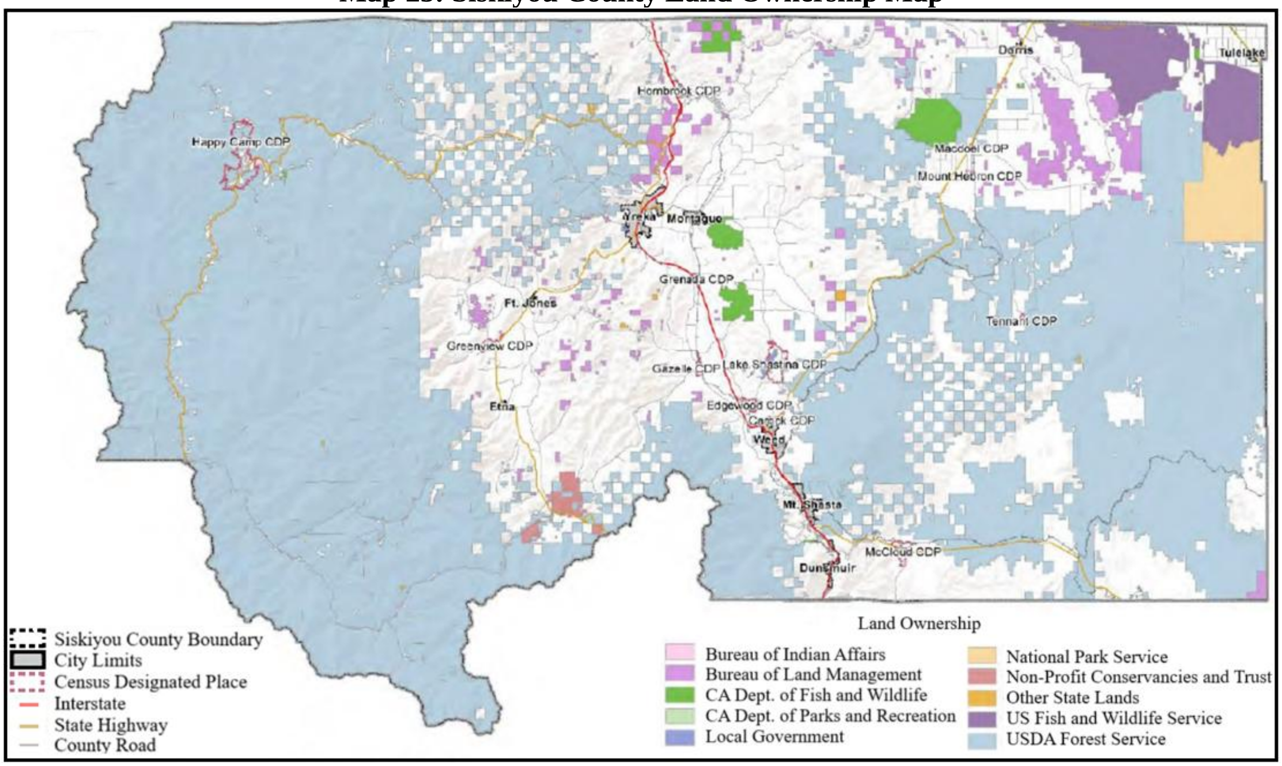
- **Economic Conditions:** The economic viability of agriculture can vary significantly over time due to factors like crop prices, weather patterns, and changes in agricultural technology. Economic challenges may lead some farmers to sell their land for non-agricultural uses or to consolidate their operations, potentially affecting the rural landscape.
- **Urbanization and Development:** In some cases, rural areas may experience suburbanization or the expansion of nearby urban centers. This can result in residential and commercial development encroaching on agricultural land. However, the extent of this development depends on local zoning and land use regulations.

EXHIBIT C

- **Infrastructure Development:** The construction of new transportation infrastructure, such as highways or railroads, can influence land use patterns. Improved infrastructure may make it easier to transport agricultural products to markets or to access rural areas for development.
- **Government Policies:** Government policies, including agricultural subsidies, land use regulations, and conservation programs, can impact the way rural and agricultural land is used. For example, conservation programs may encourage farmers to preserve land for wildlife habitat rather than development.
- **Local Planning and Zoning:** Local governments play a key role in land use planning and zoning regulations. These policies can determine whether agricultural land can be converted to non-agricultural uses, such as residential or commercial development. Some areas may have strict zoning that preserves agricultural character, while others may allow more flexibility.
- **Population Trends:** Demographic trends, including population growth or decline, can influence the demand for land in rural areas. If there is an influx of new residents seeking a rural lifestyle, it can drive demand for residential development in formerly agricultural areas.

Property owners are often responsible for implementing mitigation measures to protect their land and structures from natural hazards. The following map indicates landownership within Siskiyou County:

Map 25: Siskiyou County Land Ownership Map



Source: Siskiyou County General Plan

3.13 Regional Infrastructure Development

Infrastructure repair can have a significant impact on regional development, both positive and negative. The specific effects depend on the scale of the repair projects, the quality of the infrastructure, and the overall economic and social context of the region, and may include:

- **Improved Connectivity:** Repairing and upgrading infrastructure, such as roads, bridges, and ports, can enhance connectivity within and between regions. This improved connectivity can reduce transportation costs, facilitate the movement of goods and people, and attract businesses and investments to the region.
- **Economic Growth:** Functional infrastructure supports economic activities. When infrastructure is repaired, it can create jobs directly in the construction and maintenance sectors. Additionally, it can indirectly stimulate

EXHIBIT C

economic growth by providing a reliable foundation for businesses to operate and expand, leading to increased production and trade.

- **Enhanced Productivity:** Well-maintained infrastructure can increase productivity by reducing downtime and transportation delays. This, in turn, can make regional industries more competitive and efficient.
- **Attracting Investment:** Regions with modern and well-maintained infrastructure are often more attractive to investors. Businesses are more likely to invest in regions with reliable transportation, utilities, and communication networks, as it reduces operational risks and costs.
- **Quality of Life:** Infrastructure repair can enhance the quality of life for residents by providing access to essential services such as clean water, sanitation, healthcare, and education. This can contribute to improved human development indicators and overall well-being.
- **Resilience and Disaster Mitigation:** Infrastructure repair can include upgrades to make infrastructure more resilient to natural disasters and climate change impacts. This can help protect communities and assets and reduce the long-term costs of recovery and reconstruction.
- **Social Equity:** Infrastructure repair can address disparities in access to essential services. It can benefit marginalized communities by providing them with equal access to transportation, utilities, and public facilities.

However, it is important to note that there can be negative impacts as well, including:

- **Disruption During Construction:** Repair projects can disrupt communities and businesses during the construction phase, leading to short-term challenges.
- **Costs and Budget Constraints:** Large-scale infrastructure repair projects can be costly, and they may strain regional budgets or lead to increased taxes or debt.
- **Environmental Concerns:** If not done carefully, infrastructure repair projects can have adverse environmental impacts, such as habitat disruption or water pollution.

Recent significant state, county, and local infrastructure projects within Siskiyou County include:

- From 2016 to 2021, an average of 45 new homes were built each year, with over 90% as single-family homes.
- From 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires.
- The $26,000,000 No Place like Home 50-unit affordable housing development in Yreka was completed in September of 2024.
- Currently under construction, the Siskiyou County Jail Expansion project consists of a new two-story, 24,000 square foot facility that includes a new housing tier and 4,000 square feet of exterior yard space.
- Completed in 2021, the Siskiyou County Superior Courthouse is a 67,459 square foot two story building.
- Currently underway, the Weed Airport is conducting a taxiway and apron reconstruction project
- In progress, an electrical transmission cable 22 miles south of Tulelake on Harvey Jones Butte is being repaired.

Road maintenance projects play a critical role in hazard mitigation by improving the resilience and functionality of transportation infrastructure. Consistent repair and maintenance can help mitigate against hazards by:

- **Reduced Flooding Risk:** Regular maintenance, such as cleaning and repairing drainage systems, helps prevent flooding on roadways. Properly maintained culverts, ditches, and stormwater systems ensure that water can flow away from roads, reducing the risk of water damage and road erosion.
- **Strengthening Infrastructure:** Road maintenance projects often include reinforcing bridges, overpasses, and retaining walls to withstand seismic activity, heavy rain, and other hazards.
- **Slope Stabilization:** Road maintenance projects often include measures to stabilize slopes and prevent landslides. This includes planting vegetation, installing retaining walls, and improving drainage.

- **Erosion Control:** Implementing erosion control measures such as riprap, geotextiles, and retaining structures helps protect roadways from erosion caused by heavy rains and flooding.
- **Resilient Design:** Maintenance projects can incorporate resilient design features that account for climate change impacts, such as increased precipitation, higher temperatures, and more frequent extreme weather events. This includes elevating roadways, improving drainage systems, and using materials that can withstand changing conditions.
- **Monitoring and Adaptation:** Ongoing maintenance allows for continuous monitoring and adaptation of road infrastructure to climate change conditions, ensuring long-term resilience.

The California Department of Transportation (Caltrans) manages approximately 320 miles of highways in Siskiyou County, including eight state and interstate routes. The following map and associated table, from Caltrans, indicates current and future maintenance projects:

Map 26: Caltrans Highway Maintenance Projects

MAP ID	EA	CNTY	RTE	POST MILES	PROJECT NAME	WORK DESCRIPTION	PROGRAM	CONST ESTIMATE	BEGIN CONST	END CONST	PROJ PH	MULT CNTY	PROJ MANAGER
1	3J990	SIS	003	0.00/0.00	Yreka Rehab MMBN	Install Broadband	LOCAL	612,000	8/31/2022	11/17/2025	C		Low, Catherine A
2	3J490	SIS	003	46.80/48.00	Yreka CCEP	Improve Ped & Bicycle Facilities	STATE	1,704,000	3/17/2023	11/17/2025	C		Low, Catherine A
3	1H520	SIS	003	R46.80/R48.00	Yreka Rehab	Roadway Rehabilitation	SHOPP	52,950,000	8/15/2022	11/17/2025	C		Low, Catherine A
		SIS	263	49.07/49.41	Yreka Rehab	Roadway Rehabilitation	SHOPP	52,950,000	8/15/2022	11/17/2025	C		Low, Catherine A
4	3H32U	SIS	005	2.50/15.90	Sac Gap Combined	Pavement Rehab & Bridge Deck Repl	SHOPP	150,147,000	6/6/2023	5/1/2026	C		Molz, Kerry A
5	3H650	SIS	005	25.20/38.60	Grenada Pavement	Pavement Rehabilitation	SHOPP	19,000,000	11/6/2023	1/7/2025	C		Oguro, Michael S
6	4J180	SIS	005	R51.20/R69.29	Markers 23	Replace Pavement Markers	MAINT	300,002	11/21/2023	12/31/2024	C		Trent, Brandon W
7	1J010	SIS	096	0.00/0.00	Oakbar Culverts	Drainage Restoration	MINOR-A	930,000	9/1/2023	1/11/2024	C		Burkenpas Clint A
8	3J400	SIS	096	0.00/0.00	Thompson Creek Culverts	Drainage Restoration	MINOR-B	320,000	7/18/2023	6/12/2024	C		Mogen, Michael
9	1H590	SIS	096	43.50/57.00	Portuguese and Cade Creek	Fish Passage - Repl Culverts w/Bridges	SHOPP	12,540,000	9/21/2023	7/31/2026	C		Low, Catherine A
10	4H660	SIS	096	60.80/93.80	SIS Worker Safety	Worker Safety Turnouts	SHOPP	3,900,000	11/17/2023	1/6/2025	C		Burkenpas Clint A
11	1H360	SIS	096	76.80/78.00	Horse Creek Bridge Replacement	Bridge Replacement	SHOPP	27,539,000	2/13/2024	1/12/2027	C		Low, Catherine A
12	4H000	SIS	097	0.00/0.00	Dorris CAPM	Pavement Preservation	SHOPP	15,254,000	1/3/2024	12/8/2024	C		Low, Catherine A
13	0K640	SIS	097	18.50/22.00	Wildlife Crossing Structure	Construct Wildlife Crossing	SHOPP	15,100,000	9/3/2024	1/20/2026	C		Molz, Kerry A
14	4J900	SIS	161	15.00/17.60	Van Brimmer CIR	Pavement Rehabilitation	MAINT	1,864,000	2/7/2024	6/30/2024	C		Trent, Brandon W
15	0K390	SIS	263	52.25/56.35	Horizontal Curve Warning Sign Update	Upgrade Curve Warning Signs	MAINT	0	4/15/2024	12/31/2025	C		Norris, Daniel E
16	4J000	SIS	003	0.00/0.00	SIS 3 MMBN	Install Broadband	LOCAL	15,449,000	11/28/2024	6/30/2026	D		Buist Austin V
17	4J340	SIS	003	0.41/9.00	SIS 3 MMBN	Install Broadband	LOCAL	3,150,000	11/28/2024	6/30/2026	D		Buist Austin V
18	4J950	SIS	003	27.0/35.5	Fort Jones Culverts	Drainage Restoration	MAINT	355,000	11/7/2024	11/7/2024	D		Mogen, Michael
19	1H710	SIS	003	47.40/47.40	Yreka Maintenance Station Shop	Maintenance Station Improvements	SHOPP	4,500,000	4/16/2024	12/15/2025	D		Oguro, Michael S
20	0J540	SIS	003	48.60/54.19	Montague CAPM	Pavement Rehabilitation	SHOPP	8,190,000	6/2/2026	12/6/2027	D		Low, Catherine A
21	4J040	SIS	005	0.00/0.00	Siskiyou 5 MMBN	Install Broadband	LOCAL	20,195,000	12/30/2024	9/30/2026	D		Buist Austin V
22	4J041	SIS	005	0.00/19.07	SIS 5 MMBN 0-2.7, R15.9-R19.068	Install Broadband	LOCAL	0	10/30/1932	11/30/1935	D		Buist Austin V
23	4J370	SIS	005	2.70/15.90	SIS 5 MMBN	Install Broadband	LOCAL	4,620,000	11/28/2024	6/30/2026	D		Buist Austin V
24	2J220	SIS	089	0.00/R34.62	Curve Warning Signs	Upgrade Curve Warning Signs	SHOPP	2,870,000	7/28/2025	1/29/2027	D		Molz, Kerry A
		SIS	139	0.00/5.04	Curve Warning Signs	Upgrade Curve Warning Signs	SHOPP	2,870,000	7/28/2025	1/29/2027	D		Molz, Kerry A
25	0J850	SIS	089	20.30/34.62	McCloud CAPM	Pavement Rehabilitation	SHOPP	24,070,000	7/29/2025	12/6/2027	D		Low, Catherine A
26	4H080	SIS	096	0.00/16.00	Somes Bar CAPM	Pavement Rehabilitation	SHOPP	22,911,000	4/21/2026	1/5/2028	D		Sinclair, Alyson M
27	3J170	SIS	096	9.11/9.11	Sandy Bar Invert Repair	Drainage Restoration	MINOR-B	250,000	1/21/2025	1/6/2026	D		Maple, Kevin G
28	0K340	SIS	096	39.53/39.53	Dump Road	Stormwater Improvements	MAINT	200,000	7/11/2025	10/31/2025	D		Mogen, Michael
29	3J210	SIS	096	41.10/41.80	Happy Camp Drainage & Pavement	Pavement and Drainage improvements	MINOR-A	1,250,000	4/14/2025	12/15/2026	D		Low, Catherine A
30	4F900	SIS	096	41.10/41.80	Happy Camp Complete Streets	Pedestrian and Bicycle Improvements	STATE	6,060,000	4/14/2025	12/15/2026	D		Low, Catherine A
31	4J360	SIS	096	41.67/105.82	SIS 96 MMBN	Install Broadband	LOCAL	22,453,000	11/28/2024	6/30/2026	D		Buist Austin V
32	2J650	SIS	096	52.50/52.50	Thompson Creek Bridge	Bridge Deck Repair	SHOPP	5,940,000	6/20/2026	12/4/2028	D		Low, Catherine A
33	0H730	SIS	096	71.23/71.23	Scott River Bridge	Bridge Replacement	SHOPP	12,060,000	6/26/2027	1/3/2030	D		Low, Catherine A
34	4J510	SIS	097	0.00/53.81	SIS 97 MMBN L0.0/53.809	Install Broadband	LOCAL	18,932,000	11/28/2024	6/30/2026	D		Buist Austin V
35	1J870	SIS	097	20.21/20.21	Grass Lake Maintenance Station	Maintenance Station Improvements	SHOPP	17,890,000	7/29/2025	12/13/2027	D		Iqbal, Javed
36	0K520	SIS	097	27.00/52.10	Mt.Hebron Culverts	Drainage Restoration	MINOR-B	300,000	12/23/2025	12/23/2024	D		Mogen, Michael
37	0J550	SIS	161	4.50/9.10	Klamath Lake Rehab 2R	Pavement Rehabilitation	SHOPP	13,887,000	4/1/2025	1/2/2026	D		Low, Catherine A
38	1J330	SIS	263	54.51/56.35	SIS 263 Bridge Repairs	Bridge Rehabilitation	SHOPP	14,390,000	2/16/2027	12/19/2029	D		Low, Catherine A
39	2J770	SIS	003	0.41/54.19	Highway Curve Warning Signs	Upgrade Curve Warning Signs	PLANNING	1,420	7/20/2027	1/3/2029	P		Molz, Kerry A
		SIS	005	0.00/R69.29	Highway Curve Warning Signs	Upgrade Curve Warning Signs	PLANNING	1,420	7/20/2027	1/3/2029	P		Molz, Kerry A
		SIS	096	R0.00/105.82	Highway Curve Warning Signs	Upgrade Curve Warning Signs	PLANNING	1,420	7/20/2027	1/3/2029	P		Molz, Kerry A
40	2J810	SIS	003	R17.70/R53.20	Far North TMS	Upgrade TMS Infrastructure	PLANNING	6,740	6/1/2027	1/26/2029	P		Iqbal, Javed
41	0K730	SIS	003	28.00/36.00	Fort Jones Pavement	Pavement Preservation	SHOPP	0	9/2/2031	10/3/2035	D		Low, Catherine A
42	2J840	SIS	005	1.34/R38.69	Sac Canyon ITS	ITS Upgrade	PLANNING	7,040	6/1/2027	4/26/2029	P		Iqbal, Javed
43	2J210	SIS	005	R58.2/R69.293	Hilt Pavement Rehab	Pavement Rehabilitation	SHOPP	91,900	9/14/2027	1/28/2030	P		Low, Catherine A
		SIS	089	0.0/21.1	Bartle CAPM	Pavement Preservation	PLANNING	19,940	5/30/2028	1/24/2030	P		Low, Catherine A
44	4J730	SIS	089	24.75/24.75	McCloud Intersection Safety	Intersection Safety Improvements	SHOPP	0	1/10/2031	2/20/2035	P		Molz, Kerry A
45	0K120	SIS	096	0.00/0.00	Oakbar Culverts II	Drainage Restoration	SHOPP	0	7/4/2025	1/18/2027	D		Low, Catherine A
46	2J620	SIS	097	L0.00/11.00	Weed Blvd Pavement	Pavement Preservation	PLANNING	32,310	4/4/2028	1/18/2030	P		Low, Catherine A
		SIS	265	19.80/20.33	Weed Blvd Pavement	Pavement Preservation	PLANNING	32,310	4/4/2028	1/18/2030	P		Low, Catherine A
47	2J810	SIS	097	20.00/34.50	Far North TMS	Upgrade TMS Infrastructure	PLANNING	6,740	6/1/2027	1/26/2029	P		Iqbal, Javed

REV 10/23

Source: Caltrans

EXHIBIT C

Additionally, the Siskiyou County Public Works Department is currently completing a rehabilitation project on Big Springs Road.

Information on currently vacant land that is zoned to allow for future development (also known as buildable land) can be used to assess future growth. Data from Cal OES, developed using the LandVision system, indicates that Siskiyou County has 508,754 acres of buildable land. While Siskiyou County has a large amount of buildable land, population and housing data indicate that this land will not be fully developed during the life of this plan.

Based on the available data, it is likely that Siskiyou County and all participating jurisdictions will retain a mostly rural character during the life of this plan. Additionally, no near future development charges are anticipated to increase jurisdictional vulnerability to identified hazards. Rather, the noted demographic decrease is expected to potentially reduce across the board vulnerability to identified hazards.

3.14 Agricultural Data

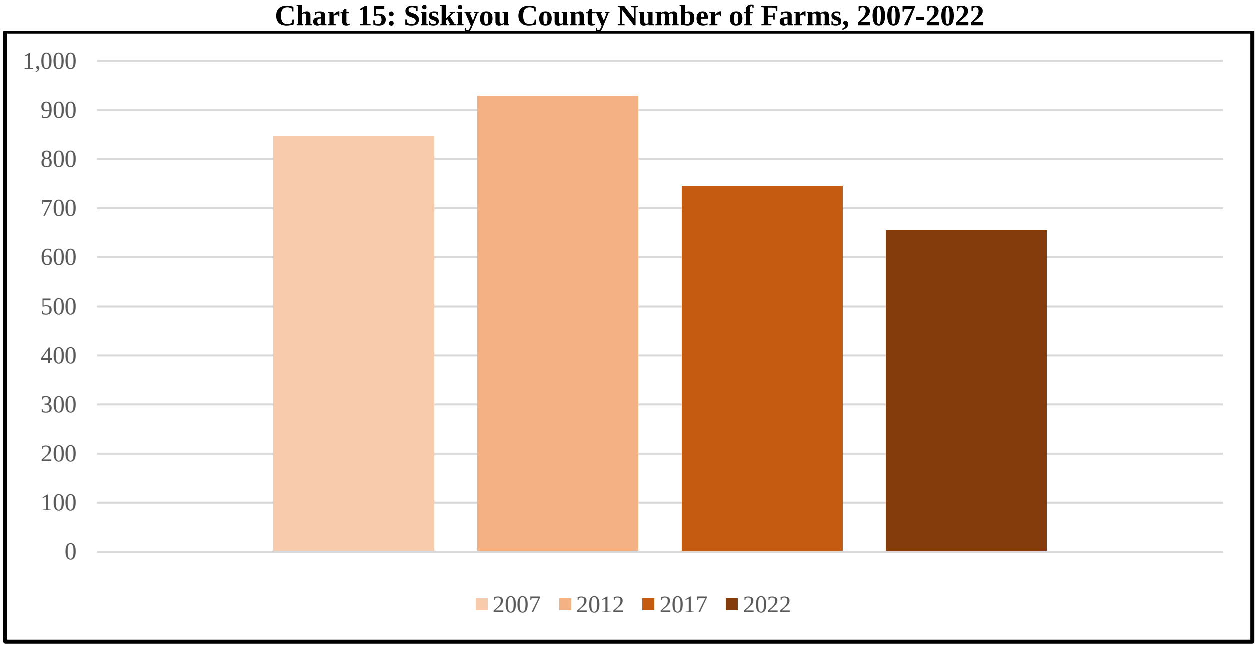
Agriculture forms a large part of both the economic and social fabric of Siskiyou County. USDA National Agricultural Statistics Service data from 2007, 2012, 2017, and 2022 (the latest available data) was used to develop an understanding of the agricultural footprint within the county, as detailed in the following table and charts:

Table 16: Siskiyou County Regional Agricultural Data

Year	2007	2012	2017	2022
Number of Farms	846	929	745	655
Total Farm Acreage	597,534	722,855	687,313	672,775
Market Value of Products Sold	$136,392,000	$233,096,000	$192,435,000	$295,726,000
Value of Machinery and Equipment	$94,449,978	$113,320,000	$106,318,000	$130,793,000
Value of Lands and Buildings	$1,766,360,000	$1,586,711,000	$2,828,476,000	$4,287,179,000

Source: USDA National Agricultural Statistics Service

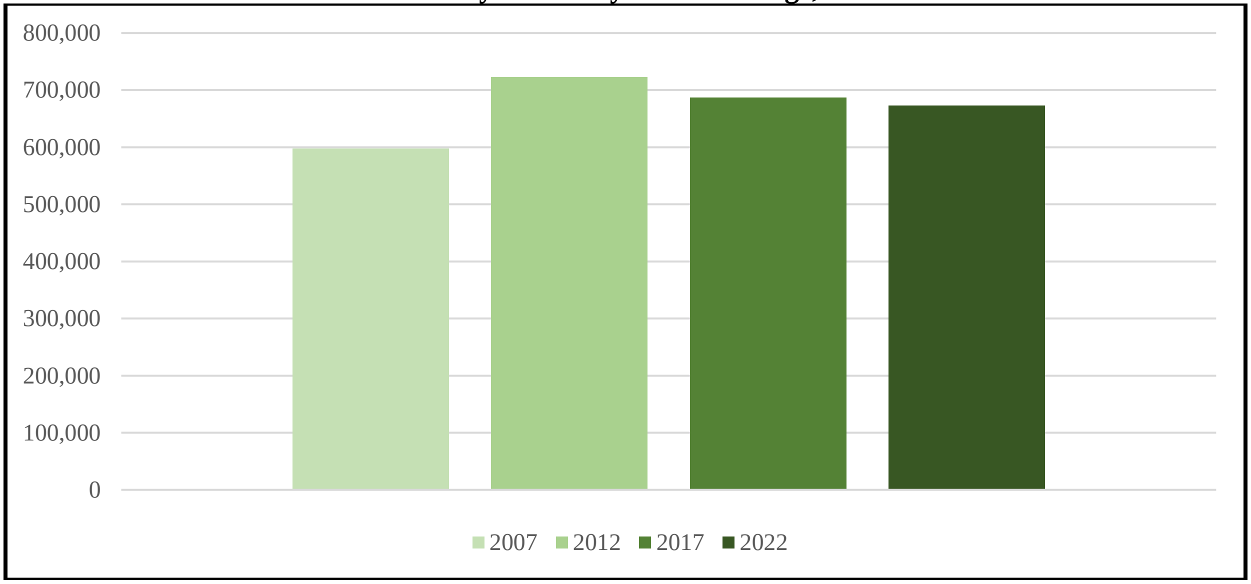
Chart 15: Siskiyou County Number of Farms, 2007-2022



Source: USDA National Agricultural Statistics Service

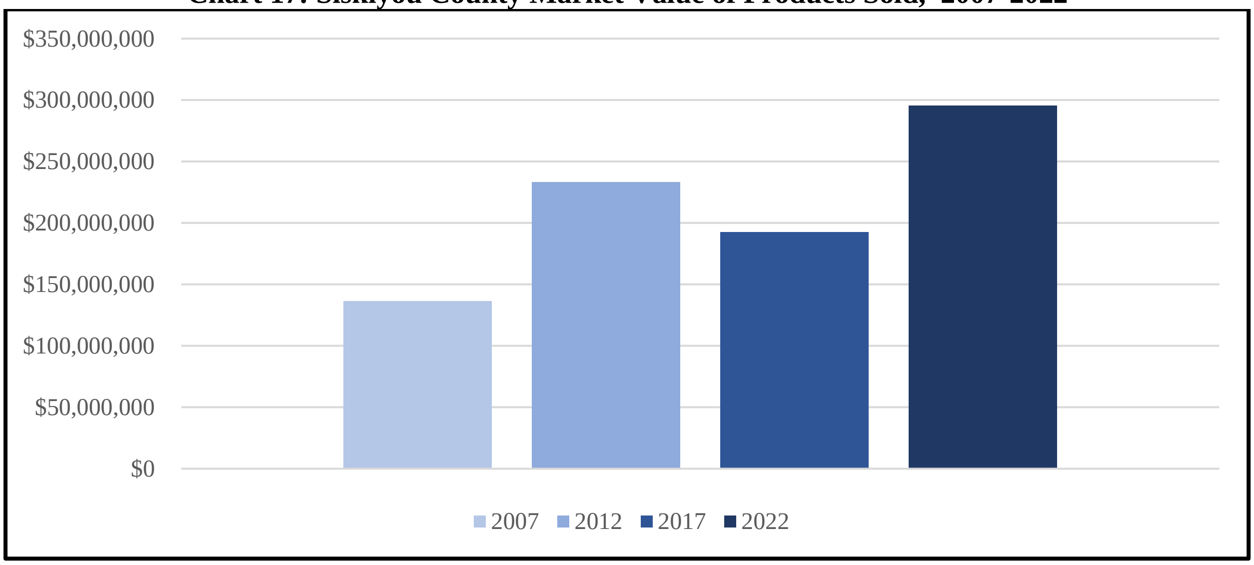
EXHIBIT C

Chart 16: Siskiyou County Farm Acreage, 2007-2022



Source: USDA National Agricultural Statistics Service

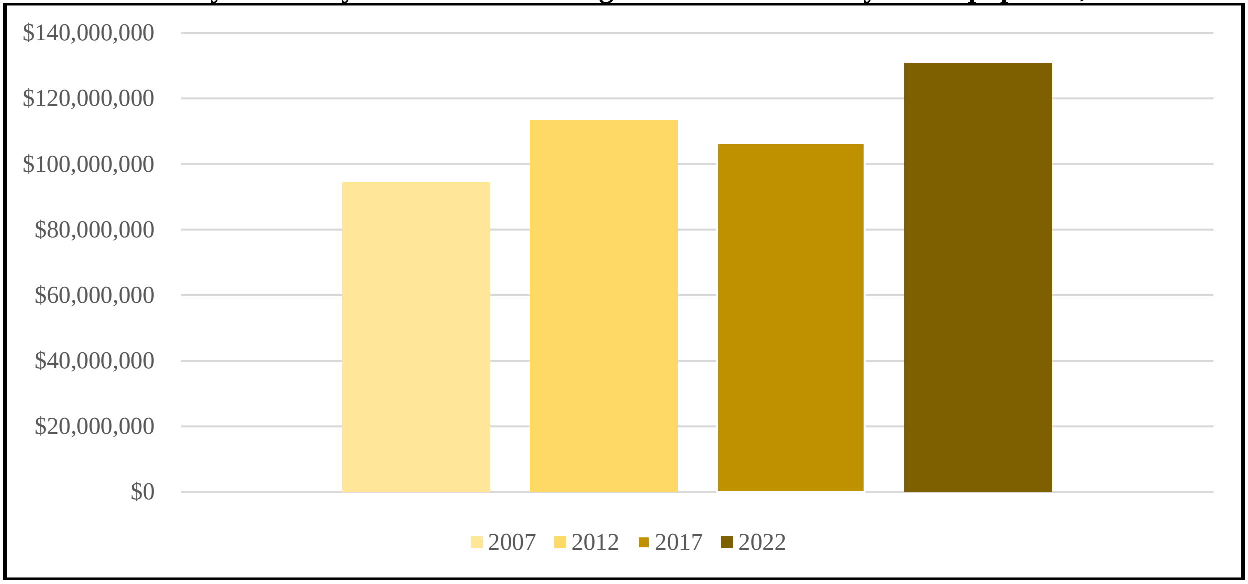
Chart 17: Siskiyou County Market Value of Products Sold, 2007-2022



Source: USDA National Agricultural Statistics Service

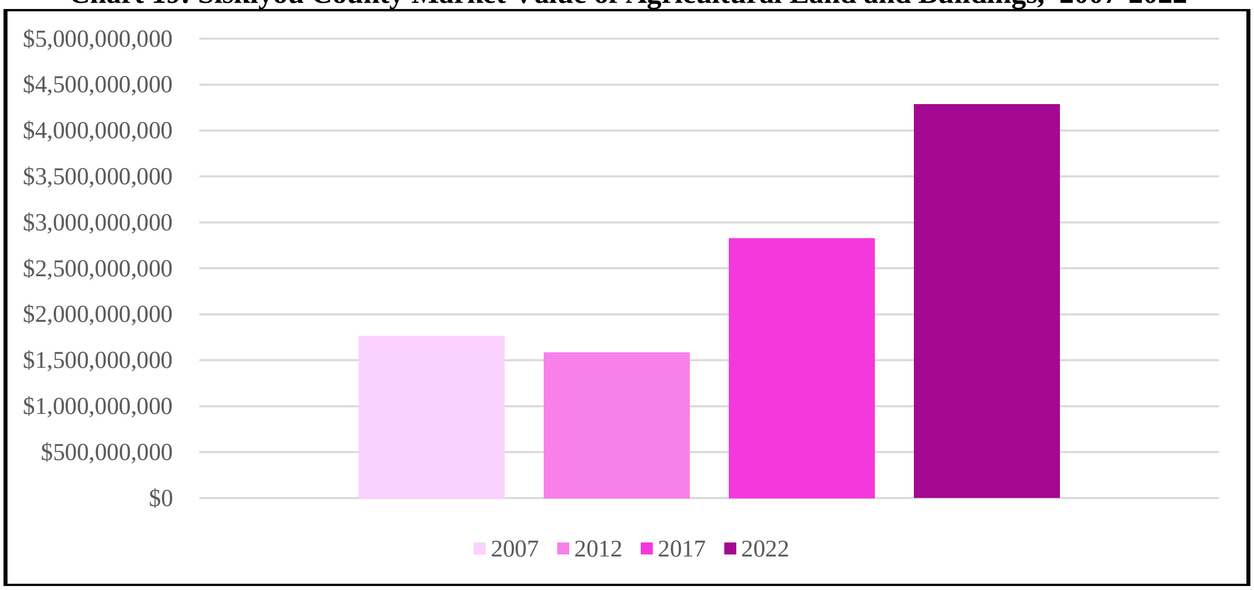
EXHIBIT C

Chart 18: Siskiyou County Market Value of Agricultural Machinery and Equipment, 2007-2022



Source: USDA National Agricultural Statistics Service

Chart 19: Siskiyou County Market Value of Agricultural Land and Buildings, 2007-2022

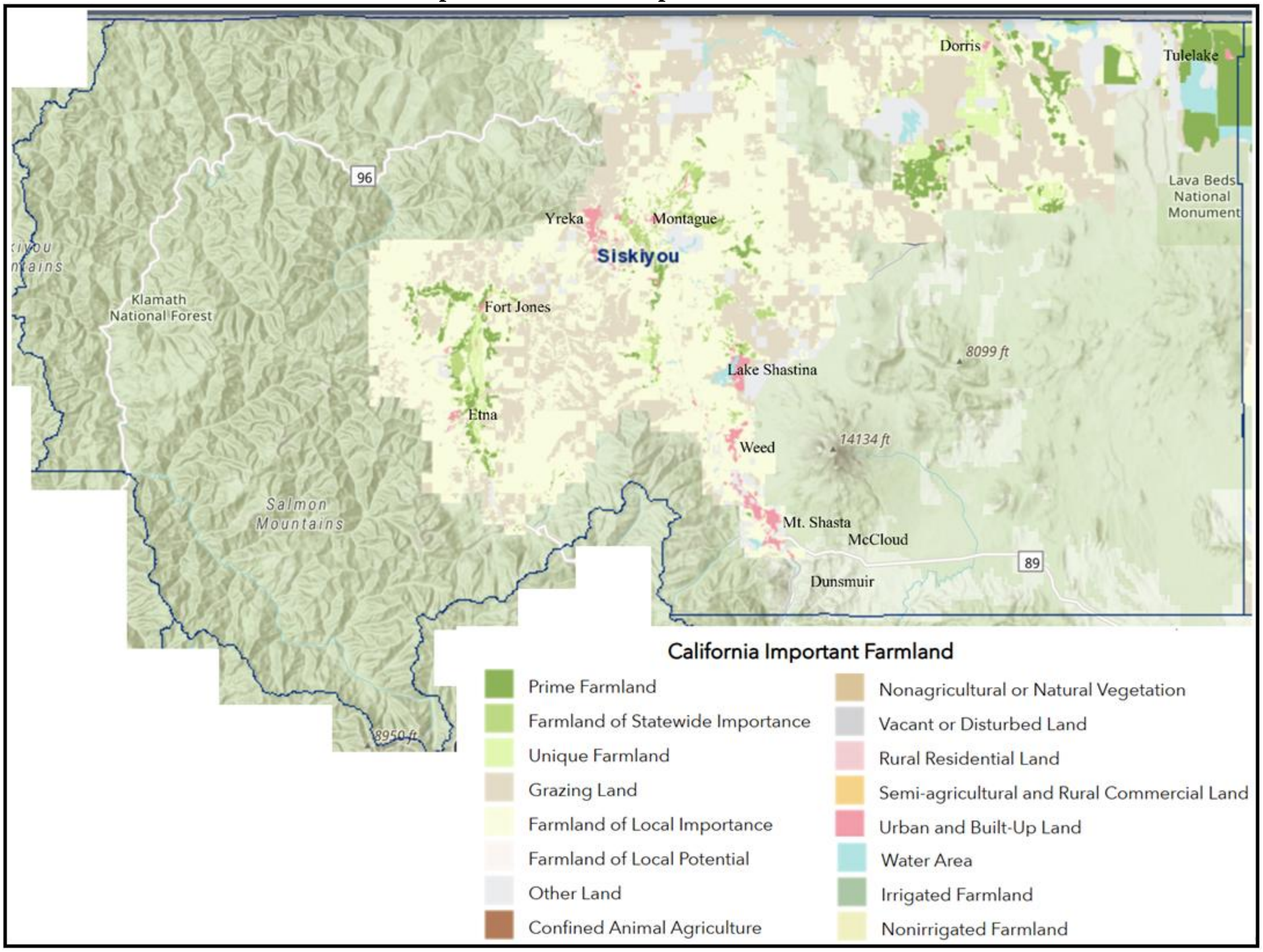


Source: USDA National Agricultural Statistics Service

California Important Farmland, classified by the California Department of Conservation, identifies and protects agricultural land vital to the state's economy and food production. The program categorizes farmland into classes such as Prime Farmland, Farmland of Statewide Importance, and Unique Farmland, based on soil quality, water availability, and agricultural productivity. This classification guides land-use planning and conservation efforts to preserve valuable farmland amid urban development and environmental challenges, ensuring sustainable agricultural resources for future generations. The following map details important farmland locations in Siskiyou Conty and participating jurisdictions:

EXHIBIT C

Map 27: California Important Farmland



Source: California Department of Conservation

3.15 Regional Climate

In general, Siskiyou County's climate is characterized by warm, dry summers and cool, wet winters typical of Mediterranean climates. However, since Siskiyou County is at the northern extreme of the Mediterranean climate zone and is in a mountainous region, winters tend to be colder than the average Mediterranean region. The geographic diversity of Siskiyou County contributes to a broad range of regional micro-climates. Elevation differences, along with distance from the Pacific Ocean, which is the main source of precipitation, account for most of the variability in Siskiyou County's climate. The alpine areas around Mount Shasta and other mountainous areas receive considerable snow in the winter. In contrast, the valleys receive only a light dusting of snow in winter.

Due to the influence of coastal air masses, the western portion of Siskiyou County receives the most moisture and it becomes progressively drier toward the east. High elevation and proximity to the Pacific Ocean results in the Klamath Mountains receiving an average of 40 to 60 inches per year in the valley regions and from 80 to 100 inches per year in the higher elevations. The Shasta Valley lies in the rain shadow of the Klamath Range, so on average the valley receives less than 20 inches each year. As winter storms move eastward with the prevailing westerlies, they reach the Cascade Range, where uplift results in relatively high precipitation (approximately 30 to 60 inches per year). As coastal storms pass over the Coast Range (west of Siskiyou County) and the ranges in the County, much of the moisture precipitates out, so the Modoc Plateau in the eastern county receives little precipitation, about 10 to 20 inches each year.

EXHIBIT C

Due to the distance from the moderating influence of the Pacific Ocean, the Modoc Plateau has more extreme temperature ranges and much colder winter temperatures. This eastern, interior part of Siskiyou County is better classified as having a steppe climate rather than a Mediterranean climate.

3.16 Potential Impacts of Climate Change

For hazards related to weather patterns, climate change may cause significant changes in patterns and event frequency. There is a scientific consensus that climate change is occurring, and recent climate modeling results indicate that extreme weather events may become more common. Rising average temperatures produce a more variable climate system which may result in an increase in the frequency and severity of some extreme weather events, including:

- Longer and more intense heat waves
- An increased risk of wildfires
- Higher wind speeds
- Greater rainfall intensity, but less rainfall frequency
- An earlier and longer wildfire season

California's Fourth Climate Change Assessment was reviewed to determine the potential effects of climate change on Siskiyou County (part of the North Coast region). The report indicates that major impacts could include:

- Average annual maximum temperatures are likely to increase by 5-9 °F by 2100, with interior regions such as Siskiyou County experiencing the greatest degree of warming.
- Winter season temperatures are expected to increase markedly, with a 5–7°F increase by 2050 and 8–11°F increase by 2100.
- Annual precipitation is not expected to significantly change. However, precipitation will likely be delivered in more intense rainfall events.
- There will be a higher likelihood of extreme wet and extreme dry years.
- An increase in intense rainfall events will increase the frequency and extent of flooding.
- Changes to streamflow patterns are expected, with flows expected to decline in dry seasons and increase in wet seasons.
- Less precipitation will fall as snow, and the total snowpack will decrease markedly.
- Data suggests a longer fire season, with increased wildfire frequency and an expansion of susceptible areas.
- Temperature increases, significantly lower snowpack, and extreme dry years (drought) will likely extend the wildfire season.

Additionally, Cal Adapt's Local Climate Snapshot Tool estimates that by the end of the century, under high emissions scenarios, Siskiyou County can expect the following changes:

- The annual average maximum temperature is expected to reach highs of 68.7 degrees Fahrenheit, up 8.9 degrees Fahrenheit from the baseline average of 59.8 degrees Fahrenheit.
- Extreme heat days, or days when the maximum temperature is above 91.4 degrees Fahrenheit, are expected to increase from four days per year to 53 days per year by the end of the century.
- Projected precipitation levels are expected to show increasing levels of variability.
- Due to the high variability of precipitation events, flooding risks are likely to increase.
- Due to the high variability of precipitation events, landslides occurrences are expected to increase.
- With temperatures increasing significantly by the end of the century, drought events are expected to worsen.
- The average projected annual burned area is projected to increase in Northern California by over 50,000 acres by the end of the century as a result of climate change-related impacts.

Section 4 –Capability Assessment

4.1 Introduction

This section of the plan discusses the current capacity of Siskiyou County and participating jurisdictions to mitigate the effects of identified hazards. A capability assessment is conducted to determine the ability to execute a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs or projects.

This capability overview documents codes, ordinances, programs, policies, and funding mechanisms for all participating jurisdictions. All listed capabilities documented in the previous LHMP were reviewed for relevance and updated to reflect the current environment, as necessary. Additionally, any codes, ordinances, programs, policies, or funding mechanisms that are no longer applicable, are outdated, or are no longer in existence have been removed.

A thoughtful review of capabilities will assist in determining gaps that could limit current or proposed mitigation activities, or potentially aggravate vulnerability to an identified hazard. Additionally, a capability assessment can detail current successful mitigation actions that should continue to receive support.

4.2 Administrative and Technical Capabilities

The administrative and technical functions of Siskiyou County and participating jurisdictions are critical in the effective implementation of hazard mitigation strategies. These functions ensure that the jurisdiction is prepared to reduce risks associated with natural and human-made hazards and can efficiently identify, integrate, and manage mitigation projects.

Siskiyou County has a dedicated staff across multiple departments for hazard mitigation roles including planning, engineering, and mapping. Additionally, the county has numerous communication channels available, including websites and social media platforms, and a variety of trained Public Information Officers and general staff to disseminate hazard mitigation information to all stakeholders and the public. The staffing capabilities of participating jurisdictions vary, with many having small, but dedicated teams.

The following table details Siskiyou County and participating jurisdiction departments and positions and their roles in supporting hazard mitigation planning:

Table 17: Siskiyou County and Participating Jurisdictions Departments Supporting Mitigation Planning

Department or Position	Hazard Mitigation Roles
Governing Board or Chief Executive	• Provides adoption resolution for LHMP. • Approves ordinances and bylaws and facilitates capital improvements budget.
Building Department	• Enforces building codes that enhance structural resilience to hazards. • Conducts inspections and issues permits ensuring compliance.
Emergency Management Department*	• Develops, implements, and updates the LHMP. • Coordinates between various departments, agencies, and external stakeholders to ensure a cohesive approach to hazard mitigation. • Provides public education on matters concerning hazard mitigation. • Coordinates hazard grant application process. • Involving local businesses, non-profits, and residents in the planning process to foster a collaborative approach to mitigation. • Supports the planning and implementation of mitigation projects.
Finance Department	• Allocates funding for hazard mitigation projects. • Manages grants and other financial resources to support mitigation efforts.
Fire Department	• Wildfire mitigation through controlled burns and fuel management. • Outreach programs to educate the public on fire safety, such as how to prevent home fires, create defensible spaces around properties.

Table 17: Siskiyou County and Participating Jurisdictions Departments Supporting Mitigation Planning

Department or Position	Hazard Mitigation Roles
	• Community planning to create defensible spaces and ensure buildings are more fire-resistant
Geographic Information System (GIS)	• Provides critical data and mapping services for hazard identification and risk assessments. • Utilizes advanced modeling techniques to predict the impact of various hazards on the community. • Supports the planning and implementation of mitigation projects.
Health Department	• Addresses public health risks associated with identified hazards. • Plans for emergency medical response and disease control measures. • Monitors environmental hazards (e.g., water contamination, hazardous materials).
Parks Department	• Manage open space and wetlands for flood control. • Manage vegetation in parks to reduce fire hazards. • Provision of green spaces to help mitigate the urban heat island effect by cooling surrounding areas through shade and evapotranspiration
Planning Department	• Enforces zoning and land-use policies to minimize hazard risks. • Integrates hazard mitigation into comprehensive and capital improvement plans.
Public Works Department	• Manages infrastructure resilience projects (e.g., road improvements, drainage systems).

Note: * Role may be taken by local fire or police department, and not dedicated emergency management department

The following table indicates if a participating jurisdiction has the above noted departments:

Table 18: Participating Jurisdiction Departments

Jurisdiction	Board or Exec	Building	Emergency Management	Financial	Fire	GIS	Health	Parks	Planning	Public Works
Siskiyou County	x	x	x	x		x	x		x	x
Dorris	x	x	x	x	x				x	x
Dunsmuir	x	x	x	x	x	x		x	x	x
Etna	x	x	x	x	x			x	x	x
Fort Jones	x	x	x	x	x				x	x
Happy Camp CSD	x	x	x	x				x		x
Lake Shastina CSD	x	x	x	x	x					x
McCloud CSD	x	x	x	x				x		x
Montague	x	x	x	x	x			x	x	x
Mt. Shasta	x	x	x	x	x				x	x
Tulelake	x	x	x	x	x				x	x
Weed	x	x	x	x	x				x	x
Yreka	x	x	x	x	x	x		x	x	x

4.3 Regulation of Development

The regulation of development plays a crucial role in helping a community become more resilient in the face of various hazards. Effective regulation of development contributes to community resilience through:

- **Risk Reduction:** Regulations guide land use and construction practices, ensuring that they provide strong protection against hazards.

- **Public Safety:** Building codes and land-use regulations establish minimum safety standards for construction, including structural integrity, fire resistance, and the use of resilient materials.
- **Infrastructure Resilience:** Regulations may require infrastructure improvements, such as the construction of resilient roads, bridges, utility systems, and drainage systems. This strengthens a community's ability to withstand hazards, ensures the continued operation of critical services, and aids in recovery.
- **Floodplain Management:** Regulations in flood-prone areas can mandate elevation requirements for new construction, ensuring that structures are built above the base flood elevation. This minimizes flood damage, reduces the need for costly post-disaster repairs, and protects property values.
- **Land Use Planning:** Effective land-use planning helps communities avoid inappropriate development in areas at high risk of hazards.
- **Community Awareness:** Public education and outreach can be incorporated into regulations, requiring communities to inform residents about local hazards, evacuation routes, and preparedness. Informed residents are more likely to take protective measures and respond effectively to disasters.

The following sections provide further details on building codes, zoning ordinances, and floodplain management.

Building Codes

In California, building codes are enforced through a combination of state and local regulations. The California Building Standards Code (Title 24) sets statewide standards for construction, which local governments may adopt and modify to address regional needs. Enforcement is carried out by local building departments, which review plans, issue permits, and conduct inspections to ensure compliance. Violations can result in fines, stop-work orders, or mandatory corrections. Local agencies also work with state agencies to ensure safety and sustainability in building practices.

Building codes establish general minimum construction standards and are enforced through authorized local building inspection agencies and inspectors. Building codes provide for:

- **Life Safety:** Building codes include provisions for fire safety, emergency egress, and the use of fire-resistant materials.
- **Accessibility and Life Support:** Building codes incorporate accessibility standards, ensuring that buildings are designed to accommodate all individuals. This is crucial during and after disasters when people with mobility issues may require assistance. Accessible features also benefit emergency responders and support recovery efforts.
- **Retrofitting Existing Buildings:** Building codes may require the retrofitting of older structures to meet modern safety standards.
- **Public Awareness:** Building codes promote public awareness of hazards and the importance of resilient construction. This can lead to informed decision-making by property owners, builders, and developers, resulting in safer structures.

Key hazard resistant building code provisions found in current building codes include:

- **Structural Design Requirements:** Provides requirements for the structural design of buildings to ensure their resistance to various hazards, including earthquakes, high winds, and snow loads. These requirements are aimed at enhancing the overall structural integrity and safety of buildings.
- **Wind Design Requirements:** Provides specific provisions for wind design, considering the geographical location of the structure. Wind loads are calculated based on factors such as wind speed, exposure, and building height.
- **Seismic Design Requirements:** Incorporates seismic design provisions to address earthquake hazards. The code includes seismic design categories and requirements for the design and construction of buildings in seismic-prone regions.

EXHIBIT C

- **Flood-Resistant Design Requirements:** Includes provisions related to flood-resistant design, particularly in areas prone to flooding. It may specify elevation requirements, construction materials, and other considerations to reduce the risk of flood damage. The vast majority of the regulations required by the NFIP are included within the International Building Code and the International Residential Code.
- **Fire-Resistant Construction Requirements:** Requirements for fire-resistant construction are included to mitigate the risk of fire hazards. This includes specifications for fire-resistant materials, assemblies, and building features.
- **Material and Construction Standard Requirements:** Establishes standards for building materials and construction methods to ensure the durability and safety of structures, considering various hazards.

Additionally, analysis indicates that adopting the latest building code could provide a savings of $11 per $1 invested. Building codes have greatly improved society’s disaster resilience, while adding only about 1% to construction costs relative to 1990 standards. The greatest benefits accrue to communities using the most recent code editions.

For Siskiyou County, the enforcement of building codes is overseen by the Building Department, which is part of the Community Development Department. This department is responsible for reviewing building plans, issuing permits, and conducting inspections to ensure compliance with the California Building Standards Code and any local amendments. The department works to ensure that all construction meets safety and environmental standards.

California Building Standards Commission adopts updated versions of the amended model Building Codes called the California Code of Regulations Title 24 every three years. Effective January 1, 2023, the following Building Codes are currently in effect and must be consulted in the preparation of construction plans.

- 2022 California Building Administrative Code, Title 24, Part 1
- 2022 California Building Code, Title 24, Volumes 1 and 2, Part 2
- 2022 California Residential Code, Title 24, Part 2.5
- 2022 California Electrical Code, Title 24, Part 3
- 2022 California Mechanical Code, Title 24, Part 4
- 2022 California Plumbing Code, Title 24, Part 5
- 2022 California Energy Code, Title 24, Part 6
- 2022 California Historical Code, Title 24, Part 8
- 2022 California Fire Code, Title 24, Part 9
- 2022 California Existing Building Code, Title 24, Part 10
- 2022 California Green Building Standards Code, Title 24, Part 11
- 2022 California Referenced Standards Code, Title 24, Part 12
- 1997 Edition Uniform Housing Code, published by the International Conference of Building Officials
- 1997 Uniform Code for the Abatement of Dangerous Buildings, published by the International Conference of Building Officials
- 1997 Uniform Administrative Code, published by the International Conference of Building Officials
- 1997 Uniform Sign Code, published by the International Conference of Building Officials
- Title 25, Housing and Community Development

In general, Siskiyou County and all participating jurisdictions require building permits for the following activities:

- Construction
- Manufactured home placement
- New Utility service/meter relocation/service upgrade
- Grading-Solar panels
- Accessory structures
- Additions

- Roofs
- Wells
- Demolition

As part of this planning effort, both Siskiyou County and participating jurisdiction personnel charged with regulating or overseeing development were given the opportunity to review and comment of the elements of this plan. Please note that not all counties have building or zoning departments. The following personnel involved in regulating development were identified:

Table 19: Participating Jurisdiction Building Department Representatives

Jurisdiction	Name	Title
Siskiyou County	Glenn Shockency	Deputy Director / Building Official
Dorris	Steve Sluss (Contracted)	Building Inspector/Code Enforcement
Dunsmuir	Leo DePaola (Contracted)	Building Inspector
Etna	Dan Burbank	Director of Public Works
Fort Jones	Glenn Shockency (County)	Deputy Director / Building Official
Happy Camp CSD	Glenn Shockency (County)	Deputy Director / Building Official
Lake Shastina CSD	Glenn Shockency (County)	Deputy Director / Building Official
McCloud CSD	Glenn Shockency (County)	Deputy Director / Building Official
Montague	Vacant	Code Enforcement Officer
Mt. Shasta	Leo DePaola	Building Official
Tulelake	Steve Sluss (Contracted)	City Building Inspector
Weed	Steve Sluss (Contracted)	Building Inspector/Code Enforcement
Yreka	James McIntyre	Building Inspector

The following details relevant municipal code sections for building codes for participating jurisdictions:

- Siskiyou County Code of Ordinances: Title 9: Building Regulations.
- Dorris Municipal Code Title 15: Buildings and Construction
- Dunsmuir Code of Ordinances Title 15: Buildings and Construction
- Etna Municipal Code Title 15: Buildings and Construction
- Fort Jones Code of Ordinances: Buildings and Construction
- Happy Camp CSD follows county ordinance
- Lake Shastina follows county ordinance
- McCloud CSD follows county ordinance
- Montague Municipal Code Title 15: Buildings and Construction
- Tulelake Municipal Code Title 15: Buildings and Construction
- Mt. Shasta Municipal Code Title 15: Buildings and Construction
- Weed Code of Ordinances Title 16: Buildings and Construction
- Yreka Code of Ordinances Title 11: Buildings and Construction

Zoning Ordinances

Zoning ordinances in Siskiyou County govern land use, development, and building requirements. These ordinances work by dividing the land into different zoning districts and establishing rules and guidelines for land use, building placement, density, and setback within the zoning districts. In general, zoning ordinances establish:

- **Zoning districts:** Areas designated for specific types of land use, such as residential, commercial, industrial, agricultural, mixed-use, or special districts.
- **Land usage within a zoning district:** Specifications as to which activities, buildings, and operations are permitted in each zoning district.

- **Enforcement:** Zoning ordinances are enforced by the local building department or zoning enforcement officers.

Zoning is the traditional, and most common, tool available to local jurisdictions to control the use of land. Zoning is used to promote health, safety, and the general welfare of the community. Zoning is used to dictate the type of land use and to set minimum specifications for use such as lot size, building height and setbacks, and density of population.

Zoning ordinances play a significant role in enhancing hazard resilience for communities and can help reduce vulnerability to various natural and man-made hazards by regulating land use and development practices. In Siskiyou County, locally instituted and enforced zoning ordinances provide for:

- **Land Use Planning:** Zoning ordinances designate land use zones within a community, ensuring that certain areas are reserved for particular uses. This can prevent the construction of critical infrastructure, homes, or businesses in high-risk zones, such as floodplains or wildfire-prone areas.
- **Setback Requirements:** Zoning ordinances often mandate specific setbacks, which are distances between structures and property lines or natural features. These setbacks can help prevent buildings from being too close to potential hazards, potentially reducing the risk of damage.
- **Building Height and Design Standards:** Zoning codes can establish building height limits to reduce exposure to certain hazards. Design standards, including materials and construction methods, can be specified to make structures more resilient.
- **Floodplain Management:** Many zoning ordinances incorporate floodplain regulations, which dictate where and how buildings can be constructed within flood-prone areas. These regulations may require buildings to be elevated, use flood-resistant materials, or include openings to allow floodwater to pass through.

Properly applied, zoning restriction is one of the most effective hazard mitigation tools available.

The following details the relevant municipal code sections for planning and zoning ordinances for Siskiyou County and participating jurisdictions:

- Siskiyou County Code of Ordinances: Title 10: Planning and Zoning.
- Dorris Municipal Code Title 18: Zoning
- Dunsmuir Code of Ordinances Title 17: Zoning
- Etna Municipal Code Title 17: Zoning
- Fort Jones Code of Ordinances Title 18: Zoning
- Montague Municipal Code Title 17: Zoning
- Mt. Shasta Municipal Code Title 18: Zoning
- Tulelake Municipal Code Title 17: Zoning
- Weed Code of Ordinances Title 18: Zoning
- Yreka Code of Ordinances Title 16: Zoning

Floodplain Management Ordinances

Floodplain ordinances and management are one of the most effective hazard mitigation tools available against flooding. Local floodplain ordinances, required for NFIP participants, are often used to prevent inappropriate development in floodplains and to reduce flood hazards. In general, they allow the jurisdiction to:

- Minimize the extent of floods by preventing obstructions that inhibit water flow and increase flood height and damage.
- Prevent and minimize loss of life, injuries, and property damage in flood hazard areas.
- Promote the public health, safety and welfare of citizens in flood hazard areas.
- Manage planned growth.

EXHIBIT C

- Grant permits for use in development within special flood hazard areas that are consistent with the community ordinance and the NFIP under 44 CFR 60.3.

The NFIP floodplain management regulations work alongside local building codes by providing specific flood-related requirements that must be met in addition to general building code standards. In NFIP communities, when constructing or substantially improving a structure in a Special Flood Hazard Area, the structure must be elevated to or above the Base Flood Elevation, which is a requirement imposed by the NFIP's regulations. The following details the relevant municipal code sections for floodplain management for Siskiyou County and participating jurisdictions. Please note that not all participating jurisdictions have floodplain management codes or ordinances:

- Siskiyou County Code of Ordinances Title 10, Chapter 10: Flood Damage Prevention
- Dunsmuir Code of Ordinances Title 19: Flood Damage Prevention
- Etna Municipal Code Title 14: Flood Damage Prevention
- Fort Jones Code of Ordinances Chapter 18.56: Flood Damage Prevention
- Montague Municipal Code Chapter 15.16: Flood Damage Prevention
- Weed Code of Ordinances Chapter 16.20: Floodplain Management
- Yreka Code of Ordinances Chapter 16.12.510: Floodplain

Additionally, the following State of California Assembly Bills apply to floodplain management:

- Assembly Bill 70: Flood Liability: A city or county may be required to partially compensate for property damage caused by a flood if it unreasonably approves new development in areas protected by a State flood control project.
- Assembly Bill 162: Flood Planning: Cities and counties must address flood-related matters in the land use, conservation, safety, and housing elements of their general plans.

Wildfire Management Ordinances

Currently, homeowners in Siskiyou County are encouraged, but not required, by Siskiyou County or participating jurisdiction code or ordinance to maintain defensible space around their properties, with the exception of the City of Dunsmuir and the City of Yreka. This includes removing dead plants, clearing low branches, spacing tree crowns, and using fire-resistant materials in home construction. These measures help reduce the likelihood of homes igniting during a wildfire.

The following details the relevant municipal code section for wildfire management for the City of Dunsmuir and the City of Yreka. These sections provide for the removal of hazardous vegetation and combustible material from improved and unimproved properties situated in the city and outlines defensible space requirements:

- Dunsmuir Code of Ordinances Chapter 8.05: Hazardous Vegetation and Combustible Material Abatement
- Yreka Code of Ordinances Title 9 – Public Pece, Safety, and Morals

The State of California has adopted defensible space requirement. Defensible space laws and building codes for the State of California outline the minimum standards, but the requirements may vary depending on factors such as proximity to wildland areas, slope steepness, the presence of combustible materials on the property, home hardening measures, and local defensible space ordinances. The following California regulations relate to wildfire defensible space requirements:

- Public Resource Code § 4291
- 14 California Code of Regulations § 1299.02
- 14 California Code of Regulations § 1299.03
- Assembly Bill 3074 (Full enforcement on new construction anticipated to be in 2025, and full enforcement on existing structures anticipated to be in 2026).

EXHIBIT C

Additionally, the following State of California Assembly Bills and Senate Bills are related to wildfire management and mitigation:

- **Assembly Bill 38:** Provides mechanisms to develop best practices for community-wide resilience against wildfires through home hardening, defensible space, and other measures.
- **Assembly Bill 1823:** Facilitates fuel reduction and other forest health projects.
- **Assembly Bill 9:** Fire safety: Fire Adapted Communities: Wildfire Hazard Establishes the Regional Forest and Fire Capacity Program to support regional leadership to build local and regional capacity and develop, prioritize, and implement strategies and projects that create fire adapted communities and landscapes by improving watershed health, forest health, community wildfire preparedness, and fire resilience.
- **Assembly Bill 38:** Fire safety: Low-Cost Retrofits: Regional Capacity Review: Wildfire Hazard Directs the California Natural Resources Agency to review the regional capacity of each county that contains a very high fire hazard severity zone and establishes a comprehensive wildfire mitigation and assistance program.
- **Assembly Bill 380:** Forestry: Priority Fuel Reduction Projects: Requires CAL FIRE to identify priority fuel reduction projects annually and exempts the identified priority fuel reduction projects from certain legal requirements.
- **Assembly Bill 497:** Forestry and Fire Protection: Local Assistance Grant Program: Fire Prevention Activities: Street and Road Vegetation Management: Appropriates funds for local assistance grants for fire prevention activities with priority for projects that manage vegetation along streets and roads to prevent wildfire ignition
- **Assembly Bill 575:** Civil Liability: Prescribed Burning Activities: Gross Negligence: Provides that a private entity engaging in a prescribed burning activity that is supervised by a person certified as burn boss is liable for damages to a third party only if the prescribed burning activity was carried out in a grossly negligent manner.
- **Assembly Bill 642:** Wildfires: Makes changes to support cultural and prescribed fire, including the creation of a Cultural Burning Liaison at CAL FIRE, and requires a proposal for creating a prescribed fire training center.
- **Government Code Section 65302.5:** Any county that has State Responsibility Areas or a very high fire hazard severity zone within its boundaries must submit a copy of the proposed safety element of a general plan to any agency with responsibility for fire protection in the county prior to adoption or amendment.
- **Senate Bill 1241:** Land use: general plan: safety element: fire hazard impacts: Mandates wildfire planning responsibilities of local governments that have jurisdiction in State Responsibility Areas and Very High Fire Hazard Severity Zones.

Code and Ordinance Summary

The following table indicates the status of the above enumerated codes and ordinances for participating jurisdictions:

Table 20: Participating Jurisdiction Codes and Ordinances

Jurisdiction	Building Code*	Floodplain Ordinance	Zoning Ordinance	Wildfire Ordinance
Siskiyou County	x	x	x	
Dorris	x		x	
Dunsmuir	x	x	x	x
Etna	x	x	x	
Montague	x	x	x	
Fort Jones	x	x	x	
Happy Camp CSD	x			
Lake Shastina CSD	x			
McCloud CSD	x			
Mt. Shasta	x		x	
Tulelake	x		x	
Weed	x	x	x	
Yreka	x	x	x	x

*: May be administered by county

4.4 Jurisdictional Plans

Planning plays a critical role in hazard mitigation by helping communities identify, assess, and reduce risks associated with natural and man-made hazards. Effective planning involves a proactive, strategic, and comprehensive approach to minimize the impact of disasters and enhance community resilience. Jurisdictions were asked if they had completed the following plans:

- **Capital Improvement Plan:** Allocates funding for infrastructure projects, including those that enhance resilience, such as stormwater management systems and seismic retrofits.
- **Community Wildfire Protection Plan**: Focused on reducing wildfire risks, this plan involves community input and includes strategies for fuel reduction, public education, and emergency response improvements.
- **Climate Action Plan:** Addresses climate-related risks by integrating mitigation and adaptation strategies to reduce the impacts of climate change.
- **Comprehensive Plan:** A comprehensive plan establishes the overall vision for a jurisdiction and serves as a guide to decision making, and generally contains information on demographics, land use, transportation, and facilities. As a comprehensive plan is broad in scope the integration of hazard mitigation measures can enhance the likelihood of achieving risk reduction goals.
- **Emergency Operations Plan:** An emergency operations plan outlines the responsibility and means and methods by which resources are deployed during and following an emergency or disaster. In Siskiyou County, the overarching county provides emergency operation planning for jurisdictions within its borders.
- **Floodplain Management Plan:** This plan aims to manage flood risks through zoning, building codes, and public education, often in coordination with FEMA's NFIP.
- **Land Use and Zoning Plan:** These plans regulate development to minimize exposure to hazards, such as restricting construction in flood-prone or wildfire-prone areas.

The following table details the status of these plan types for Siskiyou County:

Table 21: Siskiyou County Plans

Plan	Plan Name	Maintained by
Comprehensive Plan	Siskiyou County General Plan	Siskiyou County Planning Department
Emergency Operations Plan	Siskiyou County Emergency Operations Plan	SCOES
Community Wildfire Protection Plan	Community Wildfire Protection Plan - Siskiyou County Addendum	Fire Safe Council
Floodplain Management Plan	Siskiyou County Flood Management Plan	Flood Control and Water Conservation District
Land Use Plan	Siskiyou County General Plan	Siskiyou County Planning Department
Zoning Plan	Siskiyou County General Plan	Siskiyou County Planning Department
Climate Action Plan	Climate Resiliency Plan	Siskiyou Climate Collaborative
Capital Improvement Plan	Siskiyou County General Plan	Siskiyou County Planning Department

Participating Jurisdiction Plan Summary

The following table indicates the status of the above enumerated plans for participating jurisdictions. Please note that some of these are umbrella plans from Siskiyou County providing coverage to the community:

Table 22: Participating Jurisdiction Plans

Jurisdiction	Capital Improve	Climate Action*	Community Wildfire Protection*	Comprehensive	Emergency Operations*	Floodplain Management	Land Use and Zoning
Siskiyou County	x	x	x	x	x	x	x
Dorris	x	x	x	x	x		
Dunsmuir	x	x	x	x	x	x	x

EXHIBIT C

Table 22: Participating Jurisdiction Plans

Jurisdiction	Capital Improve	Climate Action*	Community Wildfire Protection*	Comprehensive	Emergency Operations*	Floodplain Management	Land Use and Zoning
Etna		x	x	x	x	x	
Fort Jones		x	x	x	x	x	x
Happy Camp CSD			x		x		
Lake Shastina CSD			x		x		
McCloud CSD			x		x		
Montague		x	x	x	x		
Mt. Shasta	x	x	x	x	x		x
Tulelake		x	x	x	x		
Weed		x	x	x	x	x	x
Yreka	x	x	x	x	x	x	x

*: May be under county plan

4.5 Financial Capabilities

Siskiyou County is recognized by the California Constitution as a Charter County. In general, Charter Counties operate under a charter which gives them greater flexibility in governing themselves, including setting up their own systems for budgeting, taxation, and financial management. This can allow for more innovative or tailored financial practices.

Siskiyou County and all participating jurisdictions can raise revenue through the application of a tax, an assessment, or a fee, each approved by a distinct constitutional and statutory authority. The differences between a tax, assessment, and fee are primarily related to their purpose and how they are imposed:

- **Tax:** A mandatory financial charge imposed by a government on individuals or entities to generate revenue for public services, such as schools, roads, and public safety. Taxes are broad and general in nature.
- **Assessment:** A charge levied on property owners to fund specific local improvements that benefit their property, like road paving or sewer systems. It is usually proportional to the benefit received.
- **Fee:** A charge for a specific service provided by the government, such as a building permit, park entry, or utility connection. Fees are usually voluntary and paid directly by the user of the service.

Additionally, Siskiyou County and all participating jurisdictions can borrow money in a number of different ways, generally used as a means of financing large projects such as infrastructure and buildings. Major methods include:

- **General Obligation Bonds:** General obligation bonds have been the traditional form of financing for capital projects such as land acquisition, park development, and transportation projects that are owned and operated by the county. In general, repayment is guaranteed by both tax revenue and operating revenue.
- **Revenue Bonds:** Generally used to finance water and wastewater projects, airports, and stormwater systems. Payment for debt service on revenue bonds comes from user fees generated by the capital facility that is being built.
- **Local Improvement District Bonds:** When a capital project is going to primarily benefit a subset of the population, a Local Improvement District can be formed. Local Improvement Districts are commonly used for projects such as street improvements, water and sewer systems, and the burying of power lines. Bond payment is through an assessment to property owners in the improvement district.

Concerning hazard mitigation, Siskiyou County and all participating jurisdictions have numerous avenues to fund potential projects, including:

- **Grants:** Siskiyou County can apply for state and federal grants for hazard mitigation projects through myriad programs.

EXHIBIT C

- **Bond Issuance:** Siskiyou County can issue bonds to finance large-scale mitigation projects, such as infrastructure upgrades.
- **Public-Private Partnerships:** Siskiyou County can collaborate with private entities to fund and implement mitigation measures.
- **Reserves and General Funds:** Siskiyou County may allocate funds from their general budget or reserves for mitigation activities.

Participating Jurisdiction Financial Capability Summary

The following table indicates the status of the above enumerated financial capabilities for participating jurisdictions:

Table 23: Participating Jurisdiction Financial Capabilities

Jurisdiction	Tax	Assessment	Fee	Grant Application	Public-Private Partnership	Reserves and General Funds
Siskiyou County	x	x	x	x	x	x
Dorris	x	x	x	x	x	x
Dunsmuir	x	x	x	x	x	x
Etna	x	x	x	x	x	x
Fort Jones	x	x	x	x	x	x
Happy Camp CSD	x	x	x	x	x	x
Lake Shastina CSD	x	x	x	x	x	x
McCloud CSD	x	x	x	x	x	x
Montague	x	x	x	x	x	x
Mt. Shasta	x	x	x	x	x	x
Tulelake	x	x	x	x	x	x
Weed	x	x	x	x	x	x
Yreka	x	x	x	x	x	x

4.6 Community-Based Classifications and Hazard Education Programs

The following community-based classifications attest to the continued investment in community resilience.

Public Protection Classification

An Insurance Services Office (ISO) Fire Suppression Rating, officially known as the Public Protection Classification rating, is a score given to evaluate the fire protection capabilities of a community. This ISO Fire Suppression Rating assesses how well-equipped a local fire department is to respond to fires, which can impact insurance premiums for homeowners and businesses within that community. Key components of the ISO Fire Suppression Rating include:

- **Emergency Communications:** This evaluates the community's emergency call center and dispatch system. The speed and efficiency of handling emergency calls are critical factors.
- **Fire Department:** The number, training, and equipment of the firefighters are assessed. This includes the department's ability to handle fires, the number of engines, distance to nearest fire apparatus, and the availability of water supply.
- **Water Supply:** The availability and reliability of water sources, such as hydrants and water mains, are evaluated. This also includes the volume of water available for firefighting.
- **Community Risk Reduction:** This includes fire prevention efforts, public fire safety education, and building code enforcement. Effective risk reduction programs can positively impact the ISO rating.

The ISO Fire Suppression Rating is given on a scale from 1 to 10, with a Class 1: rating representing the best public protection and superior fire protection services and a Class 10 rating indicating that the community’s fire protection does not meet ISO's minimum standards. A better (lower) ISO Fire Suppression Rating can lead to lower insurance premiums for property owners because it indicates a lower risk of fire damage.

The following table details ISO Fire Suppression Rating for program participants:

Table 24: Participating Jurisdiction Community ISO Ratings

Name	ISO Rating
Dunsmuir	3/3Y
Fort Jones	4/4Y
Lake Shastina CSD	3/3X
Tulelake	3
Yreka	3

Source: Insurance Services Office and local jurisdictions

Firewise USA Program

The Firewise USA program is a national initiative designed to help communities at risk from wildfires take proactive steps to reduce their vulnerability. Managed by the National Fire Protection Association, the program encourages local solutions for wildfire safety by involving homeowners, community leaders, and other stakeholders in reducing fire risks. Key elements of the program include:

- **Community Engagement:** The program focuses on encouraging communities to work together to develop and implement plans that reduce the risk of wildfire damage. This includes organizing community events, educational workshops, and fire preparedness activities.
- **Risk Assessment:** The program helps communities assess their wildfire risk by identifying vulnerable areas, such as overgrown vegetation or homes with flammable roofing materials. Communities then create a plan to address these risks.
- **Mitigation Actions:** The program encourages property owners to take specific actions to make their homes and surroundings more fire-resistant. These actions might include clearing brush and dead trees, using fire-resistant building materials, and creating defensible space around homes.
- **Education and Resources:** The program provides educational materials and resources to help communities understand wildfire risks and the steps they can take to mitigate them. This includes guidelines for homeowners, tips for creating fire-resistant landscapes, and strategies for community preparedness.
- **Community Cohesion:** The program fosters a sense of shared responsibility and cooperation among community members, which can enhance overall preparedness and resilience.
- **Potential Insurance** Discounts: Some insurance companies offer discounts to homeowners in recognized Firewise communities, reflecting the reduced risk of wildfire damage.

While Siskiyou County is not in the Firewise USA program, one jurisdiction within the county, the City of Dunsmuir, is a participant as of July 23, 2024.

StormReady Community

The StormReady program is a community preparedness initiative developed by the NWS to enhance the ability to prepare for and respond to severe weather events. The goal of StormReady is to help communities develop comprehensive weather safety plans that save lives and protect property. Key Components of the program include:

- **Establishing Warning Systems:** Communities must have multiple ways to receive severe weather warnings and alert the public. This can include NOAA Weather Radios, emergency alert systems, and local broadcast media.
- **Emergency Operations Center:** A designated location where emergency managers and public officials can monitor weather conditions and coordinate responses.
- **Public Education Programs:** Communities in this program must promote weather safety and preparedness through public outreach, including safety fairs, school programs, and distributing weather information materials.
- **Training:** Community leaders and emergency managers undergo training on how to prepare for, respond to, and recover from severe weather.

- **Advanced Monitoring Systems:** Communities are required to monitor local weather conditions in real-time, often using local spotters, weather stations, and other technology to keep track of changing weather patterns.
- **Formal Emergency Plans:** Communities must develop and maintain formal plans for responding to various types of severe weather, including hurricanes, tornadoes, floods, and winter storms. These plans should detail evacuation routes, shelter locations, and post-disaster recovery strategies.
- **Collaboration with the NWS:** Communities work closely with their local NWS office to ensure they have the latest information and resources for weather preparedness and response.
- **Potential Insurance Benefits:** Some insurance providers may offer benefits or discounts to communities that are StormReady certified, reflecting the reduced risk of weather-related damage.

Siskiyou County is a StormReady county. The City of Dunsmuir is currently working to achieve StormReady certification, and is expected to receive the designation in February of 2025

4.7 Special Districts Mitigation Capabilities

Special districts are defined by the California Special Districts Association as "local governments created by the people of a community to deliver specialized services essential to their health, safety, economy, and well-being. A community forms a special district, which are political subdivisions authorized through a state's statutes, to provide specialized services the local city or county do not provide." Special districts have several mitigation capabilities:

- **Infrastructure Development and Maintenance:** They can build and maintain infrastructure like levees, drainage systems, or firebreaks to reduce the impact of natural hazards.
- **Emergency Services:** Some districts manage fire protection, flood control, or emergency medical services, which are critical in disaster response and mitigation.
- **Land Use and Zoning:** They can enforce zoning regulations that limit development in high-risk areas.
- **Public Education and Outreach:** Special districts often provide information and resources to help communities prepare for and respond to hazards.
- **Collaboration:** They often work with local, state, and federal agencies to coordinate mitigation efforts and share resources.

Each special district has distinctive mitigation capabilities based on areas of service.

Community Services Districts have a range of mitigation capabilities that help them manage and reduce risks from natural and human-made hazards. These capabilities include:

- **Water and Wastewater Management:** Community Services Districts often manage local water supplies and wastewater systems. This includes maintaining infrastructure to ensure it is resilient to hazards like droughts, floods, and contamination events. They may implement water conservation programs and develop emergency water supply plans.
- **Fire Protection Services:** In some areas, Community Services Districts provide fire protection services, including firefighting, emergency response, and fire prevention programs. They can also be involved in vegetation management and fuel reduction projects to mitigate wildfire risks.
- **Emergency Preparedness and Response:** Community Services Districts play a role in local emergency management by coordinating response efforts, maintaining emergency shelters, and educating the community on disaster preparedness. They may also develop and implement local emergency plans.
- **Parks and Recreation Management:** Community Services Districts that manage parks and recreational areas can contribute to hazard mitigation by maintaining open spaces that serve as natural buffers against flooding and wildfire. They can also retrofit park facilities to withstand hazards.
- **Infrastructure Maintenance:** Community Services Districts are responsible for maintaining and upgrading infrastructure, including roads, stormwater systems, and public buildings. This includes ensuring these structures are resilient to hazards such as earthquakes, floods, and severe weather.

- **Community Outreach and Education:** Community Services Districts often engage with the community through outreach and education programs, promoting awareness of local hazards and encouraging residents to take steps to mitigate risks.

Fire Protection District mitigation capabilities include:

- **Fire Prevention Programs:** They conduct inspections, enforce fire codes, and promote fire-safe practices within communities.
- **Hazardous Fuels Management:** Fire districts manage vegetation to reduce fuel loads, including controlled burns and clearing brush, to prevent the spread of wildfires.
- **Emergency Response Planning:** They develop and implement response plans for wildfires, floods, and other emergencies, ensuring quick and effective action.
- **Public Education:** Fire districts educate residents on fire safety, evacuation procedures, and emergency preparedness.
- **Infrastructure Protection:** They work to protect critical infrastructure and buildings by ensuring compliance with building codes and fire-resistant construction practices.

Flood Control and Water Conservation District mitigation capabilities include:

- **Flood Control:** They manage reservoirs, levees, and drainage systems to prevent or reduce flooding.
- **Water Supply Management:** Water districts ensure the stability and reliability of water supplies during droughts or emergencies by implementing conservation measures and diversifying water sources.
- **Infrastructure Resilience:** They maintain and upgrade water infrastructure to withstand hazards like earthquakes, storms, and wildfires.
- **Emergency Response:** Water districts develop and implement emergency response plans to quickly address disruptions in water services due to natural hazards.
- **Public Education:** They educate the community on water conservation, hazard preparedness, and response strategies.

Irrigation districts possess several key mitigation capabilities that help manage and reduce risks related to water resources, natural hazards, and agricultural sustainability:

- **Water Management and Conservation:** Irrigation districts manage the delivery and allocation of water resources, ensuring efficient use during droughts or water shortages. They implement water conservation practices, such as efficient irrigation techniques, to reduce water waste and improve resilience to drought conditions.
- **Flood Control:** By managing reservoirs, canals, and other water infrastructure, irrigation districts can play a significant role in flood control. They help regulate water flow, prevent overflow during heavy rainfall, and reduce the risk of flooding in agricultural and nearby residential areas.
- **Infrastructure Resilience:** Irrigation districts maintain and upgrade water delivery systems, including canals, pipelines, and storage facilities, to ensure they are resilient to natural hazards like earthquakes, floods, and extreme weather events. This includes retrofitting aging infrastructure to withstand potential damage.
- **Soil and Erosion Control:** These districts may implement soil conservation practices, such as controlling erosion along canals and managing sedimentation in reservoirs, which helps protect water quality and prevent land degradation.
- **Drought Response Planning:** Irrigation districts often develop and implement drought response plans, which may include water rationing, prioritization of water use, and alternative water supply strategies. This helps ensure a stable water supply during prolonged dry periods.

- **Community and Farmer Education:** They provide education and outreach programs to farmers and community members on best practices for water management, conservation, and hazard preparedness, helping to foster a more resilient agricultural community.
- **Collaborative Resource Management:** Irrigation districts often collaborate with local, state, and federal agencies to develop comprehensive water management strategies, participate in watershed management programs, and contribute to regional hazard mitigation efforts.

Recreation and Parks Districts have several mitigation capabilities that help reduce risks and enhance community resilience:

- **Open Space Management:** By maintaining parks and open spaces, these districts provide natural buffer zones that can absorb floodwater, reduce erosion, and lower wildfire risks.
- **Public Education:** Districts can offer educational programs and workshops on disaster preparedness, fire safety, and environmental stewardship, which help communities understand and reduce risks.
- **Infrastructure Improvements:** Recreation and parks districts can enhance facilities to be more resilient to hazards, such as installing flood-resistant features in parks, using fire-resistant materials in buildings, and designing open spaces that reduce heat islands.
- **Community Gathering Spaces:** Parks and recreational facilities can serve as emergency shelters or staging areas during disasters, providing critical support during and after events.
- **Habitat Restoration:** Districts often engage in habitat restoration projects that can mitigate hazards like flooding and erosion by restoring natural landscapes and improving ecosystem health.
- **Collaborative Planning:** Recreation and parks districts often work with local governments, emergency services, and other organizations in planning efforts, ensuring that parks and recreational spaces are integrated into broader hazard mitigation and emergency response plans.

Resource Conservation Districts have several mitigation capabilities focused on natural resource management and environmental conservation. These capabilities include:

- **Soil and Water Conservation:** Resource Conservation Districts implement erosion control measures, manage watershed health, and promote sustainable agricultural practices to reduce the risk of soil degradation and water contamination, which can mitigate flood risks.
- **Wildfire Mitigation:** Resource Conservation Districts work on fuel reduction projects, create defensible space around communities, and restore fire-adapted ecosystems to reduce wildfire risks. They often collaborate with local fire agencies and landowners on these projects.
- **Flood Management:** Resource Conservation Districts participate in the planning and implementation of flood control projects, such as streambank stabilization and riparian restoration, which help manage floodwaters and reduce the impact of floods on communities.
- **Habitat Restoration:** By restoring natural habitats, RCDs help to maintain biodiversity and ecosystem services, which can improve the resilience of natural landscapes to hazards like wildfires, floods, and droughts.
- **Education and Outreach:** Resource Conservation Districts provide technical assistance, training, and educational programs to landowners, farmers, and the public on best practices for resource conservation and hazard mitigation.
- **Sustainable Land Use Planning:** Resource Conservation Districts often assist in developing land use plans that incorporate conservation practices, which can mitigate the impact of natural hazards by preserving open spaces and protecting critical habitats.

The above enumerated capabilities allow special districts to play a crucial role in reducing risks and enhancing community resilience against natural hazards. The following table lists relevant special districts within Siskiyou County:

Table 25: Siskiyou County Special Districts

District Type	Special District Name	Activities
Community Services	Callahan Water District	Water Enterprise
Community Services	Happy Camp Community Services District	Water Enterprise, Lighting and Lighting Maintenance Enterprise, Recreation and Park Enterprise
Community Services	Hornbrook Community Service District	Water Enterprise
Community Services	Lake Shastina Community Services District	Ambulance Service, Drainage and Drainage Maintenance, Fire Protection, Library Services, Lighting and Lighting Maintenance, Pest Control, Police Protection and Personal Safety, Recreation and Park, Streets and Roads - Construction and Maintenance, Underground Electric and Communication Facilities, Governmental Services, Water Enterprise, and Sewer Enterprise
Community Services	McCloud Community Services District	Ambulance Service, Fire Protection, Library Services, Lighting and Lighting Maintenance, Recreation and Park, Streets and Roads - Construction and Maintenance, Solid Waste Enterprise, Water Enterprise, Sewer Enterprise
Community Services	Tennant Community Services District	Solid Waste Enterprise, Water Enterprise, Sewer Enterprise, Fire Protection Enterprise, Lighting and Lighting Maintenance Enterprise
County Water	Sawyers Bar County Water District	Water Enterprise
Fire Protection	Butte Valley Fire Protection	Fire Protection
Fire Protection	Copco Lake Fire Protection District	Fire Protection
Fire Protection	Dunsmuir Fire Protection District	Fire Protection
Fire Protection	Gazelle Fire Protection District	Fire Protection
Fire Protection	Grenada Fire Protection District	Fire Protection
Fire Protection	Happy Camp Fire Protection District	Fire Protection
Fire Protection	Hornbrook Fire Protection District	Fire Protection
Fire Protection	Mayten Fire Protection District	Fire Protection
Fire Protection	Montague Fire Protection District	Fire Protection
Fire Protection	Mt. Shasta Fire Protection District	Fire Protection
Fire Protection	Scott Valley Fire Protection District	Fire Protection
Fire Protection	South Yreka Fire Protection District	Fire Protection
Fire Protection	Tulelake Multi - County Fire Protection District	Fire Protection
Irrigation	Big Springs Irrigation District	Water Enterprise

EXHIBIT C

Table 25: Siskiyou County Special Districts

District Type	Special District Name	Activities
Irrigation	Butte Valley Irrigation District	Water Enterprise
Irrigation	Grenada Irrigation District	Water Enterprise
Irrigation	Montague Water Conservation District	Water Enterprise
Irrigation	Scott Valley Irrigation District	Water Enterprise
Irrigation	Tulelake Irrigation District	Water Enterprise
Recreation and Park	Dunsmuir Recreation and Park District	Recreation and Park
Recreation and Park	Mt. Shasta Recreation and Park District	Recreation and Park
Recreation and Park	Weed Recreation and Park District	Recreation and Park
Resource Conservation	Shasta Valley Resource Conservation District	Resource Conservation
Resource Conservation	Siskiyou Resource Conservation District	Resource Conservation
School District	Butte Valley Unified School District	Education
School District	Dunsmuir School District	Education
School District	Scott Valley Unified School District	Education
School District	Siskiyou Union High School District	Education
School District	Yreka Union High School District	Education

4.8 Jurisdictional Compliance with NFIP

Siskiyou County NFIP participating communities are committed to continued involvement and compliance. To help facilitate compliance, NFIP participating communities:

- Meet the minimum standards set forth in the program.
- Adopted floodplain regulations through local ordinance.
- Enforce floodplain ordinances through building restrictions.
- Regulate new construction in Special Flood Hazard Areas as outlined in their floodplain ordinance.
- Utilize FEMA DFIRMs, where available.
- Monitor floodplain activities.

A community's NFIP coordinator plays a crucial role in managing and implementing floodplain management activities to reduce flood risk. Their responsibilities typically include:

- **Administering Floodplain Regulations:** Ensuring the community complies with NFIP standards by enforcing local ordinances and building codes in designated flood-prone areas.
- **Assisting Property Owners:** Providing guidance on flood insurance requirements, helping residents understand their flood risk, and facilitating access to NFIP insurance.
- **Maintaining Flood Maps:** Keeping and updating FIRMs to reflect current flood risks and communicating changes to stakeholders.
- **Coordinating Flood Risk Reduction Efforts:** Collaborating with federal, state, and local agencies to implement flood mitigation strategies and projects.

- **Community Outreach:** Educating the public about flood hazards, mitigation measures, and the importance of flood insurance coverage.

By fulfilling these duties, NFIP coordinators help reduce flood damage and promote community resilience. The following represent NFIP coordinators for each participating community within Siskiyou County:

Table 26: NFIP Coordinators

Jurisdiction	Department	Name	Title
Siskiyou County	Flood Control District	Joy Hall	Director
Dunsmuir	Building Department	Leo DePaola (Contracted)	Building Inspector
Etna	Public Works	Dan Burbank	Director of Public Works
Fort Jones	Building Department	Glenn Shockency (County)	Deputy Director / Building Official
Montague	Building Department	Vacant	Code Enforcement Officer
Weed	Building Department	Steve Sluss (Contracted)	Code Enforcement
Yreka	Public Works	Matt Bray	Director

Participation in the NFIP is based on an agreement between the participating community and the federal government. If a community agrees to adopt and enforce a floodplain ordinance designed to reduce future flood risks, all citizens in the participating community can purchase flood insurance. In Siskiyou County, as part of NFIP participation, NFIP communities must:

- Use current NFIP flood maps in adopting floodplain management regulations.
- Require permits and regulate development in SFHAs.
- Ensure that development does not increase the flood hazard on other properties.
- Meet current elevation standards. Ensuring the lowest occupied floor is elevated to or above the base flood elevation indicated on the NFIP flood map.

Siskiyou County jurisdictions Dorris, Mt. Shasta, and Tulelake currently do participate in the NFIP. Reasons for current non-participation include the requirement of adopting and enforcing floodplain management regulations, maintaining records, and updating flood maps. These smaller jurisdictions, with limited resources, currently find this administrative effort overwhelming. Additionally, these jurisdictions perceive their flood risk as minimal or nonexistent, especially if there are no SFHAs within their jurisdiction. Finally, implementing flood mitigation measures, such as updating infrastructure or adhering to NFIP standards, can be expensive. These jurisdictions have constrained budgets and currently prioritize other needs over NFIP participation. Please note that Community Service Districts are not eligible for participation under current program guidelines.

While most floodplain requirements have been incorporated into the current Building Codes, some additional provisions and regulations may be required by a community. Communities participating in the NFIP are required to adopt, enforce and maintain a local floodplain ordinance as a stipulation of compliance with the program. The purpose of this ordinance is to ensure public safety, minimize impact to people and property from flooding, protect watercourses from encroachment, and maintain the capability of floodplains to retain and carry off floodwaters. The local floodplain coordinator is typically the municipal official responsible for overseeing the enforcement and update of the document.

Siskiyou County jurisdictional floodplain ordinances are typically enforced by law enforcement departments and/or code enforcement offices. For all Siskiyou County NFIP participating communities the enforcement process works as follows:

- **Identification of Violations:** Violations are often identified through various means, such as citizen complaints, routine inspections, or observations by enforcement officers.

EXHIBIT C

- **Notification:** Once a violation is identified, the responsible party is typically notified of the violation. This notification may come in the form of a written citation, warning letter, or verbal communication depending on the severity of the violation and local procedures.
- **Correction Notice:** In many cases, the responsible party is given a certain amount of time to correct the violation. They may be required to remedy the situation, obtain necessary permits, or comply with specific regulations.
- **Follow-up Inspections:** After the designated correction period, enforcement officers may conduct follow-up inspections to ensure that the violation has been addressed satisfactorily.
- **Penalties and Fines:** If the responsible party fails to comply with the ordinance or correct the violation within the specified timeframe, they may face penalties or fines. These penalties can vary depending on the nature and severity of the violation and may escalate for repeated offenses.
- **Legal Action:** In cases of persistent non-compliance or serious violations, local authorities may initiate legal proceedings against the responsible party. This can involve court appearances, injunctions, or other legal measures to compel compliance.

Additionally, FEMA has specific requirements NFIP communities must follow both before (pre-disaster) and after (post-disaster) a flood event. These requirements are designed to mitigate flood risks, promote sustainable development, and ensure eligibility for federal disaster assistance and flood insurance benefits. The following figure represents both pre- and post-disaster NFIP community requirements:

Figure 9: Pre- and Post-Disaster Community NFIP requirements

Source: FEMA

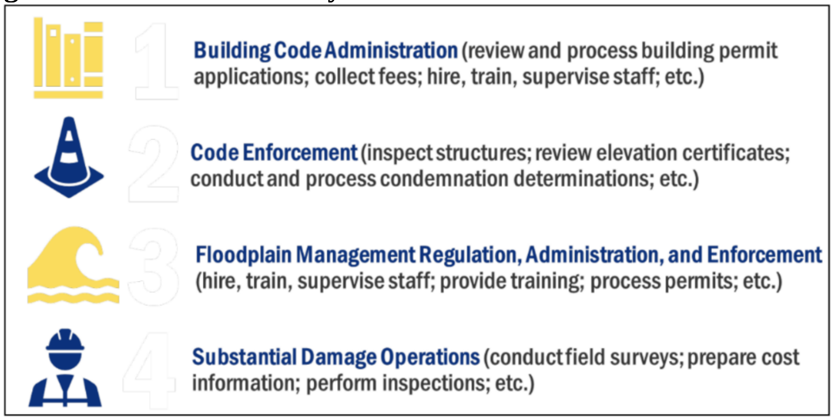
When structures located in the SFHAs are substantially modified (more than 50% damaged or improved) they are required to be brought into compliance with current NFIP standards and local building codes. In cases of repairs being conducted as a result of damage, jurisdictional NFIP coordinators are responsible for substantial damage and improvement determinations. These determinations are required for compliance in the NFIP and must be completed before residents begin repairs or permits are issued.

However, the May 2020 Report to Congressional Committees on the National Flood Insurance Program by the United States Government Accountability indicates “FEMA generally does not collect or analyze the results of these assessments, limiting its ability to ensure the process operates as intended. Furthermore, FEMA has not clarified how communities can access NFIP claims data. Such data would help communities target substantial damage assessments after a flood.” This has been found to be true in Siskiyou County, with submitted information and data underutilized and some FEMA available data unshared and/or unadvertised.

Section 1206 of the Disaster Recovery Reform Act of 2018 authorizes the FEMA to provide communities with the resources to administer and enforce building code and floodplain management ordinances following a major disaster declaration through FEMA’s Public Assistance Program. To be eligible for reimbursement under the Public Assistance Program, including for the Disaster Recovery Reform Act of 2018 Section 1206, communities must be designated for Public Assistance permanent work under a major disaster declaration and be legally responsible to administer and enforce building codes or floodplain management regulations. Communities must also be in good standing with the NFIP. Available assistance includes:

EXHIBIT C

Figure 10: Disaster Recovery Reform Act of 2018 Available Assistance



Source: FEMA

It is worth noting that this assistance is available for a variety of hazards occurrence types, not just flooding.

Key to achieving across the board reduction in flood damages is a robust community assistance, education, and awareness program. As such, Siskiyou County and all NFIP participating jurisdictions will continue to develop both electronic (including social media) and in person outreach activities.

4.9 Challenges and Opportunities for Capability Improvement

As always, challenges exist due to the day-to-day demands of the working environment, including staffing issues, budget restrictions, and staffing turnover. These issues can, and do, impact the utilization and incorporation of the LHMP and the completion of identified hazard mitigation projects.

As part of this planning process, the MPC worked to identify gaps and deficiencies identified in the completion of this LHMP. Resulting from this assessment is a series of problem statements, concise descriptions of issues or challenges that need to be addressed. These problem statements were determined to be applicable to all participating jurisdictions:

- Continued climate change is driving an increased incidence of major hazard occurrences, stressing the response, recovery, and mitigation capabilities of even the most prepared jurisdiction.
- Available funding for the completion of hazard mitigation projects is at a premium, with only occasional room in available budgets for required project match.
- The difficulties in applying for and managing hazard mitigation grants can be a challenge.
- Staffing at all levels is stretched thin, with many personnel wearing multiple hats, compromising mitigation capabilities.

Improving capabilities can lead to enhanced performance, increased efficiency, and better outcomes in hazard mitigation planning and implementation. The following identify recommended improvements:

- Continued instruction should be solicited from Cal OES and FEMA Region IX on grant application and grant management strategies to reflect changing requirements.
- All participating jurisdictions should conduct more extensive educational outreach to all communities, especially vulnerable and underserved communities, on mitigation actions and methodologies
- Participating jurisdictions not in the NFIP should apply for membership,
- Participating NFIP communities should apply for membership in the CRS to allow citizens to receive discounts off their federally backed flood insurance policies.
- Participating jurisdictions who are not current participants should apply for membership in the Firewise USA program.
- Participating jurisdictions without an ISO Fire Suppression Rating should apply for a rating.

EXHIBIT C

- Siskiyou County and participating jurisdictions should continue to explore and engage in public-private emergency planning partnerships to further increase hazard resiliency through the infusion of additional funding and expertise to help complete mitigation projects.
- Participating jurisdictions do not have wildfire specific codes or ordinances should draft and adopt them.
- Siskiyou County and all participating jurisdictions should institute a more robust system to track the occurrence and impact of hazard occurrences.

The following table summarizes these opportunities for each participating jurisdiction:

Table 27: Participating Jurisdiction Opportunities for Improvement

Jurisdiction	Grant Education	Community Outreach	NFIP App.	CRS App.	Firewise App.	ISO App.	Wildfire Ordinance	Impact Tracking
Siskiyou County	x	x		x	x	x	x	x
Dorris	x	x	x	x	x	x	x	x
Dunsmuir	x	x		x				x
Etna	x	x		x	x	x	x	x
Fort Jones	x	x		x	x		x	x
Happy Camp CSD	x	x			x	x	x	x
Lake Shastina CSD	x	x			x		x	x
McCloud CSD	x	x			x	x	x	x
Montague	x	x	x	x	x	x	x	x
Mt. Shasta	x	x		x	x	x	x	x
Tulelake	x	x		x	x		x	x
Weed	x	x	x	x	x	x	x	x
Yreka	x	x	x	x	x			x

To help overcome many of these identified challenges, participating jurisdictions will work collaboratively using the following strategies, as appropriate:

- **Innovation and Adaptation:** Foster a culture of innovation and adaptability. Encourage employees to think creatively, embrace change, and explore new ways of doing things to overcome challenges.
- **Training and Development:** Invest in training and development to enhance skills and knowledge.
- **Communication Improvement:** Enhance communications and provide clear and transparent communication when sharing information, aligning teams, and addressing concerns.
- **Collaboration and Teamwork:** Encourage collaboration and teamwork which allows for the pooling of diverse skills and perspectives, leading to more effective problem-solving (the MPC is a good example of effective use of this strategy).
- **Technology Adoption:** Embrace technology to streamline operations and enhance productivity.
- **Agile Project Management:** Implement agile project management methodologies to enhance flexibility and responsiveness to changing conditions. Agile approaches allow teams to adapt quickly to challenges.

As appropriate, these strategies will be tailored for specific circumstances, with a combination of these strategies often being more effective than relying on a single approach.

Section 5 – Hazard Identification and Risk Assessment

5.1 Introduction

The goal of hazard mitigation is to reduce the future impacts of hazards, including deaths and injuries, property damage, and disruption to local and county economies, and to further reduce the amount of public and private funds spent to assist recovery. To complete this goal, hazard mitigation decision-making in this plan has been based on a robust risk assessment, completed to identify natural, human caused, and technological hazards that represent a risk to Siskiyou County. The following provides definitions of the risk assessment terms used during this assessment:

- **Hazard:** An act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing.
- **Exposure:** The people, property, systems, or functions that could be lost to a hazard. Generally, exposure includes what lies in the area the hazard could affect.
- **Vulnerability:** Vulnerability is susceptibility to physical injury, harm, damage, or economic loss. It depends on an asset’s construction, contents, and economic value of its functions.
- **Risk:** A function of hazard, vulnerability, and exposure. It refers to the likelihood of an event resulting in an adverse condition that causes injury or damage.

In order to accomplish this assessment, all relevant natural, human caused, and technological hazards, potential vulnerabilities, and exposures were identified. As potential hazards, vulnerabilities, and exposure are identified Siskiyou County can continue to develop a strategy to identify and prioritize mitigation action to defend against these potential risks.

5.2 Declared Federal Disasters

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. §§ 5121-5206) provides for the Federal support of State and local governments and their citizens when impacted by an overwhelming disaster. The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, establishes the process for requesting a Presidential disaster declaration and defines the type of assistance available.

If it is apparent that a Presidential disaster declaration may be necessary to assist in the recovery of an impacted area, Siskiyou County and FEMA Region IX will conduct a Preliminary Damage Assessment. This assessment is used to determine:

- The extent of the event.
- The impact of the event on individuals and public facilities.
- The types of federal assistance that may be needed.

Once the assessment is complete, and if a determination is made that the damages exceed available State of California resources, the Governor may submit through FEMA Region IX a declaration request to the President.

A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. Not all programs, however, are activated for every disaster. The determination of which programs are authorized is based on the types of assistance specified in the Governor’s request and the needs identified during the initial and subsequent assessments. FEMA disaster assistance programs may include:

- Individual Assistance
- Public Assistance
- Hazard Mitigation

EXHIBIT C

To recognize and encourage mitigation, FEMA considers the extent to which mitigation measures contributed to the reduction of disaster damages. This could be especially significant in those disasters where, because of mitigation, the estimated public assistance damages fell below the per capita indicator.

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. The MPC reviewed the historical federal disaster declarations to assist in hazard identification. The following table details Disaster Declarations for Siskiyou County:

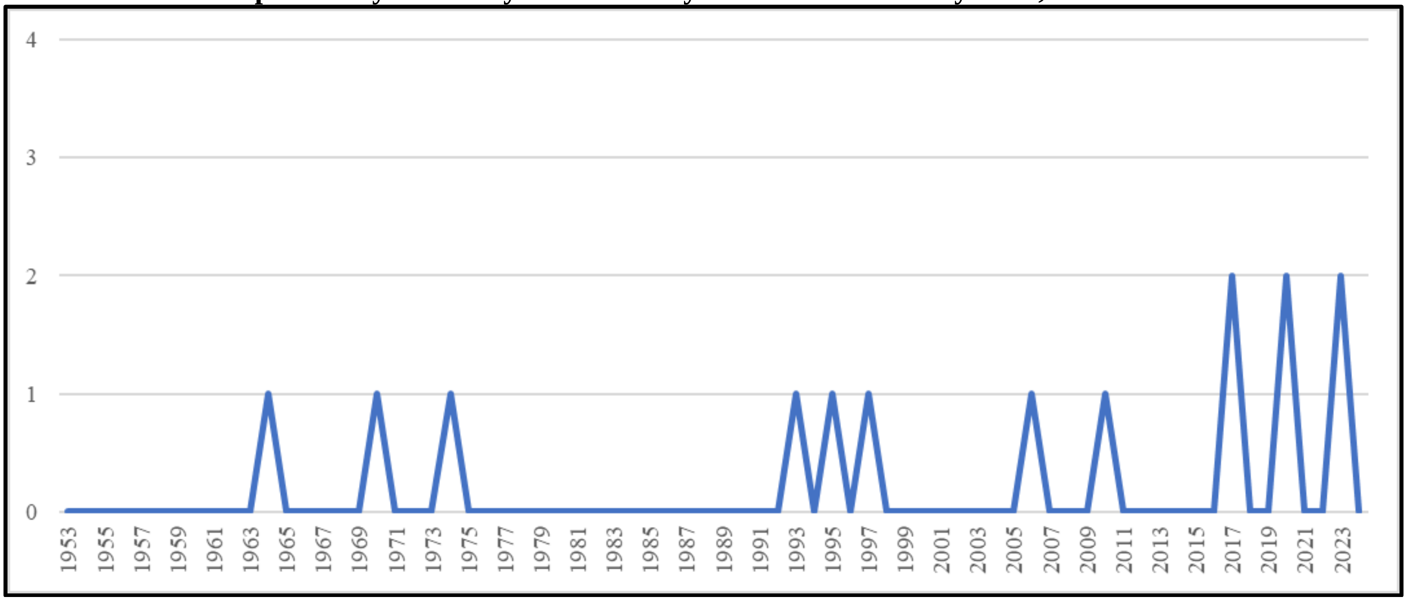
Table 28: Siskiyou County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual and Public Assistance	Mitigation Dollars Obligated
DR-4570-CA	11/21/2023	Hurricanes (Tropical Storm Hilary)	$5,891,570	$72,286
DR-4683-CA	1/14/2023	Severe Winter Storms, Flooding, Landslides, and Mudslides	$152,481,240	$11,290,426
DR-4569-CA	10/16/2020	California Wildfires	$207,894,170	$33,655,435
DR-4482-CA	3/22/2020	California Covid-19 Pandemic	$1,232,934,886	$74,335,415
DR-4308-CA	4/1/2017	Severe Winter Storms, Flooding, Mudslides	$427,999,655	$15,012,050
DR-4301-CA	2/14/2017	Severe Winter Storms, Flooding, and Mudslides	$130,483,948	$22,708,200
DR-4142-CA	08/29/2013	Wildfire (Karuk Reservation)	$444,517	-
DR-1884-CA	3/8/2010	Severe Winter Storms, Flooding, and Debris and Mud Flows	$28,353,445	-
DR-1628-CA	2/3/2006	Severe Storms, Flooding, Mudslides, and Landslides	$163,229,337	-
DR-1155-CA	1/4/1997	Severe Storms, Flooding	-	-
DR-1046-CA	3/12/1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	-	-
DR-979-CA	2/3/1993	California Severe Storm, Winter Storm, Mud & Landslides, Flooding	-	-
DR-412-CA	1/25/1974	California Severe Storms, Flooding	-	-
DR-283-CA	2/16/1970	California Severe Storms, Flooding	-	-
DR-183-CA	12/24/1964	California Heavy Rains & Flooding	-	-

Source: FEMA
-: Not reported

EXHIBIT C

Graph : Siskiyou County Presidentially Declared Disaster By Year, 1953 - 2024



Source: FEMA

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local or Tribal government efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe. The total amount of assistance provided for in a single emergency may not exceed $5,000,000. The following types of assistance are available under an Emergency Declaration:

- Public Assistance, Categories A (debris removal) and B (emergency protective measures)
- Individual Assistance, the Individuals and Households Program

The MPC reviewed the historical federal emergency declarations to assist in hazard identification. The following table details Emergency Declarations for Siskiyou County.

Table 29: Siskiyou County Emergency Declarations

Designation	Declaration Date	Incident Type	Individual and Public Assistance
EM-3428-CA	3/13/2020	California Covid-19	$8,313,848
EM-3248-CA	9/13/2005	California Hurricane Katrina Evacuation	$988,951
EM-3023-CA	1/20/1977	Drought	-

Source: FEMA

The Governor, or the Governor's Authorized Representative, may submit a request for a fire management assistance declaration as required. FEMA will approve declarations for fire management assistance when it is determined that a fire or fire complex on public or private forest land or grassland threatens such destruction as would constitute a major disaster.

The MPC reviewed the historical fire management declarations to assist in hazard identification. Research indicates that there have been six fire management declarations for Siskiyou County since 1953:

Table 30: Siskiyou County Fire Management Declarations

Designation	Declaration Date	Incident Name	Public Assistance	Emergency Work
FM-5450-CA	9/2/2022	California Mill Fire	$8,303,965	$253,281
FM-5393-CA	6/29/2021	California Lava Fire	$3,697,476	$503,088
FM-5361-CA	9/9/2020	California Slater Fire	-	-

EXHIBIT C

Table 30: Siskiyou County Fire Management Declarations

Designation	Declaration Date	Incident Name	Public Assistance	Emergency Work
FM-5250-CA	9/5/2018	California Klamathon Fire	$18,158,242	$585,590
FM-5079-CA	9/15/2014	California Boles Fire	$5,294,855	$165,882
FM-5068-CA	8/2/2014	California Oregon Gulch Fire	$1,134,200	$22,006

Source: FEMA

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. The following table details the proclamations for Siskiyou County:

Table 31: Siskiyou County California Proclamations of State of Emergency

Designation	Declaration Date	Incident Type	Damages*
2023-09	09/12/2023	Tropical Storm Hilary	-
2023-08	08/29/2023	Happy Camp Fire	-
2023-01	01/04/2023	Winter Storm	$1,234,636,773
2022-08	09/02/2022	Mill Fire	$84,513,380
2022-07	07/30/2022	McKinney Fire	$15,061,500
2021-04	07/16/2021	Lava Fire	$9,310,474
2020-07	09/10/2020	Wildfire	$245,298,163
2020-01	03/04/2020	Pandemic	$13,958,966,199
2018-04	07/05/2018	Wildfire	$32,808,626
2017-03	03/07/2017	Severe Storms	$1,038,319,506
2017-01	01/23/2017	Severe Storms	$186,874,243
2015-05	10/30/2015	Drought	-
2007-01	12/29/2007	Flood	-
2007-02	01/12/2007	Freeze	$2,700,400
2001-03	05/04/2001	Drought	$14,858,480
97-01	01/02/1997	Winter Storm	-
-	09/10/1987	Wildfire	$18,000,000
-	04/17/1972	Freeze	$111,517,260

Source: Cal OES
*: Damages reported for all impacted counties, tribal reservations, and cities
-: Not reported

5.3 Identified Potential Hazards

One of the first steps in developing a hazard assessment is to identify the hazards that have a reasonable risk of occurring. Proper identification allows for appropriate and well-planned action in order to mitigate the extent and cascading impacts of an incident. Furthermore, while not all disaster contingencies can be planned for, applying an all-hazards approach to the mitigation process does yield greater awareness and better preparedness for unforeseen hazard incidents overall.

The MPC discussed previously identified hazards and deliberated on any changes or additions to the regional hazard profile. A thorough and comprehensive revision of data for each hazard was completed as part of this plan update. Additionally, this plan has worked, as per FEMA recommendations, to merge similar hazards together with the aim of both simplifying the usage of the plan and reducing duplication of effort.

The MPC confirmed the following natural hazards that may impact the Siskiyou County:

- Dam Failure
- Drought
- Earthquake

EXHIBIT C

- Extreme Heat
- Flood
- Landslide (to include avalanche as a mass material movement)
- Severe Weather
- Subsidence
- Volcanic Activity
- Wildfire

The following table, generated using information researched for this plan and discussions with MPC members, stakeholders, and the public, indicates the improvement or worsening of conditions related to the identified hazards:

Table 32: Natural Hazard Change in Conditions

Natural Hazard	Change in Conditions	Notes
Dam Failure	Improving	The number of extremely high hazard dams in the county has declined, with only one remaining.
Drought	Worsening	Available data indicates that the rate of drought occurrence is increasing.
Earthquake	Unchanged	Geological conditions have not changed.
Extreme Heat	Worsening	Data indicates that the number of high temperature days has been increasing. Continued climate change is expected to exacerbate these conditions.
Flood	Worsening	Data indicates that while rainfall occurrence has lessened, the number of heavy rainfall events have increased. Additionally, increased wildfire and drought occurrences have exacerbated conditions related to flash flood events.
Landslide	Worsening	Increased wildfire and drought occurrences have exacerbated conditions related to landslide events. Additionally, changing climate is likely to impact snowpack stability, increasing the potential of avalanche occurrence.
Severe Weather	Worsening	Data indicates that incidences of severe weather are likely to increase due to changes in climate.
Subsidence	Worsening	Drought conditions and aquifer drawdown have exacerbated subsidence events.
Volcanic Activity	Unchanged	Geological conditions have not changed.
Wildfire	Worsening	Increased extreme heat and drought occurrences have exacerbated conditions related to wildfire events.

The following table indicates the increase or decrease in vulnerabilities to the identified hazards in this LHMP since the completion of the 2018 LHMP:

Table 33: Natural Hazard Change in Vulnerability

Natural Hazard	Change in Vulnerability	Notes
Dam Failure	Decreasing	The number of citizens and property exposed to a dam failure event has decreased due to high hazard dams being removed.
Drought	Increasing	A continued decline in population in all jurisdictions will decrease the human vulnerability to drought. However, aging water infrastructure and a slight increase in agricultural land will tend to increase the overall vulnerability.
Earthquake	Decreasing	A continued decline in all jurisdictional populations will decrease vulnerability.

Table 33: Natural Hazard Change in Vulnerability

Natural Hazard	Change in Vulnerability	Notes
Extreme Heat	Increasing	A continued increase in both the age of residences and an aging population for all jurisdictions will increase vulnerability.
Flood	Increasing	A continued decline in population and a static level of housing will in all jurisdictions will decrease vulnerability. However, the expanded extent of flash flood events, due largely to wildfire scars, in areas previously not determined as susceptible will increase vulnerability.
Landslide	Increasing	A continued decline in population and a static level of housing will decrease vulnerability. However, the expanded extent of potential landslide areas, due largely to wildfire scars will increase vulnerability.
Severe Weather	Unchanged	A continued decline in population and a static level of housing in all jurisdictions will decrease vulnerability. However, aging infrastructure and housing will increase potential vulnerability.
Subsidence	Increasing	A continued decline in population and a static level of housing will decrease vulnerability. However, aging infrastructure and structures in all jurisdictions are at increased risk.
Volcanic Activity	Decreasing	A continued decline in population and a static level of housing in all jurisdictions will decrease vulnerability.
Wildfire	Increasing	A continued spread of citizens into remote areas of the county will increase potential vulnerability. Current programs to harden exposed structures and educate community members and a decreasing population may eventually decrease future vulnerability.

Based on discussion with the MPC, a lack of identified risk or history, and geographic improbability, numerous FEMA identified hazards such as coastal erosion and hurricane were not included in the scope of this plan. Additionally, the following natural hazards, while recognized as potential hazards, did not warrant full discussion for the enumerated reasons:

- **Sea Level Rise:** Siskiyou County has no exposure to rising sea levels.
- **Levee Failure:** A review of the National Levee Database, maintained by the United States Army Corps of Engineers, indicates that there are 35 levee systems within Siskiyou County. Further analysis indicates that the majority of these systems protect farmland from flooding, however a small subset of levees provides protection for 157 people, 60 buildings valued at $28,201,00, and no critical facilities. However, no instances of levee failure, injuries, deaths, or property loss from a levee failure event were found in Siskiyou County for available history.
- **Tsunami:** Siskiyou County has no coastal exposure, and thus no exposure to a Tsunami event.

Should future conditions change, or new data become available, these hazards will be reevaluated and, if necessary, included with a full analysis in an amended LHMP.

5.4 Hazard Planning Significance

For the purposes of this plan, hazard planning significance refers to the relevance of the identified hazard to the jurisdictions of Siskiyou County when calculating risk and vulnerability. In order to help quantify the planning significance for a hazard, data was reviewed on three levels, federal (various data sets), state (State of California 2023 Hazard Mitigation plan and available state databases and GIS resources), and local (data relevant to occurrence and vulnerability on a county and local level). This allowed for a comparison between data sets for each hazard type and allowed for a summation at the county level. It is recognized that inconsistencies in methodologies and data make it difficult to make a direct comparison across all data levels. However, as possible, collected data was translated into a unified model that accounted for any variability in data and methodologies. The result of this assessment provides a larger scale snapshot of how Siskiyou County jurisdictions view risk and allowed for integration of hazard data into the LHMP.

Augmenting state and local data, FEMA's NRI dataset and online tool was used to help determine local community risk for identified natural hazards in this LHMP. This tool is useful in that it helps provide a simple, visual method of understating local level jurisdictional vulnerability. However, like all clearinghouse databases, it is recognized to have some limitations. As such, and as mentioned above, the data was vetted by Siskiyou County and participating jurisdictions against local and state data and analysis. Where discrepancies exist, they are noted and discussed in the relevant hazard section.

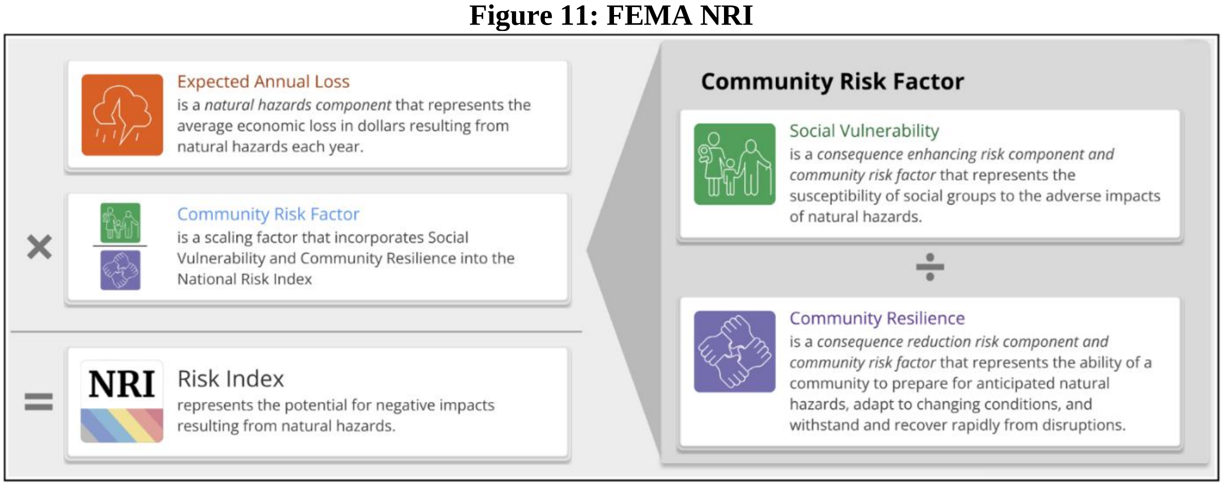
The risk equation behind the Risk Index includes three components, Expected Annual Loss (EAL), social vulnerability (previously discussed), and community resilience (previously discussed). The dataset supporting EAL provides estimates measured in 2022 U.S. dollars. The datasets supporting the social vulnerability and community resilience components have been standardized using a minimum-maximum normalization approach prior to being incorporated into the NRI risk calculation.

As part of the NRI, EAL represents the average economic loss in dollars resulting from a hazard each year. It quantifies loss for relevant consequence types, buildings, people, and agriculture. An EAL score and rating represent a community's relative level of expected losses each year when compared to all other communities at the same level. EAL is calculated using an equation that includes exposure, annualized frequency, and historic loss ratio risk factors. Exposure is a factor that measures the building value, population, and agriculture value potentially exposed to a natural hazard occurrence. Annualized frequency is a factor that measures the expected frequency or probability of a hazard occurrence per year. Historic loss ratio is a factor that measures the percentage of the exposed consequence type value (building, population, or agriculture) expected to be lost due to an occurrence. EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk.

To calculate Risk Index values, the NRI generates a Community Risk Adjustment to scale EAL values up or down, depending on their community risk factors, increasing with social vulnerability and decreases with community resilience. For a jurisdiction, a higher social vulnerability results in a higher Risk Index value while higher community resilience results in a lower Risk Index value.

Using these three components, Risk Index values are calculated for each jurisdiction (county and Census tract). The calculated Risk Index values form an absolute basis for measuring Risk within the NRI, and they are used to generate Risk Index percentiles and ratings across communities. The risk equation behind the NRI is as follows:

Figure 11: FEMA NRI



Source: FEMA

EXHIBIT C

For both the Risk Index and EAL there is a qualitative rating that describes the nature of a community's score in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Because all ratings are relative, there are no specific numeric values that determine the rating.

The National Risk Index provides relative Risk Index percentiles and ratings based on data for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience. Separate percentiles and ratings are also provided for each component: Expected Annual Loss, Social Vulnerability, and Community Resilience. For the Risk Index and Expected Annual Loss, percentiles and ratings can be viewed as a composite score for all hazards or individually for each of the 18 hazard types.

A community's score is represented by its percentile ranking among all other communities at the same level for Risk, Expected Annual Loss, Social Vulnerability and Community Resilience. For example, if a given Census tract's Risk Index percentile for a hazard type is 85.32 then its Risk Index value is greater than 85.32% of all US Census tracts. These scores are then assigned a qualitative rating that describes the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." To determine Risk and Expected Annual Loss ratings, a methodology known as k-means clustering or natural breaks is applied to each value. This approach divides all communities into five groups such that the communities within each group are as similar as possible (minimized variance) while the groups are as different as possible (maximized variance). A cubed root transformation is applied to both Risk and Expected Annual Loss values before k-means clustering. Without the transformation, these values are heavily skewed by an extreme range of population and building value densities between urban and rural communities. By applying a cube root transformation, the National Risk Index controls for this characteristic and provides ratings with greater differentiation and usefulness.

The following table summarizes the FEMA NRI for Siskiyou County and participating jurisdictions for all identified natural hazards:

Table 34: Participating Jurisdiction All Natural Hazard Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile
Siskiyou County	All	Relatively Moderate	90.61
Dorris	06093000200	Very High	99.46
Dunsmuir	06093001100	Relatively Moderate	69.06
Etna	06093000800	Very High	97.8
Fort Jones	06093000600	Relatively High	85.3
Happy Camp CSD	06093001300	Relatively High	94.91
Lake Shastina CSD	06093000902	Relatively Moderate	76.25
McCloud CSD	06093001200	Relatively Moderate	79.11
Montague	06093000300	Relatively High	96.7
Mt. Shasta	06093001003	Relatively Low	40.59
Tulelake	06093000100	Very High	98.7
Weed	06093000901	Relatively High	93.71
Yreka	06093000703	Relatively Low	51.66

Source: FEMA NRI

In order to gain an understanding of vulnerability, the following table details the estimated FEMA EAL data for Siskiyou County and participating jurisdictions (by census tract):

Table 35: Participating Jurisdiction All Natural Hazard EAL

Jurisdiction	Census Tract	EAL	National Percentile	Building EAL	Population Equivalence EAL (fatalities)	Agricultural EAL	Composite EAL
Siskiyou County	All	Relatively Moderate	88.61	$17,186,244	$1,831,557 (0.16)	$15,161,692	$34,179,493
Dorris	06093000200	Very High	99.01	$507,412	$148,704 (0.01)	$5,541,375	$6,197,491

EXHIBIT C

Table 35: Participating Jurisdiction All Natural Hazard EAL

Jurisdiction	Census Tract	EAL	National Percentile	Building EAL	Population Equivalence EAL (fatalities)	Agricultural EAL	Composite EAL
Dunsmuir	06093001100	Relatively Low	60.28	$530,077	$116,242 (0.01)	$0.51	$646,319
Etna	06093000800	Very High	97.41	$2,460,612	$269,996 (0.02)	$1,418,041	$4,148,650
Fort Jones	06093000600	Relatively High	86.32	$971,662	$146,300 (0.01)	$521,556	$1,639,519
Happy Camp CSD	06093001300	Relatively High	91.54	$1,999,570	$251,000 (0.02)	$2,715	$2,253,285
Lake Shastina CSD	06093000902	Relatively Moderate	78.37	$355,263	$59,231 (0.01)	$735,370	$1,149,863
McCloud CSD	06093001200	Relatively Moderate	79.99	$1,074,465	$136,335 (0.01)	$15,211	$1,226,011
Montague	06093000300	Relatively High	95.68	$975,276	$120,315 (0.01)	$2,140,460	$3,236,051
Mt. Shasta	06093001003	Relatively Low	59.95	$608,519	$31,099 (0.00)	$786	$640,403
Tulelake	06093000100	Very High	97.46	$372,162	$71,831 (0.01)	$3,740,543	$4,184,537
Weed	06093000901	Relatively High	88.39	$1,508,759	$192,623 (0.02)	$132,433	$1,833,815
Yreka	06093000703	Relatively Low	42.25	$346,796	$55,855 (0.00)	$436	$346,796

Source: FEMA NRI

Any identified differences in vulnerability to each hazard are noted in each individual hazard section.

5.5 Hazard Occurrence and Assessment Data

NOAA's National Centers for Environmental Information (NCEI) Storm Events Database was used as the primary source of information for previous occurrences of storm events. It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event, the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Most of the events from NCEI are not associated with a federal emergency or disaster. If the event occurred at the same time as an event that was later determined to be a federal emergency or disaster, it is included with the NCEI data even if it occurred in a county not included in the federal declaration.

Environmental Systems Research Institute ArcGIS v10 was used to determine which critical facilities were located within the boundaries of identified hazards (when applicable, and if data was available). Data was provided by the following agencies:

- Siskiyou County and participating jurisdiction GIS departments
- SCOES
- FEMA's National Flood Hazard Layer
- University of Wisconsin–Madison Spatial Analysis for Conservation and Sustainability Silvis Lab
- NOAA

Data was also obtained and utilized using Hazus-MH, Version 2.2 SP1, a program administered by the FEMA used to model losses. Modelling for hazards uses Hazus analysis to estimate losses and projected impacts from historical and annualized hazard events. Hazus default data was used in the analysis, including the 2020 Census and other State and Federal government facility databases. A level I analysis was run in Hazus for flood and earthquake, meaning the default population, building stock, and critical infrastructure data within the program was used to calculate losses and damages. Multiple hazard scenarios were run to estimate losses for the identified hazards. For the earthquake and hurricane hazards, historic event scenarios and probabilistic scenarios were run. Flood losses were analyzed using the 100 return scenarios as well as a probabilistic scenario.

Where appropriate, other utilized modeling types and systems are detailed in the relevant hazard analysis section.

5.6 Jurisdictional Critical Facilities, Assets, and Community Lifelines

Certain facilities and assets, such as infrastructure and community lifelines, have a net positive value on the community as they contribute to the public good by facilitating the basic functions of society. These facilities maintain order, public health, education, and help the economy function. Additionally, there are infrastructure and facilities integral to disaster response and recovery operations. Conversely, some infrastructure and facilities are of extreme importance due to the negative externalities created when they are impacted by a disaster. What fits these definitions will vary slightly from community to community, but the definitions remain as a guideline for identifying critical facilities and infrastructure. Siskiyou County maintains critical facility details under separate cover for security purposes. For this LHMP, it is assumed that all critical facilities are at equal risk to non-point hazard occurrence but may have varying risk to point hazard occurrence (dam failure and flood). Data concerning critical facilities potentially impacted by these point hazards, as available, is detailed under the respective hazard section.

Each hazard section provides a discussion on potentially vulnerable community lifelines. Community lifelines enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security.

5.7 Hazard Profiles

Each identified hazard is profiled in the subsequent sections, with the level of detail varying based on available information. Sources of information are cited in the detailed hazard profiles below.

For hazards that have a higher chance of occurrence for specific jurisdictions throughout Siskiyou County, a discussion is provided as to the differing levels of potential vulnerability. All other hazards have been determined to have an equal chance of occurrence for all participating jurisdictions.

The following hazards are presented in alphabetical order, and not by planning significance, for ease of reference.

5.8 Dam Failure

5.8.1 Hazard Description

A dam is a barrier across flowing water that obstructs, directs, or slows down the flow, often creating a reservoir, lake, or impoundment. Most dams have a section called a spillway or weir, over or through, which water flows, either intermittently or continuously. Dams commonly come in two types, embankment (the most common) and concrete (gravity, buttress, and arch), as well as sizes. They also serve a number of purposes and provide essential benefits, including drinking water, irrigation, hydropower, flood control, and recreation.

Large or small, dams have a powerful presence that is frequently overlooked until a failure occurs. Dams fail in two ways, a controlled spillway release done to prevent full failure, or the partial or complete collapse of the dam itself. In each instance, an overwhelming amount of water, and potentially debris, is released. Dam failures are rare, but when they do occur, they can cause loss of life and immense damage to property, critical infrastructure, and the environment.

Possible reasons for dam failure include but are not limited to:

- Sub-standard construction materials/techniques
- Spillway design error
- Geological instability caused by changes to water levels during filling or poor surveying
- Sliding of a mountain into the reservoir
- Poor maintenance, especially of outlet pipes
- Human, computer, or design error
- Internal erosion, especially in earthen dams
- Earthquakes
- Terrorism

There are three classifications of dam failure, hydraulic, seepage, and structural. The following is an explanation of each of these failure classifications:

- **Hydraulic:** This failure is a result of an uncontrolled flow of water over and around the dam structure as well as the erosive action on the dam and its foundation. The uncontrolled flow causing the failure is often classified as wave action, toe erosion, or gullying. Earthen dams are particularly susceptible to hydraulic failure because earthen materials erode more quickly than other materials, such as concrete and steel. This type of failure constitutes approximately 40% of all dam failures.
- **Seepage:** Seepage is the velocity of an amount of water controlled to prevent failure. This occurs when the seepage occurs through the structure to its foundation, where it begins to erode within. This type of failure accounts for approximately 4% of all dam failures.
- **Structural:** A failure that involves the rupture of the dam or the foundation by water movement, earthquake, or sabotage. When weak materials construct dams (large, earthen dams) are the primary cause of this failure. Structural failure occurs with approximately 30% of dam failures.

5.8.2 Location and Extent

The California Department of Water Resources Division of Safety of Dams oversees all dam safety programs. These programs are responsible for developing and maintaining an inventory of dams, classifying dams, and ensuring the compliance of all regulated dams.

Dams in the State of California are ranked by Dam Hazard Classification, which is determined by the potential for infrastructure and property damage downstream if a dam failure were to occur. Current Dam Hazard Classifications are:

Table 36: Dam Hazard Potential Classification

Hazard Classification	Potential Downstream Impacts	Number of Dams
Low	No probable loss of human life and low economic and environmental losses. Losses are expected to be principally limited to the owner's property.	12
Significant	No probable loss of human life but can cause economic loss, environmental damage, impacts to critical facilities, or other significant impacts.	3
High	Expected to cause loss of at least one human life.	3
Extremely High	Expected to cause considerable loss of human life or would result in an inundation area with a population of 1,000 or more.	1

Source: National Inventory of Dams

The U.S. Army Corps of Engineers National Inventory of Dams (NID) program indicates that there are 19 dams in Siskiyou County, with two extremely high hazard dams, Copco No. 1 and Iron Gate recently removed. Additionally, the NID provides a condition assessment on each dam. The definition of dam condition assessment are as follows:

- **Satisfactory:** No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions in accordance with state engineers' rules and regulations for dams or tolerable risk guidelines.
- **Fair:** No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic incidents may result in a dam safety deficiency. Risk may be in the range to take further action.
- **Poor:** A dam safety deficiency is recognized for loading conditions, which may realistically occur. Remedial action is necessary. A poor condition is used when uncertainties exist as to critical analysis parameters, which identify a potential dam safety deficiency. Further investigations and studies are necessary.
- **Unsatisfactory:** A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

Public Comment: *What dams are left to fail?*

As low and significant hazard dams were determined by the MPC to be of minimal concern, the following table details information concerning the four identified extremely high and high hazard dams within the county:

Table 37: Siskiyou County Extremely High and High Hazard Dams

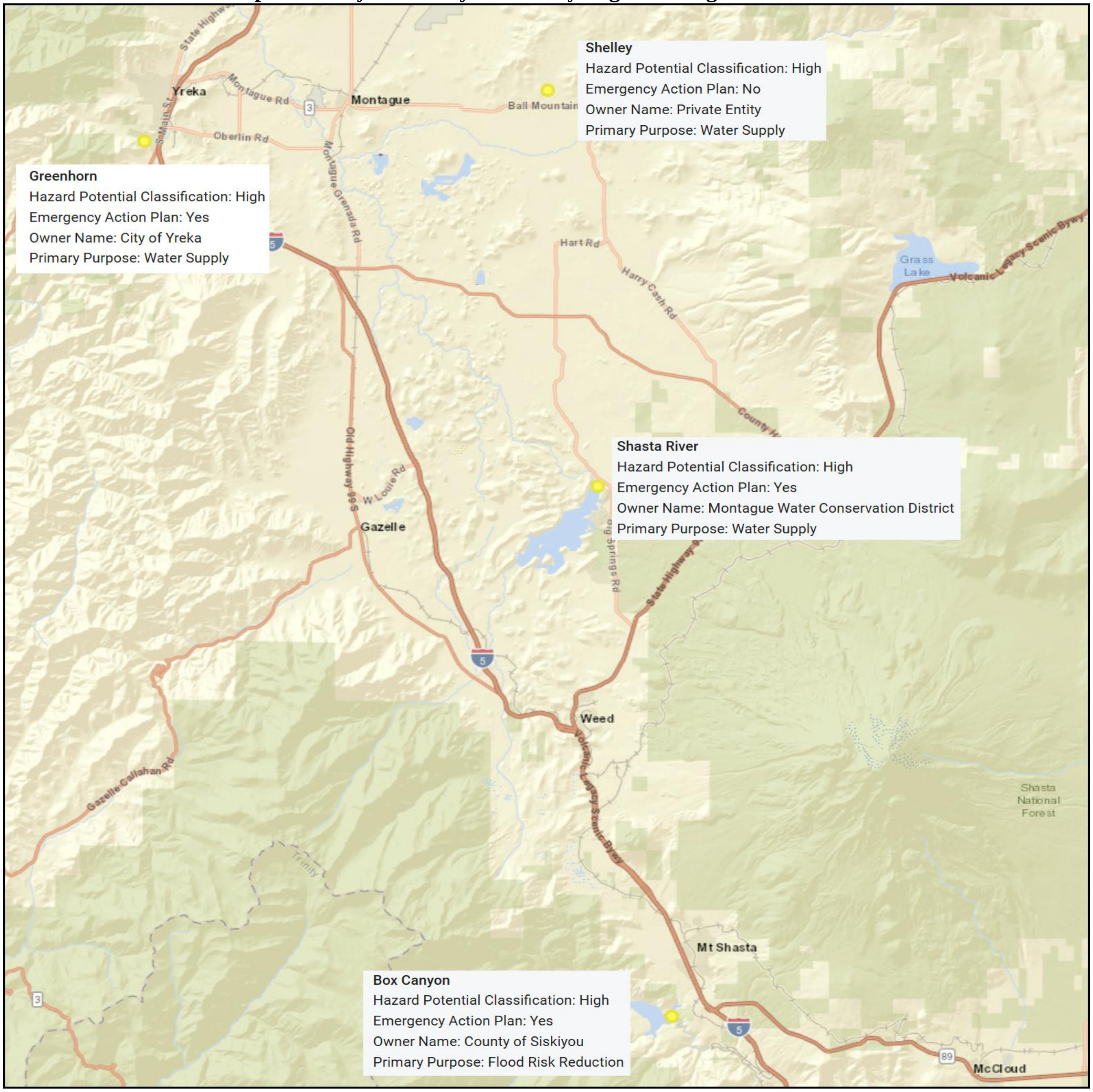
NID Number	Name	Nearest Jurisdiction	Owner	Hazard Potential Classification	Condition Assessment	Emergency Action Plan
CA008889	Box Canyon	Dunsmuir	Siskiyou County	Extremely High	Satisfactory	Yes
CA00244	Shasta River	Montague	Montague Water Conservation District	High	Satisfactory	Yes
CA00826	Greenhorn	Yreka	City of Yreka	High	Satisfactory	Yes
CA00926	Shelley	Montague	Private Entity	High	Satisfactory	No

Source: NID

EXHIBIT C

The following map, from the NID, indicates the location of extremely high and high hazard dams within Siskiyou County:

Map 28: Siskiyou County Extremely High and High Hazard Dams



Source: National Inventory of Dams

Discussions with the MPC and a review of all available data indicated that the dam failure hazard was not a concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Dorris:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **Dunsmuir:** Dam failure identified as a community concern as areas of the jurisdiction are in identified failure inundation areas which could impact citizens, buildings, and infrastructure.

EXHIBIT C

- **Etna:** Dam failure is not a hazard of concern as jurisdiction is not in any identified dam failure inundation areas.
- **Fort Jones:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **Happy Camp CSD:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **Lake Shastina CSD:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **McCloud CSD:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **Montague:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **Mt. Shasta:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **Tulelake:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **Weed:** Dam failure is not a hazard of concern as jurisdiction is not in any identified failure inundation areas.
- **Yreka:** Dam failure hazard identified as a community concern as areas of the jurisdiction are in identified failure inundation areas which could impact citizens, buildings, and infrastructure.

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.8.3 Previous Occurrences

Data from the National Performance of Dams Program at Stanford University indicates Siskiyou County has had no reported dam failure incidents.

5.8.4 Probability of Future Incidents

Despite no historical occurrences of dam failure, there remains a significant concern due to the presence of one extremely high hazard dam within the county. The probability of dam failure events is not easily measured, but may be aligned with:

- The probability of future flood events
- Preventative measures taken by dam owners and operators, maintenance and repair
- Frequent condition inspections
- Proper operating procedures

At present, there is no history of a dam failure of any size in Siskiyou County or its participating jurisdictions. In lieu of any historical events, the next best prediction tool would be based on the structural state of the dam. However, maintenance and structural information on the dams was not available for public use. As such, available historic occurrence data suggests that there is a near zero percent probability of dam failure in a given year. However, it is important to note that the lack of past incidents does not protect against future incidents.

The California Department of Water Resources Division of Safety of Dams conducts routine monitoring and inspection of dams within the state on an identified schedule, with priority placed on those dams which pose the greatest potential threat. However, to fully determine the probability of a future event, a full engineering inspection would need to be completed on each dam, something beyond the scope of this plan.

Dams undergoing repair and/or reconstruction are required to be designed to pass at least the 1%-annual-chance rainfall event with one foot of freeboard. The most critical and hazardous dams are required to meet a spillway design standard much higher than passing the runoff from a 1%-annual-chance rainfall event. Although not all the dams have been shown to withstand the 1%-annual-chance rainfall event, most of the dams meet this standard due to original design requirements or recent spillway upgrades.

5.8.5 Projected Changes in Hazard Location, Intensity, Frequency, and Duration

As indicated by California's Fourth Climate Change Assessment, Siskiyou County is likely to see less available water for both storage and recreation. A warming climate will continue to decrease the snowpack, which has been steadily declining. Combined with the predicted decrease in annual rainfall, it is likely that smaller amounts of water will be available for storage in lakes and reservoirs. Additionally, the changing climate and resultant higher temperatures is likely to increase the rate of water usage while concurrently increasing evaporation from surface waters. As such, it is expected that the amount of water stored behind dams in Siskiyou County will potentially decrease, lessening the potential impact of this hazard.

However, a potential outcome of changing climate in Siskiyou County is an increase in extreme precipitation events which may lead to more severe floods and a greater risk of dam failure. Additional projected greater periods of drought conditions and high heat may result in ground cracking, a reduction of soil strength, erosion, and subsidence in earthen dams.

The 2018 National Climate Assessment report indicates that much of the water infrastructure in the United States, including dams, is nearing the end of its planned life expectancy. As indicated in the report:

- "Aging and deteriorating dams and levees also represent an increasing hazard when exposed to extreme or, in some cases, even moderate rainfall. Several recent heavy rainfall events have led to dam, levee, or critical infrastructure failures, including the Oroville emergency spillway in California in 2017, Missouri River levees in 2017, 50 dams in South Carolina in October 2015 and 25 more dams in the state in October 2016, and New Orleans levees in 2005 and 2015. The national exposure to this risk has not yet been fully assessed."

At present there is no comprehensive assessment of the climate-related vulnerability and risks to existing dams. Additionally, there are no common design standards concerning the repair or modification of existing dams nor for the design and construction of new dams operated in the face of changing climate risk.

Land use trends can significantly impact a community's vulnerability to dam failure. The way land is developed and used in proximity to dams can influence the potential consequences of failure, affecting the safety of residents and infrastructure. Development in potential dam failure inundation areas without adequate consideration for flood risk increases vulnerability. Increased urbanization and population density near dams can intensify the consequences of failure. Higher population density means more people and assets are at risk, leading to greater potential for loss of life and property damage. However, Siskiyou County and participating jurisdictions are seeing a decrease in population, potentially lowering the vulnerability to a dam failure event.

The location of critical infrastructure, such as hospitals, schools, and emergency services, in close proximity to dams or levees can heighten vulnerability. Infrastructure assets may be at risk of damage or disruption, impacting the community's ability to respond effectively to a failure. However, Siskiyou County and participating jurisdictions are not projecting any major infrastructure projects or growth in the number of structures, potentially lowering the vulnerability to a dam failure event.

5.8.6 Vulnerability and Impact Analysis

FEMA NRI

The National Risk Index does not provide rankings for the dam failure hazard.

Extremely High Hazard and High Hazard Dam Failure Inundation Mapping

Dams in the State of California with an extremely high or high Hazard classification are required to have an Emergency Action Plan. An Emergency Action Plan delineates:

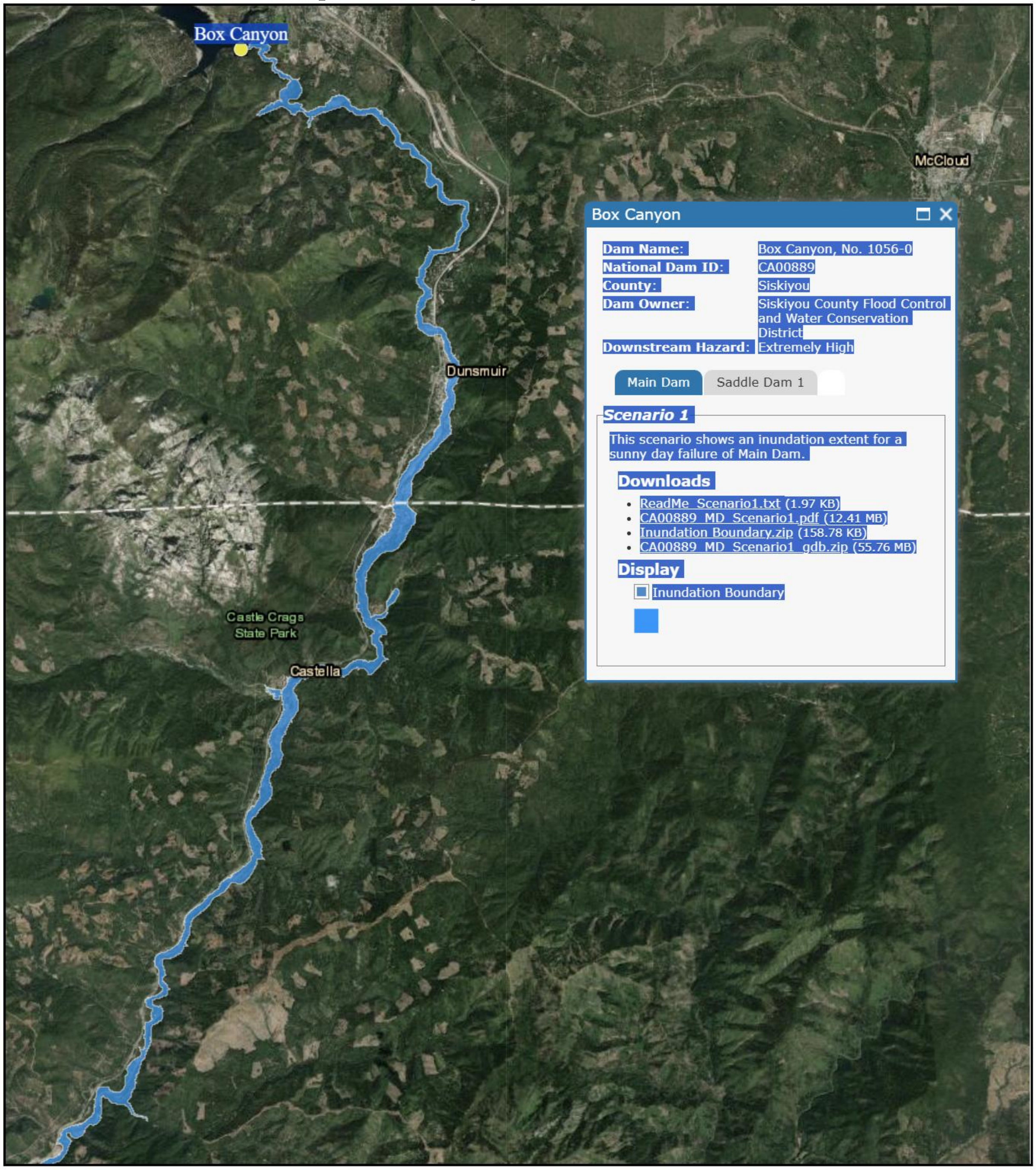
- Incidents that can lead to emergency conditions and failure
- Downstream locations that could be affected by a failure event
- Actions to be taken to minimize property damage, infrastructure loss, and loss of life

EXHIBIT C

In general, the dam owner is responsible for development and maintenance of the Emergency Action Plan.

In order to understand the potential risk to Siskiyou County, efforts were made to review all available Emergency Action Plans for extremely high and high hazard dams. Data from the California Department of Water Resources Dam Breach Inundation Map Web Publisher, a repository of Emergency Action Plan inundation maps, was used for this review. The following maps indicate potential dam failure inundation areas for extremely high and high hazard dams in Siskiyou County:

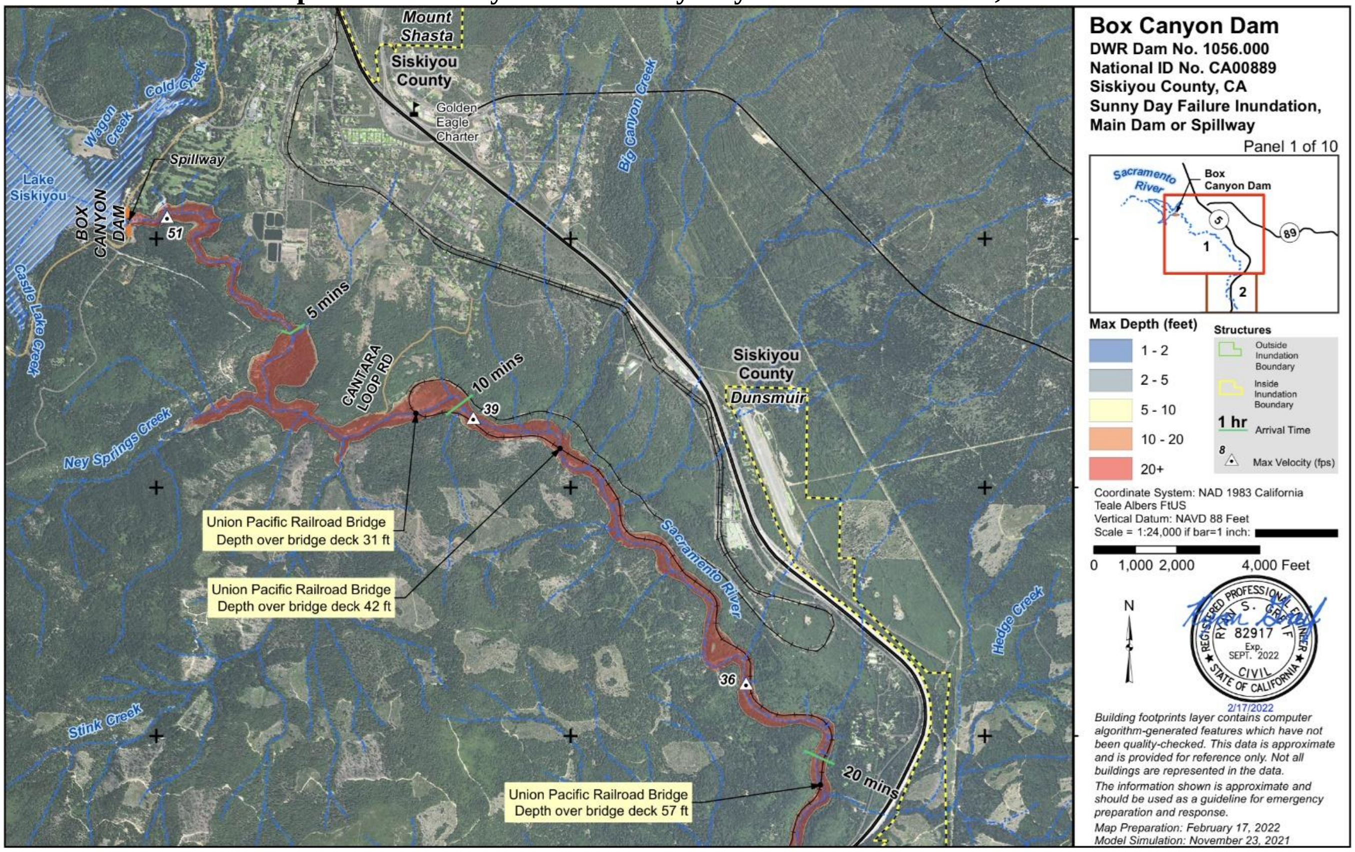
Map 29: Box Canyon Dam Inundation Zone



Source: California Department of Water Resources Dam Breach Inundation Map Web Publisher

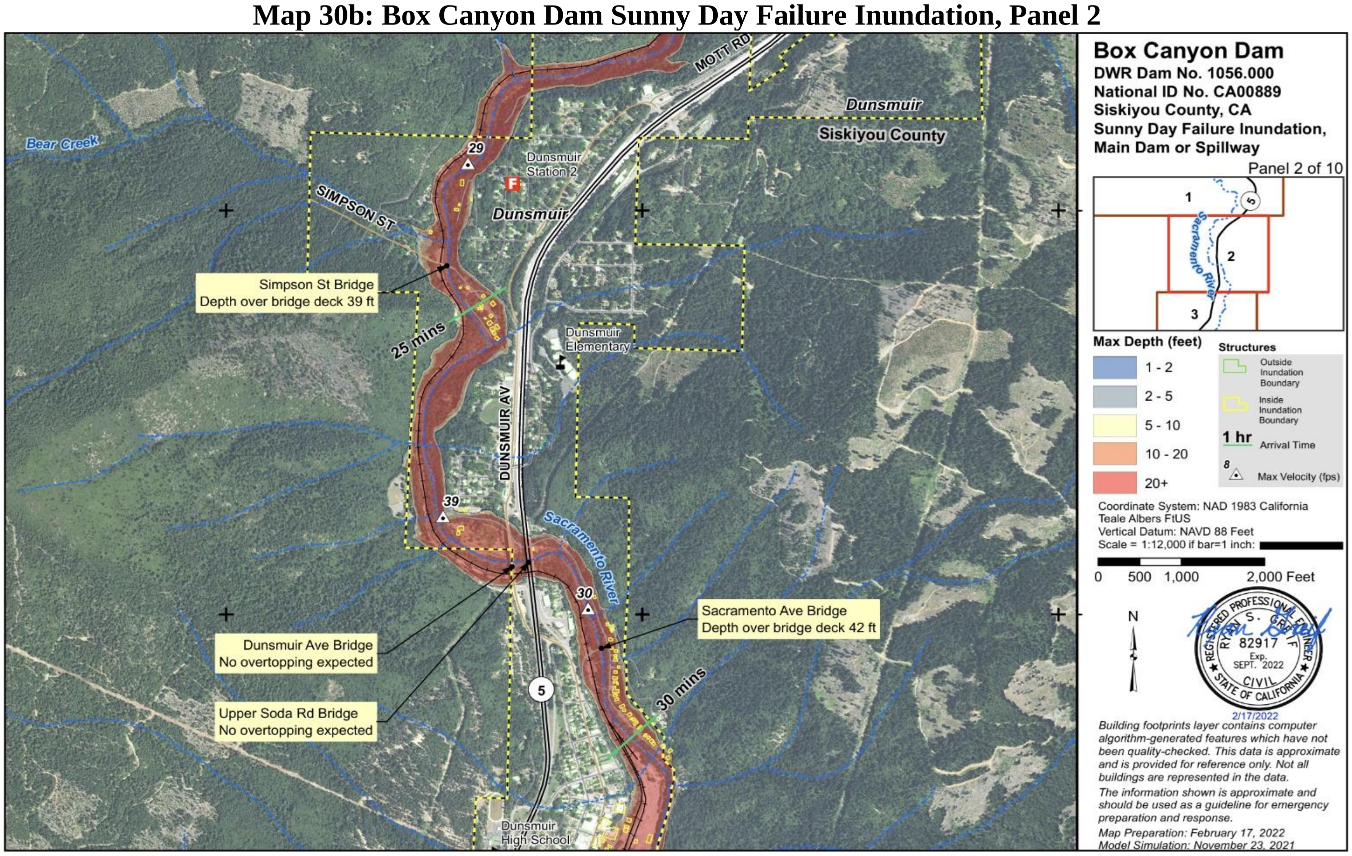
EXHIBIT C

Map 30a: Box Canyon Dam Sunny Day Failure Inundation, Panel 1



Source: Box Canyon Dam Sunny Day Failure Inundation, Main Dam or Spillway

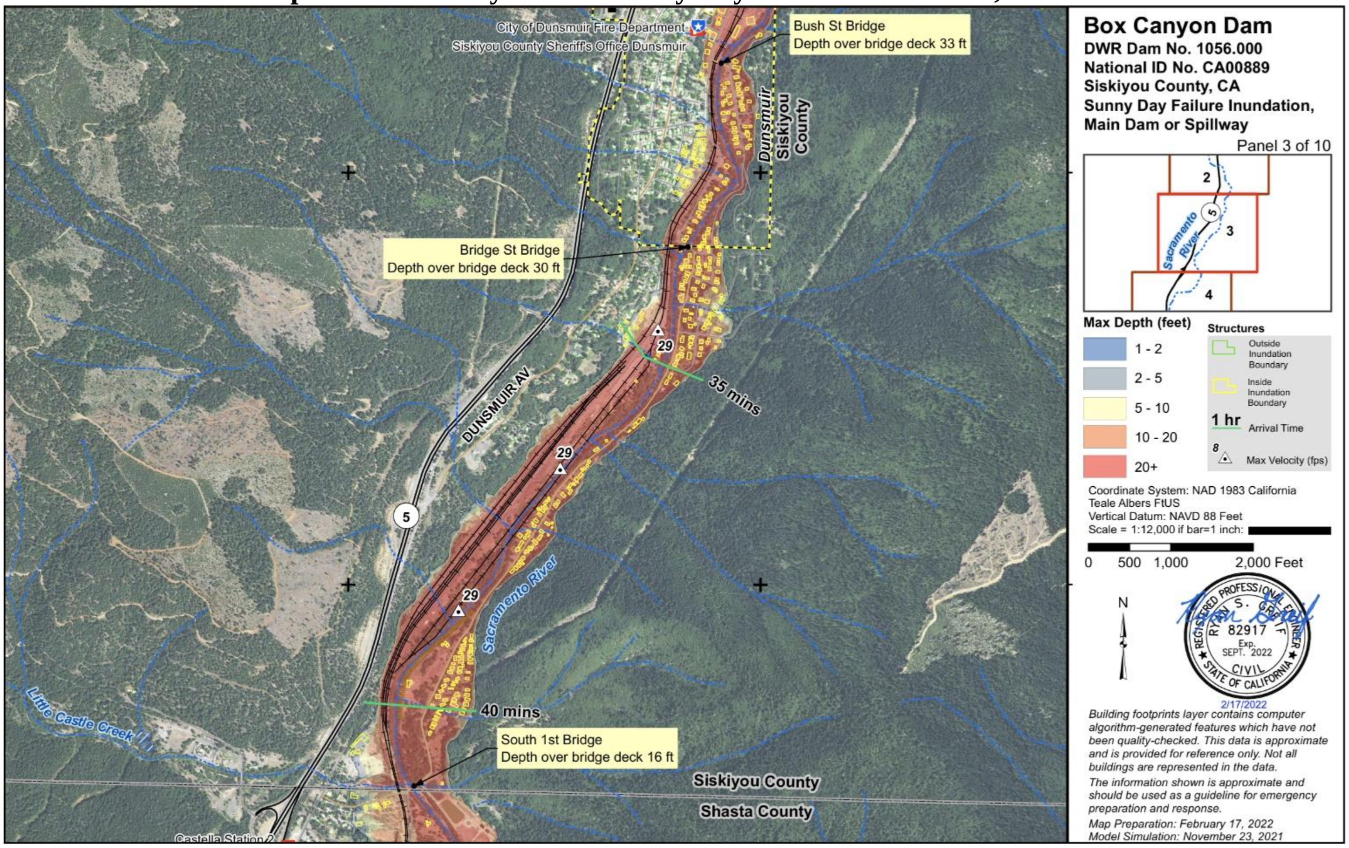
Map 30b: Box Canyon Dam Sunny Day Failure Inundation, Panel 2



Source: Box Canyon Dam Sunny Day Failure Inundation, Main Dam or Spillway

EXHIBIT C

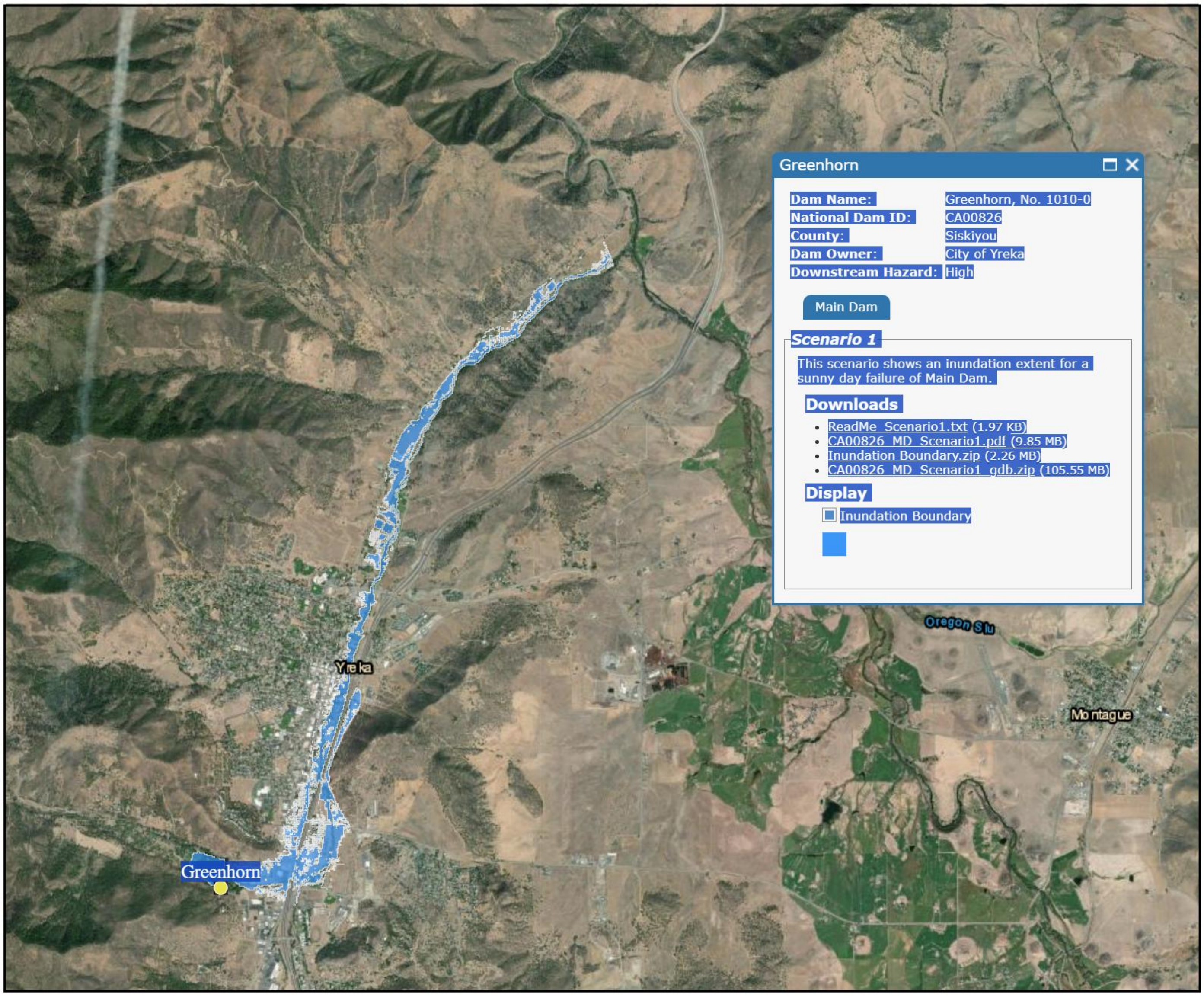
Map 30c: Box Canyon Dam Sunny Day Failure Inundation, Panel 3



Source: Box Canyon Dam Sunny Day Failure Inundation, Main Dam or Spillway

EXHIBIT C

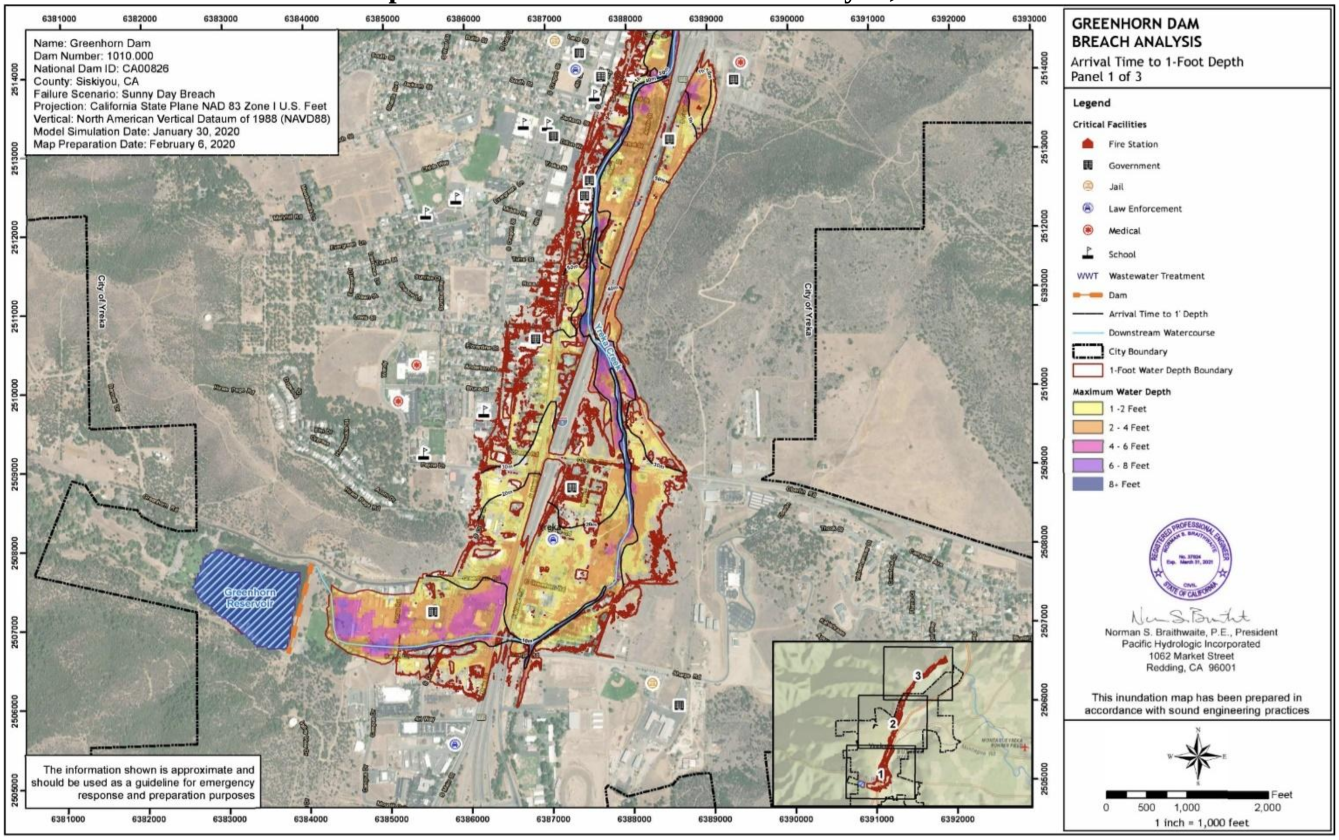
Map 31: Greenhorn Dam Inundation Zone



Source: Dam Breach Inundation Map Publisher

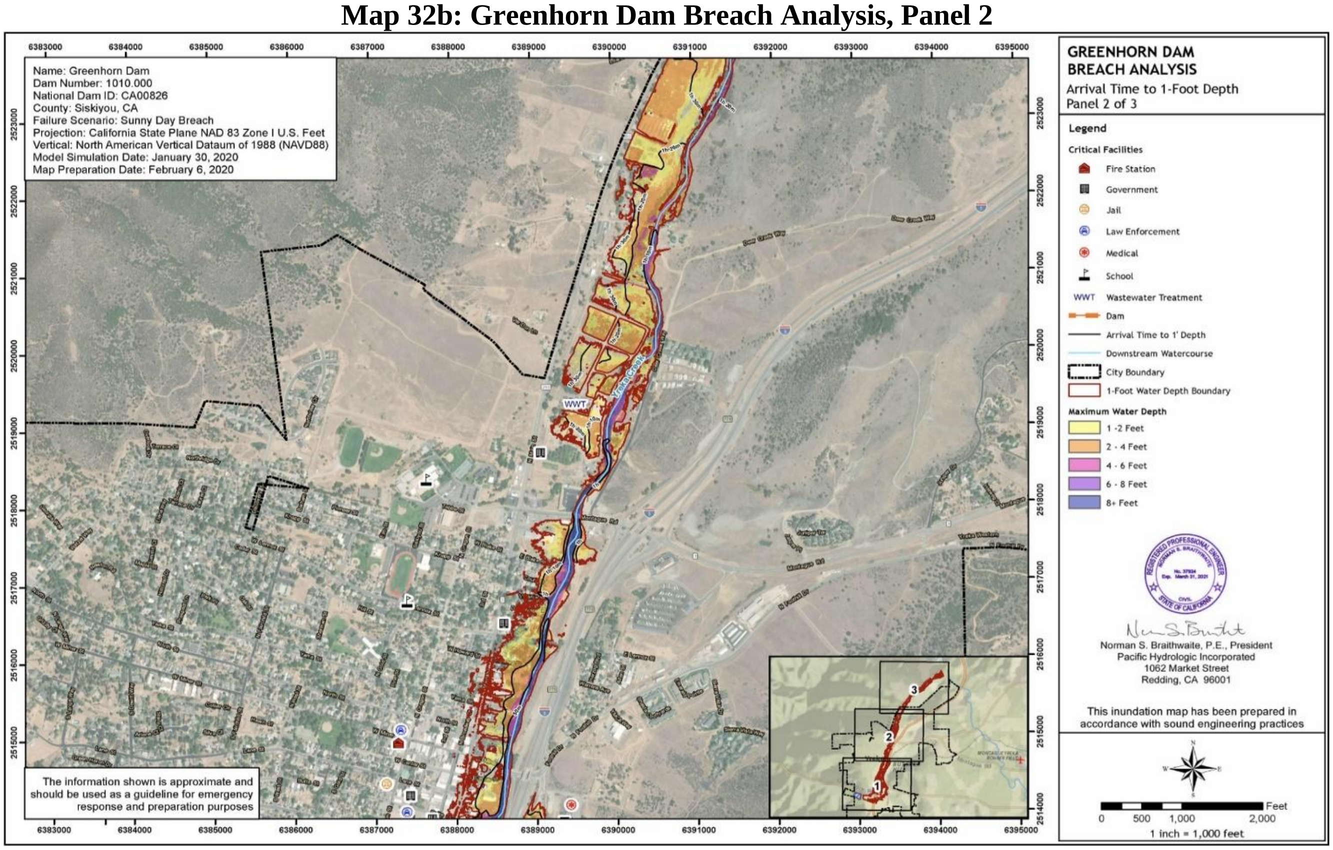
EXHIBIT C

Map 32a: Greenhorn Dam Breach Analysis, Panel 1



Source: Greenhorn Dam Breach Analysis

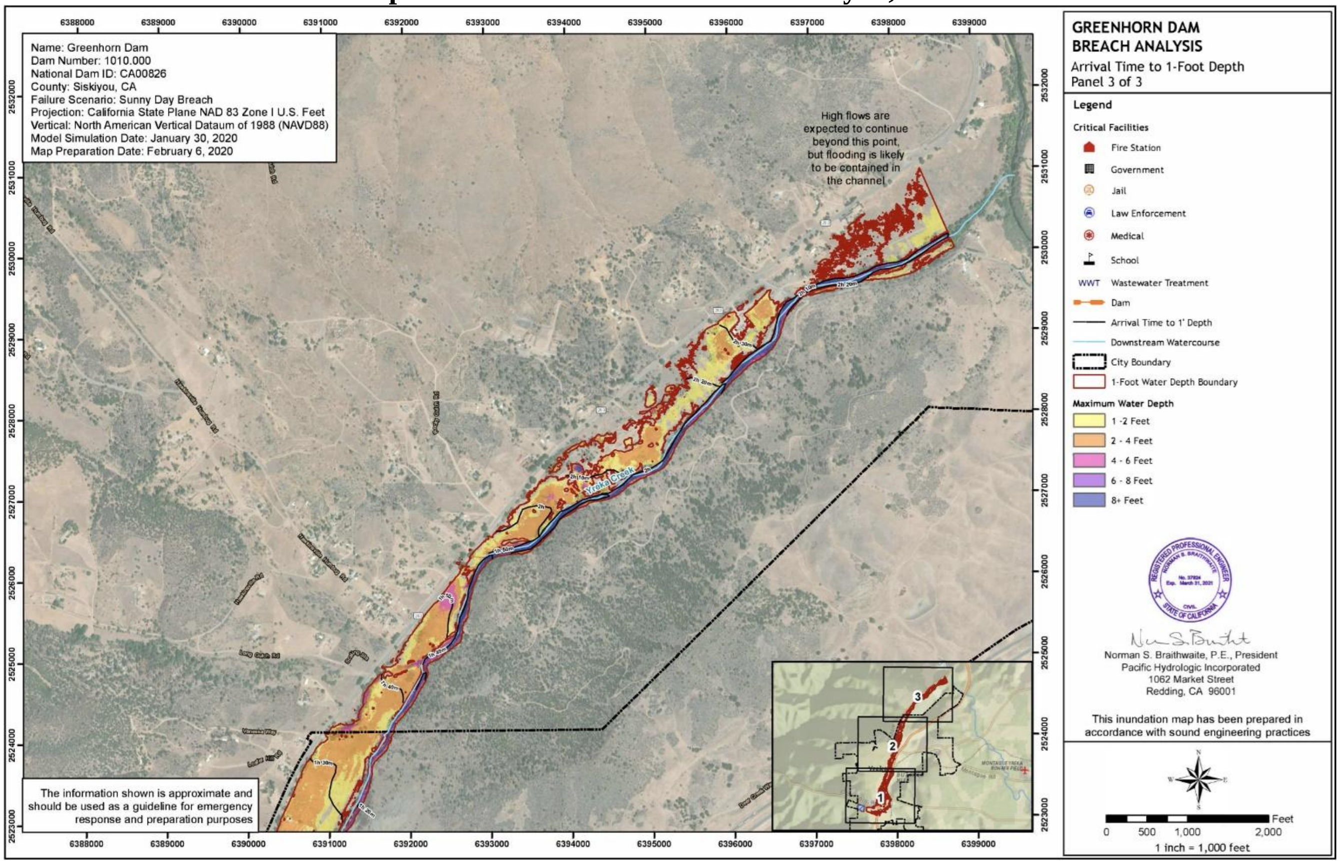
Map 32b: Greenhorn Dam Breach Analysis, Panel 2



Source: Greenhorn Dam Breach Analysis

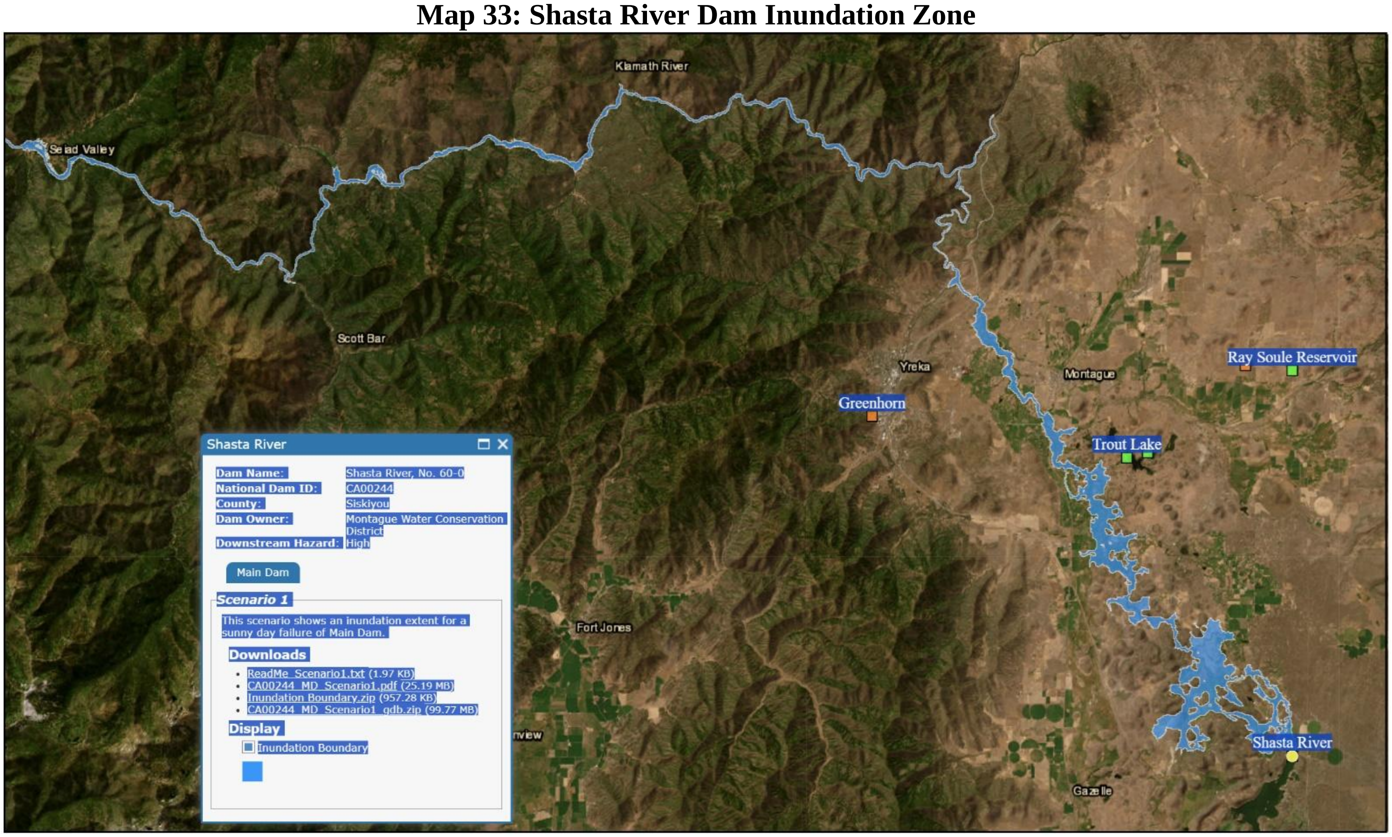
EXHIBIT C

Map 32c: Greenhorn Dam Breach Analysis, Panel 3



Source: Greenhorn Dam Breach Analysis

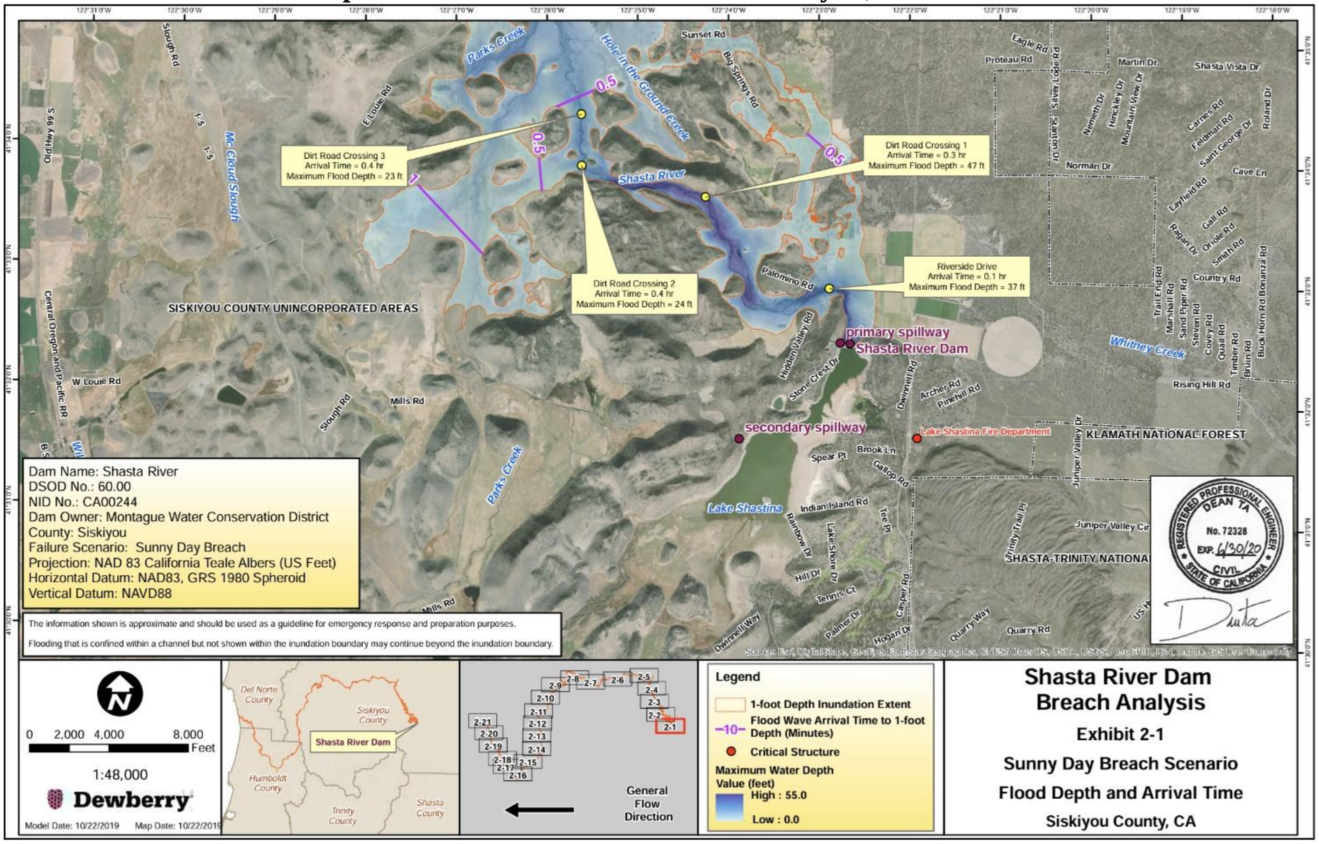
Map 33: Shasta River Dam Inundation Zone



Source: Dam Breach Inundation Map Publisher

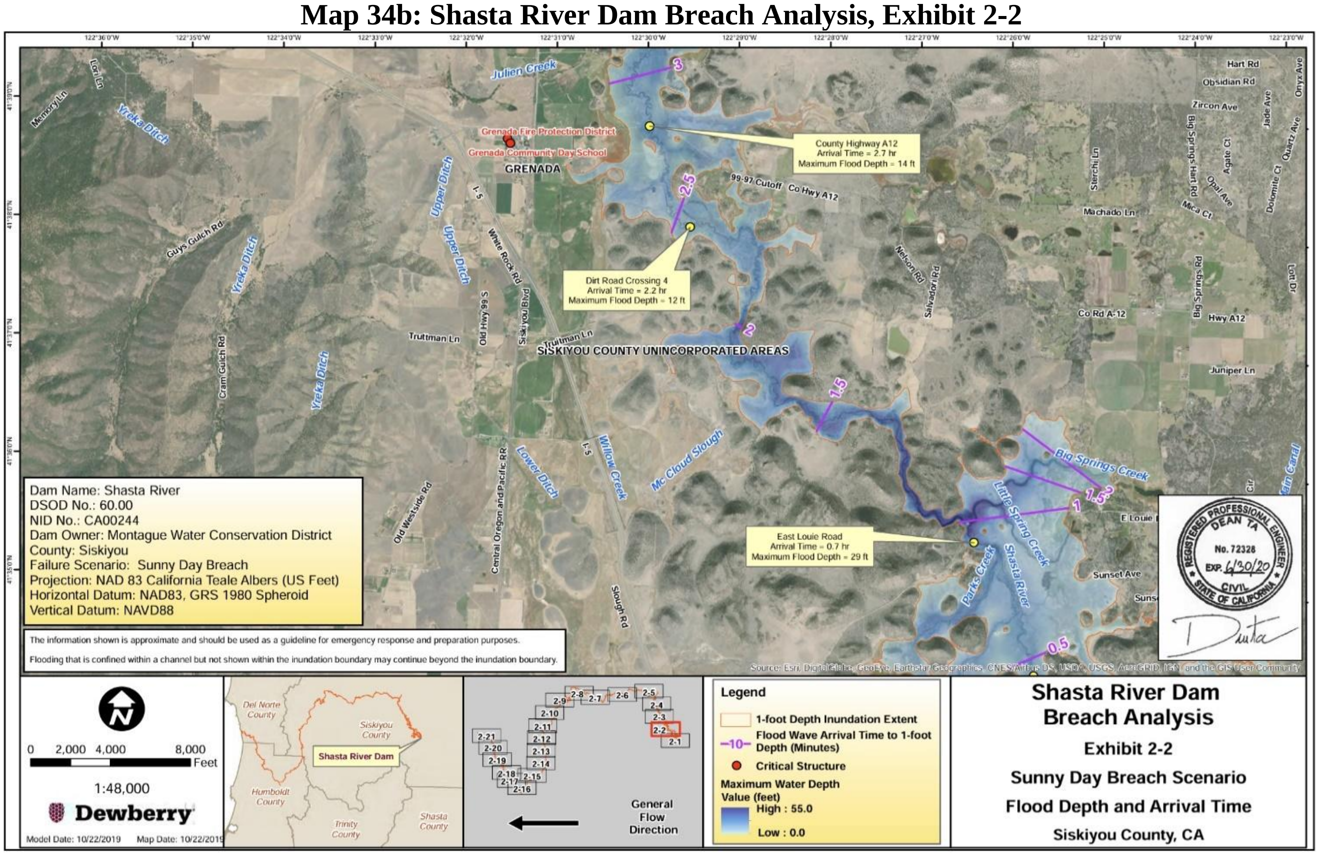
EXHIBIT C

Map 34a: Shasta River Dam Breach Analysis, Exhibit 2-1



Source: Shasta River Dam Breach Analysis

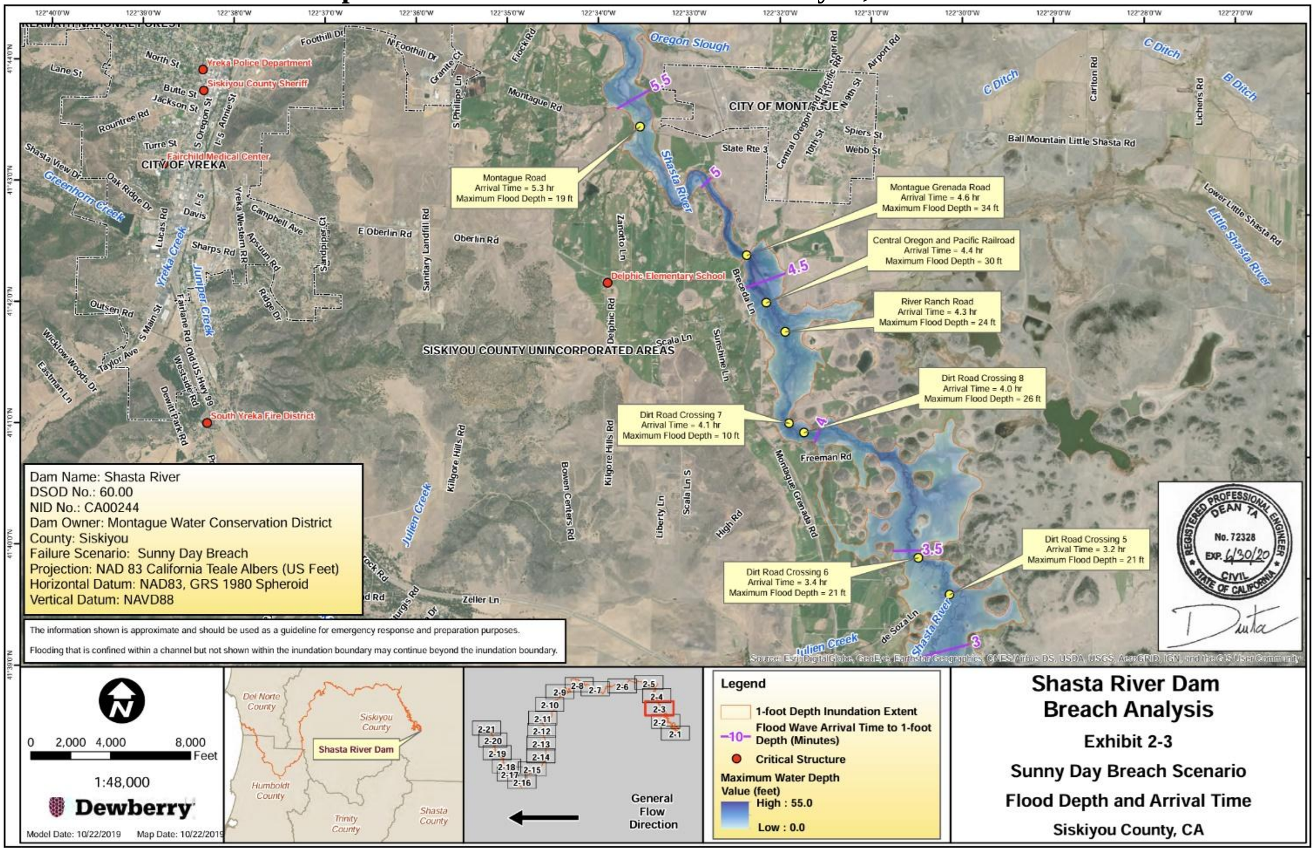
Map 34b: Shasta River Dam Breach Analysis, Exhibit 2-2



Source: Shasta River Dam Breach Analysis

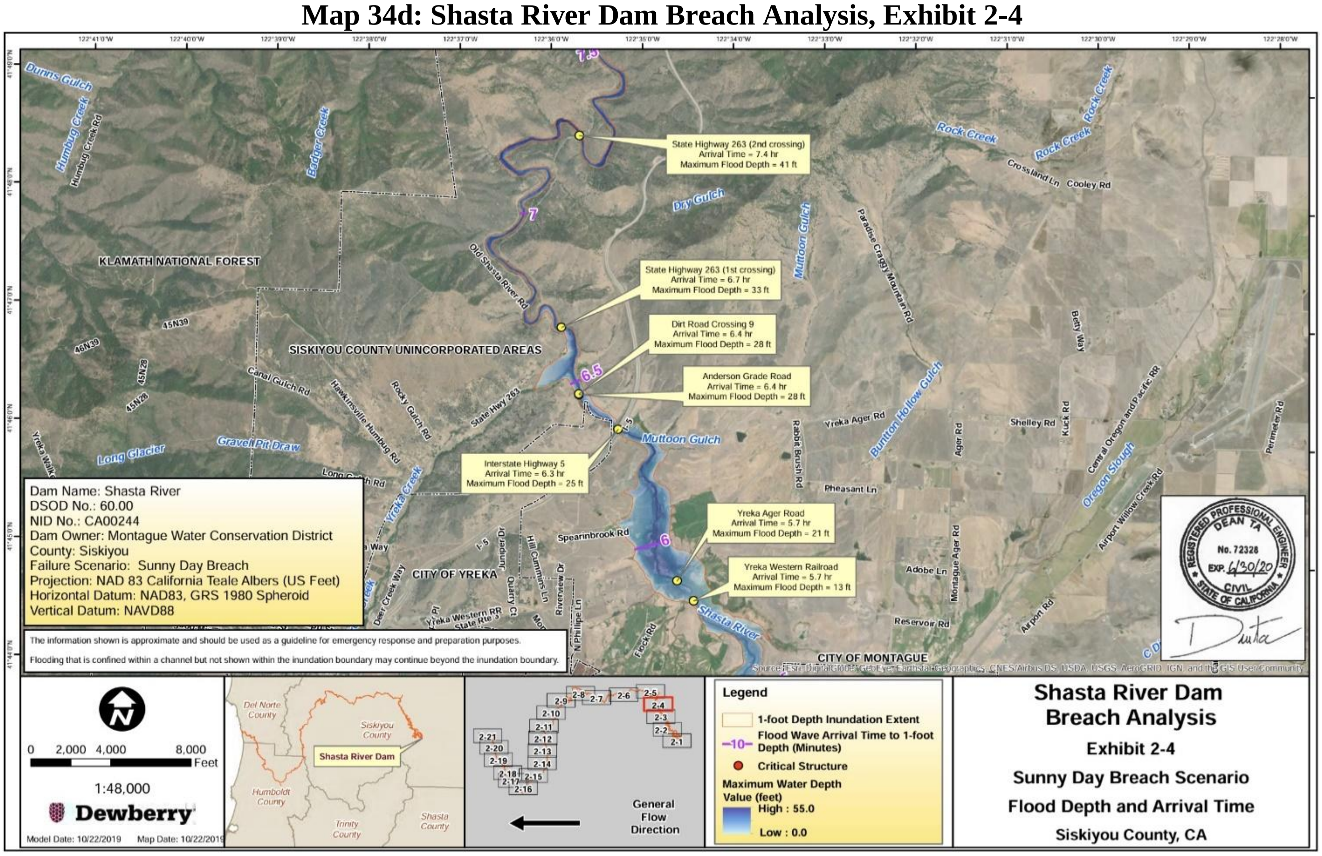
EXHIBIT C

Map 34c: Shasta River Dam Breach Analysis, Exhibit 2-3



Source: Shasta River Dam Breach Analysis

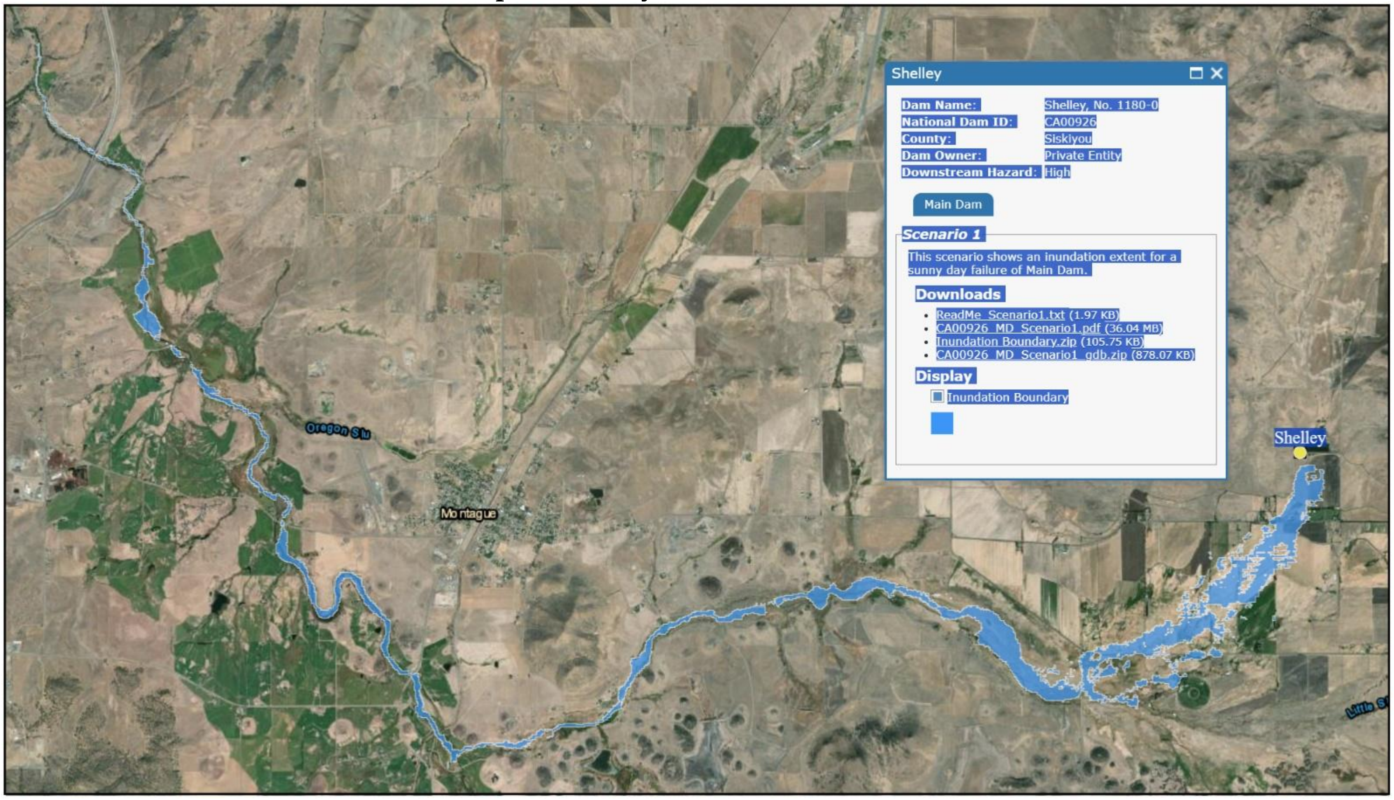
Map 34d: Shasta River Dam Breach Analysis, Exhibit 2-4



Source: Shasta River Dam Breach Analysis

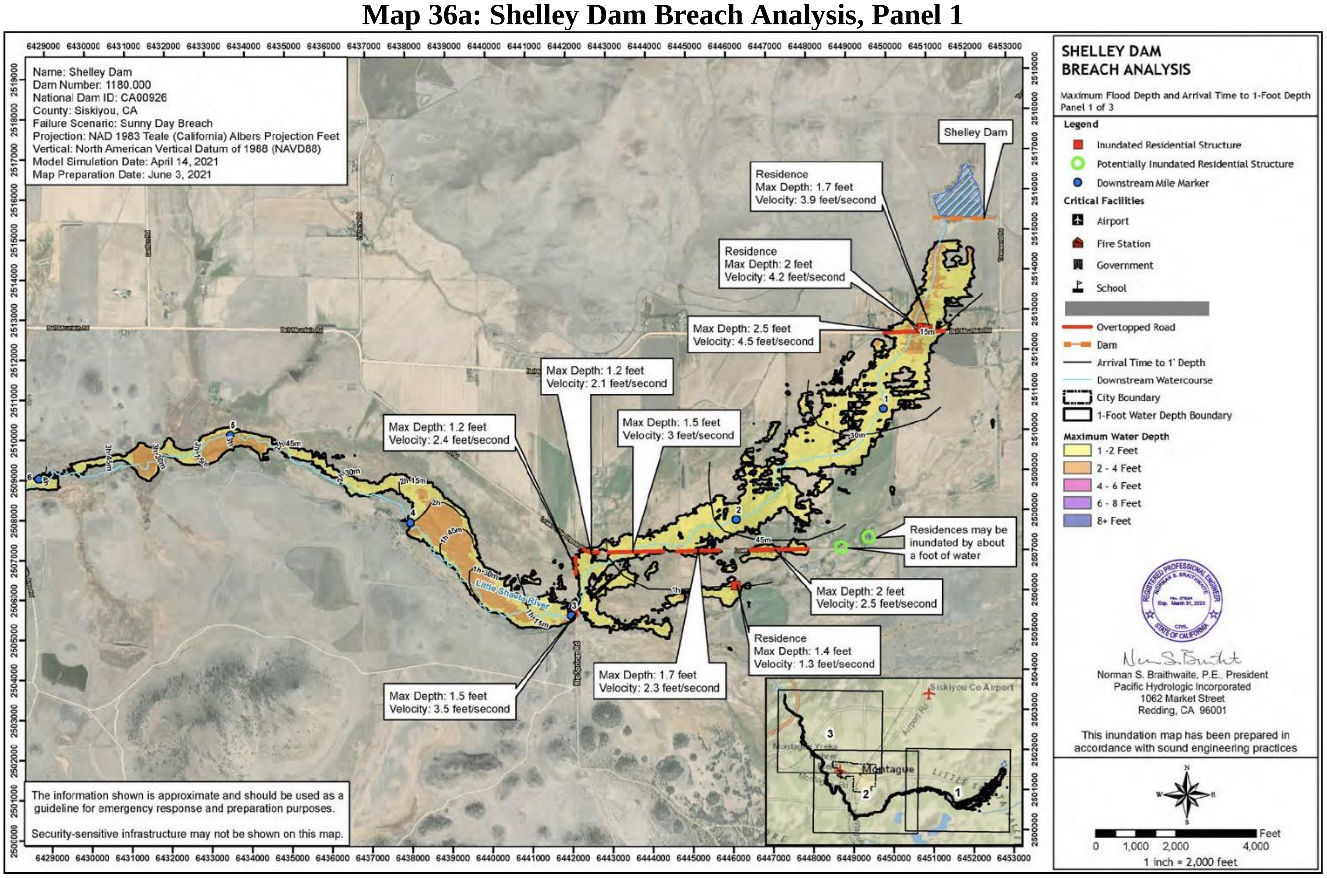
EXHIBIT C

Map 35: Shelley Dam Inundation Zone



Source: Dam Breach Inundation Map Publisher

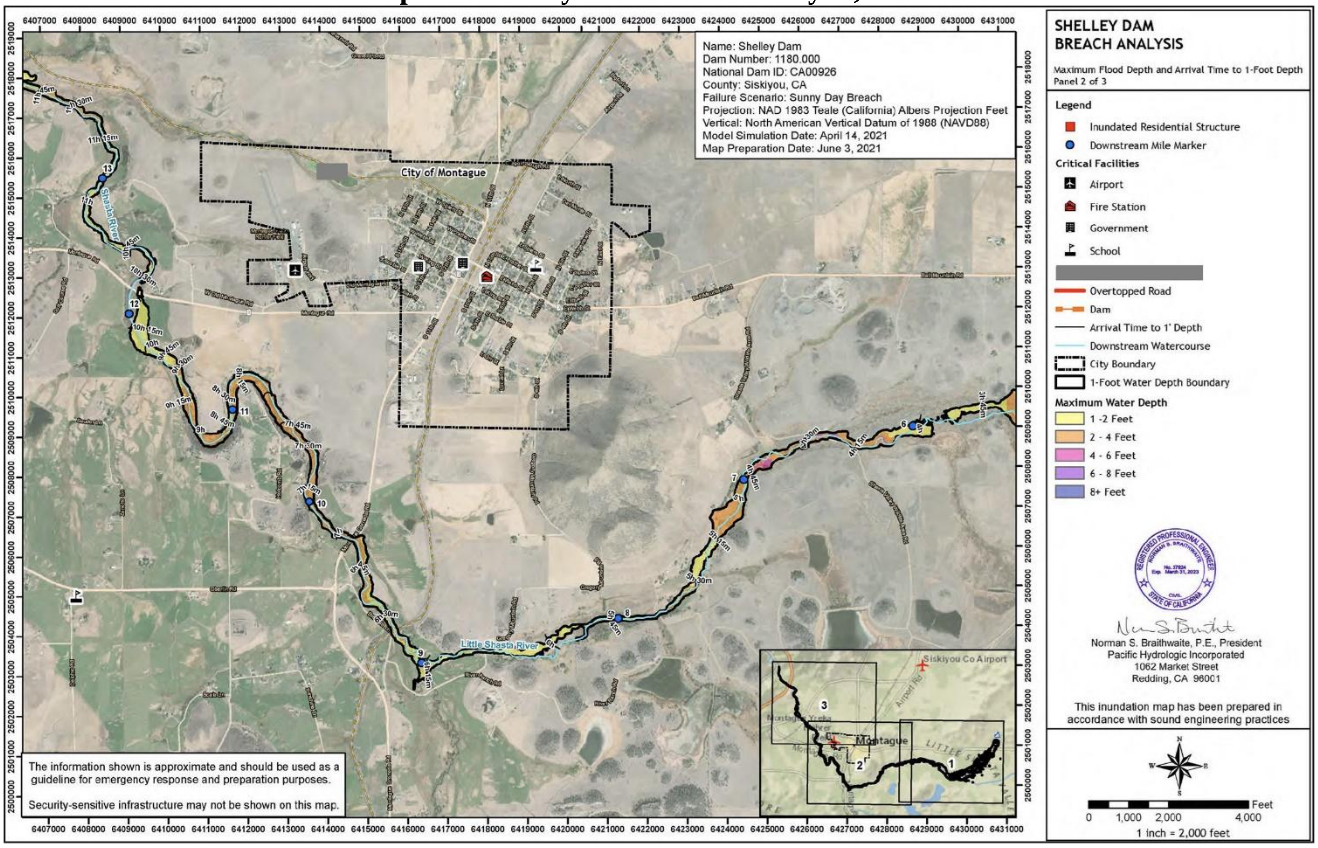
Map 36a: Shelley Dam Breach Analysis, Panel 1



Source: Shelley Dam Breach Analysis

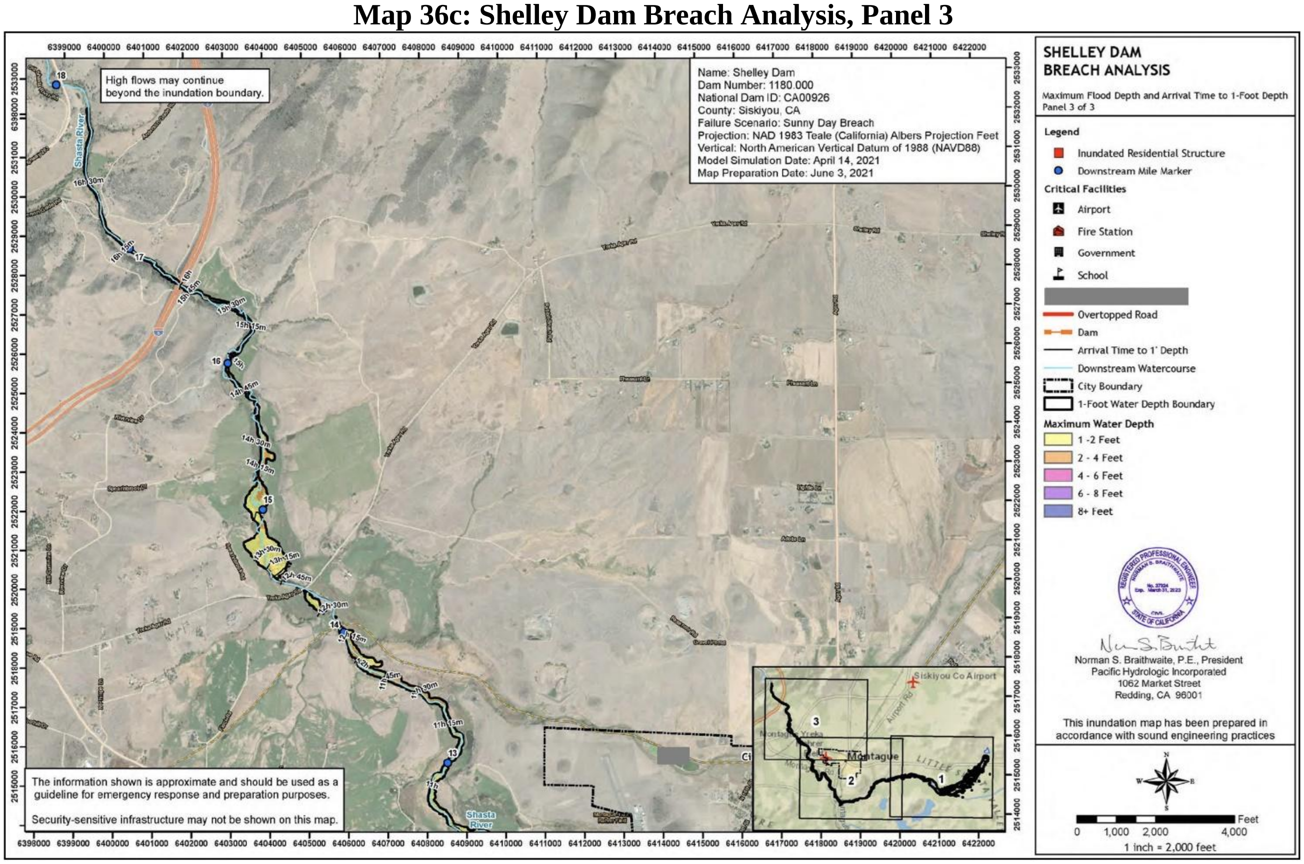
EXHIBIT C

Map 36b: Shelley Dam Breach Analysis, Panel 2



Source: Shelley Dam Breach Analysis

Map 36c: Shelley Dam Breach Analysis, Panel 3



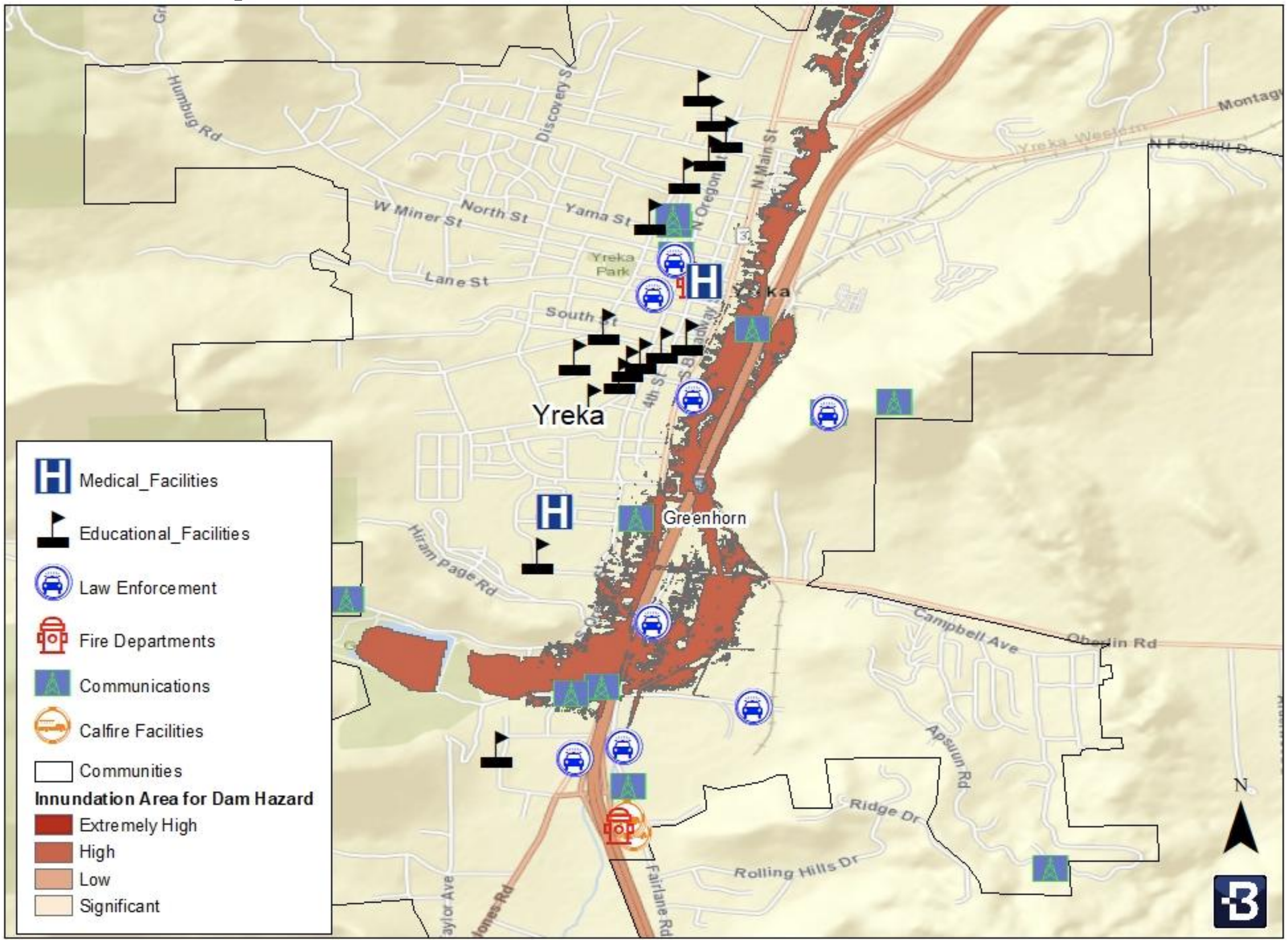
Source: Shelley Dam Breach Analysis

EXHIBIT C

Critical Facilities in and Near Inundation Areas

The following maps illustrate critical facilities in and near dam failure inundation areas for extremely high and high hazard dams. Please note that Box Canyon Dam, Shasta River Dam, and Shelly Dam have no such facilities in mapped inundation areas.

Map 37: Critical Facilities in and Near Greenhorn Dam Inundation Area



Source: Siskiyou County and BOLDplanning

Population

A dam failure event can have devastating and wide-ranging impacts on both people and communities. The severity of these impacts depends on the volume of water released and the location of the dam in relation to communities, and may include:

- **Loss of Life:** The sudden release of a large volume of water can result in flooding downstream, leading to drowning and casualties. The loss of life can be particularly high if a dam failure occurs in highly populated areas or when people are unable to evacuate in time.
- **Long Term Displacement:** People living downstream may be forced to evacuate their homes leading to displacement and requiring long-term shelter assistance.
- **Economic Consequences:** Both property damage and the disruption of transportation and utilities could affect local economies.
- **Psychological Trauma:** Survivors of dam failure events may experience psychological trauma, including post-traumatic stress disorder and anxiety.

As of this plan, a complete analysis has not been conducted on the potential impact of a dam failure event on the population of Siskiyou County. However, the following table, utilizing data from the U.S. Census Bureau, the California

EXHIBIT C

Department of Water Resources Dam Breach Inundation Map Web Publisher, and GIS analysis, provides an estimate of the potentially impacted population from a dam failure by jurisdiction:

Table 38: Potentially Impacted Population, Dam Failure

Jurisdiction	Potentially Impacted Population
Siskiyou County	637
Dorris	0
Dunsmuir	222
Etna	0
Fort Jones	0
Happy Camp CSD	0
Lake Shastina CSD	0
McCloud CSD	0
Montague	0
Mt. Shasta	0
Tulelake	0
Weed	0
Yreka	750

Source: U.S. Census Bureau, California Department of Water Resources Dam Breach Inundation Map Web Publisher

Additionally, the loss of community lifelines can have a direct economic impact on the population. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 39: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

Buildings and Structures

Any structure within an identified inundation zone of a dam failure will be potentially impacted (depending on the severity on the failure incident). Potential impacts may include:

- **Structural Damage:** Facilities located downstream could sustain severe structural damage. Floodwater can inundate buildings, causing structural failures, collapsing walls, and damaging foundations. This can render facilities inoperable or unsafe for use.
- **Equipment and System Damage:** Equipment and systems can be severely damaged or destroyed by floodwater and debris carried by the flood. This can include electrical systems, water and wastewater systems, machinery, data centers, and communication equipment.
- **Long-Term Recovery:** The recovery process could be lengthy and resource intensive. It may involve rebuilding damaged infrastructure, restoring functionality, and implementing measures to prevent future vulnerabilities.

As of this plan, a complete analysis has not been conducted on the potential impact of a dam failure event on the buildings of Siskiyou County. However, individual location mapping indicates that no jurisdictional historic buildings were identified in potential inundation areas. The following table, utilizing data from the U.S. Census Bureau, the California Department of Water Resources Dam Breach Inundation Map Web Publisher, and GIS analysis, provides an estimate of the potentially impacted buildings from a dam failure by jurisdiction. Additionally, an estimate of the value of structures was determined using the jurisdictional median household value, as noted, from the U.S. Census Bureau.:

Table 40: Potentially Impacted Population, Dam Failure

Jurisdiction	Potentially Impacted Buildings	Valuation
Siskiyou County	277	$120,715,400 ($320,200 median valuation)
Dorris	0	$0
Dunsmuir	93	$22,515,300 ($242,100 median valuation)
Etna	0	$0
Fort Jones	0	$0
Happy Camp CSD	0	$0
Lake Shastina CSD	0	$0
McCloud CSD	0	$0
Montague	0	$0
Mt. Shasta	0	$0
Tulelake	0	$0
Weed	0	$0
Yreka	109	$25,255,300 ($231,700 median valuation)

Source: U.S. Census Bureau, California Department of Water Resources Dam Breach Inundation Map Web Publisher

Governmental

Government operations may be immediately impacted, especially if any facilities are within the inundation area of failure. The extent of the impact depends on multiple factors concerning the extent of the failure, and may include:

- **Emergency Response and Management:** Jurisdictional response agencies may be called upon to respond to a failure event. They must coordinate rescue operations, evacuations, and disaster response efforts to mitigate the immediate risks to human life and property.
- **Public Health and Safety:** Jurisdictional public health agencies would provide support for public health needs during and after a dam failure, including responding to injuries, managing emergency shelters, and addressing potential health risks from contaminants or waterborne diseases.
- **Financial Impact:** A dam failure event can strain state budgets due to the costs associated with emergency response, infrastructure repair, environmental cleanup, and long-term recovery efforts. Local governments may need to allocate additional funds to address these needs.

The following table, utilizing information from the Greenhorn Dam Breach Analysis, details downstream government facilities likely to be impacted by a failure event:

Table 41: Greenhorn Dam Breach Analysis Impacted Infrastructure

Infrastructure Classification	Name	Arrival Time After Failure (minutes)	Maximum Flood Depth (feet)
Government	US Fish and Wildlife Department Service	5	2-4
Government	Siskiyou County Administration	22	1-2
Government	Siskiyou County Probation Department	50	1-2
Government	Siskiyou County Air Pollution	55	1-2

Source: Greenhorn Dam Breach Analysis and Siskiyou County

A review of identified inundation areas for Box Canyon Dam, Shasta River Dam, and Shelly Dam indicates that no government buildings in identified inundation areas.

Transportation and Electrical Infrastructure

The failure of a dam can have significant and wide-ranging impacts on transportation infrastructure, affecting roads, bridges, railways, and other critical components of transportation systems. Potential impacts may include:

- Flooding and Erosion: Dam failures can lead to rapid and extensive flooding, causing erosion of roadways and bridge foundations. This can result in the collapse or significant damage to roads and bridges, disrupting transportation routes.
- Extended Downtime: The repair of transportation infrastructure, especially major roads and bridges, can take a significant amount of time. During this period, transportation networks may be partially or entirely unavailable.

The following table, utilizing information from the Box Canyon Dam Sunny Day Failure Inundation, Main Dam or Spillway Map, details downstream transportation infrastructure likely to be impacted by a failure:

Table 42: Box Canyon Sunny Day Failure Impacted Infrastructure

Infrastructure Classification	Name	Arrival Time After Failure (minutes)	Maximum Flood Depth (feet)
Railroad	Union Pacific Railroad Bridge	9	31
Railroad	Union Pacific Railroad Bridge	12	42
Railroad	Union Pacific Railroad Bridge	21	57
Road	Simpson Street Bridge	24	39
Railroad	Sacramento Avenue Bridge	28	42
Road	Bush Street Bridge	32	33
Road	Bridge Street Bridge	34	30
Railroad	South 1st Bridge	41	16

Source: Box Canyon Dam Sunny Day Failure Inundation, Main Dam or Spillway

A review of the Greenhorn Dam Breach Analysis indicates that the majority of Yreka would be impacted by a Greenhorn Dam failure event, including the majority of roads and bridges within city limits. Due to the extensive nature of the road network a full listing would be impractical. Please see the above refenced inundation maps for a detailing of impacted transportation infrastructure.

The following table, utilizing information from the Shasta River Dam Breach Analysis, details downstream transportation infrastructure likely to be impacted by a failure:

Table 43: Shasta River Dam Breach Analysis, Transportation Infrastructure

Infrastructure Classification	Name	Arrival Time After Failure (hours)	Maximum Flood Depth (feet)
Road	Riverside Drive	0.1	37
Road	Louie Road	0.7	29
Road	County Highway A12	2.7	14
Road	River Ranch Road	4.3	24
Railroad	Central Oregon and Pacific Railroad	4.4	30
Road	Montague Grenada Road	4.6	34
Road	Montague Road	5.3	19
Railroad	Yreka Western Railroad	5.7	13
Road	Yreka Ager Road	5.7	21
Interstate Highway	Interstate Highway 5	6.3	25
Road	Anderson Grade Road	6.4	28
Road	State Highway 263	6.7	33
Road	State Highway 263	7.4	41
Road	State Highway 263	7.5	29
Road	Klamath River Road	8.0	36

EXHIBIT C

Table 43: Shasta River Dam Breach Analysis, Transportation Infrastructure

Infrastructure Classification	Name	Arrival Time After Failure (hours)	Maximum Flood Depth (feet)
Road	Walker Bridge Connection Road	11.5	24
Road	State Highway 96	12.9	24
Road	Bar Road	13.2	30
Road	Bar Road	13.2	30
Road	State Highway 96	16.2	24
Road	Elk Creek Road	21.2	24
Road	Independence Creek Road	23.7	24
Road	State Route 96	25.8	25
Road	State Route 96	25.8	25
Road	State Route 96	28.5	30
Road	State Route 96	28.5	30

Source: Shasta River Dam Breach Analysis

The following table, utilizing information from the Shelley Dam Breach Analysis, details downstream transportation infrastructure likely to be impacted by a failure:

Table 44: Shelley Dam Breach Analysis, Transportation Infrastructure

Infrastructure Classification	Name	Arrival Time After Failure (hours)	Maximum Flood Depth (feet)
Road	Ball Mountain Road	0.25	2
Road	Lower Little Shasta Road	1	1.2
Road	Big Springs Road	1.1	1.5

Source: Shelley Dam Breach Analysis

A wide variety of data sources, from the Federal Highway Administration to state and federal Departments of Transportation, can be sourced for construction and repair costs. Average per-mile repair costs for local roads, state highways, and interstates can vary widely depending on factors such as the type of repair (resurfacing, reconstruction, or major rehabilitation), local labor and material costs, geographic conditions, and traffic volumes. The following details a range of repair costs for local, state, and interstate roadway systems:

- Local Roads
    - Resurfacing/Repaving: Costs generally range between $20,000 to $100,000 per mile.
    - Major Rehabilitation or Reconstruction: Costs generally range between $150,000 to $1 million per mile.
- State Highways
    - Resurfacing/Repaving: Costs generally range between $100,000 to $300,000 per mile.
    - Major Rehabilitation or Reconstruction: Costs generally range between $500,000 to $2,000,000 per mile.
- Interstates
    - Resurfacing/Repaving: Costs generally range between $250,000 to $1,000,000 per mile.
    - Major Rehabilitation or Reconstruction: Costs generally range between $2,000,000 to $5,000,00 per mile.

Factors affecting roadway construction and repair costs can include:

- **Extent of Damage:** Minor repairs such as resurfacing are cheaper than full-depth reconstruction.
- **Geography and Terrain:** Roads in mountainous or difficult terrains may cost more due to drainage and foundation issues.

- **Traffic Control and Detours:** Roads with heavy traffic may require expensive detour systems and safety measures, especially for interstates and state highways.
- **Urban vs. Rural:** Repairs in urban areas are typically more expensive due to higher labor costs, complex traffic patterns, and higher land costs.
- **Material Costs:** Prices for materials like asphalt, concrete, and steel can vary significantly based on regional supply chains.
- **Environmental and Regulatory Costs:** Permitting, environmental mitigation, and compliance with federal/state regulations can add to the cost.

Bridges crossing rivers can pose significant concerns during flooding events resulting from a dam failure due to the increased risk of structural failure. Floodwater caused by a dam failure can exert powerful hydraulic forces on bridge structures, with the flow of water, debris, and floating objects impacting the bridge's substructure and foundation. Scouring, the removal of soil or sediment around bridge foundations can increase during a flood event, increasing the risk of failure. Floodwater can also cause the deformation and misalignment of bridge components. As water levels rise and fall, the structural elements may undergo stress and strain, potentially leading to long-term damage and misalignment.

A wide variety of data sources, including the Federal Highway Administration and state and federal Departments of Transportation, can be sourced for bridge construction and repair costs. The average construction and repair costs for bridges vary significantly depending on factors like the size and complexity of the bridge, its location, materials used, and the extent of the repairs or construction required. The following details a range of construction costs for bridges:

- Small Bridge (local, 2-lane bridge over a small waterway or road): Costs generally range between $150 to $400 per square foot.
- Medium-Sized Bridge (state highway, spanning larger rivers or railways): Costs generally range between $300 to $600 per square foot.
- Large Bridge (interstate or urban multi-lane bridge, often requiring complex engineering): Costs generally range between $500 to $1,000+ per square foot.

The following details a range of repair costs for bridges:

- Minor Repairs (deck resurfacing, guardrail fixes, minor structural repairs): Costs generally range between $50,000 to $500,000.
- Medium Repairs (replacing sections of the deck, repairing piers or abutments): Costs generally range between $500,000 to $5,000,000.
- Major Repairs or Rehabilitation (full deck replacement, structural strengthening, or seismic retrofitting): Costs generally range between $5,000,000 to $50,000,000.
- Emergency Repairs (post-disaster or structural failure): Costs generally range between $10,000,000 to $100,000,000.

Factors affecting bridge construction and repair costs can include:

- Bridge Type and Design: Suspension, cable-stayed, truss, arch, or simple beam bridges each have different design requirements and associated costs.
- Location: Urban areas or difficult terrains (e.g., over water, in mountainous regions) can significantly increase costs due to land acquisition, permitting, and construction challenges.
- Materials: The use of steel, concrete, or composite materials impacts the price. Specialized materials (e.g., weathering steel for durability) increase costs.

EXHIBIT C

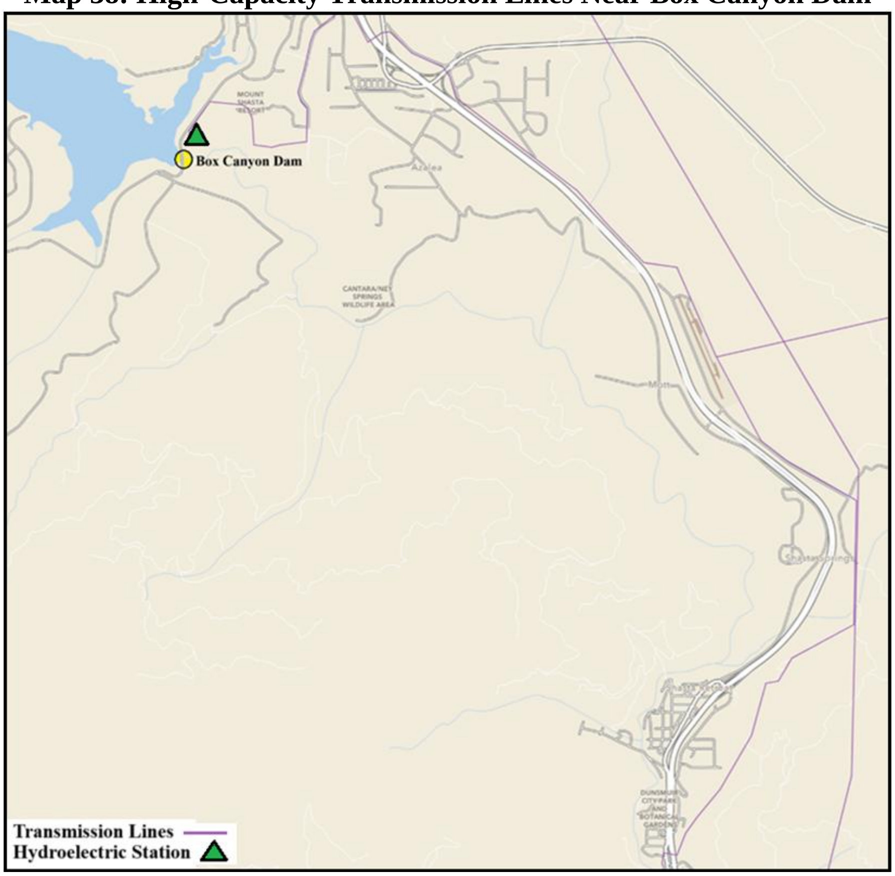
- Traffic Management: Bridges over busy roads or waterways may require costly traffic diversion plans or temporary structures.
- Environmental and Regulatory Compliance: Projects near sensitive areas (rivers, wetlands, protected lands) or those requiring special permits may face higher costs.
- Labor and Regional Costs: Labor costs, equipment rates, and material availability can vary widely by region.

The failure of a dam can have significant impacts on power utilities, affecting both the generation and distribution of electrical power. Potential consequences may include:

- Power Line Disruption: Dam or levee failures can cause flooding and erosion, potentially damaging power lines and transmission towers. This can result in the disruption of electricity transmission from power generation facilities to distribution networks.
- Substation Impact: Substation Flooding: Flooding from a dam or levee failure can impact electrical substations, which play a crucial role in transforming and distributing electricity. Substation failures can lead to widespread power outages.
- Grid Instability: The sudden loss of a significant power source can lead to voltage and frequency fluctuations. This instability can affect the overall reliability of the power grid.
- Emergency Shutdowns: In the event of a dam or levee failure, power utilities may need to implement emergency shutdowns of affected power plants and electrical infrastructure to prevent further damage and ensure the safety of personnel.

The following maps detail the locations of high-capacity transmission lines and power generation facilities near extremely high and high hazard dams in Siskiyou County:

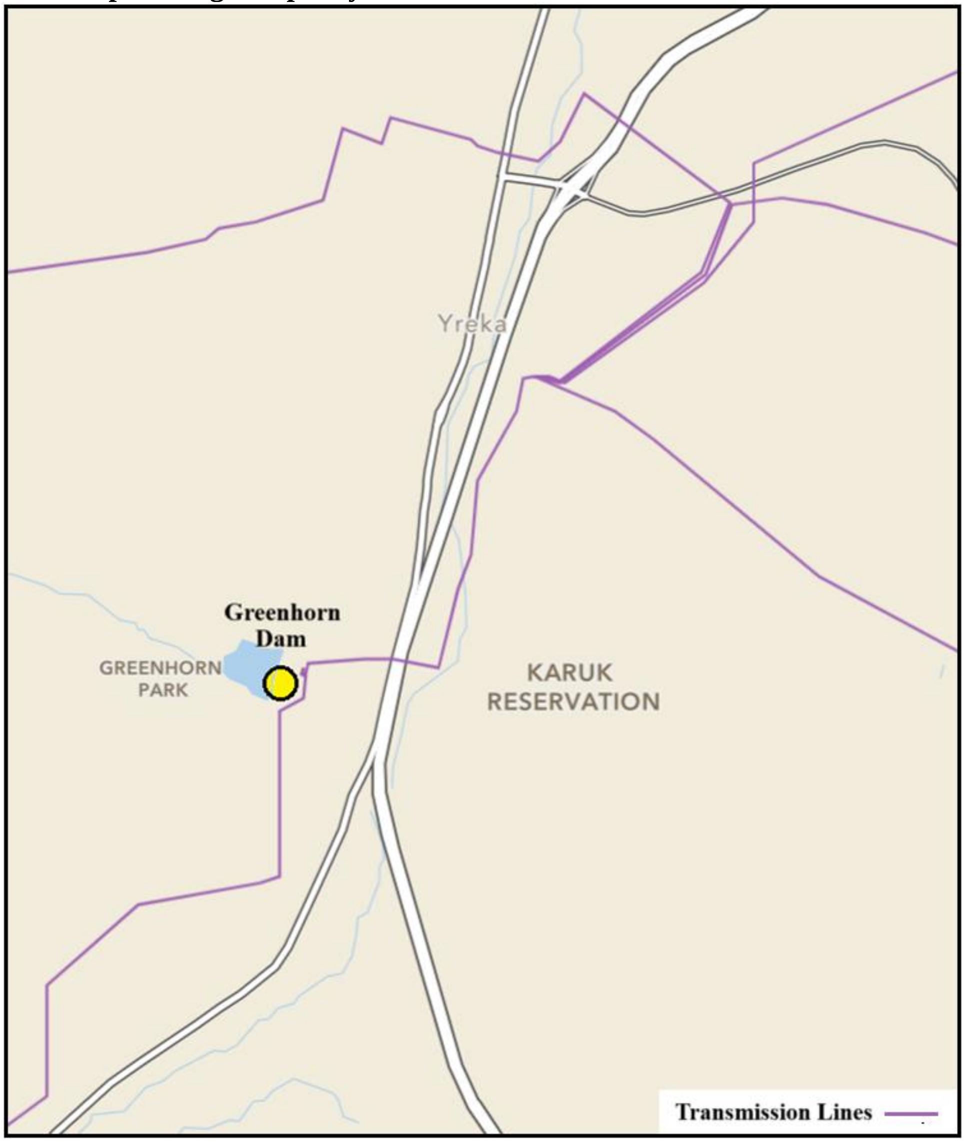
Map 38: High-Capacity Transmission Lines Near Box Canyon Dam



Source: FEMA RAPT

EXHIBIT C

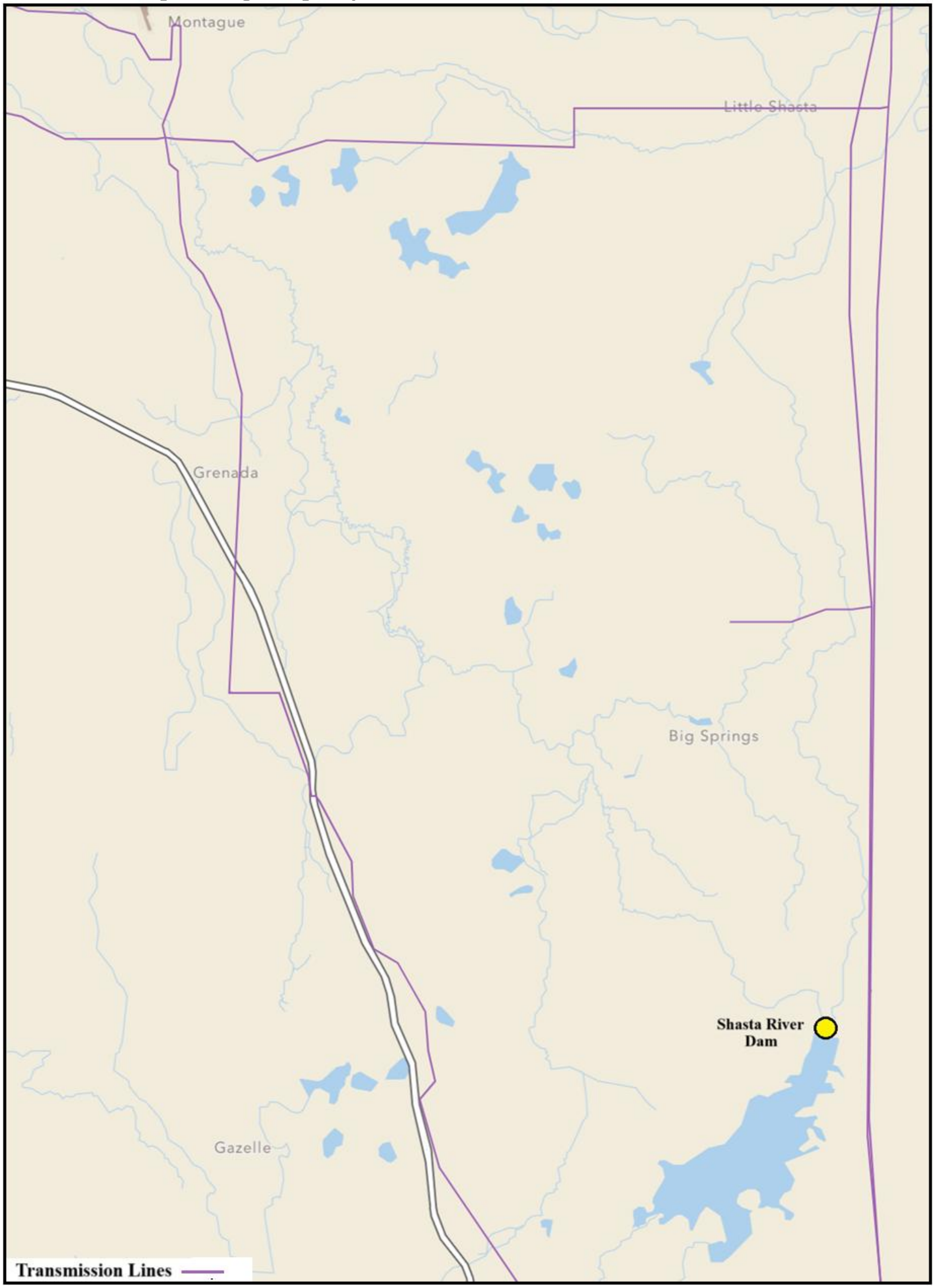
Map 39: High-Capacity Transmission Lines Near Greenhorn Dam



Source: FEMA RAPT

EXHIBIT C

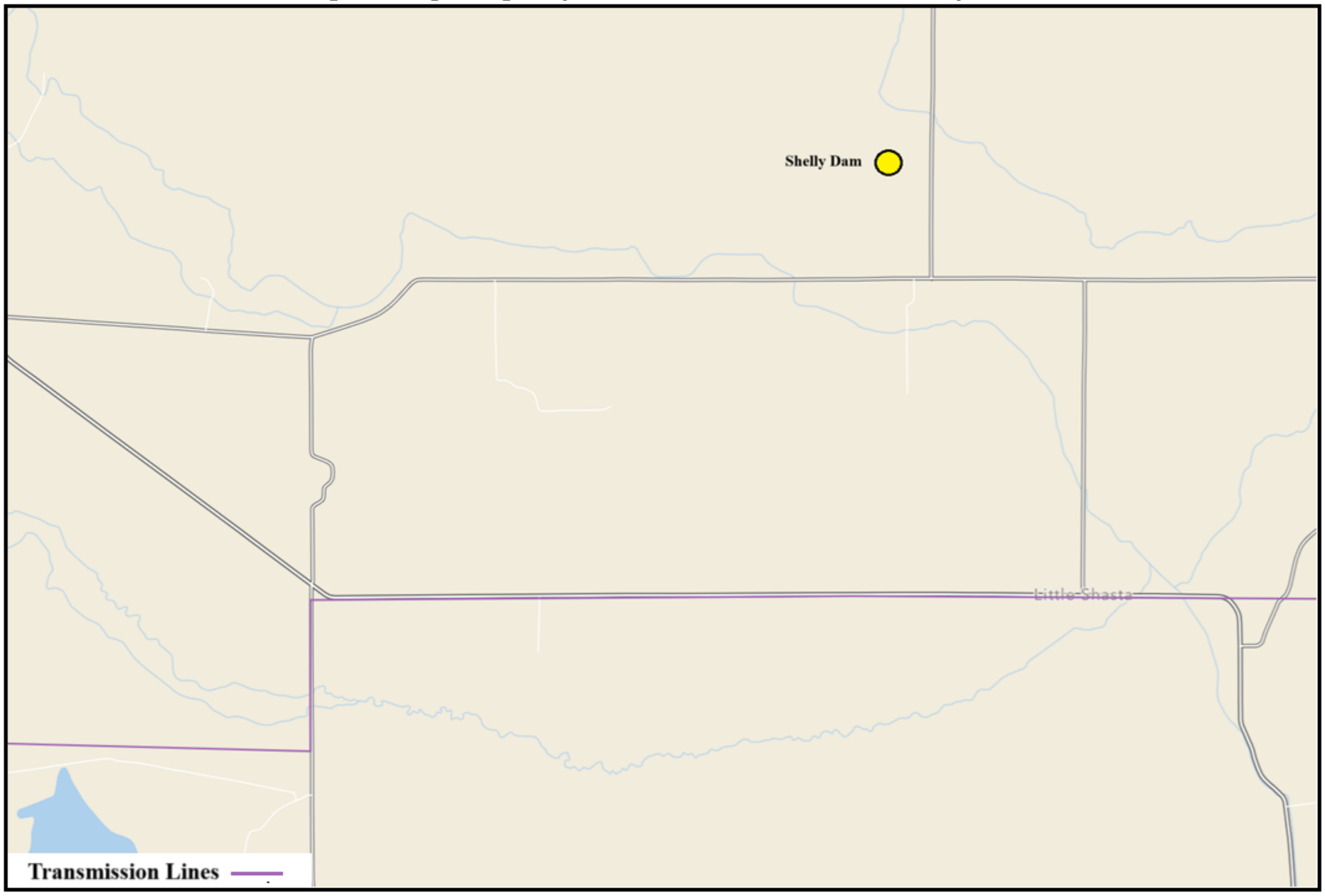
Map 40: High-Capacity Transmission Lines Near Shasta River Dam



Source: FEMA RAPT

EXHIBIT C

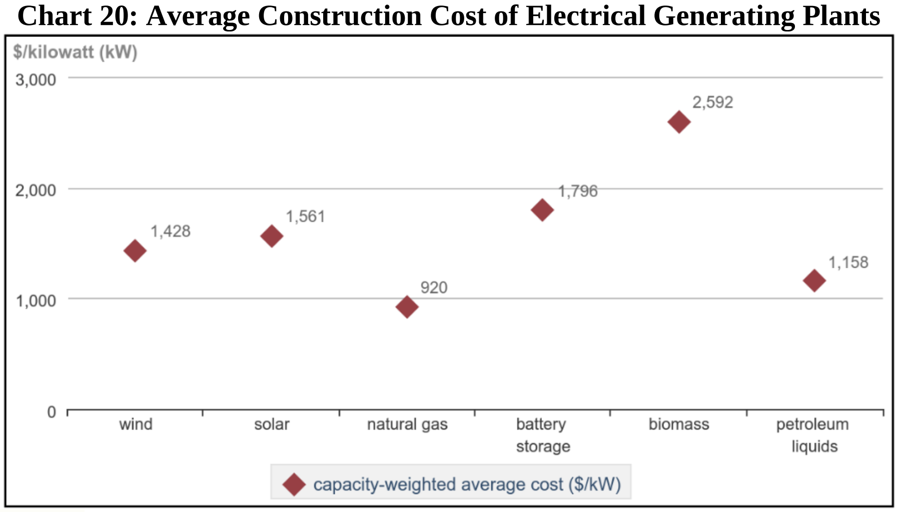
Map 41: High-Capacity Transmission Lines Near Shelly Dam



Source: FEMA RAPT

The construction costs for a hydroelectric plant can vary significantly depending on the size, type of plant, location, and complexity of the project. Data concerning the construction costs of electrical generating plants from the U.S. Energy Information Administration indicates the following average per kW cost, by generating plant type, for new construction:

Chart 20: Average Construction Cost of Electrical Generating Plants



Source: U.S. Energy Information Administration

The Box Canyon Dam hydroelectric generating station is rated at five megawatts of capacity, and reconstruction costs can be estimated at $60,000,000.

EXHIBIT C

A wide variety of data sources, including the U.S. Energy Information Administration, Federal Energy Regulatory Commission, and the Electric Power Research Institute, can be sourced for construction and repair costs. The repair costs for a hydroelectric plant can vary greatly depending on the type of repair, the size of the plant, and the specific components that require attention. Typical repairs cost are:

- Minor Repairs (Routine Maintenance & Component Replacement): Costs generally range between $10,000 to $100,000.
- Moderate Repairs (Replacing Medium-Sized Components): Costs generally range between $100,000 to $1 million.
- Major Repairs (Structural or Extensive Mechanical/Electrical Work): Costs generally range between $1,000,000 to $50,000,000, depending on the scale.
- Emergency Repairs (After Natural Disasters or Accidents): Costs generally range between $5,000,000 to $100,000,000.

For context, after major flooding, the Oroville Dam spillway repairs in Butte County California cost approximately $1,100,000,000.

The cost to reconstruct high-capacity (voltage) power transmission lines varies significantly based on several factors, such as the voltage of the line, geographic terrain, regulatory requirements, and environmental considerations. The following present rough cost estimates for construction:

- High-Voltage Alternating Current Transmission Lines:
  - Overhead lines: Costs generally range between $300,000 to $1,000,000 per mile.
  - Underground lines: Costs generally range between $1,000,000 and $10,000,000 per mile.
- High-Voltage Direct Current Transmission Lines:
  - Overhead lines: Costs can range between $500,000 to $2 million per mile.
  - Underground lines: Costs can range between $3,000,000 to $15,000,000 per mile Key Factors Affecting Costs:

The cost to construct neighborhood power distribution lines (rather than large high-capacity transmission lines) depends on whether the lines are overhead or underground, as well as factors like geography, local labor rates, and regulatory requirements. The following present rough cost estimates for construction:

- Overhead Neighborhood Power Distribution Lines: Costs generally range between $150,000 to $500,000 per mile.
- Underground Neighborhood Power Distribution Lines: Costs generally range between $500,000 to $2,000,000 or more per mile.

The cost to repair high-capacity power transmission lines varies widely depending on the extent of the damage, the location, and the type of transmission line. Here are some general considerations:

- High-Voltage Overhead Transmission Lines:
  - Minor Repairs (fixing or replacing a small section of damaged wire, insulators, or hardware): Costs generally range between $10,000 and $50,000 per mile.
  - Moderate Repairs (replacing several towers or larger segments of lines): Costs generally range between $50,000 and $200,000 per mile.
  - Major Repairs (such as extensive damage from storms, fires, or other disasters requiring multiple towers, wires, and more complex restoration): Costs generally range between $200,000 to over $1,000,000 per mile.

EXHIBIT C

- High-Voltage Underground Transmission Lines:
    - Minor Repairs: Costs generally range between $100,000 to $500,000 per mile.
    - Major Repairs: Costs generally range between $1,000,000 to $5,000,000 or more per mile.

The cost to repair neighborhood power distribution lines, which typically carry lower voltage power than high-capacity transmission lines, also depends on several factors, such as the extent of the damage, whether the lines are overhead or underground, and the location.

- Overhead Neighborhood Distribution Lines:
    - Minor Repairs (such as fixing downed lines, poles, or transformers): Costs generally range between $5,000 to $20,000 per mile.
    - Moderate Repairs (replacing several poles, wires, or small transformers): Costs generally range between $20,000 to $100,000 per mile.
    - Major Repairs (extensive damage from a major storm or accident affecting many poles, transformers, and lines): Costs generally range between $100,000 to $500,000 per mile.
- Underground Neighborhood Distribution Lines:
    - Minor Repairs (fixing small sections of cable or minor equipment malfunctions): Costs generally range between $50,000 to $150,000 per mile.
    - Moderate Repairs (replacing larger segments of underground cable): Costs generally range between $150,000 to $500,000 per mile.
    - Major Repairs (extensive damage to underground systems, possibly caused by floods, storms, or construction accidents): Costs generally range between $500,000 to $2,000,000 per mile.

Factors influencing both reconstruction and repair costs for electrical transmission lines include:

- Terrain: Building lines through mountainous or densely populated areas will increase costs.
- Permitting and Land Acquisition: Securing permits and land can add significant costs.
- Environmental and Regulatory Costs: Meeting environmental impact requirements and complying with local regulations can also influence the final price.
- Voltage Level: Higher voltage transmission lines, such as those over 500 kV, are generally more expensive than lower voltage lines.

Medical, Education, and Response Facilities

The following table, utilizing information from the Greenhorn Dam Breach Analysis, details downstream medical, education, and response facilities likely to be impacted by the failure:

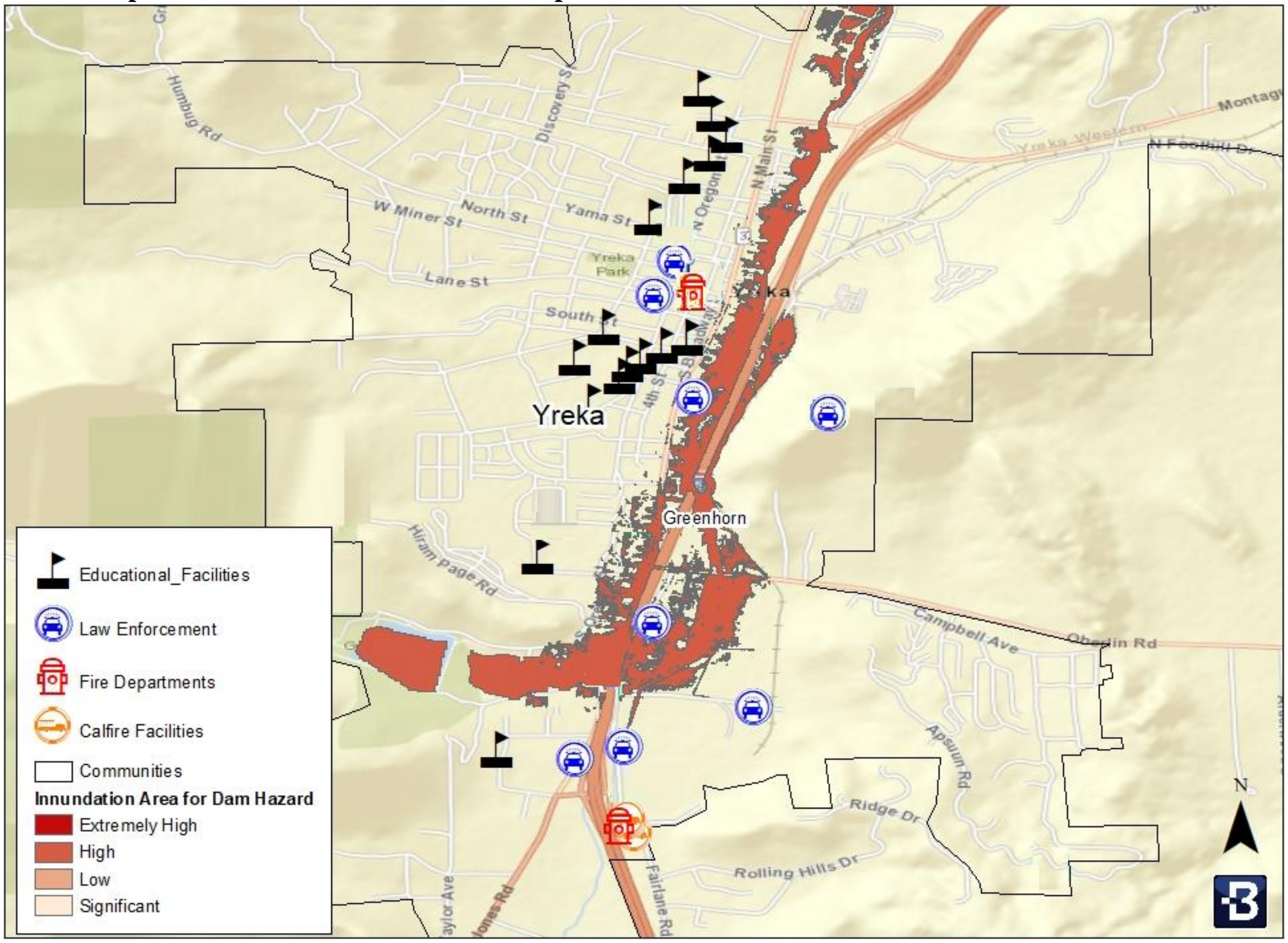
Table 45: Greenhorn Dam Breach Analysis Potentially Impacted Medical, Educations, and Response Facilities

Infrastructure Classification	Name	Arrival Time After Failure (minutes)	Maximum Flood Depth (feet)
Police	Yreka Police Department (Animal Control)	19	1-2
Medical	Yreka Rural Health Clinic - VA	20	1-2

Source: Greenhorn Dam Breach Analysis

The following map, utilizing information from the Greenhorn Dam Breach Analysis, details downstream medical, education, and response likely to be impacted by a failure:

Map 42: Medical, Education, and Response Facilities in Greenhorn Dam Inundation Area



Source: Greenhorn Dam Breach Analysis and BOLDplanning

The following table, utilizing information from the Shasta River Dam Breach Analysis, details downstream medical, education, and response likely to be impacted by a failure:

Table 46: Shasta River Dam Breach Analysis Potentially Impacted Medical, Educations, and Response Facilities

Infrastructure Classification	Name	Arrival Time After Failure (hours)	Maximum Flood Depth (feet)
Fire	Klamath River Volunteer Fire Company	~12.5	~24 (border of area)
School	Klamath Union Elementary School	~12.5	~24 (border of area)

Source: Shasta River Dam Breach Analysis

Neither Box Canyon Dam or Shelly Dam had any medical, education, and response facilities in identified inundation areas.

Communication Systems

No comprehensive mapping of communications systems was available for review to compare against known inundation zones. However, it is assumed that communications lines and towers are in known inundation areas. Of particular concern are 911 and dispatch systems. All jurisdictions are served by a 911 and dispatch system, providing direct dispatching for:

- Law Enforcement
- Emergency Medical Services
- Fire

EXHIBIT C

Flood water from a dam failure can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Damage to Infrastructure:** Flood water can cause physical damage to communication infrastructure such as cell towers, antennas, satellite dishes, and power lines. This damage can result in interruptions or complete failure of communication services.
- **Power Outages:** Flood water can lead to power outages by knocking down power lines or damaging electrical substations. Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.
- **Structural Instability:** Flood water can cause structural instability in communication towers and buildings housing communication equipment. If these structures are not properly reinforced, they may collapse or sustain damage, disrupting communication services.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. The following data, from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency, indicates cost ranges for communications system components:

Table 47: Summary of Communication System Component Costs

Components	Examples	Cost	Expected Lifespan
Infrastructure	Towers, shelters, commercial and backup power equipment,	$$$–$$$$$	20–25 years
Fixed Station Equipment	Antennas, repeaters, towers on wheels, consoles, mobile stations, servers, computers, physical and electronic security elements (e.g., fencing, cameras, monitors, environmental conditions)	$$-$$$	3-15 years
Devices	Handheld portable radios, cellular phones, satellite phones, mobile data devices	$-$$	2-10 years
Accessories	Holsters, chargers, speakers, lapel microphone extensions, Bluetooth, vehicle kits, air cards, intercoms	$	2-10 years
Features	Encryption to protect against security risks, ruggedization to ensure reliant services, Over-the-Air-Programming, automatic roaming	$-$$$	-
Software and Data Storage	Global information system, emergency notifications, monitoring, call answering, database access, Automatic Vehicle Locator	$-$$	-

Source: U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency

Environmental Impacts

The environmental impact of dam or levee failures depends on the circumstances of the failure. After a failure occurs, the resulting flooding and moving debris can affect wildlife and natural habitats. The spread of pollution and hazardous materials can have negative impacts on the environment. Ecosystems and natural habitats may be destroyed, causing the migration or death of local wildlife. Depending on the timing and location of the failure, it can result in rapid changes in water temperature downstream. This can be harmful to temperature-sensitive aquatic species and ecosystems. Dam failures can disrupt natural ecological processes, such as nutrient cycling, sediment transport, and flow regimes. These disruptions can have cascading effects on ecosystems.

Jurisdictional Concerns:

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

EXHIBIT C

- **Dunsmuir:** 637 people, 93 structures valued at $22,515,300, and road and rail infrastructure were identified in failure inundation areas. Potentially compounding these issues, the proximity of the dam to the jurisdiction would limit warning time. A smaller road network and the possibility of Interstate 5 being impacted could hamper response and recovery efforts.
- **Yreka:** 222 people, 109 structures valued at $25,255,300, and road and rail infrastructure were identified in failure inundation areas. Additionally, four government facilities, one police facility, and one medical facility were identified in failure inundation areas. Potentially compounding these issues, the proximity of the dam to the jurisdiction would limit warning time. A smaller road network and the possibility of Interstate 5 being impacted could hamper response and recovery efforts.

Cascading Impacts

Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with dam failure may include:

- Flooding
- Landslides
- Erosion
- Environmental degradation
- Loss of power associated with facilities that provide hydropower
- Loss of water supply
- Damage to agricultural lands

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 48: Dam Failure Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Heavy flooding can cause power loss, property damage, injury, and death, and the displacement of populations. Standing water can also pose a public health risk due to the reproduction of disease vectors such as mosquitos.
Impact on Responders	Heavy flooding may cause inaccessibility of roadways for first responders as well as damage of materials and resources. First responders will also have to facilitate evacuation measures to move people from the flooded area.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Flooding caused by dam failure may create power outages, debris damage, and road closures.
Delivery of Services	Delivery of services may be disrupted due to flood-damaged bridges and roadways. Transit systems may face closures due to public safety concerns. The ability to deliver food, drinking water, and services will be heavily disrupted. Flooding may also interrupt communications and transportation due to power failure and accessibility challenges.
Property, Facilities, and Infrastructure	Flooding from failures impacts roads and bridges, businesses, hospitals, and other critical entities. Water and sewer systems may also be damaged. Homes and businesses may be completely destroyed if situated close to the failure point.

Table 48: Dam Failure Consequence Analysis

Subject	Potential Impacts
Impact on Environment	Flooding and moving debris can affect natural areas and wildlife, spreading pollution and hazardous materials. Ecosystems and natural habitats may be completely destroyed, causing migration or death of wildlife.
Economic Conditions	There is a fiscal impact on the government after a failure due to disruption of travel and commerce routes and employee's ability to travel to work. Recourses at all levels are utilized, impacting the ability to access resources long-term.
Public Confidence in Governance	Direct, immediate, and effective actions must be taken in order to maintain public confidence. Response activities must include all levels of government.

5.8.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, any additional growth within dam inundation areas would place additional populations at risk. Should any population increase occur, potentially vulnerable populations could face disproportionate effects from a dam failure.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. Of particular concern when considering housing data is mobile home residences. Mitigating this concern, all jurisdictions have seen a consistent decline in the percentage of mobile homes as part of housing stock. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires.

Future land use planning should be proactive to address future hazard conditions. Current building codes limit the locating of any new development, structures, or critical facilities and infrastructure within potential dam inundation areas. Along with the continued enforcement of building codes, the restrictions and requirements are expected to decrease future vulnerability.

5.8.8 Mitigation Opportunities

Public Comment: *Reference nature-based solutions.*

The following table presents examples of potential actions that can be instituted for mitigating the dam failure hazard.

Table 49: Potential Dam Failure Mitigation Actions

Category	Example Action
Planning and Regulation	Advise the public about the local dam inundation areas and flood protection measures.
	Require a thorough watershed analysis for all proposed dam or reservoir projects.
	Establish a green infrastructure program to link, manage, and expand existing parks, preserves, greenways, etc.
	Take action to minimize the effects of flooding on people, property, and building contents through measures including flood warning, emergency response, and evacuation planning.
Infrastructure	Implement an inspection, maintenance, and enforcement program to help ensure continued structural integrity of dams.
	Routinely clean debris from support bracing underneath low-lying bridges.
	Remove dam and return to natural system.
Natural Systems	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.

EXHIBIT C

Table 49: Potential Dam Failure Mitigation Actions

Category	Example Action
	Preserve floodplain storage capacity by limiting or prohibiting the use of fill within the floodplain.
	Compensate an owner for partial rights, such as easement or development rights, to prevent a property from being developed.
Education	Educate the public about securing debris, propane tanks, yard items, or stored objects that may otherwise be swept away, damaged, or pose a hazard if picked up and washed away by floodwater.
	Use outreach programs to advise homeowners of risks to life, health, and safety.
	Offer GIS hazard mapping online for residents and design professionals.

EXHIBIT C

5.9 Drought

5.9.1 Hazard Description

Drought is defined as an abnormally dry period lasting months or years when an area has a deficiency of water and precipitation in its surface and or underground water supply. It is, however, a normal, seasonal, and recurrent feature of climate that occurs in virtually all climate zones—typically in late spring through early fall. The duration of drought varies widely. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades. The hydrological imbalance can be grouped into the following non-exclusive categories:

- Agricultural: When the amount of moisture in the soil no longer meets the needs of previously grown crops
- Hydrological: When surface and subsurface water levels are significantly below their normal levels
- Meteorological: When there is a significant departure from the normal levels of precipitation
- Socio-Economic: When the water deficiency begins to significantly affect the population

When below average, little or no rain falls, soil can dry out, and plants can die. If unusually dry weather persists and water supply problems develop, the period is defined as a drought. Human activity such as over-farming, excessive irrigation, deforestation, and poor erosion controls can exacerbate a drought’s effects. It can take weeks or months before the effects of below average precipitation on bodies of water are observed. Depending upon the region, droughts can happen more quickly, and be noticed sooner, or have their effects naturally mitigated. The more humid and wet an area is, the faster the effects will be realized. A naturally dry region, which typically relies more on subsurface water, will take more time to actualize its effects.

Periods of drought can have significant environmental, agricultural, health, economic, and social consequences. The effects vary depending upon vulnerability and regional characteristics. Droughts can also reduce water quality through a decreased ability for natural rivers and streams to dilute pollutants and increase contamination. The most common effects are diminished crop yield, increased erosion, dust storms, ecosystem damage, reduced electricity production due to reduced flow through hydroelectric dams, shortage of water for industrial production, and increased risk of wildland fires.

5.9.2 Location and Extent

All of Siskiyou County, including all participating jurisdictions, is susceptible to drought conditions. However, the specific susceptibility to drought depends on various factors, including climate patterns, land use practices, and water management strategies.

Droughts are regularly monitored by multiple federal agencies using a number of different indices. One of the best indicators of historic drought periods is provided by the U.S. Drought Monitor. The U.S. Drought Monitor provides a summary of drought conditions across the United States, including Siskiyou County. Often described as a blend of art and science, the map is updated weekly by combining a variety of data-based drought indices and indicators, along with local expert input, into a single composite drought indicator. The following table details the U.S. Drought Monitor categories:

Table 50: U.S. Drought Monitor Categories

Rating	Described Condition	Possible Impacts
None	No drought conditions	None
D0	Abnormally Dry	• Short-term dryness slowing planting, growth of crops • Some lingering water deficits

EXHIBIT C

Table 50: U.S. Drought Monitor Categories

Rating	Described Condition	Possible Impacts
		• Pastures or crops not fully recovered
D1	Moderate Drought	• Some damage to crops, pastures • Some water shortages developing • Voluntary water-use restrictions requested
D2	Severe Drought	• Crop or pasture loss likely • Water shortages are common • Water restrictions imposed
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water creating water emergencies

Source: U.S. Drought Monitor

Precipitation data is collected by the University of California Siskiyou County Cooperative Extension Office. The following table indicates annual precipitation averages for Siskiyou County for two stations, Tulelake and Scott Valley, Fort Jones from 2021 - 2024:

Table 51: Siskiyou County Average Rainfall Monthly Totals, 2021 - 2024

	Tulelake Station				Scott Valley, Fort Jones Station			
Year	**2024**	**2023**	**2022**	**2021**	**2024**	**2023**	**2022**	**2021**
January	1.37”	0.04”	0.2”	0.44”	4.95”	2.79”	0.52”	2.01”
February	1.49”	0.23”	0”	0.92”	2.19”	1.1”	0.07”	1.58”
March	0.73”	1.11”	0.2”	0.16”	2.22”	2.89”	0.72”	0.9”
April	0.97”	0.29”	1.72”	0.68”	0.92”	0.18”	1.21”	0.15”
May	0.33”	1.58”	0.36”	0.24”	0.54”	1.02”	0.15”	0.09”
June	0.21”	0.28”	1.14”	0.16”	0.05”	0.37”	0.92”	0.3”
July	0.0”	0.0”	0.0”	0.2”	0.01”	0.04”	0.23”	0.41”
August	0.69”	1.68”	0.02”	0.16”	0.32”	0.3”	0.06”	0.02”
September	0.09”	0.49”	0.09”	1.47”	0.68”	0.78”	0.34”	0.09”
October	0.74”	0.32”	0.02”	1.92”	0.21”	0.2”	0”	0.24”
November	1.73”	0.58”	0.07”	0.56”	6.75”	1.27”	1.53”	0.61”
December	-	1.25”	0.13”	0.72’	-	2.34”	4.69”	3.94”

Source: University of California Siskiyou County Cooperative Extension Office
-: Not reported as future date

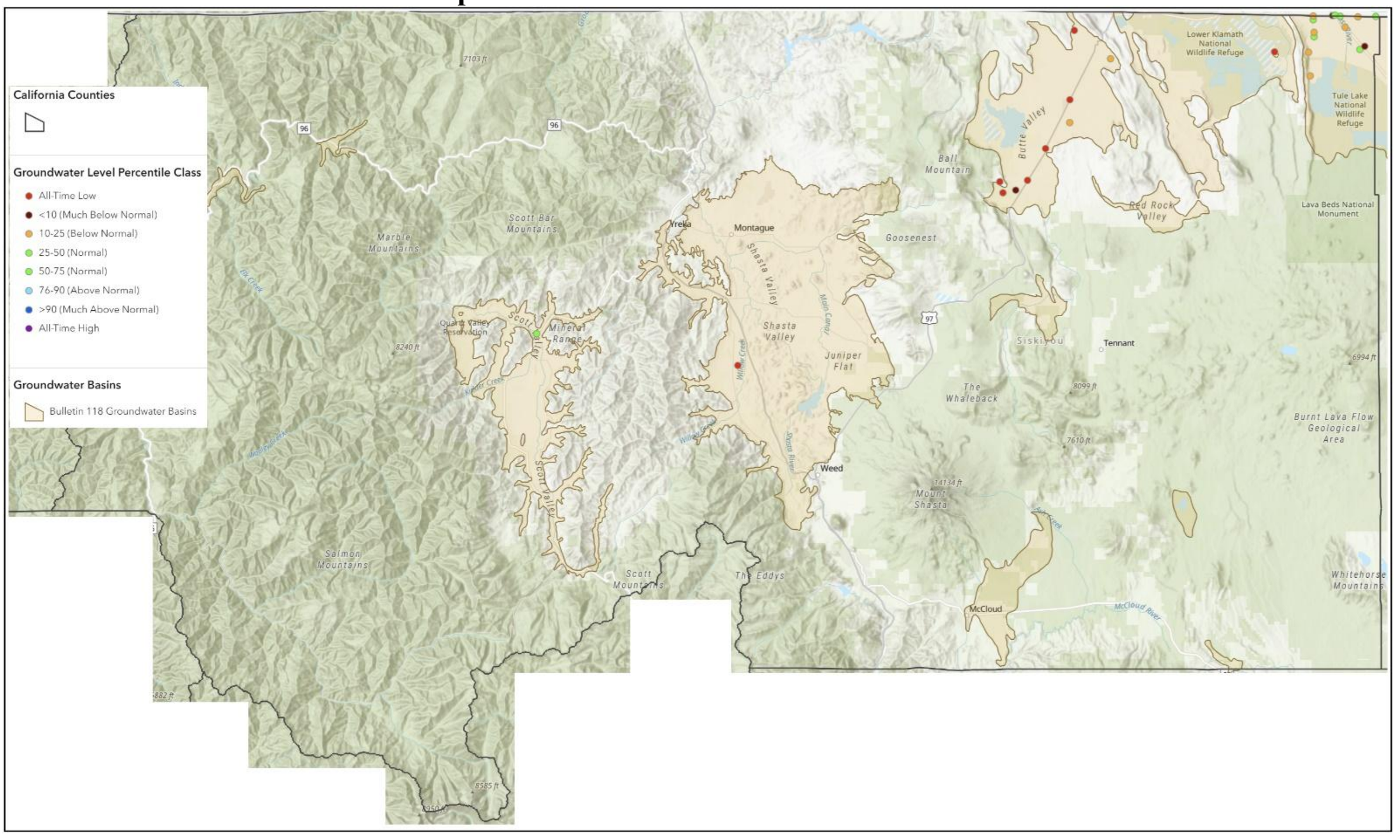
Groundwater in Siskiyou County is a vital resource for agriculture, domestic use, and the environment. Groundwater is heavily used in Siskiyou County for irrigating crops, especially during the dry summer months. The reliance on groundwater is more pronounced during drought periods when surface water becomes less available. In many areas of the county a significant portion of irrigation water comes from groundwater wells, which can strain local aquifers. The peak pumping season for agriculture often coincides with the lowest natural recharge periods, which can lead to overdraft, when more water is pumped from the aquifer than is naturally replenished. This seasonal overdraft puts pressure on groundwater reserves, affecting water availability for future use.

Many rural residents of Siskiyou County depend on groundwater for their domestic water needs, as municipal water systems are limited in more isolated areas. Private wells are common, and during times of drought or groundwater depletion, residents can face shortages or need to deepen wells.

In September 2014, Governor Jerry Brown signed legislation requiring that California's critical groundwater resources be sustainably managed by local agencies, through the Sustainable Groundwater Management Act. In Siskiyou County there are four basins that fall under the requirements of act, the Shasta, Scott and Butte Valley Basins and the Tulelake Subbasin. To carry out the requirements of act, the Siskiyou County Flood Control and Water Conservation District serves as the Groundwater Sustainability Agency for the three basins, and the Siskiyou County Board of Supervisors serves as the member the Tulelake Subbasin, alongside Tulelake Irrigation District, Modoc County and the City of Tulelake. These agencies were required to develop Groundwater Sustainability Plans for each of the basins that assessed the current and projected future conditions of the basins, and established management and monitoring activities and long-term goals. The Scott Valley and Shasta Valley plan have been approved, while Butte Valley and Tulelake are still awaiting a determination.

The following map, from the California Natural Resources Agency, shows the current groundwater level percentile class for Siskiyou County:

Map 43: Groundwater Level Percentile Class



Source: California Natural Resources Agency

Current drought conditions, which change weekly, may be found on the U.S. Drought Monitor website.

The MPC view drought as not only a local or county hazard, but as a regional hazard as well. Discussions with the MPC and a review of all available data indicated that drought is a concern for all participating jurisdictions, with all jurisdictions having similar concerns. The following provides a narrative of the level of jurisdictional concern:

- **Siskiyou County:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Dorris:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Dunsmuir:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.

EXHIBIT C

- **Etna:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Fort Jones:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Happy Camp CSD:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Lake Shastina CSD:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **McCloud CSD:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Montague:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Mt. Shasta:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Tulelake:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Weed:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.
- **Yreka:** Drought identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in drought condition will have a negative impact on wildfire conditions.

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.9.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced no Presidential Disaster Declarations related to drought.

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. The following table details drought Emergency Declarations for Siskiyou County.

Table 52: Siskiyou County Drought Emergency Declarations

Designation	Declaration Date	Incident Type	Individual and Public Assistance
EM-3032-CA	1/20/1977	Drought	-

Source: FEMA
-: Not reported

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. The following table details drought proclamations for Siskiyou County:

Table 53: Siskiyou County California Drought Proclamations of State of Emergency

Designation	Declaration Date	Incident Type	Damages*
2015-05	10/30/2015	Drought	-
2001-03	05/04/2001	Drought	$14,858,480

Source: Cal OES
*: Damages reported for all impacted counties, tribal reservations, and cities
-: Not reported

Comprehensive data on droughts, drought impacts, and drought forecasting is extremely limited and often inaccurate. Due to the complexity of drought monitoring and the large areas droughts impact, agencies have difficulty quantifying and standardizing drought data.

One of the best indicators of historic drought periods is provided by the U.S. Drought Monitor, which lists weekly drought conditions for the Siskiyou County. Historical data was gathered from the U.S. Drought Monitor weekly reports for the 20-year period between 2005 and 2024. This data was compiled and aggregated to provide a yearly estimate of the percentage of Siskiyou County in each Drought Monitor category.

Table 54: Percentage Area in U.S. Drought Monitor Category, 2005 - 2024

Year	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
2024 (YTD)	54.9%	45.1%	11.7%	0.1%	0.0%	0.0%
2023	18.4%	81.6%	29.4%	14.5%	1.4%	0.0%
2022	0.0%	100.0%	99.8%	96.3%	75.5%	0.3%
2021	0.0%	100.0%	99.8%	95.0%	78.3%	12.0%
2020	7.7%	92.3%	82.6%	70.6%	47.9%	0.0%
2019	76.8%	23.2%	13.3%	7.1%	1.0%	0.0%
2018	16.9%	83.1%	37.2%	18.6%	2.7%	0.0%
2017	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2016	28.9%	71.1%	27.4%	12.5%	1.5%	0.0%
2015	0.0%	100.0%	99.9%	96.0%	25.6%	0.0%
2014	0.0%	100.0%	100.0%	98.4%	61.8%	6.3%
2013	12.3%	87.7%	68.6%	45.7%	0.0%	0.0%
2012	32.1%	67.9%	27.6%	1.5%	0.0%	0.0%
2011	90.6%	9.4%	0.8%	0.0%	0.0%	0.0%
2010	40.1%	59.9%	38.5%	7.7%	0.0%	0.0%
2009	4.7%	95.3%	82.4%	6.7%	0.1%	0.0%
2008	41.9%	58.1%	22.7%	1.7%	0.0%	0.0%
2007	48.5%	51.5%	10.1%	0.0%	0.0%	0.0%
2006	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2005	84.0%	16.0%	1.3%	0.0%	0.0%	0.0%

Source: U.S. Drought Monitor

The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, and there is an expedited process for drought. The following table represents the total number of Secretarial Disaster Declarations, by county, for the 10-year period of 2015 to 2024 for Siskiyou County:

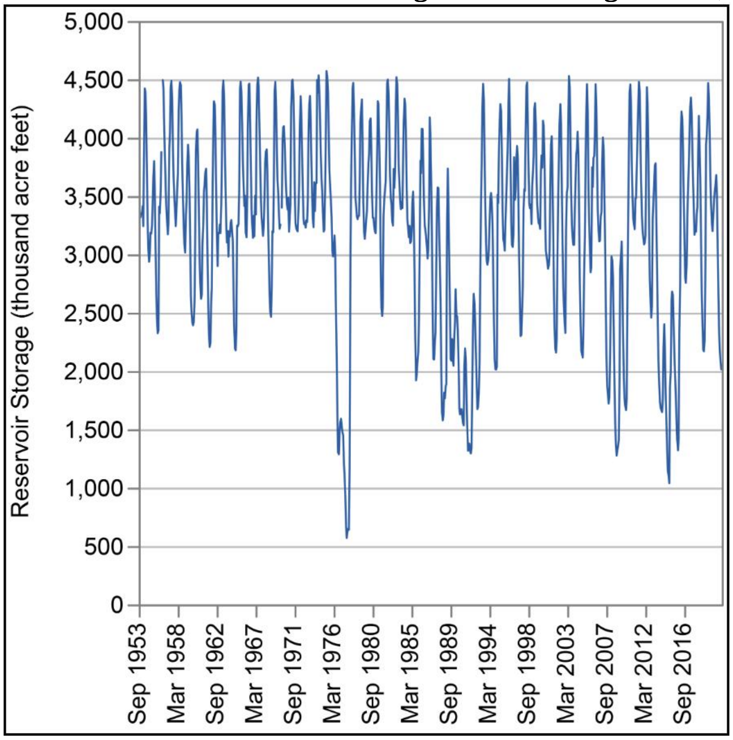
Table 55: Secretarial Drought Disaster Declarations, 2015 -2024

Jurisdiction	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015
Siskiyou County	-	S5371, S5431	S5146, S5157, S5165	S4916, S4927, S4941, S4995	S4675, S4676, S4741	S4467	S4390, S4399	-	S3952, S3964	S3784, S3803, S3810, S3813 S3858, S3943

Source: USDA Farm Service Agency
Note: - designates no declarations

The Shasta Dam Reservoir generally experiences seasonal cycles in water levels from year to year. However, water levels have dropped significantly several times over the past 68 years due to drought conditions. In 2014, the reservoir reached its second-lowest level, surpassed only by extremely low levels during the 1977 drought.

Chart 21: Shasta River Dam Reservoir Average Water Storage Levels, 1953 to 2020



Source: California Department of Water Resources

5.9.4 Probability of Future Events

Historically, drought has affected Siskiyou County and all participating jurisdictions on a reoccurring basis. In reviewing historical data from the U.S. Drought Monitor weekly reports for Siskiyou County from 2005 through 2024 a weekly average can be created indicating the percentage time in each Drought Monitor category. This average can be used to extrapolate the potential likelihood of future drought conditions.

Table 56: Estimated Weekly Probability of Siskiyou County Being in U.S. Drought Monitor Category

None	D0-D4	D1-D4	D2-D4	D3-D4	D4
37.9%	62.1%	42.7%	28.6%	14.8%	0.9%

Data: U.S. Drought Monitor

Siskiyou County and all participating jurisdictions can experience rapid droughts, with a sudden onset of intense dry periods following a period of normal precipitation. While these conditions may last only a few months, they can result in agricultural losses, water supplies shortages, and low stream and river volume.

While predicting drought provides many challenges, NOAA's National Integrated Drought Information System provides the Drought Early Warning System to improve drought early warning capacity. The system is a network of regional and national partners that share information and coordinate actions to help communities in the region cope with drought. Developing and implementing the system allows California, and Siskiyou County to quickly respond to emerging drought conditions. Through developing regional systems, the National Integrated Drought Information System is building the foundation for a nationwide system to improve drought forecasting.

5.9.5 Projected Changes in Hazard Location, Intensity, Frequency, and Duration

According to the National Institutes of Health National Center for Biotechnology Information publication Global Drought Trends and Future Projections "Drought is one of the most difficult natural hazards to quantify and is divided into categories (meteorological, agricultural, ecological and hydrological), which makes assessing recent changes and future scenarios extremely difficult." However, using long term data estimates of future drought conditions can be determined through a combination of climate modeling, historical data analysis, and scientific assessments. This modelling takes into account factors such as temperature, precipitation, soil moisture, and other relevant variables.

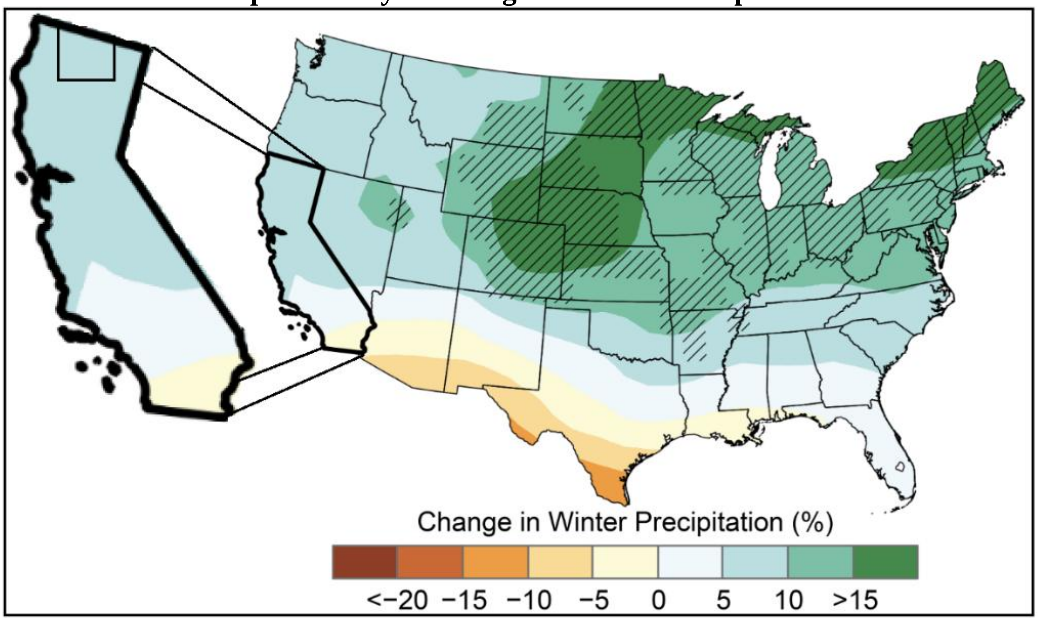
EXHIBIT C

Because snowpack plays an important role in the management of California's complex water system, some of the most impactful droughts have coincided with years of abnormally low snowpack accumulation during the winter months.

Drought conditions can be exacerbated by warm temperatures. The record warmth in 2014 and 2015, in combination with multiple years of below average precipitation, led to one of California's most severe droughts.

Current modelling from the NOAA State Climate Summary 2022 for California suggests that winter precipitation is projected to increase slightly in Siskiyou County and all participating jurisdictions, but these changes are small relative to the natural variability. The following map indicates the expected slight annual increase in winter precipitation for Siskiyou County and all participating jurisdictions:

Map 44: Siskiyou Change in Annual Precipitation



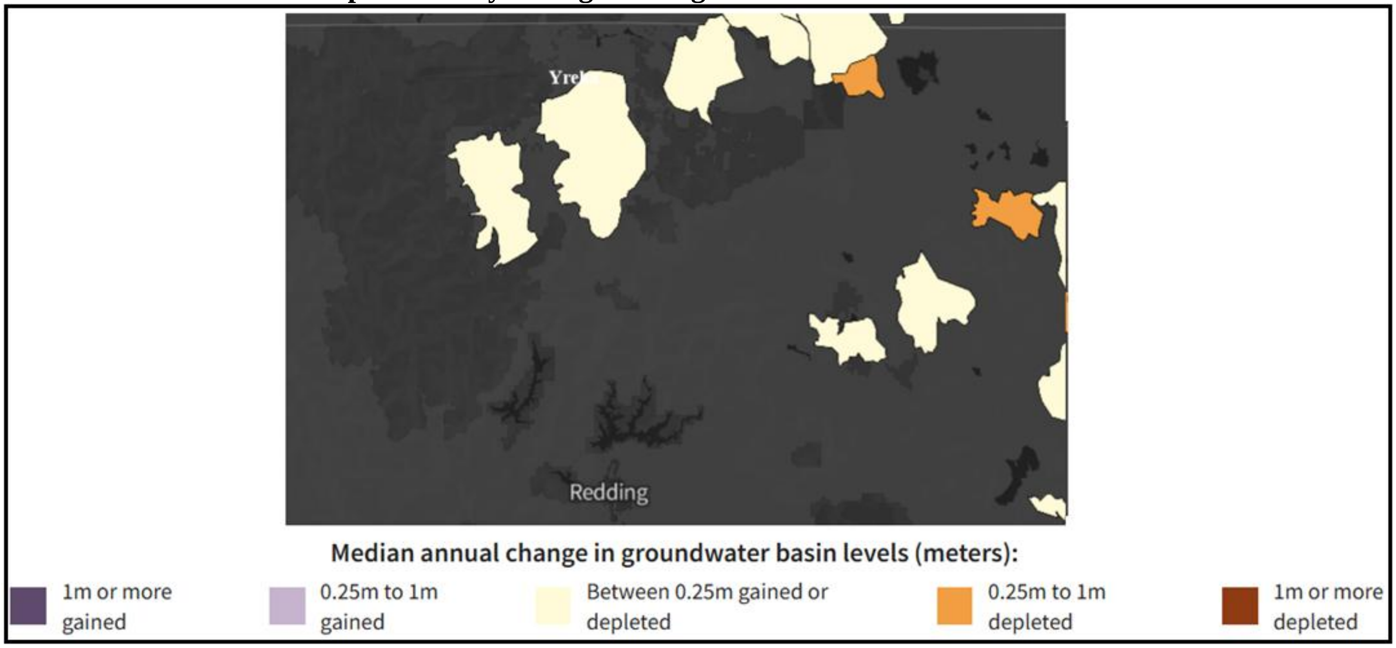
Source: NOAA NCEI State Climate Summary 2022 for California

Projected rising temperatures are projected to raise the snow line, which will increase the likelihood that precipitation will fall as rain rather than snow. This will result in a reduced snowpack and consequently a reduction in water storage. Additionally, projected higher spring temperatures will result in an earlier melting of the snowpack, which can have critical implications for Siskiyou County and participating jurisdictions. This is due to flood control rules requiring that water be allowed to flow downstream and prohibiting the storage of water in reservoirs for use in the dry season. A new management strategy called Forecast-Informed Reservoir Operations is being tested to address such challenges.

There are continued concerns about the amount and usage of groundwater in Siskiyou County. The following map, from the 2024 study Nature: Rapid Groundwater Decline and Some Cases of Recovery on Aquifers Global, illustrates the per years losses and gains for aquifers in Siskiyou County:

EXHIBIT C

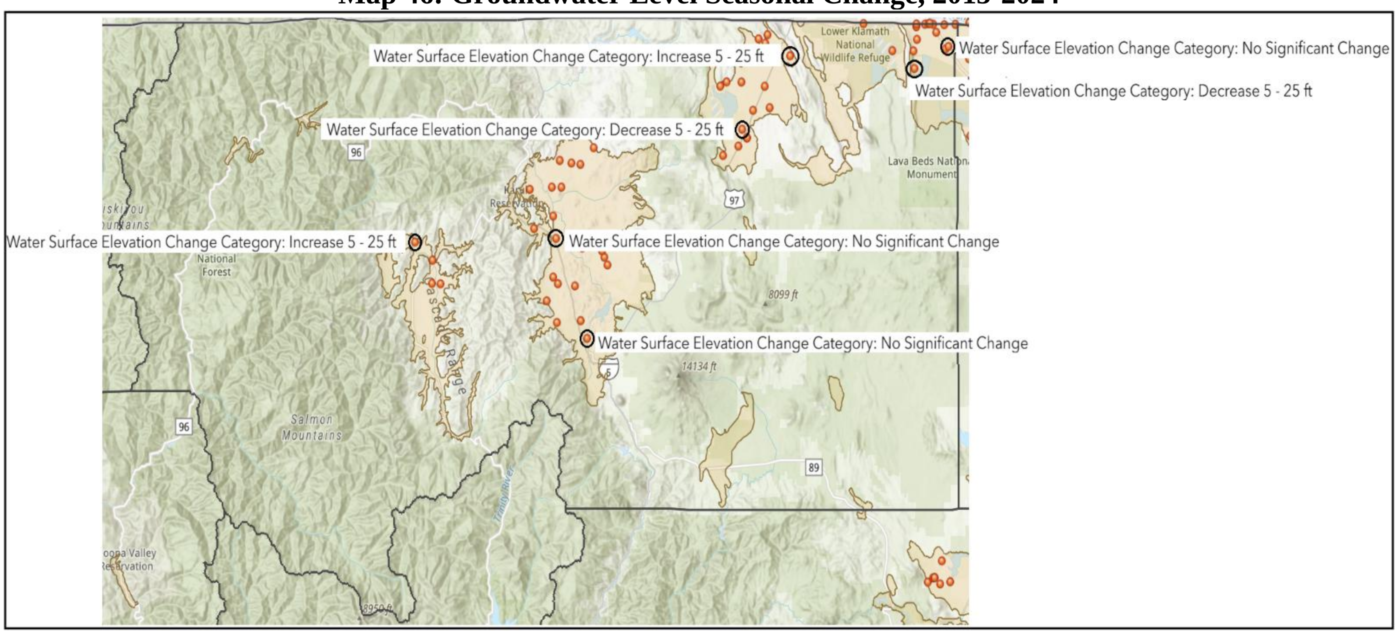
Map 45: Yearly Changes in Regional Groundwater Conditions



Source: Nature: Rapid Groundwater Decline and Some Cases of Recovery on Aquifers Globally

The following map, from the Division of Water Resources, indicates seasonal changes in water surface elevation at production wells throughout the county over the previous 10 years. Data indicates that eastern areas of the county are seeing groundwater level drawdowns:

Map 46: Groundwater Level Seasonal Change, 2015-2024



Source: Division of Water Resources

5.9.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Siskiyou County and all participating jurisdictions from drought. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Siskiyou County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data

EXHIBIT C

for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 57: Participating Jurisdiction Drought Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per year
Siskiyou County	All	Relatively High	99.5	60.9
Dorris	06093000200	Very High	100.0	72.5
Dunsmuir	06093001100	No Rating	0.0	45.5
Etna	06093000800	Relatively High	99.8	54.1
Fort Jones	06093000701	Relatively High	99.7	52.5
Happy Camp CSD	06093001300	No Rating	0.0	55.7
Lake Shastina CSD	06093000902	Relatively High	99.6	52.2
McCloud CSD	06093001200	Relatively Low	93.4	71.9
Montague	06093000300	Very High	99.9	71.3
Mt. Shasta	06093001003	Relatively Low	81.4	45.5
Tulelake	06093000100	Very High	99.9	66.5
Weed	06093000901	Relatively High	98.8	48
Yreka	06093000703	Relatively Low	81.8	47.7

Source: FEMA NRI

Table 58: Participating Jurisdiction Drought Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Drought EAL
Siskiyou County	All	Relatively Moderate	99.5	$15,000,000
Dorris	06093000200	Very High	99.9	$5,400,000
Dunsmuir	06093001100	No Rating	0	$0
Etna	06093000800	Relatively High	99.8	$1,300,000
Fort Jones	06093000701	Relatively High	99.7	$883,000
Happy Camp CSD	06093001300	No Rating	0	$0
Lake Shastina CSD	06093000902	Relatively High	99.7	$730,000
McCloud CSD	06093001200	Relatively Moderate	93.5	$15,000
Montague	06093000300	Very High	99.9	$2,100,000
Mt. Shasta	06093001003	Relatively Low	83.5	$777,000
Tulelake	06093000100	Very High	99.9	$3,700,000
Weed	06093000901	Relatively Moderate	98.3	$130,000
Yreka	06093000703	Relatively Low	81.2	$402,000

Source: FEMA NRI

Population

Droughts are rarely a direct cause of death, though the associated heat, dust, and stress can all contribute to increased mortality. However, drought can severely challenge a public water supplier through depletion of the raw water supply and greatly increased customer water demand. Even if the raw water supply remains adequate, problems due to limited treatment capacity or limited distribution system capacity may be encountered. Water supply planning is the key to minimizing the effects of drought on the population. Public water suppliers should continue to work to identify vulnerabilities and develop infrastructure, conservation plans, and partnerships to reduce the likelihood of running out of water during a drought.

Additionally, the loss of community lifelines can have a direct economic impact on the population. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

EXHIBIT C

Table 59: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Wastewater Services	$66
Loss of Water Services	$138

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

At greater risk may be the vulnerable populations and equity priority communities, including the especially young, the elderly, and those below the poverty level. Hazard occurrences can exacerbate existing vulnerabilities and create new challenges. Vulnerable populations may have pre-existing health conditions that make them more susceptible to heat-related illnesses and dehydration, both of which can be exacerbated during droughts. People on fixed incomes and with limited resources may face difficulties in adapting their homes to withstand hazard conditions or may lack financial resources to cope with the increased costs of food, water, and energy. Details concerning potentially vulnerable populations may be found in Section 3.4: Socially Vulnerable and At-Risk Populations.

Buildings and Structures

In general, buildings within all jurisdictions are not directly vulnerable to losses as a result of drought. However, there is a potential that building occupants could be impacted by power failures caused by either increased utility demand or damaged power delivery infrastructure. In addition, drinking water infrastructure may be specifically vulnerable to the impacts of drought. Any decrease in groundwater supplies would stress this infrastructure and may cause shortages or rationing.

Governmental Operations

Governmental operations and facilities will likely experience minimal impacts from drought conditions, unless there are substantial power, communications, or water outages. However, reduced water availability would likely have an immediate impact on firefighting efforts in urban and suburban areas as fire suppression equipment requires a minimum level of water pressure to activate.

Transportation and Electrical Infrastructure

Droughts can have numerous impacts on both transportation and electrical distribution systems, often leading to challenges that require proactive management. The impacts of droughts on transportation systems may include:

- **Cracking and Shifting:** Drought conditions can cause soil to dry out and shrink, leading to cracks and shifts in roadways, especially in areas with expansive clay soil. This can result in uneven surfaces, potholes, and damage to the structural integrity of roads, making them unsafe for use.
- **Roadbed Damage:** Low moisture levels can cause subsidence and roadbed instability, requiring more frequent road repairs and maintenance.
- **Soil Subsidence:** The foundations of bridges can be compromised if the surrounding soil dries out and shifts. This can increase the stress on bridge supports, potentially leading to structural issues that require costly repairs.
- **Track Shifting and Damage:** The ground beneath railroad tracks can shift or crack during prolonged droughts, leading to track misalignment or buckling. This increases the risk of derailments and requires more frequent inspection and maintenance.
- **Runway Damage:** The same soil subsidence issues that affect roadways can also impact runways, causing cracks and instability that may need repairs.

Additionally, drought can impact both the electrical generation capacity and transmission. The impacts of droughts on electrical systems may include:

- **Hydropower Generation Reduced Water Availability:** Drought directly impacts hydropower plants by reducing the water available to generate electricity. Lower water levels in reservoirs and rivers mean reduced flow through turbines, limiting the amount of power that can be produced. In severe droughts, hydropower plants may have to shut down altogether, reducing overall grid capacity.

- **Thermal Power Plant (Water-Cooled) Cooling Water Shortages:** Thermal power plants (such as coal, natural gas, and nuclear plants) rely on water for cooling. Drought can reduce the availability of water for these cooling processes, forcing plants to reduce output or shut down temporarily.
- **Damage to Power Lines:** Drought increases the risk of wildfires, which can damage or destroy electrical transmission lines, substations, and other infrastructure. Wildfires can cause widespread power outages, as seen in several instances in California and Australia.
- **Preemptive Power Shutoffs:** To prevent wildfires, power utilities may preemptively shut down power lines during extreme drought and dry wind conditions to avoid sparking fires. This can lead to significant disruptions for businesses and residents.
- **Transmission Line Sag:** Droughts often coincide with extreme heat, which can cause power as the wires expand. This increases the risk of contact with trees or the ground, potentially leading to power outages or safety hazards.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities

Water utilities are particularly vulnerable to drought conditions due to the direct impact on both water availability and supply. Water utilities can be affected by drought through:

- **Reduced Water Availability:** The reduction in water availability directly impacts the amount of water that water utilities can draw from local sources.
- **Lower Reservoir Levels**: Lower reservoir levels can affect the ability to meet water demand during periods of high usage.
- **Declining Groundwater** Levels: Lower groundwater levels make it more challenging for utilities to extract water.
- **Water Quality Challenges:** Lower water levels can lead to higher concentrations of contaminants, minerals, and sediments in the available water sources, requiring more extensive and costly treatment processes.
- **Increased Treatment Costs:** Treating water from depleted or lower-quality sources during drought conditions may require additional treatment steps, technologies, or chemicals, leading to increased operational costs for water utilities.
- **Competition for Water Resources:** During droughts, there is increased competition for limited water resources among various users, including agriculture, industry, and households. Water utilities may face challenges in securing sufficient water supplies amid this heightened competition.
- **Impact on Water Infrastructure:** Reduced water flow in rivers and streams can expose water infrastructure, such as pipelines, to the risk of corrosion.
- **Water Use Restrictions:** To conserve water during droughts, authorities may implement water use restrictions and conservation measures.

The State Water Resources Control Board Division of Drinking Water regulates public drinking water systems. In general, there are three classifications of systems, as follows:

- **Community Water Systems:** These systems supply water to the same population year-round and include subdivisions, mutual water companies, and mobile home parks.
- **Non-transient Non-Community Water Systems:** These systems regularly supply water to the same people for at least six months of the year, and include schools, hospitals, and office buildings.
- **Transient Non-Community Water Systems:** These systems provide water to places where people don't stay for long periods of time, such as campgrounds, gas stations, and restaurants.

EXHIBIT C

The following have been identified as water utility providers in Siskiyou County:

Table 60: Siskiyou County Water Utility Providers

Water System Name	Type	Primary Source Water Type
Abrams Lake Mobile Estates	Community	Groundwater
Ash Creek Fire Station-Stnf	Transient	Groundwater
Big Springs Union Elem. School	Non-Transient Non-Community	Groundwater
Butteville Union School	Non-Transient Non-Community	Groundwater
CAL FIRE-Deadwood Conservation Camp	Non-Transient Non-Community	Groundwater
Cal Ore Mobile Estates	Community	Groundwater
Callahan Water District	Community	Surface Water
Caltrans-Collier Rest Stop	Transient	Surface Water
Caltrans-Dunsmuir Grade Insp. Facility	Non-Transient Non-Community	Groundwater
Caltrans-Grass Lake Rest Stop	Transient	Groundwater
Caltrans-Weed Rest Stop	Transient	Groundwater
Cold Creek Mutual Water Company	Community	Groundwater
Copco Lake MWC	Community	Groundwater
Cove Mobile Villa	Community	Groundwater
Delphic Elementary School	Non-Transient Non-Community	Groundwater
Dillon Creek Campground	Transient	Groundwater
Doctor's Park Owners Association	Non-Transient Non-Community	Groundwater
Dollar General Store - Weed	Transient	Groundwater
Dorris, City Of	Community	Groundwater
Dunsmuir, City Of	Community	Groundwater
Etna, City Of	Community	Surface Water
Fort Jones, Town Of	Community	Groundwater
Fowlers Campground	Transient	Groundwater
Gazelle School	Non-Transient Non-Community	Groundwater
Grenada Sanitary District	Community	Groundwater
Happy Camp C.S.D.	Community	Surface Water
Hornbrook C.S.D.	Community	Groundwater
Indian Scotty Campground	Transient	Groundwater
JH Ranch	Transient	Groundwater
Juanita Lake Campground	Transient	Groundwater
Junction Elementary School	Non-Transient Non-Community	Groundwater
Juniper Village Farm Labor Housing	Transient	Groundwater
Kangaroo Lake Campground	Transient	Groundwater
Kidder Creek Orchard Camp	Transient	Groundwater
Klamath Basin National Wildlife Refuge	Transient	Groundwater
Lake Shastina CSD	Community	Groundwater
Lake Siskiyou Campground	Transient	Surface Water
Lake Siskiyou M.W.C.	Community	Groundwater
Lava Beds National Monument	Transient	Groundwater
McBride Springs Campground	Transient	Groundwater
McCloud C.S.D.	Community	Groundwater
MDF-Medicine Lake	Transient	Groundwater
Montague, City Of	Community	Surface Water
Monte Shasta M.W.C.	Community	Groundwater
Mt. Hebron Work Center	Transient	Groundwater
Mt. Shasta Ski Park	Transient	Groundwater
Mt. Shasta, City Of	Community	Groundwater
Oak Bottom Cg & WC	Transient	Groundwater
Oak Knoll Work Center	Transient	Groundwater
Oak Valley Acres P.O.A.	Community	Groundwater
Pneuma Retreat Center - Stewart Mineral	Transient	Groundwater

EXHIBIT C

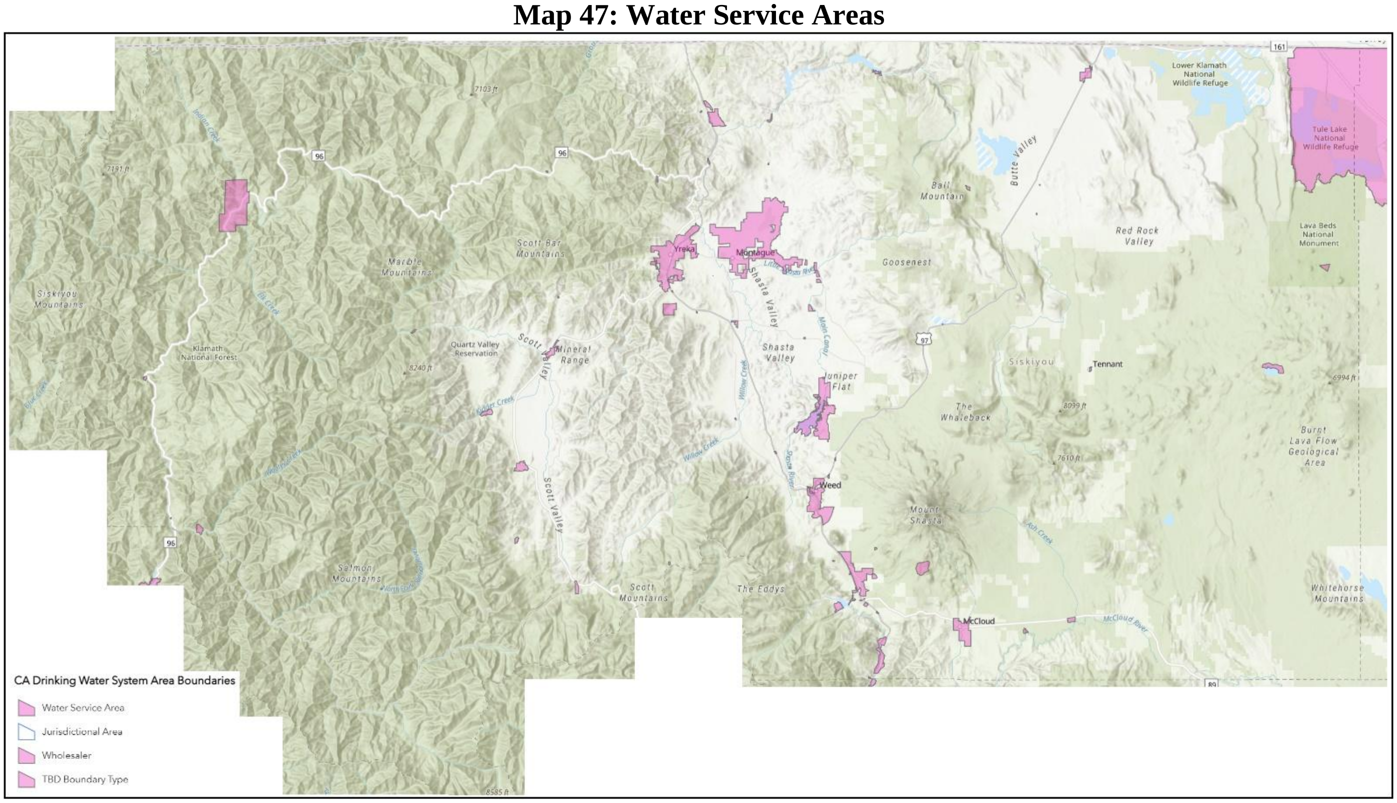
Table 60: Siskiyou County Water Utility Providers

Water System Name	Type	Primary Source Water Type
Railroad Park Resort	Transient	Groundwater
R-Ranch Headquarters	Transient	Groundwater
R-Ranch Klamath River	Transient	Groundwater
Sawyer S Bar Work Center	Transient	Groundwater
Shadow Mountain Mhp	Community	Groundwater
Shasta Cascade Mobile Home Park	Community	Groundwater
Shasta Horizon Mobile Home Park	Community	Groundwater
Shasta View Heights Owners Association	Community	Groundwater
Shastina Mobile Estates	Community	Groundwater
Siskiyou Co. Rolling Hills MWC	Community	Groundwater
Siskiyou Co. Service Area #5/Carrick	Community	Groundwater
Siskiyou Lake Highlands MWC	Community	Groundwater
Sun Mountain M.W.C.	Community	Groundwater
Swiss Holiday Lodge	Transient	Groundwater
Tennant C.S.D.	Community	Groundwater
Tree Of Heaven Campground	Transient	Groundwater
Tulelake, City Of	Community	Groundwater
Weed Golf Club, Inc.	Transient	Groundwater
Weed, City Of	Community	Groundwater
Willow Creek School	Non-Transient Non-Community	Groundwater
Yreka, City Of	Community	Surface Water

Source: State Water Resources Control Board Division of Drinking Water

The following map, from the State Water Resources Control Board, shows water service areas within Siskiyou County:

Map 47: Water Service Areas



Source: State Water Resources Control Board

Drought can severely challenge a public water supplier through depletion of the raw water supply and greatly increased customer water demand. Even if the raw water supply remains adequate, problems due to limited treatment capacity or

EXHIBIT C

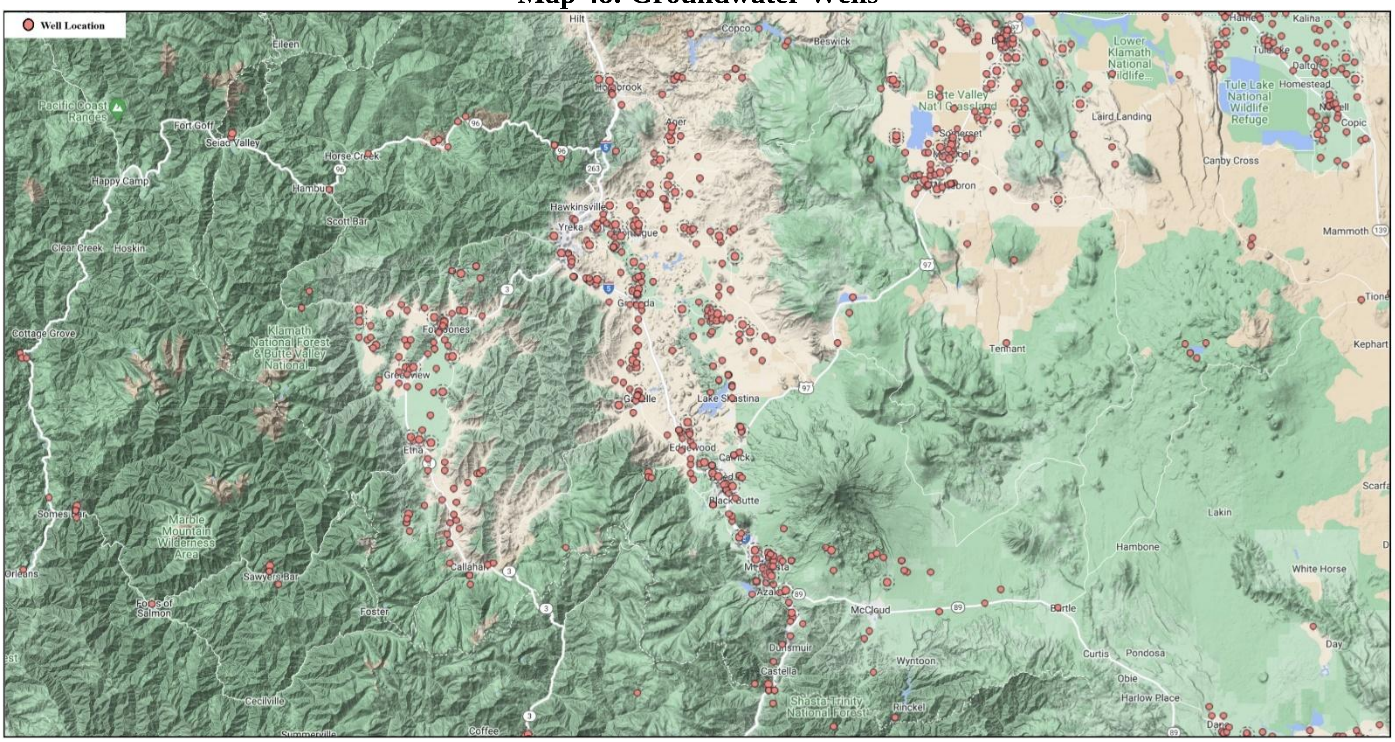
limited distribution system capacity may be encountered. Water supply planning is the key to minimizing the effects of drought on the population. Public water suppliers should continue to work to identify vulnerabilities and develop infrastructure, conservation plans, and partnerships to reduce the likelihood of running out of water during a drought.

Communities and citizens served by private wells rather than water supply districts may be at higher risk to drought conditions, and may see the following impacts:

- **Lowering of Water Table:** Drought conditions can lead to a lowering of the water table, which is the level at which groundwater is located. Private wells that rely on groundwater may experience reduced yields or, in extreme cases, may run dry.
- **Decreased Well Recharge:** Drought reduces the amount of precipitation, leading to decreased recharge of groundwater. Private wells depend on a sustainable recharge rate to maintain a consistent and reliable water supply.
- **Increased Competing Demands:** During a drought, increased water demand for agricultural irrigation, municipal water supply, and other uses can create competition for the available groundwater. Private wells may face challenges due to this increased demand.
- **Water Quality Concerns:** Lower groundwater levels during droughts can lead to changes in water quality. Concentrations of minerals, contaminants, and pollutants may increase, affecting the suitability of water for drinking and other uses.

The following map, from the California Water Boards Groundwater Information System, indicates the location of groundwater wells throughout Siskiyou County:

Map 48: Groundwater Wells

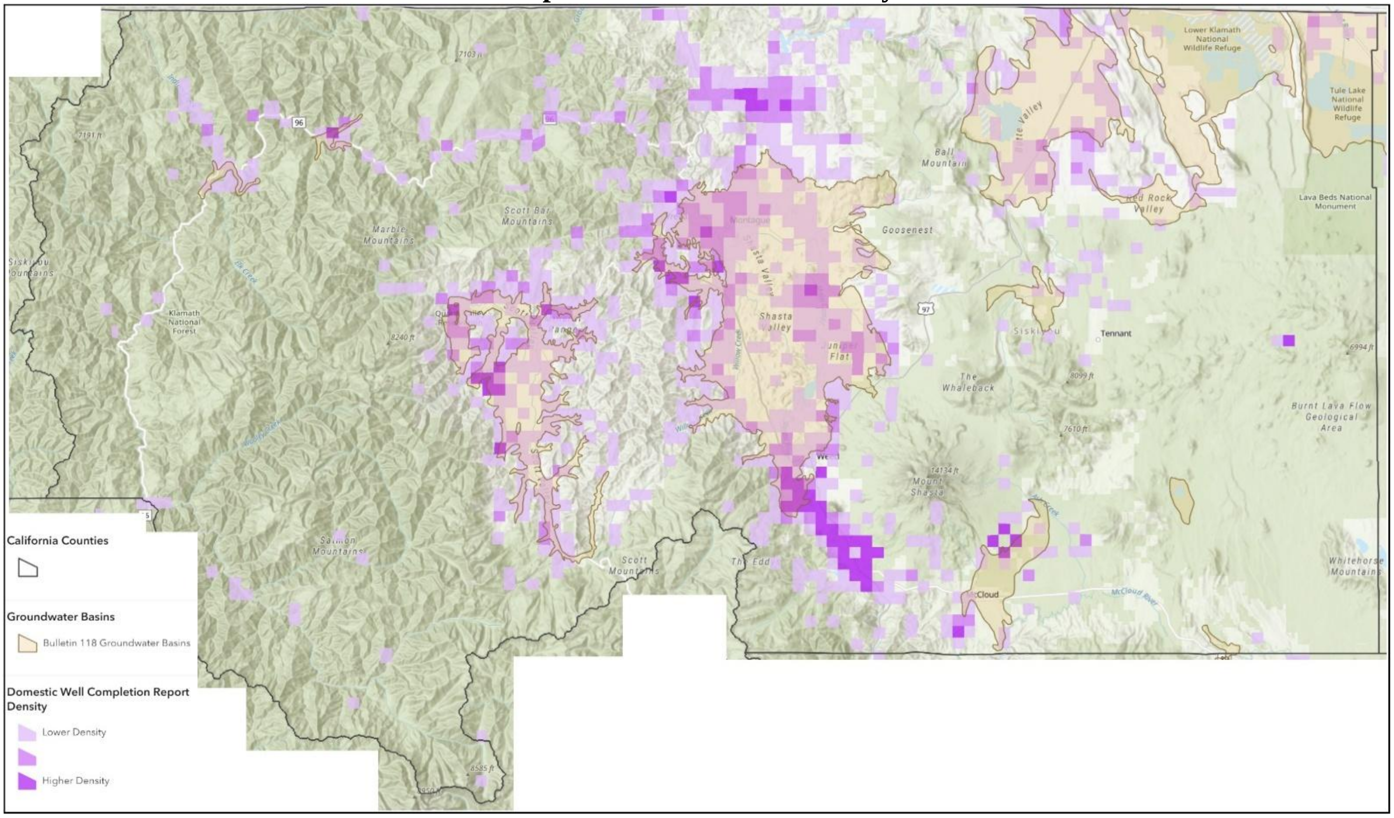


Source: California Water Boards Groundwater Information System

Augmenting this information, the following map from the State Water Resources Control Board shows domestic well density in Siskiyou County:

EXHIBIT C

Map 49: Domestic Well Density



Source: State Water Resources Control Board

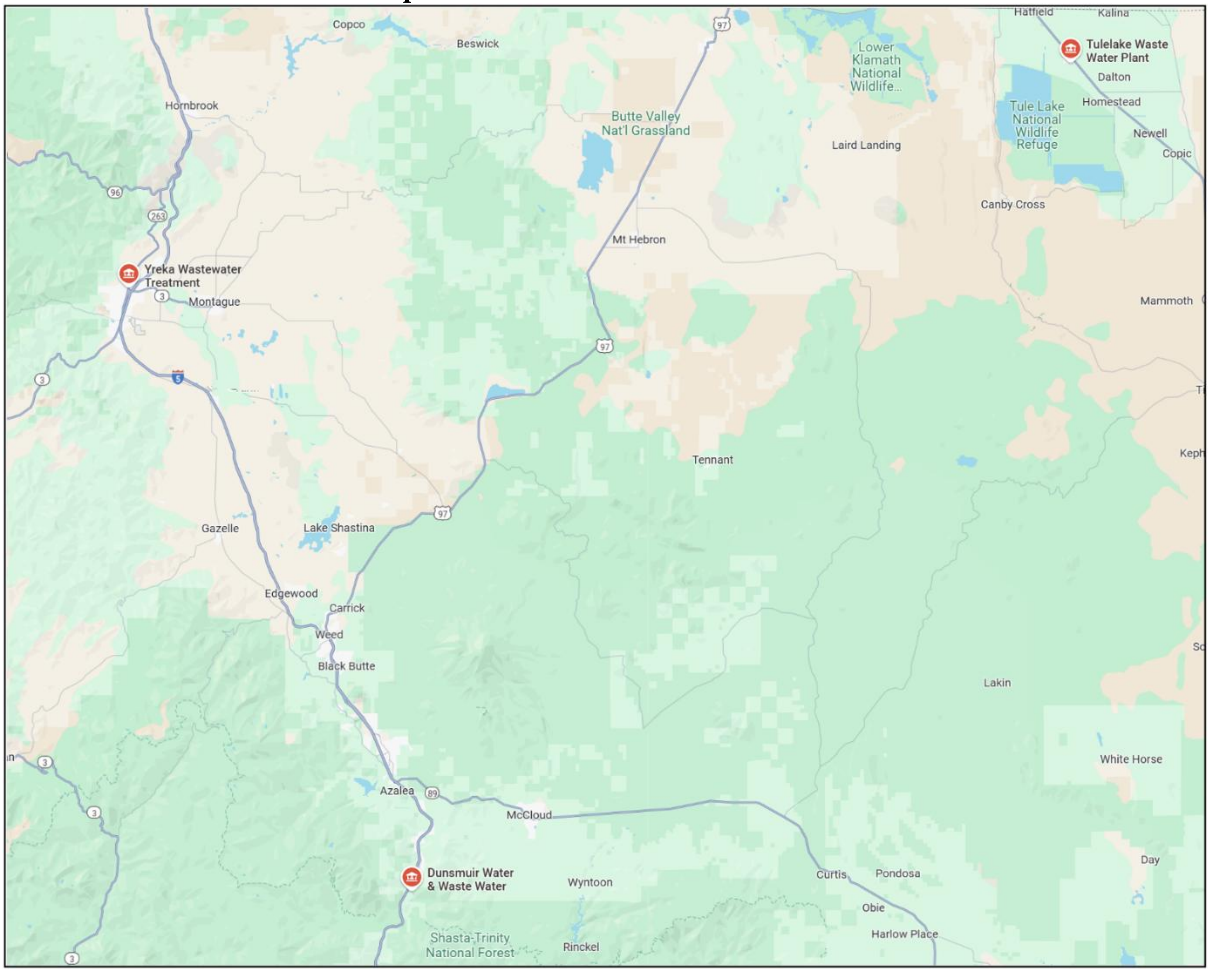
Should it be required to drill a private well deeper to accommodate for drought conditions impacting the level of the water table, on average, the cost to drill a private water well in the United States can range from $15 to $45 per foot. However, it's important to note that this is a general estimate, and actual costs can vary based on geological and hydrogeological conditions and well depth.

Additionally, drought can impact wastewater treatment facilities, and operations, including:

- **Biological Treatment Efficiency:** Many wastewater treatment plants use biological processes that rely on microorganisms to break down waste. These microorganisms depend on a certain balance of water, oxygen, and waste concentration to function effectively. During droughts, changes in the wastewater's composition and flow can reduce the efficiency of biological treatment systems, requiring process adjustments or additional chemical treatments.
- **Pipe Cracking and Ground Shifts:** Drought causes soil to dry out and shrink, potentially leading to ground shifts that can crack or damage underground sewer pipes. This can result in leaks, blockages, or sewer line failures that require costly repairs.
- **Increased Infiltration and Inflow:** During drought, groundwater levels may drop, and sewer systems can experience increased infiltration of saline or contaminated water, particularly in coastal areas. This can exacerbate the corrosion of pipes and other infrastructure.

Three wastewater treatment plants were identified in Siskiyou County, serving Dunsmuir, Tulelake, and Yreka. The following map indicates the locations of these treatment plants:

Map 50: Wastewater Treatment Plants



Source: Google Maps

The costs to repair or reconstruct water and wastewater utility plants and distribution systems can vary significantly based on factors such as the size of the facility, the extent of the damage, local labor costs, and material availability. However, some general estimates can provide insight into the typical expenses.

- **Water Utility Plants**
  - Minor repairs: These may involve fixes to pumps, valves, or small sections of piping. On average, minor repairs for water treatment facilities can range from $10,000 to $100,000, depending on the scale of the damage and the equipment involved.
  - Moderate repairs: More substantial repairs, such as fixing filtration systems or repairing damaged tanks, can cost anywhere from $500,000 to $2,000,000. These projects often involve replacing large equipment and reconfiguring damaged systems.
  - Major repairs or partial reconstruction: For significant damage, such as structural failures, system-wide overhauls, or upgrades, the cost may rise to $10,000,000. This typically includes substantial replacement of infrastructure, new piping systems, and modernizations to meet current standards.
  - Reconstruction Costs: Complete reconstruction of a water utility plant can be very expensive, often costing between $30,000,000 and $20,000,000, depending on the capacity of the plant and the complexity of the systems involved.
- **Wastewater Treatment Plants**
  - Minor repairs (such as fixing aerators, pumps, or control systems) can cost between $50,000 and $500,000, depending on the facility's size and the severity of the issues.

EXHIBIT C

- Moderate repairs: Involves fixing critical components like clarifiers or digesters and can range from $1,000,000 to $5,000,000.
- Major repairs or upgrades: For larger systems, like upgrading an entire section of a plant or replacing significant infrastructure, the costs can escalate to $10,000,000.
- Reconstruction Costs: Complete reconstruction of wastewater plants typically ranges between $50,000,000 and $30,000,000, depending on the plant's capacity and required technology. Factors such as meeting modern regulatory standards can also drive costs.

- **Distribution Systems (Water and Wastewater)**
  - Water Distribution System Repair Costs: Repairing or replacing damaged pipelines, pumps, or valves in water distribution systems can cost anywhere from $50,000 to $200,000 per mile for minor repairs. More extensive pipe replacement, especially in urban areas where digging and rerouting traffic are involved, can escalate to $500,000 to $2,000,000 per mile.
  - Wastewater Distribution Repair Costs: pipelines (especially those dealing with larger sewage systems) tend to have higher repair costs due to increased complexity. These can range from $1 million to $3 million per mile, especially in densely populated regions or for large diameter pipes.
  - Water Distribution Reconstruction Costs: For water distribution system reconstruction, costs can range from $1,000,000 to $5,000,000 per mile, particularly for high-capacity urban systems with large pipe diameters or advanced technology like smart metering.
  - Wastewater Distribution Reconstruction Costs: For wastewater system reconstruction, particularly for larger pipelines, the cost per mile can range from $3,000,000 to $8,000,000, depending on the urban density, excavation challenges, and regulatory requirements.

Medical, Education, and Response Facilities

In general, medical, educational, and response facilities are not directly vulnerable to losses as a result of drought. Both operations and facilities will likely experience minimal impacts from drought conditions, unless there are substantial power, communications, or water outages.

Communication Systems

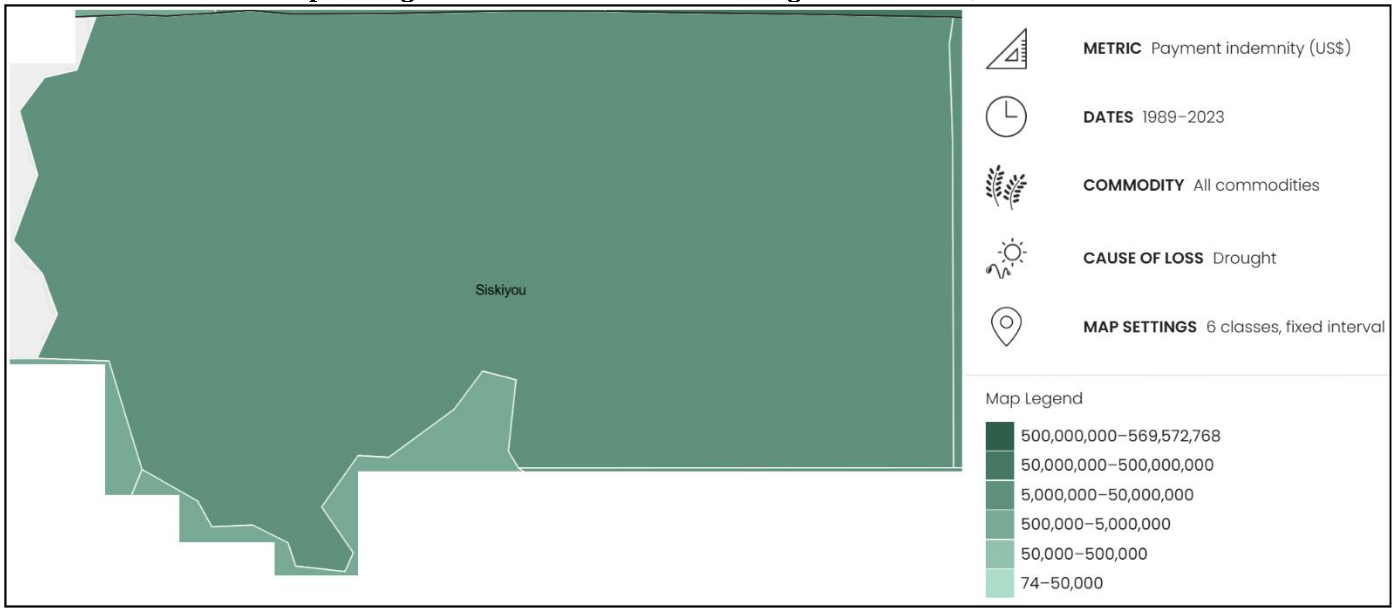
In general, communications systems are not directly vulnerable to losses as a result of drought, and would likely experience minimal impacts from drought conditions, unless there are substantial power outages.

Environmental and Agricultural Impacts

Drought conditions can cause significant agricultural impacts. In addition to obvious losses in yields in both crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and disease to forests and reduce growth. The incidence of wildfires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

The following map from the United States Department of Agriculture details total county-wide agricultural losses due to drought conditions from 1989 - 2023:

Map 51: Agricultural Losses Due to Drought Conditions, 1989 - 2023



Source: United States Department of Agriculture

Although environmental losses are difficult to quantify, increasing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects. Environmental losses are the result of damage to plant and animal species, wildlife habitat, and air and water quality, wildfires, degradation of landscape quality, loss of biodiversity, and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. However, many species will eventually recover from it if it is a temporary aberration. However, the degradation of landscape quality, with increased soil erosion, may lead to a more permanent loss of biological productivity of the landscape.

Jurisdictional Concerns:

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Siskiyou County:** With 16.9% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the jurisdictional agriculture base, and important part to the fabric of the community, will continue to be vulnerable to the impacts of drought conditions.
- **Dorris:** With 20.5% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the remote nature of the jurisdiction may hinder future access to water supplies.
- **Dunsmuir:** With 16.1% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations.
- **Etna:** With 15.6% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the jurisdictional agriculture base, and important part to the fabric of the community, will continue to be vulnerable to the impacts of drought conditions.
- **Fort Jones:** With 23.4% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the jurisdictional agriculture base, and important part to the fabric of the community, will continue to be vulnerable to the impacts of drought conditions.

EXHIBIT C

- **Happy Camp CSD:** With 21.0% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the jurisdictional forestry base, and important part to the fabric of the community, will continue to be vulnerable to the impacts of drought conditions.
- **Lake Shastina CSD:** Drought conditions may impact tourism and recreation industries.
- **McCloud CSD:** With 13.3% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the jurisdictional agriculture base, and important part to the fabric of the community, will continue to be vulnerable to the impacts of drought conditions.
- **Montague:** With 17.2% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the jurisdictional agriculture base, and important part to the fabric of the community, will continue to be vulnerable to the impacts of drought conditions.
- **Mt. Shasta:** With 18.4% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations.
- **Tulelake:** With 41.8% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the jurisdictional agriculture base, and important part to the fabric of the community will continue to be vulnerable to the impacts of drought conditions.
- **Weed:** With 32.7% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, the jurisdictional agriculture base, and important part to the fabric of the community will continue to be vulnerable to the impacts of drought conditions.
- **Yreka:** With 22.6% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. Additionally, drought conditions may impact tourism and recreation industries.

Cascading Impacts

Public Comment: *Some hazards may be subsequent to the primary hazard.*

Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with drought may include:

- Decrease in water quality
- Increased wildfire risk
- Environmental degradation
- Land subsidence
- Damage to agricultural lands

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 61: Drought Consequence Analysis

Subject	Potential Impacts
Impact on the Public	If the drought coincides with warmer months, vulnerable populations may face an increased risk of dehydration, death, heat-related illness, heat stroke. Lower quantities of water may also increase the likelihood of contamination due to higher concentrations of bacteria. During droughts, dry soils and wildfires increase the number of airborne particles, such as pollen and smoke, which can worsen chronic respiratory illnesses.
Impact on Responders	Reduced water availability would likely complicate firefighting efforts in urban and suburban areas where wildfire-fighting tactics such as chemical retardants and

Table 61: Drought Consequence Analysis

Subject	Potential Impacts
	controlled burns are less suitable. Some fire suppression equipment requires a minimum level of water pressure to activate. If the drought coincides with warm months, first responders may face increased risk of heat-related injuries or death.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. While the expectation is minimal, this threat may impact an agency's ability to implement their continuity plan based on the hazard's potential to impact power, communications, or water outages. Critical life-saving activities and fire suppression will be directly impacted by these outages.
Delivery of Services	Droughts may impact the delivery of goods and services if there are shortages of raw materials.
Property, Facilities, and Infrastructure	Drought conditions may threaten the levels or quality of municipal public water supplies or impact small communities and/or private potable water wells.
Impact on Environment	The potential of drought-related impacts could have significant impacts on supplies of animal feed, livestock, meat and dairy products, and processed grain products, and on crop production. Drought conditions may also increase the potential for fires. Drought is also associated with insect infestations, plant disease, wind erosion of soil, and decrease in levels of water produced by natural aquifers.
Economic Conditions	The economic impacts from a drought could be significant. Droughts have the potential to drain state, and local resources, which will have a significant fiscal impact on the local government.
Public Confidence in Governance	Droughts can adversely affect the public, first responders, infrastructure, agriculture, economy, and overall operations. Direct, effective, and timely response by all levels of government is required for public confidence in governance, especially in recognizing and mitigating economic impacts of the drought.

5.9.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, should any population increase occur, potentially vulnerable populations could face disproportionate effects from a drought. Of particular concern are the increasing number of unhoused persons within the county, who according to data from the 2023 NorCal Continuum of Care point in Time Report have increased by 112% from 2019 to 2023. Additionally, it is expected that there will be an increase in the number of elderly citizens and citizens living below the poverty level in all jurisdictions as a percentage of total population. These higher percentages may increase future vulnerability due to increased demands on water supplies, causing an increase in commodity pricing.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires. Current building codes require considerations for water conservation, and any renovation to existing housing stock will require adherence to these provisions.

Extreme heat conditions will continue to be considered for any future jurisdictional development or renovation, including climate or heat proofing structures. In addition, jurisdictions will help areas adapt to extreme heat by encouraging the usage of heat-resistant materials during infrastructure renovation and design.

EXHIBIT C

5.9.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the drought hazard.

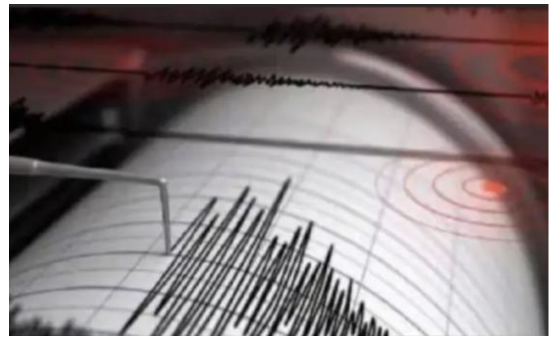
Table 62: Example Drought Mitigation Actions

Category	Example Action
Planning and Regulation	Gather and analyze water and climate data to gain a better understanding of local climate and drought history.
	Identify available water supplies.
	Improve water supply monitoring.
	Develop a drought emergency plan.
	Develop criteria or triggers for drought-related actions.
	Develop a drought communication plan to facilitate timely communication of relevant information.
	Establish an irrigation time/scheduling program or process so that all agricultural land gets the required amount of water.
	Develop an ordinance to restrict the use of public water resources for non-essential usage.
	Adopt ordinances to prioritize or control water use, particularly for emergency situations like fire fighting
Infrastructure	Design water delivery systems to accommodate drought events.
	Develop new or upgrading existing water delivery systems to eliminate breaks and leaks
Natural Systems	Incorporate drought tolerance practices into landscape ordinances to reduce dependence on irrigation.
	Provide incentives for xeriscaping.
	Use permeable driveways and surfaces to reduce runoff and promote groundwater recharge
Education	Provide information on installing low-flow water saving showerheads and toilets.
	Provide information on adjusting sprinklers to water the lawn and not the sidewalk or street.
	Provide information on installing rain-capturing devices for irrigation.
	Encourage the installation of graywater systems in homes to encourage water reuse

EXHIBIT C

5.10 Earthquake

5.10.1 Hazard Description



An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves that are typically caused by the rupturing of geological faults. A fault is a fracture or zone of fractures between two blocks of rock. Faults allow the blocks to move relative to each other, which, when rapidly occurring, causes an earthquake. When stresses in the crust exceed the strength of the surrounding rock, a rupture or break may occur fault plane. The point of origin of an earthquake is known as the hypocenter, which may be deep beneath the surface. The point at the surface directly above the hypocenter is known as the epicenter. Seismic waves radiate out from the hypocenter causing the ground to shake. These waves can travel long distance, but in general are strongest near the epicenter.

Earthquakes tend to occur along faults, which can be divided into three categories:

- **Normal Fault:** Resulting from pulling or tension with the overlying block moving down the dip of the fault plane
- **Thrust (Reverse) Fault:** Resulting from squeezing or compression, with the overlying block moving up the dip of the fault plane
- **Strike-Slip (Lateral) Fault:** Resulting from either type of stress, with the blocks moving horizontally past one another

5.10.2 Location and Extent

Siskiyou County is located within the North American tectonic plate, a major tectonic plate that covers a significant portion of North America. Siskiyou County is situated near plate boundaries, where tectonic activity is more pronounced. As such, all participating jurisdictions are at risk to an earthquake event.

Two scales are used when referring to earthquake activity. Estimating the total force of an earthquake is the Richter scale, and the observed damage from an earthquake is the Modified Mercalli Intensity Scale. Additionally, both Peal Ground Acceleration (%g) and Velocity (cm/s) can be used to measure and quantify force and movement. Peak Ground Acceleration (PGA) is a measure of the maximum acceleration experienced by a point on the Earth's surface during an earthquake. It quantifies the intensity of ground shaking at a specific location and is a crucial parameter for assessing seismic hazard. PGA is typically measured in units of gravity (g), where 1 g is approximately equal to the acceleration due to Earth's gravity (about 9.81 meters per second squared or 32.2 feet per second squared). So, if the PGA at a location is 0.2 g, it means the ground acceleration during the earthquake was 20% of the acceleration due to gravity. PGA can vary significantly from one location to another during the same earthquake event. Factors that influence PGA include the earthquake's magnitude, depth, distance from the epicenter, and local geological conditions.

The following table equates the above referenced earthquake scales.

Table 63: Earthquake Magnitude Scale Comparison

Mercalli Scale Intensity	Verbal Description	Richter Scale Magnitude	Acceleration (%g)	Velocity (cm/s)	Witness Observations
I	Instrumental	1 to 2	0.17%	<0.1	None
II	Feeble	2 to 3	1.40%	1.1	Noticed only by sensitive people
III	Slight	3 to 4	1.40%	1.1	Resembles vibrations caused by heavy traffic
IV	Moderate	4	3.90%	3.4	Felt by people walking, rocking of free-standing objects

EXHIBIT C

Table 63: Earthquake Magnitude Scale Comparison

Mercalli Scale Intensity	Verbal Description	Richter Scale Magnitude	Acceleration (%g)	Velocity (cm/s)	Witness Observations
V	Rather Strong	4 to 5	9.20%	8.1	Sleepers awakened; bells ring
VI	Strong	5 to 6	18.00%	16	Trees sway, some damage from falling objects
VII	Very Strong	6	35.00%	31	General alarm, cracking of walls
VIII	Destructive	6 to 7	65.00%	60	Chimneys fall and some damage to building
IX	Ruinous	7	125.00%	116	Ground crack, houses begin to collapse, pipes break
X	Disastrous	7 to 8	>125.0%	>116	Ground badly cracked, many buildings destroyed. Some landslides
XI	Very Disastrous	8	>125.0%	>116	Few buildings remain standing, bridges destroyed.
XII	Catastrophic	8 or greater	>125.0%	>116	Total destruction; objects thrown in air, shaking and distortion of ground

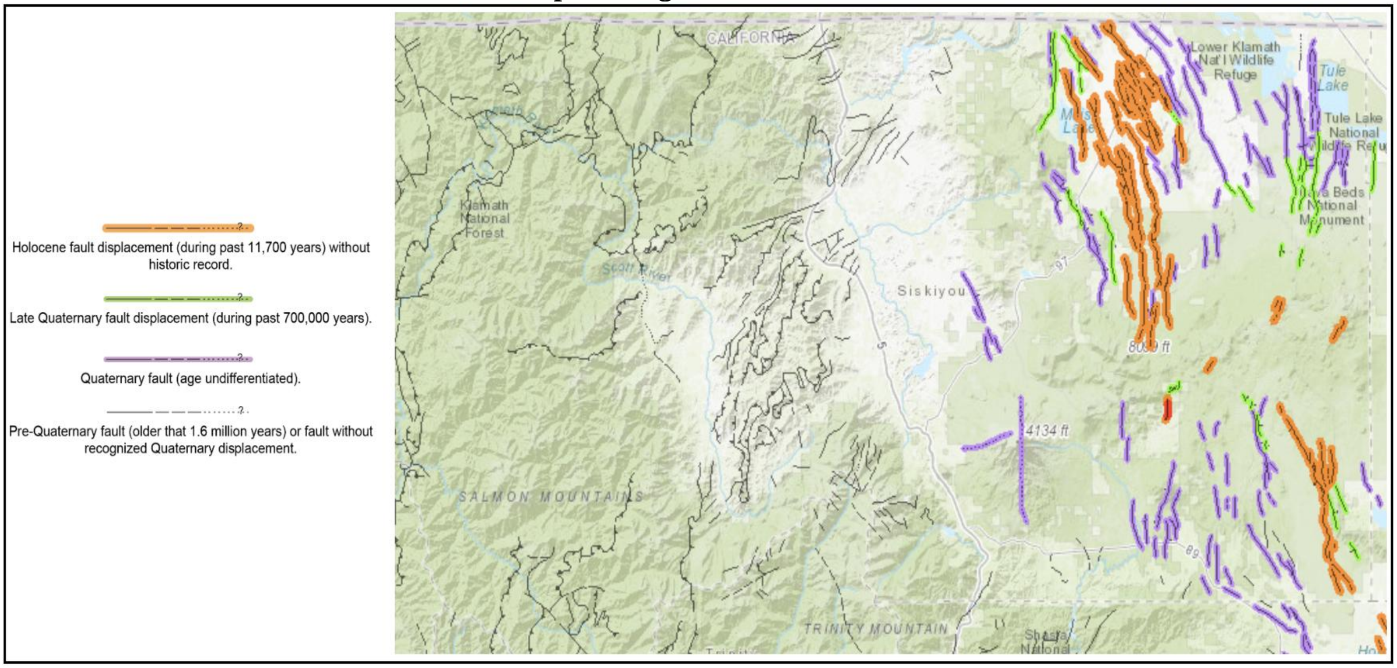
Faults can be classified based on the time period in which they were most active. These time periods are significant in geology for understanding fault activity, seismic risk, and landscape evolution. The following are generally accepted fault classifications:

- **Holocene Faults:** Active within the last 11,700 years, these are considered the most active faults because they have produced movement (displacement) recently in geologic terms. They are often associated with recent seismic activity and present a higher risk for future earthquakes.
- **Late Quaternary Faults:** Active within the last 700,000 years, these faults pose a moderate earthquake risk. While they may not have moved in the very recent past, they are still considered capable of producing future earthquakes.
- **Quaternary Faults:** Active within the last 2.6 million years, these faults are considered active in the geologic sense. However, the risk they pose for earthquakes today is generally lower than Holocene or late Quaternary faults.
- **Pre-Quaternary Faults:** Active before 2,600,000 years ago, these faults are considered to pose a low risk of earthquakes. Since these faults have not been active in millions of years, they are unlikely to experience reactivation under current tectonic stress conditions.

The following map, from the California Department of Conservation, details regional fault lines:

EXHIBIT C

Map 52: Regional Fault Lines



Source: California Department of Conservation

The National Earthquake Hazards Reduction Program maps soil types that define the potential for significant impact from an earthquake due to seismic wave amplification. The soil types are generally described as follows:

- Type A: Hard rock
- Type B: Rock
- Type C: Dense soil/soft rock
- Type D: Stiff soil
- Type E: Soft soil
- Type F: Special soils requiring special evaluation

Of concern, Type D and Type E soils have a high potential to cause structural damage during an earthquake due to seismic wave amplification. Type D soils, often referred to as stiff soils, typically consist of dense sand, gravel, or stiff clay. These soils offer moderate resistance to seismic waves, meaning that the amplitude of earthquake waves may be somewhat amplified as they pass through this type of soil. While Type D soils are not as prone to extreme amplification as softer soils, they still can intensify ground shaking during an earthquake.

Type E soils, known as soft soils, typically consist of soft clay, loose sand, or any unconsolidated materials that are prone to higher levels of amplification during seismic events. This soil can significantly increase the amplitude and duration of earthquake shaking, making structures built on them more vulnerable to damage. Type E soils amplify seismic waves much more than stiffer soil types. The soft, loose nature of the soil doesn't absorb seismic energy effectively, causing stronger ground shaking. Buildings or structures located on Type E soils are at higher risk of experiencing severe damage during an earthquake due to this amplification effect. Areas with Type E soils may require additional building reinforcements, such as deeper foundations or vibration-absorbing materials, to protect against earthquake damage.

The following map, from the State of California, details the extent of Type D and Type E soils in Siskiyou County:

EXHIBIT C

Map 53: Siskiyou County Type D and Class E Soils Map

Source: State of California

Liquefaction occurs when loosely packed or wet soils near the ground surface lose their strength during strong ground shaking, causing these soils to behave like a liquid. Liquefaction beneath buildings and other structures can cause significant damage during earthquakes. As of this plan, no liquefaction mapping has been completed in Siskiyou County, representing a gap in the understanding of the risk from this hazard.

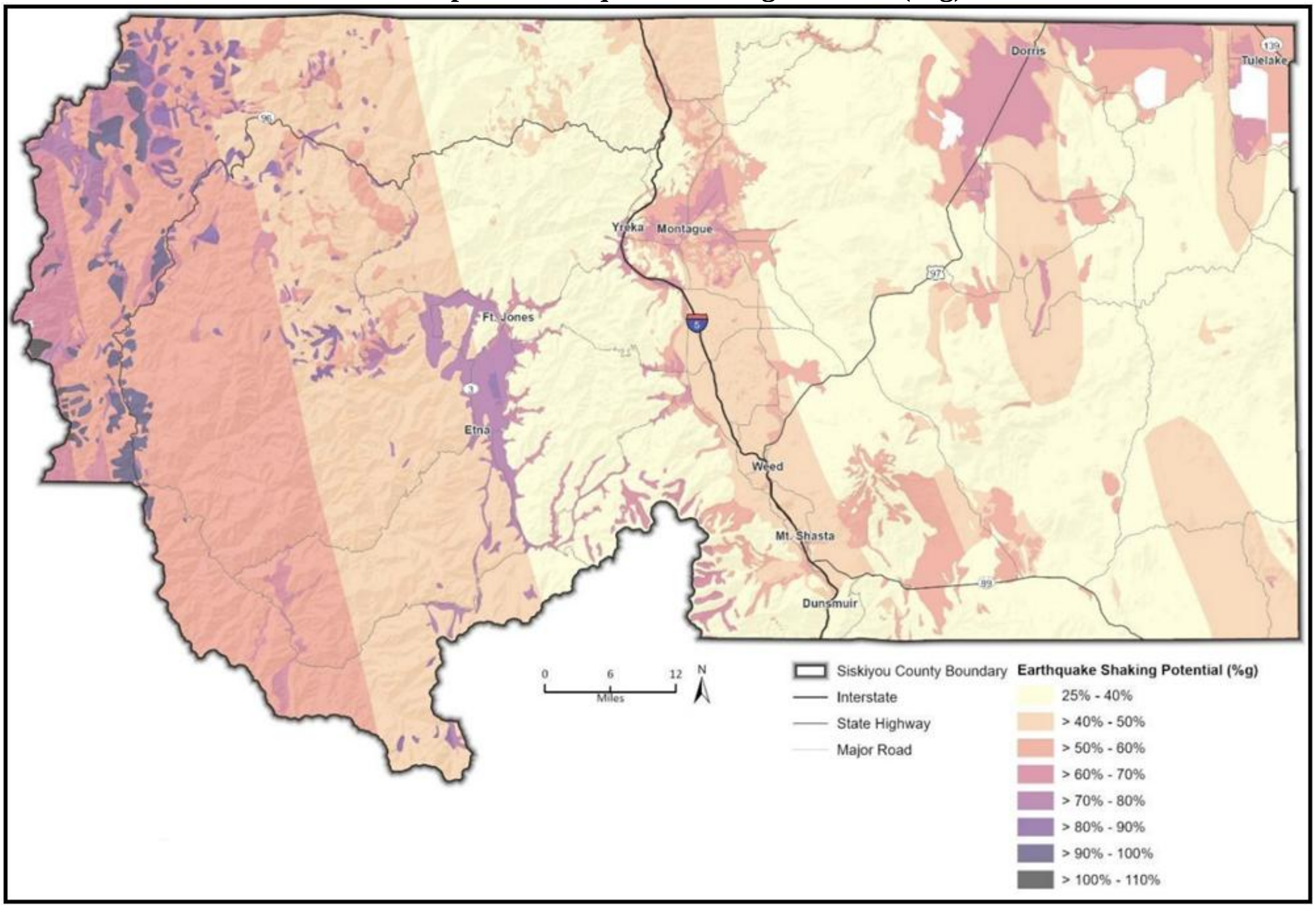
Earthquake shaking potential (%g) refers to the percentage of the force of gravity (g) that is experienced as ground shaking during an earthquake. The value of g (9.8 m/s^2) represents the standard acceleration due to gravity. When describing earthquake shaking potential in terms of %g, it indicates how strong the shaking is relative to gravity. For example, 10%g means the ground is accelerating at 10% of the force of gravity, or 0.98 m/s^2 while 50%g means the ground is accelerating at 50% of gravity, or 4.9 m/s^2. In general terms, shaking potential can translate into the following impacts:

- **10%g:** Typically felt as light shaking, which may be noticeable but usually causes little to no structural damage.
- **30%g-50%g:** Moderate to strong shaking. At this level, buildings may sustain some structural damage, especially if not properly designed for seismic activity.
- **100%g (1g):** This represents severe shaking. At 1g, the ground acceleration is equivalent to gravity, and significant damage to structures and infrastructure can occur.
- **Above 100%g:** These extreme levels of shaking, sometimes recorded near the epicenter of large earthquakes, can cause severe and widespread damage to both buildings and the natural landscape.

Seismic hazard maps often express shaking potential in %g to indicate the probability of experiencing certain levels of ground shaking at a location over a given period (e.g., 10% chance of 50%g shaking in 50 years). The following map indicates earthquake shaking potential for Siskiyou County and all participating jurisdictions.

EXHIBIT C

Map 54: Earthquake Shaking Potential (%g)



Source: California Geologic Society

The MPC view earthquake as not only a local or county hazard, but as a regional hazard as well. Discussions with the MPC and a review of all available data indicated that earthquake is a concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Siskiyou County:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Dorris:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of higher shaking potential.
- **Dunsmuir:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Etna:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of high shaking potential.
- **Fort Jones:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of high shaking potential.
- **Happy Camp CSD:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of greater shaking potential.
- **Lake Shastina CSD:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of greater shaking potential.

EXHIBIT C

- **McCloud CSD:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Montague:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of greater shaking potential.
- **Mt. Shasta:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Tulelake:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of greater shaking potential.
- **Weed:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of greater shaking potential.
- **Yreka:** Earthquake identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, mapping has indicated that jurisdiction is identified in an area of greater shaking potential.

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.10.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced no Presidential Disaster Declarations related to earthquakes.

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Siskiyou County has experienced no Emergency Declarations related to earthquakes.

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. Siskiyou County has experienced no proclamations of a State of Emergency related to earthquakes.

Siskiyou County has experienced a relatively benign history of seismic activity compared to more active regions of California, such as the San Francisco Bay Area or Southern California. According to the data from the USGS, there have been thousands of earthquakes of various magnitudes in the Siskiyou County over the past 70 years. However, only a small number of these quakes have exceeded a magnitude of 3.0, with an even smaller number exceeding a magnitude of 4.5 on the Modified Mercalli Scale. Over the past 70 years, only seven earthquakes in or near Siskiyou County have registered at or exceeding a magnitude of 4.5, most recently in September of 2023. The following table identifies earthquakes in and near Siskiyou County with a magnitude of 4.5 or greater since 1900:

Table 64: Siskiyou County Magnitude 4.5+ Earthquakes, 1900 - 2024

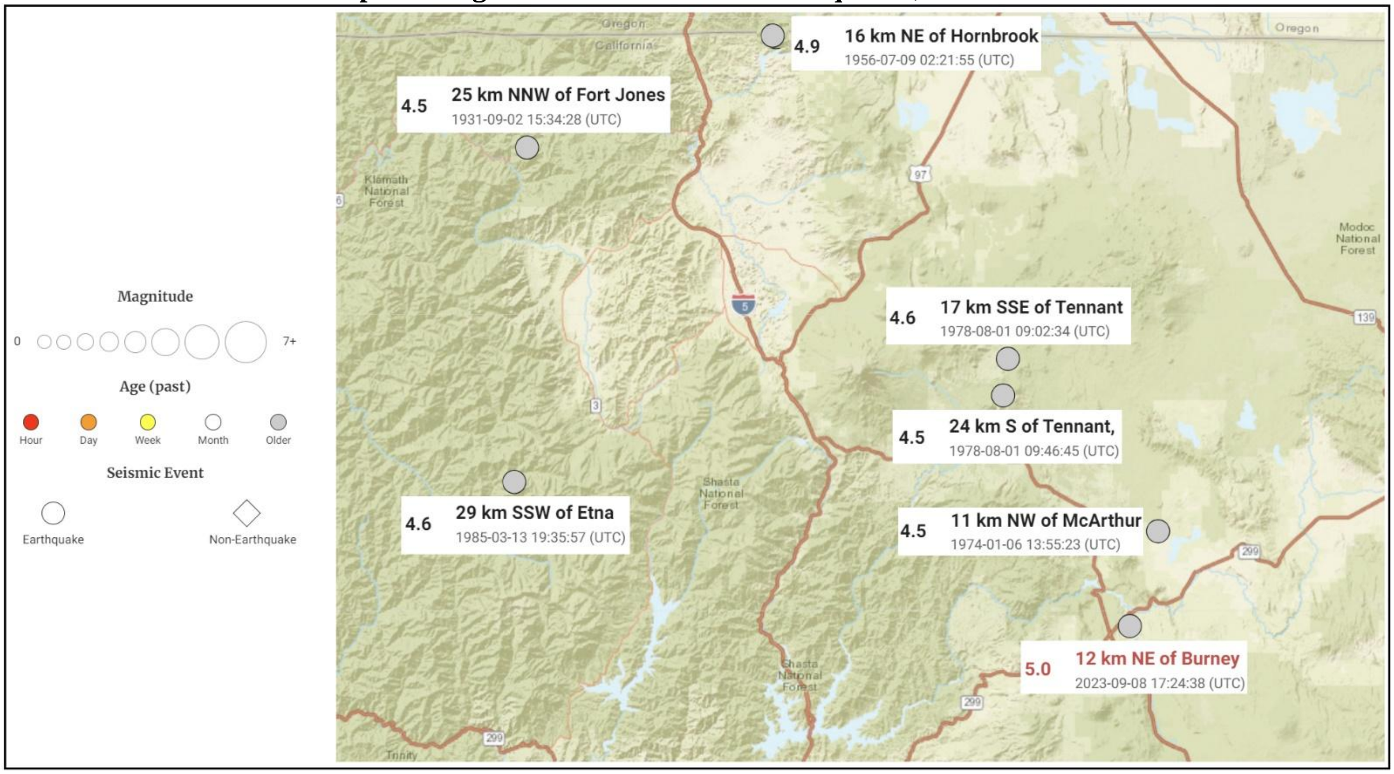
Event Year	Magnitude	Nearest City
2023	5.0	Burney
1985	4.6	Etna
1978	4.5	Tennant
1978	4.6	Tennant
1974	4.5	McArthur
1956	4.9	Hornbrook
1931	4.5	Fort Jones

Source: USGS

The following map illustrates the location of the earthquakes:

EXHIBIT C

Map 55: Magnitude 4.5 and Great Earthquakes, 1900 – 2024



Source: USGS

Regionally, extending as far north as Eugene, Oregon, as far south as San Francisco, as far east as Carson City, Nevada, and as far West as the Pacific Ocean, there have been ten earthquakes registering greater than magnitude 6.5 since 1900. The quakes are as follows:

Table 65: Regional Magnitude 6.5+ Earthquakes, 1900 - 2024

Event Year	Magnitude	Location
2014	6.8	Pacific Ocean
2010	6.5	Pacific Ocean
1992	6.6	Pacific Ocean
1992	7.2	Petrolia
1980	7.2	Eureka
1954	6.5	Eureka-Arcata
1941	6.8	Pacific Ocean
1923	7.1	Pacific Ocean
1918	6.5	Pacific Ocean
1906	7.9	San Francisco

Source: USGS

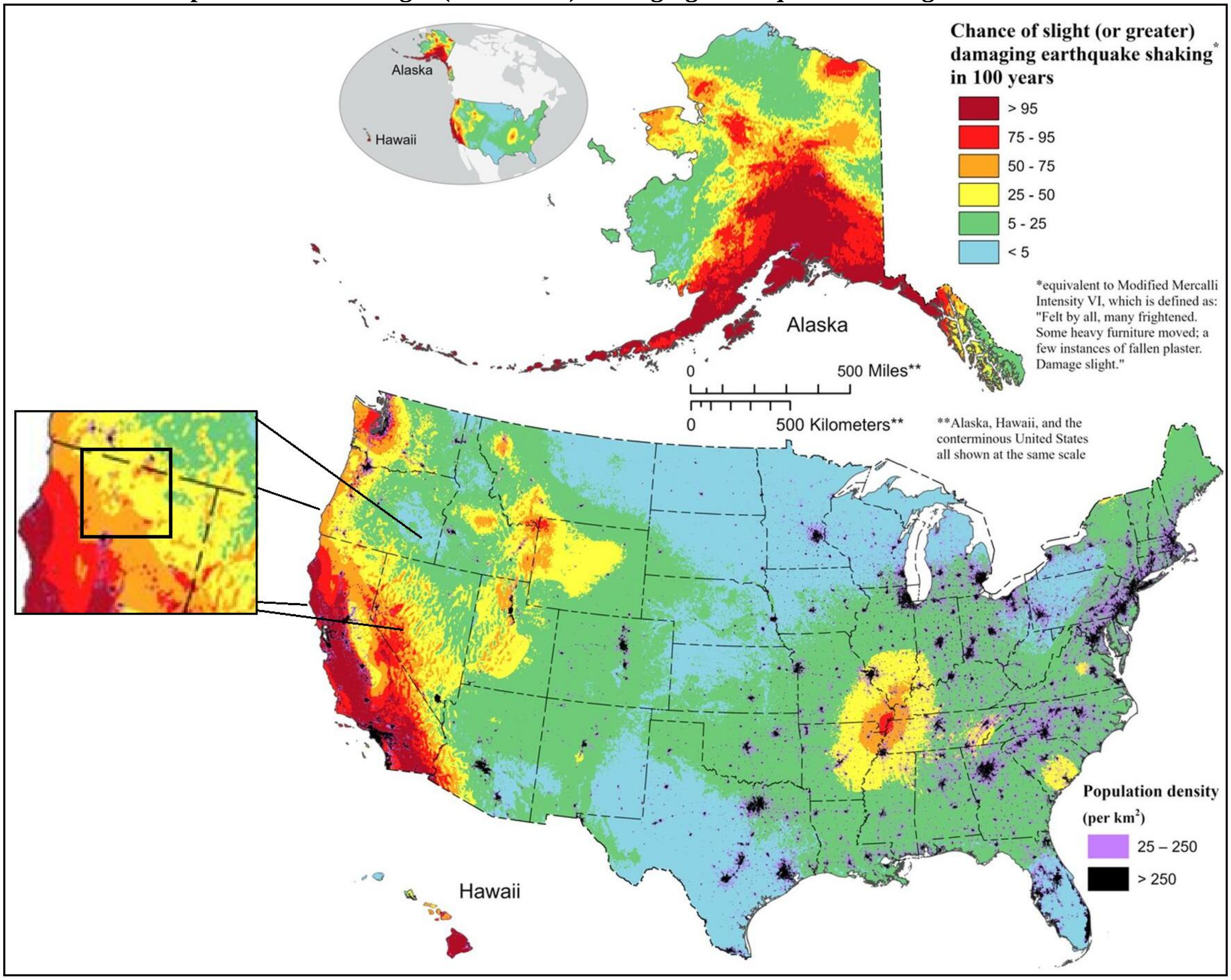
There have been no state or federal declared earthquake disasters in Siskiyou County.

5.10.4 Probability of Future Events

Predicting the occurrence of earthquakes is tremendously challenging due to the large number of factors involved. However, mapping from the USGS can help detail future earthquake probability. The following map, from the USGS, illustrates the chance of damaging earthquake shaking in 100 Years for Siskiyou County (approximately 25%-75% for the majority of the county):

EXHIBIT C

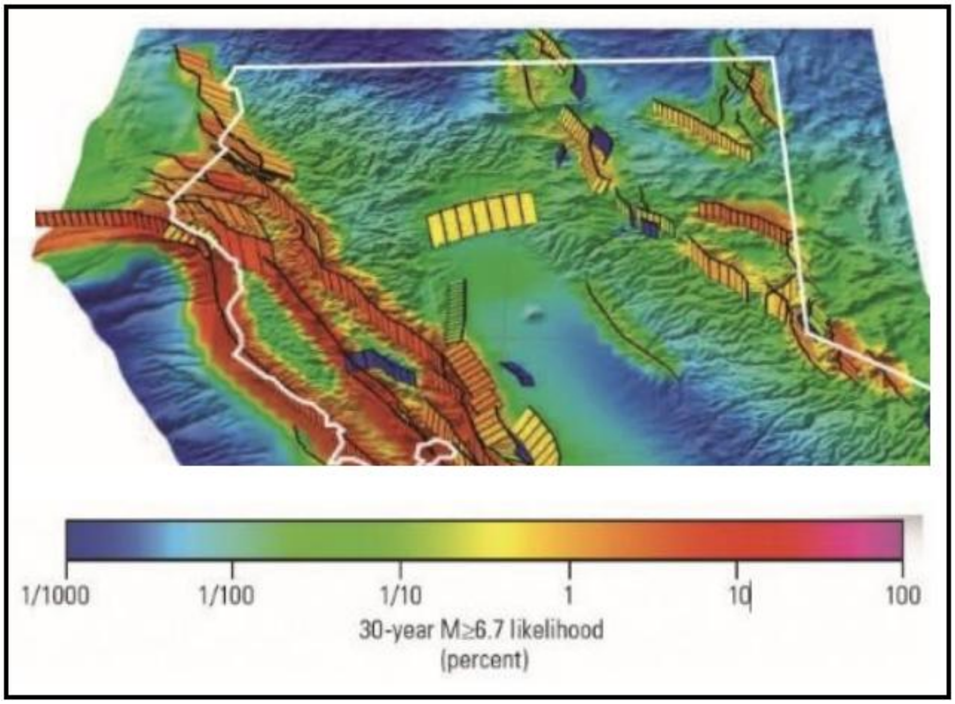
Map 56: Chance of Slight (or Greater) Damaging Earthquake Shaking in 100 Years



Source: USGS

Additionally, the Statewide California Earthquake Center has developed an earthquake forecast model for California, the third Uniform California Earthquake Rupture Forecast, to provide authoritative estimates of the magnitude, location, and likelihood of earthquake fault rupture throughout the state. The following map shows the likelihood of an earthquake of magnitude 6.7 or greater through 2044. As indicated on the following map, Siskiyou County is in the lowest likelihood percentage:

Map 57: Likelihood of a Magnitude 6.7 or Larger Earthquake through 2044



Source: Statewide California Earthquake Center Third Uniform California Earthquake Rupture Forecast

5.10.5 Projected Changes in Location, Intensity, Frequency, and Duration

Due to the very long-term nature of geological processes, including earthquakes, the seismic hazard for Siskiyou County is not expected to change during the life of this plan. Additionally, future climate change is expected to have no impact on this hazard.

5.10.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Siskiyou County and all participating jurisdictions from earthquakes. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Siskiyou County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 66: Participating Jurisdiction Earthquake Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Siskiyou County	All	Relatively Moderate	94.6	0.394%
Dorris	06093000200	Relatively Moderate	86.6	0.415%
Dunsmuir	06093001100	Relatively Moderate	84.8	0.367%
Etna	06093000800	Relatively Moderate	89.4	0.453%
Fort Jones	06093000701	Relatively Moderate	85.9	0.320%
Happy Camp CSD	06093001300	Relatively High	91.0	0.396%
Lake Shastina CSD	06093000902	Relatively Moderate	81.8	0.374%
McCloud CSD	06093001200	Relatively Moderate	83.3	0.389%
Montague	06093000300	Relatively Moderate	86.6	0.325%
Mt. Shasta	06093001003	Relatively Low	76.4	0.347%
Tulelake	06093000100	Relatively Moderate	87.4	0.412%
Weed	06093000901	Relatively High	92.0	0.358%

EXHIBIT C

Table 66: Participating Jurisdiction Earthquake Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Yreka	06093000703	Relatively Moderate	82.6	0.297%

Source: FEMA NRI

Table 67: Participating Jurisdiction Earthquake Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Earthquake EAL
Siskiyou County	All	Relatively Moderate	93.4	$6,200,000
Dorris	06093000200	Relatively Moderate	86.3	$453,000
Dunsmuir	06093001100	Relatively Moderate	82.7	$242,000
Etna	06093000800	Relatively High	88.4	$610,000
Fort Jones	06093000701	Relatively Moderate	85.0	$368,000
Happy Camp CSD	06093001300	Relatively High	88.6	$624,000
Lake Shastina CSD	06093000902	Relatively Moderate	81.4	$190,000
McCloud CSD	06093001200	Relatively Moderate	82.6	$239,000
Montague	06093000300	Relatively Moderate	85.0	$368,000
Mt. Shasta	06093001003	Relatively Moderate	79.3	$130,000
Tulelake	06093000100	Relatively Moderate	84.8	$354,000
Weed	06093000901	Relatively High	89.0	$656,000
Yreka	06093000703	Relatively Moderate	80.8	$170,000

Source: FEMA NRI

FEMA HAZUS-MH Earthquake Analysis

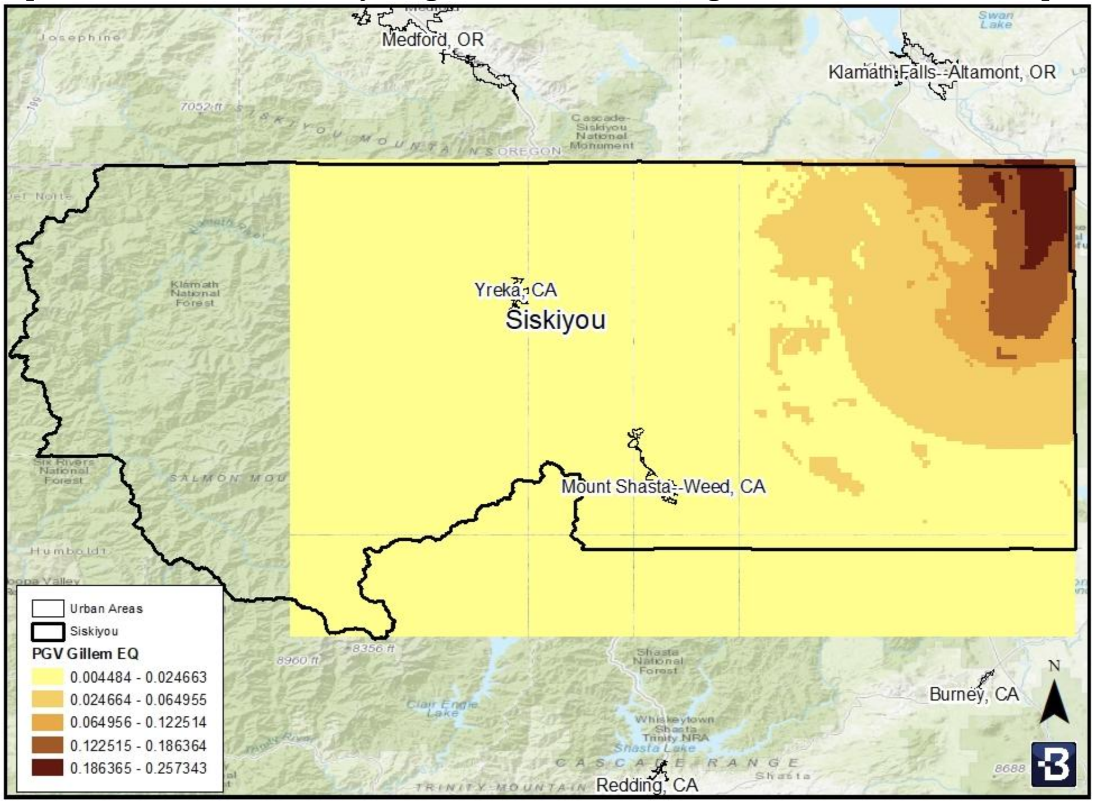
FEMA's HAZUS-MH was used to conduct two loss estimations, one from a magnitude 7.1 earthquake along the Sky Lakes Fault Zone, and one from a magnitude 6.8 Gillem - Big Crack fault zone. The damage estimate indicated the following:

- **Magnitude 7.1 Sky Lakes Fault Zone Earthquake**
    - Approximately four buildings will be at least moderately damaged.
    - No buildings will be damaged beyond repair.
    - No critical facilities (hospitals, schools, Emergency Operations Centers, Police Stations, and Fire Stations) will be damaged, and all will have functionality of day one.
    - No transportation systems will suffer damage, and all will be operational on day one.
    - No utility facility or systems will suffer damage, and all will be operational on day one.
    - There will be no debris generated.
    - There will be no displaced households.
    - There will be no persons seeking temporary shelter.
    - There will be no casualties or deaths.
    - Total economic loss is estimated at $51,810,000.
- **Magnitude 6.8 Gillem - Big Crack Fault Zone Earthquake**
    - Approximately 112 buildings will be at least moderately damaged.
    - No buildings will be damaged beyond repair.
    - Four critical facilities (hospitals, schools, Emergency Operations Centers, Police Stations, and Fire Stations) will suffer at least moderate damage (all schools). The remainder will have functionality of day one.
    - No transportation systems will suffer damage, and all will be operational on day one.
    - One utility system facility will suffer moderate damage (a wastewater treatment plant). The remainder will be operational on day one.
    - 342 households will be without power on day one, dropping to 50 household on day 7 and one household on day 90.

- There are 3,000 tons of debris generated.
- There will be three displaced households.
- There will be two persons seeking temporary shelter.
- There will be one casualty and no deaths.
- Total economic loss is estimated at $65,350,000.

The following maps, created using FEMA Hazus-MH Data, illustrate the peak ground velocity for the two modeled earthquake events. Peak Ground Velocity is a measure of the maximum speed at which the ground moves during an earthquake. Peak Ground Velocity quantifies how fast the ground is moving at its highest point of velocity during seismic shaking. This measure is important because it directly correlates to the potential for structural damage during an earthquake.

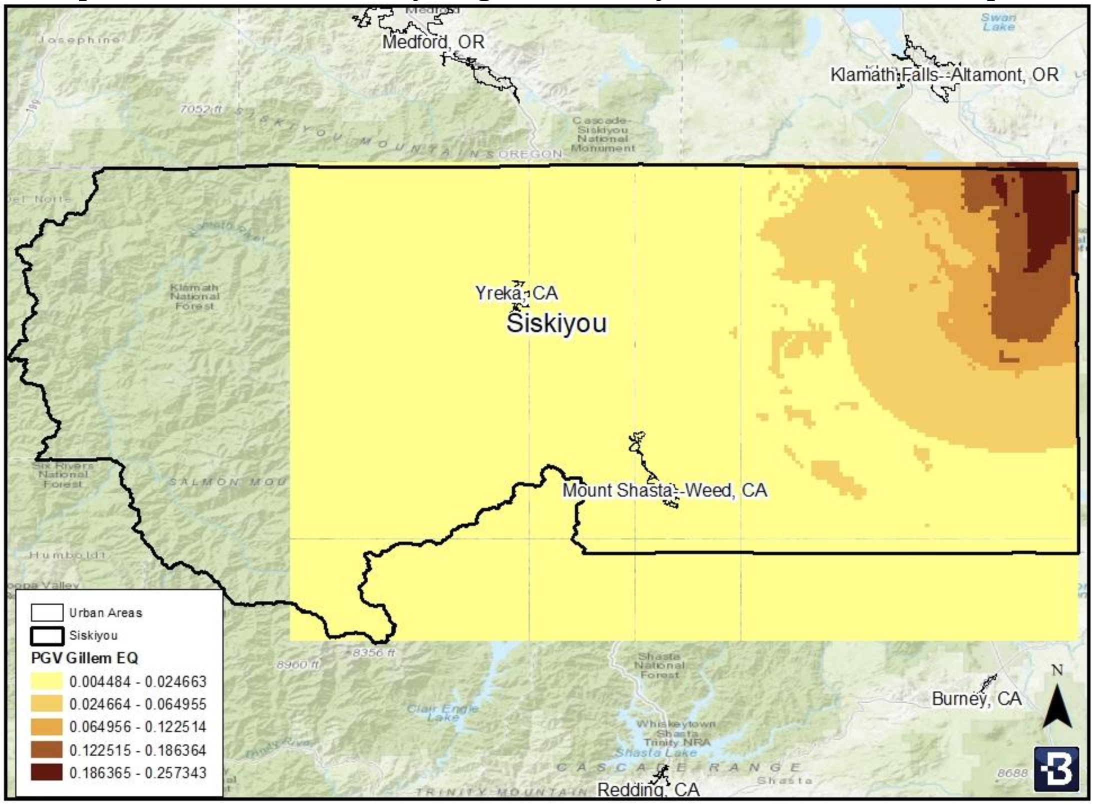
Map 58: Peak Ground Velocity Magnitude 6.8 Gillem - Big Crack Fault Zone Earthquake



Source: FEMA Hazus-MH

EXHIBIT C

Map 59: Peak Ground Velocity Magnitude 7.1 Sky Lakes Fault Zone Earthquake



Source: FEMA Hazus-MH

Population

Although major earthquakes occur infrequently in Siskiyou County, a large magnitude quake could have profound impacts on the citizens of all jurisdictions, affecting their physical, emotional, and social well-being. The impacts can be broken down into the following categories:

- **Physical Impact**
  - Injuries and Fatalities: Earthquakes often lead to serious injuries and deaths, usually caused by collapsing buildings, falling debris, or fires triggered by broken gas lines. The extent of these injuries depends on the magnitude of the quake, building standards, and preparedness in the affected area.
  - Access to Medical Services: Hospitals and emergency services can become overwhelmed by the sudden influx of injured people. In some cases, healthcare facilities may also be damaged, reducing their capacity to provide care.
- **Emotional and Psychological Impact**
  - Trauma and Anxiety: Survivors often experience psychological stress, anxiety, and trauma from the quake and aftershocks. The sudden and unpredictable nature of earthquakes can cause long-lasting fear, especially in areas where aftershocks continue for days or weeks.
  - Post-Traumatic Stress Disorder: People who have lost loved ones, their homes, or have experienced life-threatening situations may develop Post-Traumatic Stress Disorder, affecting their long-term mental health.
- **Social and Economic Impact**
  - Displacement: Many people are left homeless after major earthquakes due to the destruction of homes. Temporary shelters may be set up, but displaced families can experience difficult living conditions, lacking access to food, clean water, and sanitation.

EXHIBIT C

- Loss of Livelihood: Economic losses can be devastating, especially for people whose businesses, jobs, or properties are destroyed. In regions where many rely on agriculture or small businesses, the economic recovery can take years.
- Community Disruption: The destruction of infrastructure such as schools, transportation, and utilities (electricity, water, gas) can disrupt daily life for extended periods. Recovery efforts can take months or even years, affecting education, jobs, and community cohesion.

Earthquakes may disproportionately affect socially vulnerable populations, exacerbating pre-existing inequalities and making recovery more difficult for these groups. Earthquakes may disproportionately impact these groups in the following ways:

- **Increased Risk of Injury and Death**
    - Housing in Unsafe Areas: Socially vulnerable groups are more likely to live in poorly constructed housing, which is more prone to collapse during an earthquake. Many low-income communities are located in areas with higher seismic risk, such as near fault lines or on unstable ground.
    - Lack of Access to Earthquake-Resistant Infrastructure: Vulnerable populations, especially in under-resourced areas, may live in buildings not built to modern safety standards, increasing their risk during seismic events.
- **Delayed or Inadequate Emergency Response**
    - Limited Access to Emergency Services: Socially vulnerable populations may experience delayed access to rescue efforts, medical care, and emergency shelters due to geographic isolation, discrimination, or lack of resources like transportation. Rural, low-income, or marginalized communities may not receive the same level of emergency response as wealthier urban areas.
    - Language Barriers: Non-English-speaking populations or those with limited literacy may struggle to receive or understand emergency alerts, evacuation instructions, or recovery information, increasing their vulnerability during and after an earthquake.
- **Economic Impact and Prolonged Recovery**
    - Loss of Livelihoods: Earthquakes can disrupt working conditions, particularly for those in informal employment such as day laborers or small business owners. Socially vulnerable populations often lack savings or insurance to cushion the economic blow of losing their homes or jobs.
    - Housing and Relocation Issues: Low-income households are less likely to have earthquake insurance or the financial means to repair or rebuild their homes. As a result, they may face prolonged displacement and be forced to live in overcrowded or substandard shelters for extended periods.
- **Mental Health and Social Support Challenges**
    - Psychological Impact: Vulnerable populations may have less access to mental health care and social services to help them cope with the trauma.
    - Weakened Social Networks: Socially vulnerable populations often rely on tight-knit community networks for support. Earthquake displacement can disrupt these networks, making recovery more difficult for individuals who lose access to family, friends, and community support systems.
- **Barriers to Recovery Resources**
    - Disparities in Aid Distribution: Vulnerable populations may face challenges accessing recovery assistance, such as government aid, housing assistance, and loans. Bureaucratic obstacles, discrimination, or lack of information can prevent marginalized groups from receiving the help they need.
    - Exclusion from Decision-Making: Marginalized groups are often excluded from post-disaster decision-making processes, meaning their specific needs and challenges may not be addressed in recovery planning. This can lead to inequitable rebuilding and recovery efforts, further disadvantaging these populations.

EXHIBIT C

Additionally, older adults may have limited mobility, making it difficult for them to evacuate during an earthquake or seek assistance afterward. They may also suffer more from disruptions to medical care or loss of essential services. Earthquakes can severely impact people with disabilities who may need specialized evacuation assistance, accessible emergency shelters, and medical care. Often, emergency plans do not fully consider the needs of people with physical or cognitive disabilities. Children are particularly vulnerable during disasters because they rely on adults for safety and care. Displacement from homes, schools, and social networks can cause long-term developmental and psychological effects on children.

The loss of utility and communications services can also have a large impact on individuals. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values:

Table 68: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

All Siskiyou County and participating jurisdiction citizens are vulnerable to the impacts of earthquakes. Please see Section 3.3: Population Data and Section 3.4: Socially Vulnerable and At-Risk Populations for data concerning jurisdictional populations.

Buildings and Structures

All buildings, including historic buildings, within each participating jurisdiction can be damaged during an earthquake due to the intense ground shaking, surface rupture, and secondary effects such as soil liquefaction or landslides. The severity of the damage depends on factors such as the earthquake's magnitude, distance from the fault, local soil conditions, and the building's design, materials, and age. Here are the main ways in which buildings and structures can be damaged and the types of damage that can occur:

- **Ground Shaking**
  - Cracking of Walls and Foundations: When buildings sway from side to side due to seismic waves, rigid components such as walls, beams, and foundations can crack or split. This is especially common in older buildings not designed for earthquake resistance.
  - Collapse of Load-Bearing Walls: In severe cases, load-bearing walls may fail, leading to partial or complete building collapse.
  - Failure of Columns and Beams: The vertical supports (columns) and horizontal supports (beams) may fail due to excessive forces, leading to the collapse of floors or entire sections of buildings.
  - Damage to Facades: Exterior cladding and facades can crack, detach, or fall off due to shaking, posing hazards to people and property below.
  - Ceiling and Partition Failures: Interior ceilings and non-load-bearing partitions may collapse or become dislodged, causing injuries and further damage to interiors.
- **Surface Rupture**
  - Foundation Shift or Shear: The building's foundation may shear, split, or shift in different directions if it straddles the fault, leading to severe structural damage.
  - Displacement of Structures: Buildings located directly on the fault line can be displaced horizontally or vertically, causing irreparable structural damage.
- **Soil Liquefaction**
  - Foundation Settling or Tilting: Buildings can sink or tilt as the soil beneath them loses its ability to support their weight.

EXHIBIT C

  - Piping and Utility Damage: Underground utilities like water, gas, and sewage lines can rupture due to soil movement, causing leaks, contamination, or service disruptions.
- **Ground Failure and Landslides**
  - Collapse of Slopes: Buildings located on slopes or near cliffs are at risk of sliding down or collapsing if the ground beneath them gives way.
  - Impact Damage from Debris: Landslides can send rocks, trees, and other debris crashing into buildings, causing structural damage.
- **Resonance Effects**
  - Excessive Swaying and Cracking: Buildings that experience resonance may sway much more than those not affected by this phenomenon, leading to cracking, weakening, or failure of structural components.
  - Tall vs. Short Buildings: Taller buildings may experience more severe damage if the ground motion resonates with their height, whereas shorter structures may be less affected by resonance but still suffer other types of damage.

Of particular concern to all jurisdictions are unreinforced masonry buildings. An unreinforced masonry building is constructed of brick or masonry with no steel reinforcing bars. Because these buildings were not built using modern building codes, they are much more likely to experience damage or collapse during an earthquake. As of this plan, no survey has been conducted to determine the number of unreinforced masonry buildings in Siskiyou County or participating jurisdictions.

All participating jurisdiction buildings and structures are at risk to the potential impacts of an earthquake. FEMA's Hazus-MH estimates that:

- There are 25,608 building in the county
- These building have an aggregate total replacement value of $11,613,000,000

Additionally, FEMA's HAZUS-MH indicates the following damage estimates:

- **Magnitude 7.1 Sky Lakes Fault Zone Earthquake**
  - Approximately four buildings will be at least moderately damaged.
  - No buildings will be damaged beyond repair.
  - There will be no debris generation.
- **Magnitude 6.8 Gillem - Big Crack Fault Zone Earthquake**
  - Approximately 112 buildings will be at least moderately damaged.
  - No buildings will be damaged beyond repair.
  - There are 3,000 tons of debris generated.

Governmental Operations

Earthquakes can significantly disrupt governmental operations at various levels. These impacts are especially pronounced in the immediate aftermath, where response efforts, infrastructure damage, and communication breakdowns can severely hamper government functions. Impacts to governmental operations may include:

- **Damage to Government Buildings:** Earthquakes can damage or destroy government offices, courts, police stations, fire departments, and other essential facilities. This makes it difficult for public officials and emergency responders to coordinate disaster response efforts.
- **Emergency Management Strain:** Governments are responsible for coordinating emergency responses, including search and rescue operations, medical assistance, and evacuations. Earthquakes can overwhelm local

government capacities, particularly in communities that lack preparedness plans or resources. The scale of the disaster often requires the involvement of state or federal agencies, further complicating coordination.

- **Communication Breakdowns:** Earthquakes can damage communication networks, including internet and phone services, preventing effective communication between government officials, emergency responders, and the public. This hinders the dissemination of critical information such as evacuation routes, safety guidelines, and status updates.
- **Budget Strains:** The cost of responding to and recovering from an earthquake can put significant pressure on government budgets. Resources may need to be diverted from other programs to fund disaster relief, infrastructure repair, and rebuilding efforts. Governments often face additional costs for temporary housing, rebuilding public facilities, and providing social services to displaced populations.
- **Economic Disruption:** Earthquakes can severely disrupt local and regional economies, affecting government revenues from taxes and fees. The temporary shutdown of businesses, loss of jobs, and damage to the tax base can lead to budget shortfalls, making it harder for governments to finance recovery efforts.
- **Accountability and Criticism:** The effectiveness of a government's response to an earthquake can impact public trust and confidence. If governments are perceived as slow or inadequate in their disaster response, they may face public criticism, protests, or political fallout. Conversely, a well-coordinated and effective response can strengthen public trust in leadership.
- **Education and Social Services:** Schools, which are often public institutions, may be destroyed or damaged, delaying the education of children. Government-run social services, including food distribution and welfare programs, may be strained or interrupted, especially as the need for these services often increases post-disaster.

Transportation and Electrical Infrastructure

Earthquakes can have numerous impacts on both transportation and electrical distribution systems, often leading to challenges that require proactive management. The impacts of earthquakes on transportation systems may include:

- **Roads and Highways:** Earthquakes can cause cracking, buckling, and collapse of roads, highways, and bridges. In severe cases, transportation networks are cut off, hindering emergency response, evacuation, and the transportation of goods. Ground shaking and surface rupture can make roads impassable, especially in areas prone to landslides or liquefaction.
- **Bridges and Tunnels:** Bridges are especially vulnerable to collapse during earthquakes due to the extreme forces exerted on their structures. Older bridges not built to modern seismic codes are at higher risk of failure. Tunnels can also collapse or become blocked by debris, cutting off access to critical routes.
- **Railways:** Rail systems can be severely impacted by earthquakes, as tracks may buckle or become misaligned, leading to derailments.

An earthquake can impact both the electrical generation capacity and transmission. The impacts of earthquakes on electrical systems may include:

- **Power Plants:** Earthquakes can damage power generation facilities causing a cessation of services and costly repairs.
- **Transmission Lines:** Power transmission lines and substations can be damaged by ground shaking, especially in areas with unstable soils. This can result in prolonged power outages, which disrupt communication, emergency services, and basic living conditions.
- **Grid Instability:** Damage to power infrastructure can lead to cascading failures within the electrical grid. Substations, transformers, and electrical distribution networks can be knocked offline.

As indicated by the FEMA's Hazus-MH loss estimations, the following transportation and electrical utility impacts can be anticipated:

- **Magnitude 7.1 Sky Lakes Fault Zone Earthquake**
    - No transportation systems will suffer damage, and all will be operational on day one.
    - No utility facility or systems will suffer damage, and all will be operational on day one.
- **Magnitude 6.8 Gillem - Big Crack Fault Zone Earthquake**
    - No transportation systems will suffer damage, and all will be operational on day one.
    - One utility system facility will suffer moderate damage (a wastewater treatment plant). The remainder will be operational on day one.
    - 342 households will be without power on day one, dropping to 50 household on day 7 and one household on day 90.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities
Water and wastewater utilities are vulnerable to earthquake events due to the potential for plant damages and distribution system damages. Impacts may include:

- **Water Supply:** Earthquakes can rupture underground water pipes and damage water treatment facilities, leading to water shortages or contamination. In many cases, people are left without clean drinking water, and authorities must rely on temporary solutions like bottled water or emergency water delivery.
- **Wastewater Systems:** Sewer lines and wastewater treatment plants are particularly vulnerable to ground movement. Ruptured sewer lines can lead to sewage leaks, contaminating groundwater and local water sources. Damage to wastewater treatment plants can lead to untreated sewage being released into waterways, causing public health hazards.

As indicated by the FEMA's HAZUS-MH loss estimations, the following water and wastewater utility impacts can be anticipated:

- **Magnitude 7.1 Sky Lakes Fault Zone Earthquake**
    - No water or wastewater utility facility or system will suffer damage, and all will be operational on day one.
- **Magnitude 6.8 Gillem - Big Crack Fault Zone Earthquake**
    - One wastewater treatment plant will suffer moderate damage on day one, but will regain greater than 50% functionality by day 7.

Mapping and details concerning operators of water and wastewater utility providers may be found in Section 5.9.6.

Medical, Education, and Response Facilities
Earthquakes can significantly disrupt medical, education, and response facilities and operations at various levels. These impacts are especially pronounced in the immediate aftermath, where response efforts, infrastructure damage, and communication breakdowns can severely hamper functions. Impacts may include:

- **Damage to Facility:** Earthquakes can damage or destroy facilities, causing a significant drop or cessation of services.
- **Services Strain:** Emergency response, including search and rescue operations and medical assistance may be severely impacted due to the number of casualties.
- **Capacity Strain:** Earthquakes can overwhelm capacities, particularly in communities that lack preparedness plans or resources. The scale of the disaster often requires the involvement of state or federal agencies, further complicating coordination.

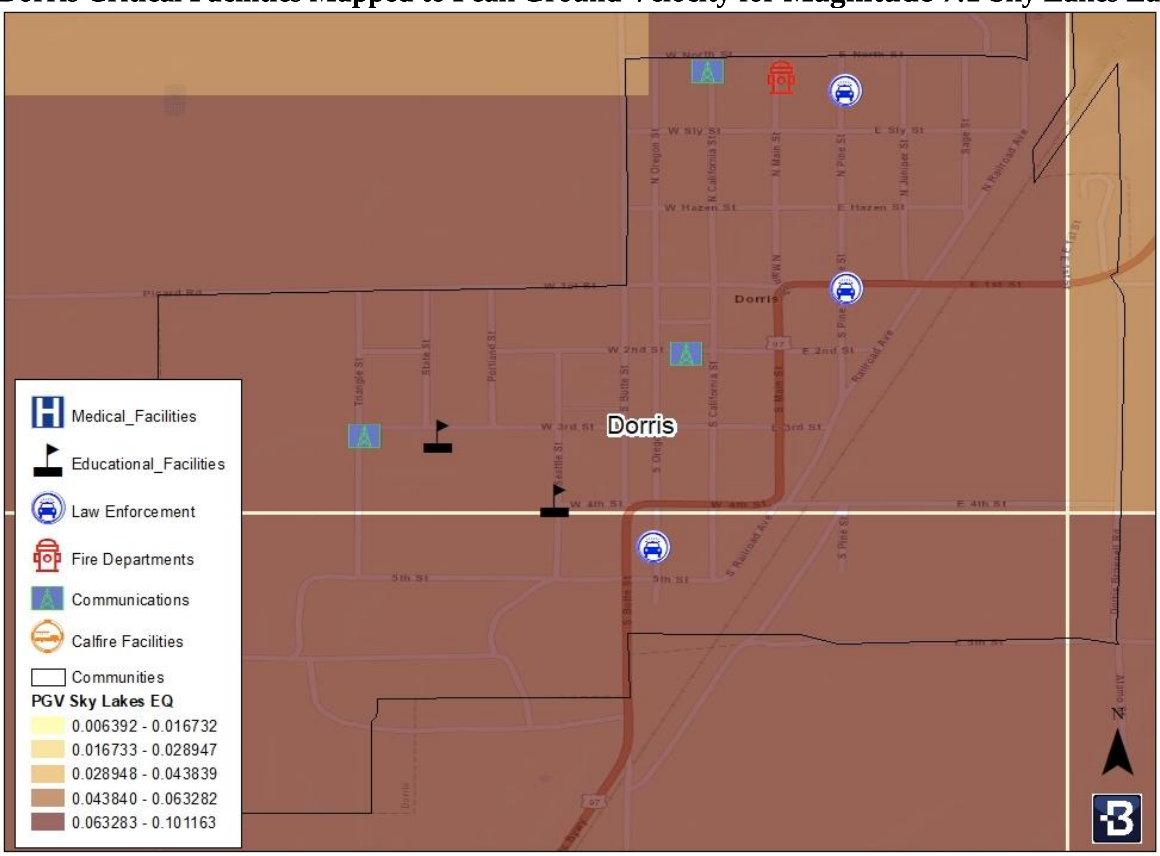
- **Communication Breakdowns:** Earthquakes can damage communication networks, including internet and phone services, preventing effective communication and hindering the dissemination of critical information.
- **Budget Strains:** The cost of responding to and recovering from an earthquake can put significant pressure on budgets.

As indicated by the FEMA's HAZUS-MH loss estimations, the following medical, education, and response facilities and operations impacts can be anticipated:

- **Magnitude 7.1 Sky Lakes Fault Zone Earthquake**
  - No critical facilities (hospitals, schools, Emergency Operations Centers, Police Stations, and Fire Stations) will be damaged, and all will have functionality of day one.
  - There will be no persons seeking temporary shelter.
  - There will be no casualties or deaths.
- **Magnitude 6.8 Gillem - Big Crack Fault Zone Earthquake**
  - Four critical facilities (hospitals, schools, Emergency Operations Centers, Police Stations, and Fire Stations) will suffer at least moderate damage (all schools). The remainder will have functionality of day one.
  - There will be three displaced households.
  - There will be two persons seeking temporary shelter.
  - There will be one casualty and no deaths

The following maps detail critical facility locations mapped to the expected peak ground velocity from a Magnitude 7.1 Sky Lakes Fault Zone Earthquake:

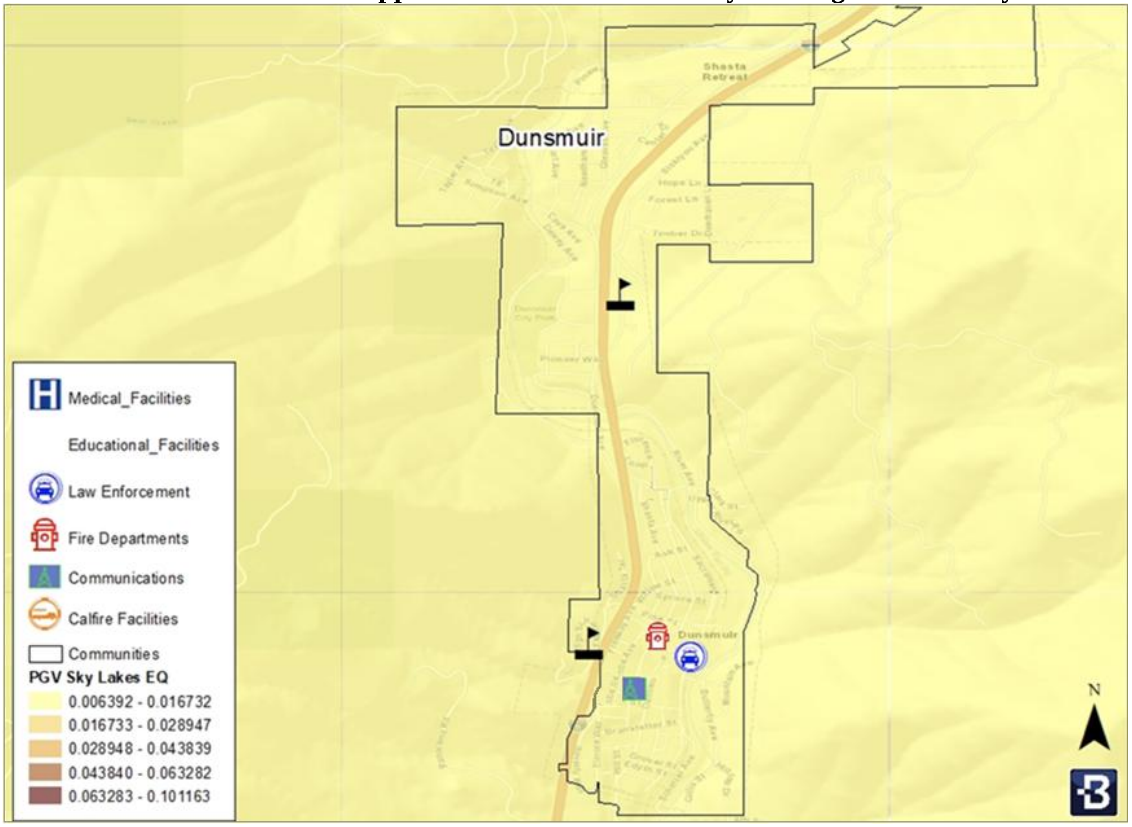
Map 60: Dorris Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

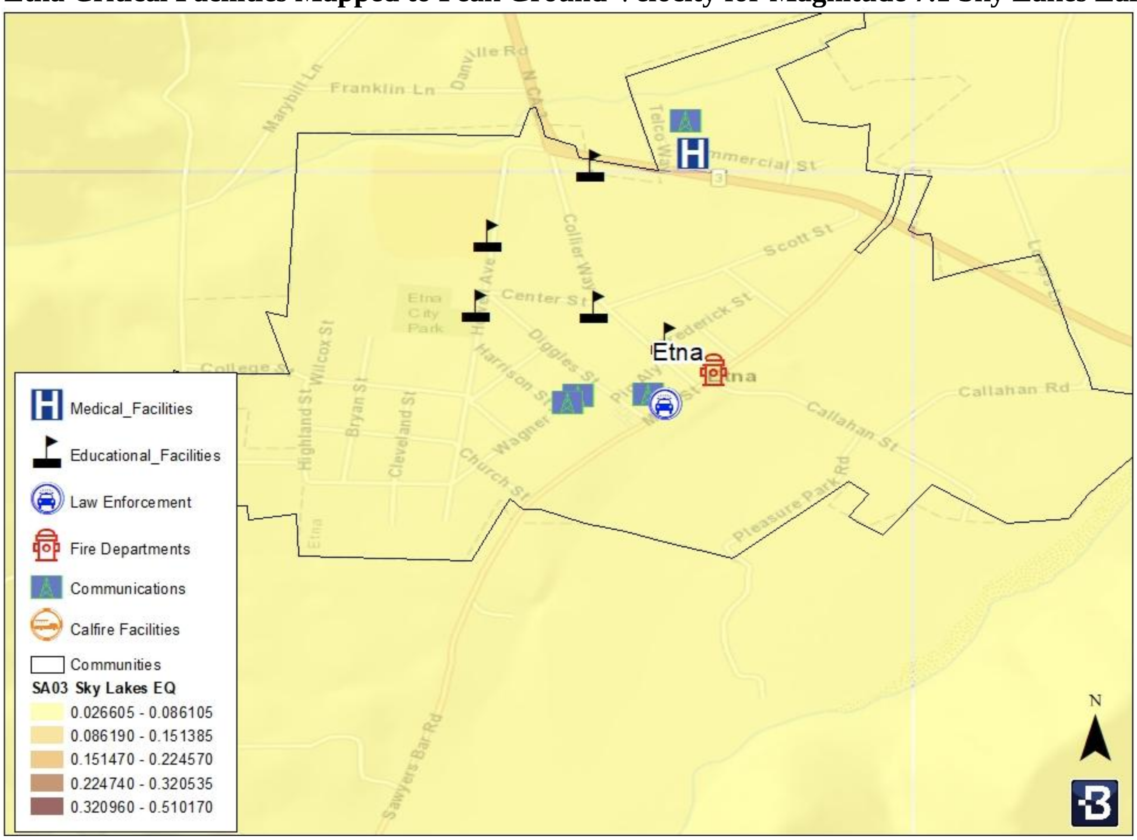
EXHIBIT C

Map 61: Dunsmuir Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

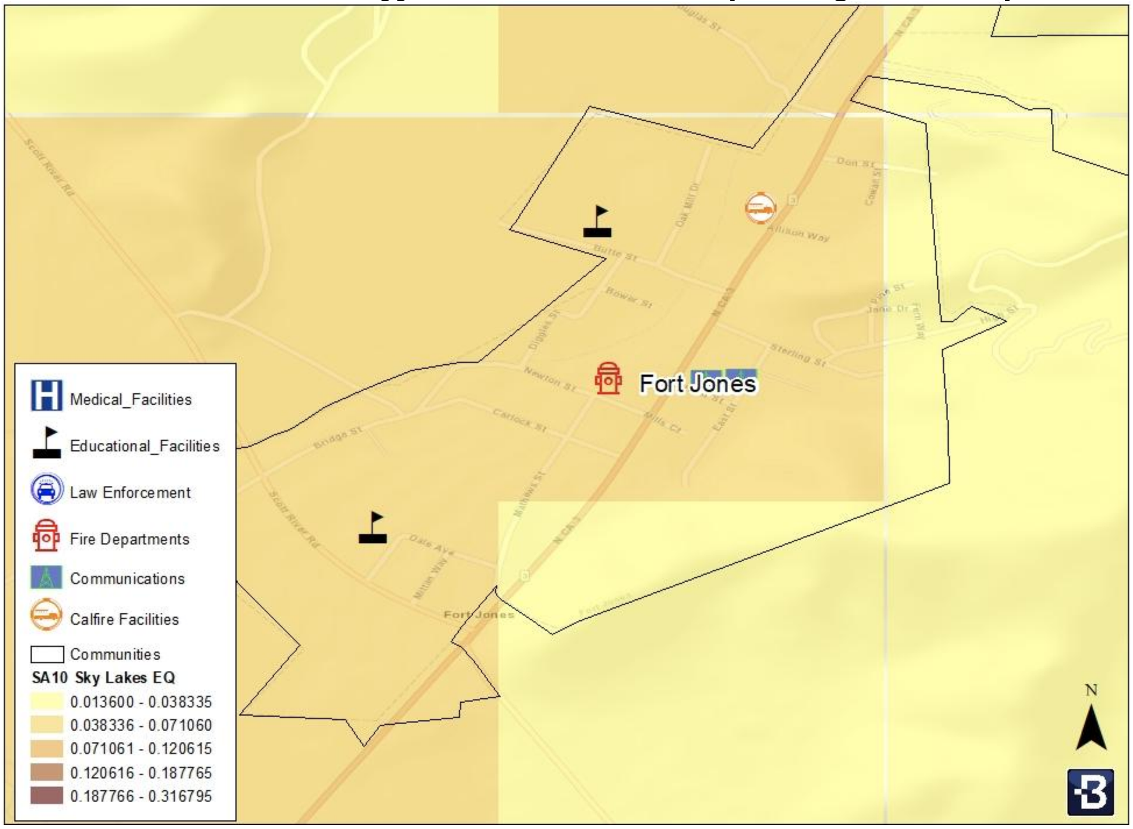
Map 62: Etna Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

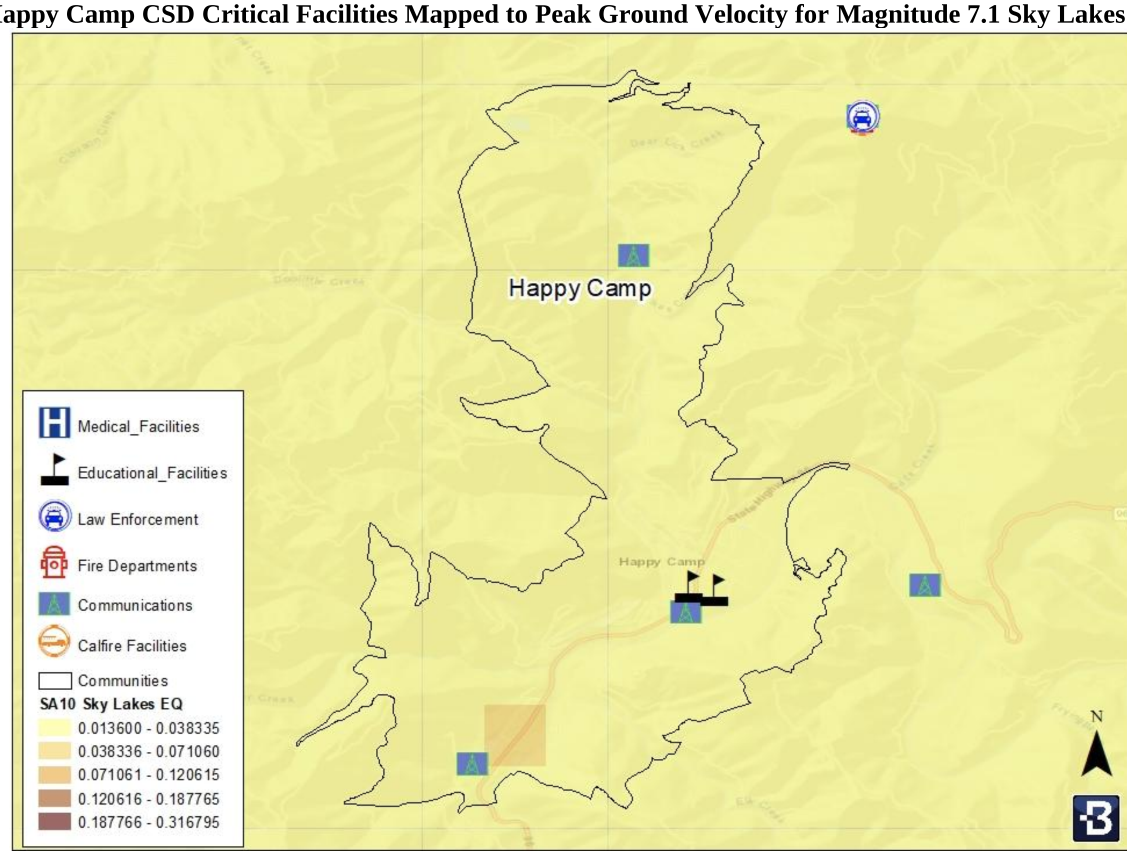
EXHIBIT C

Map 63: Fort Jones Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

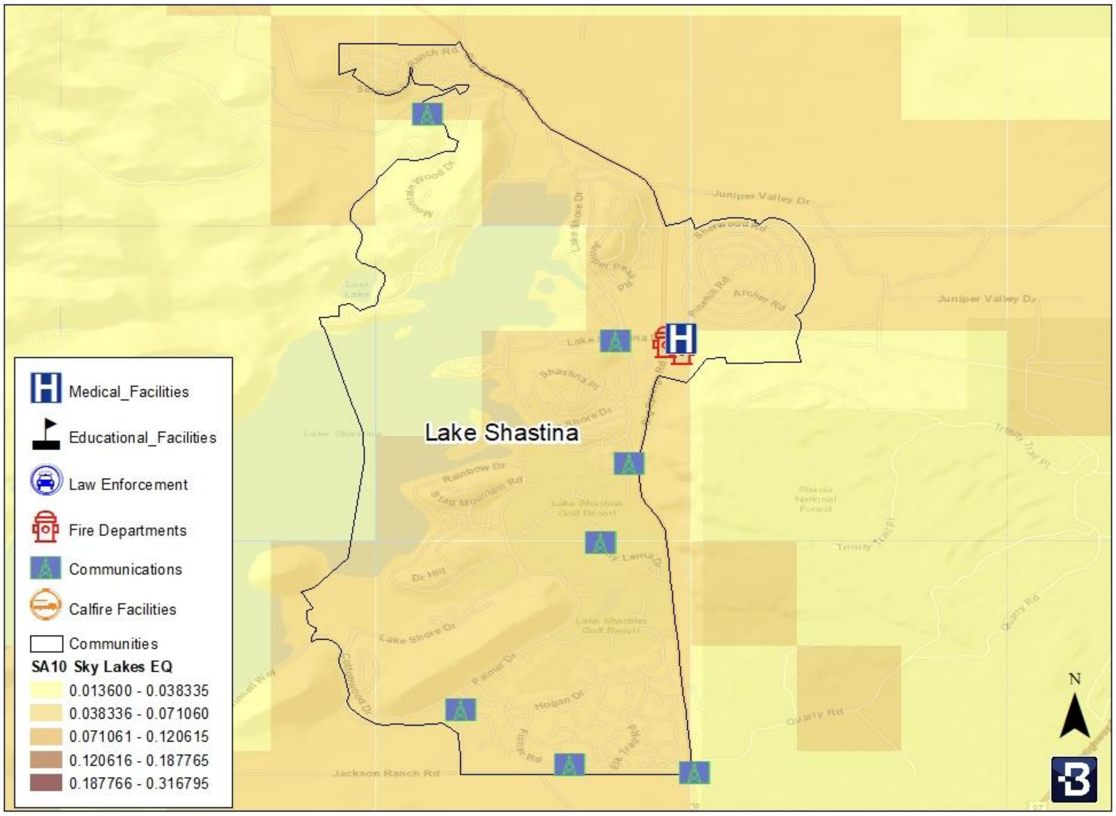
Map 64: Happy Camp CSD Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

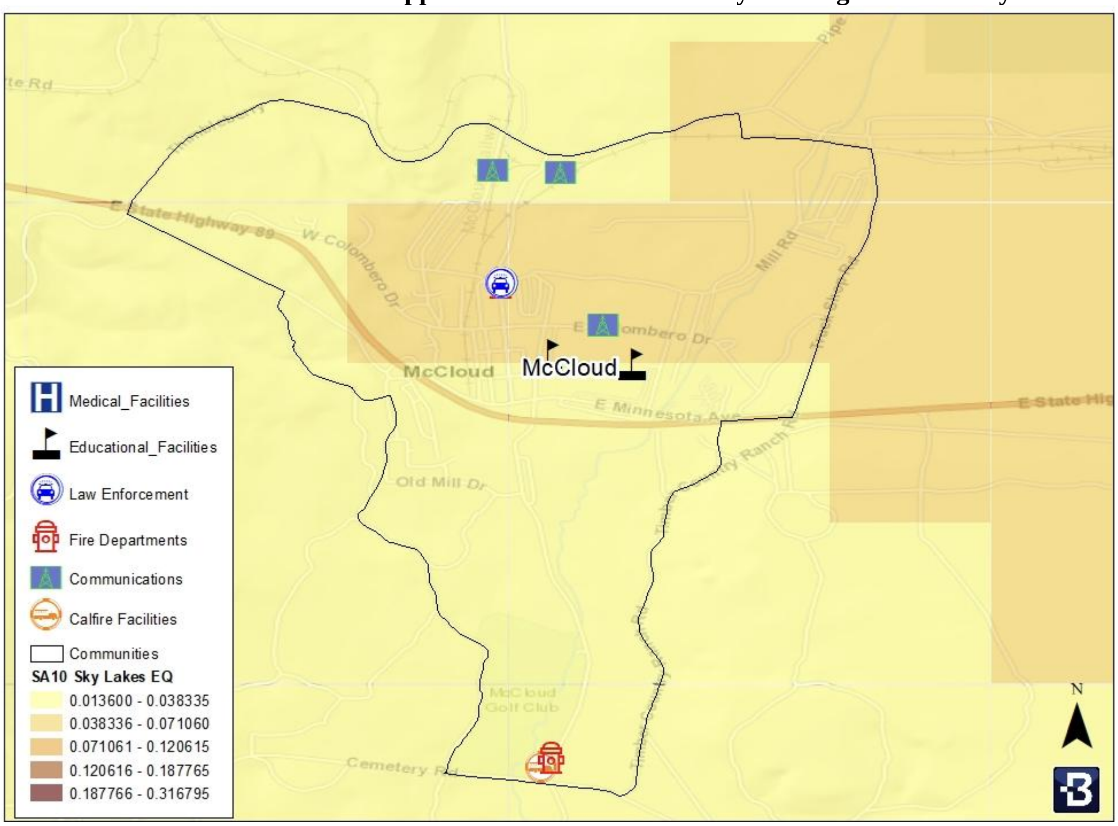
EXHIBIT C

Map 65: Lake Shastina CSD Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

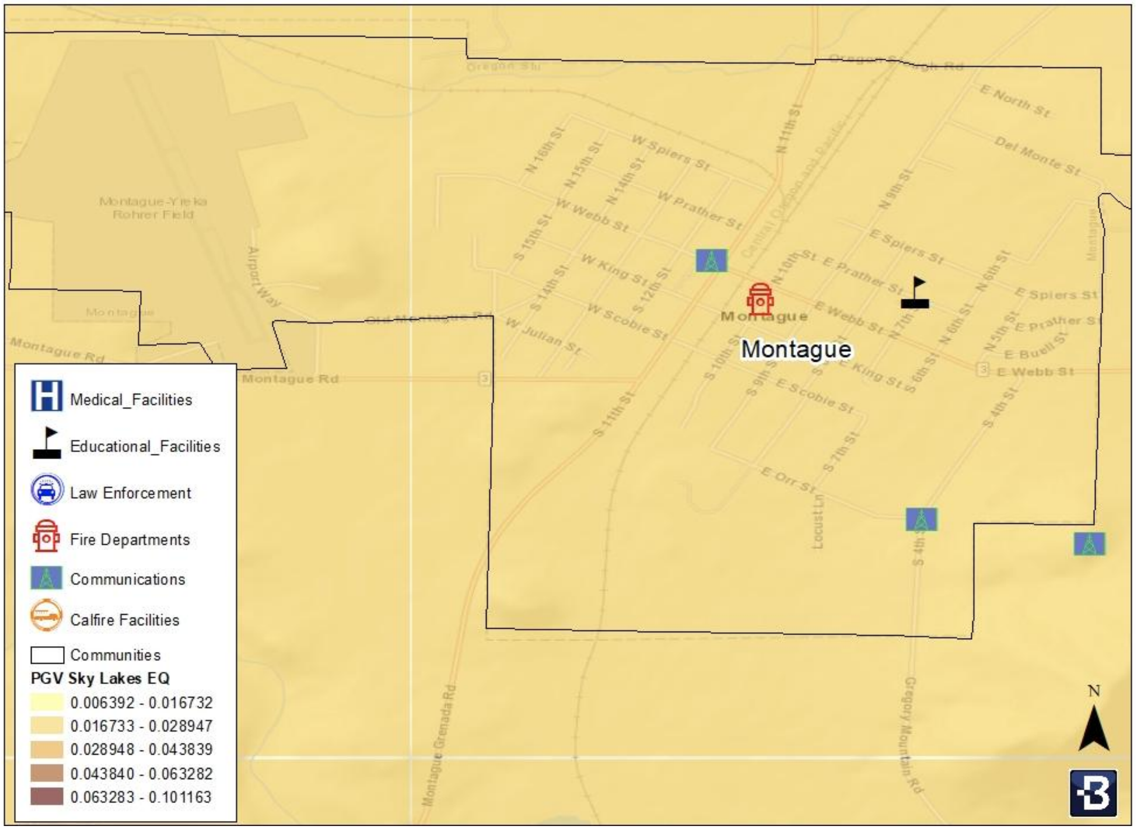
Map 66: McCloud CSD Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

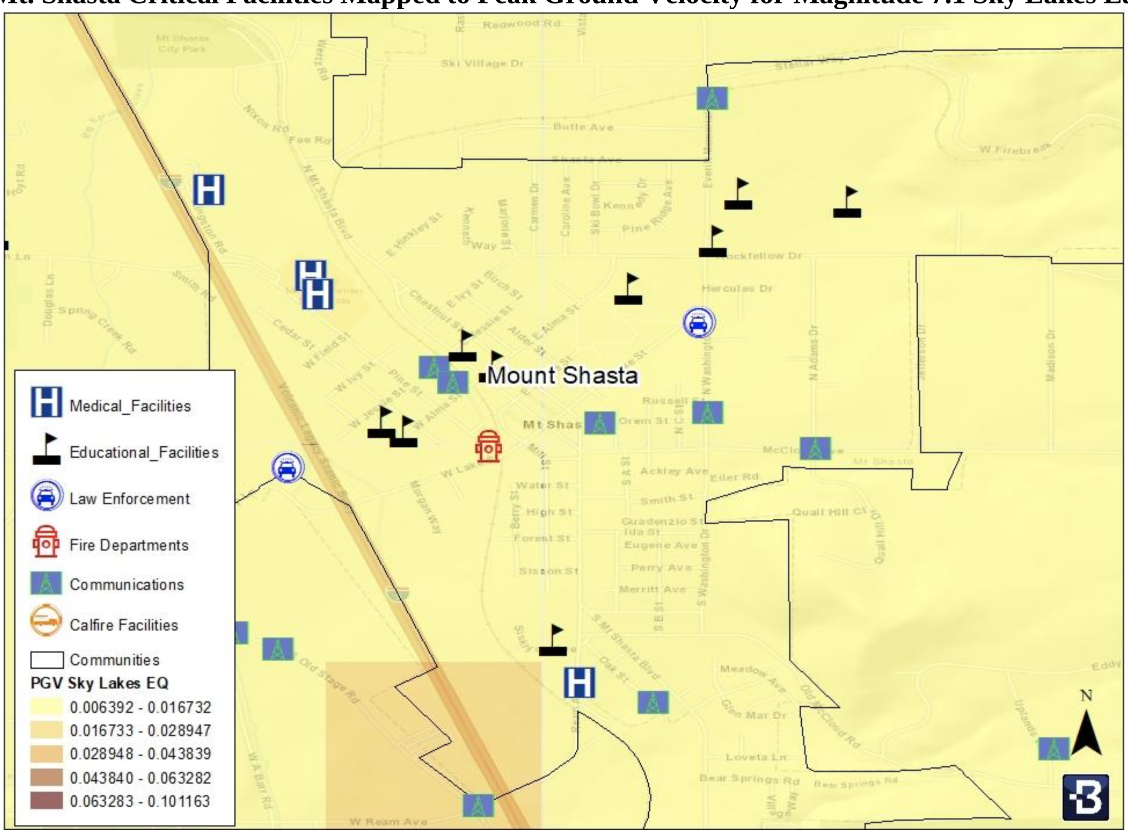
EXHIBIT C

Map 67: Montague Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

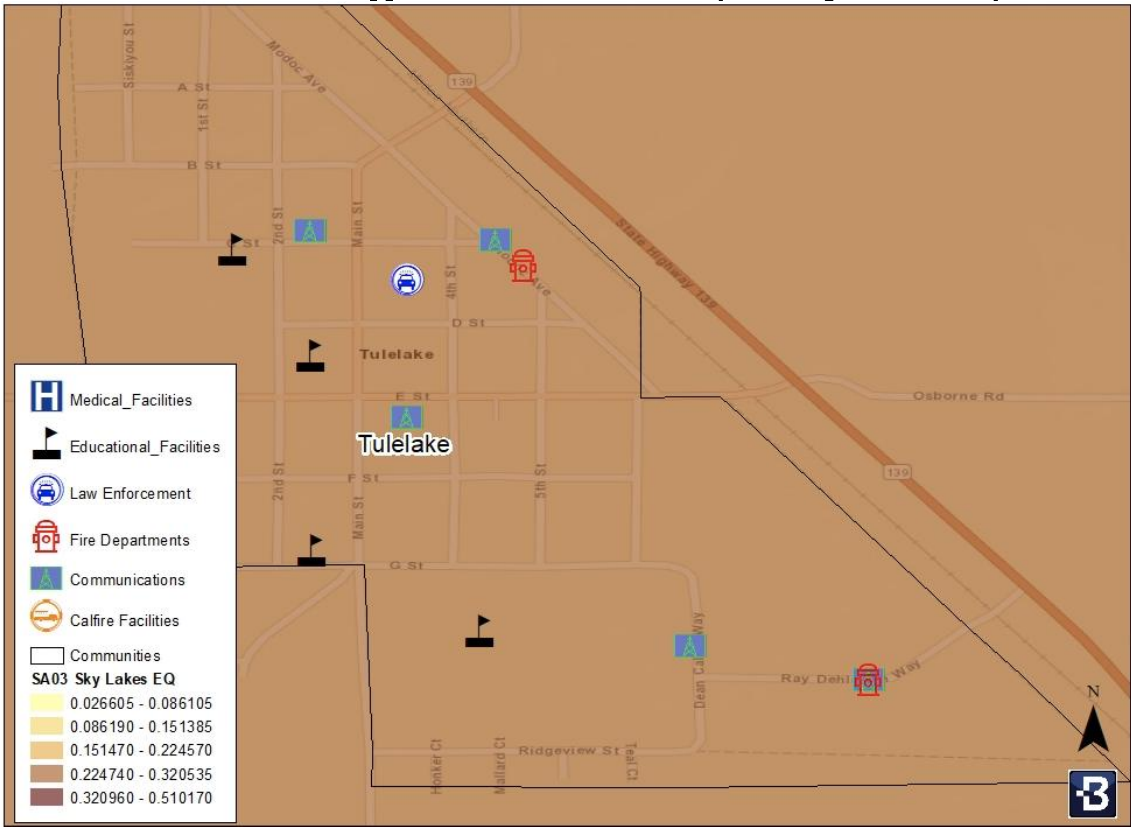
Map 68: Mt. Shasta Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

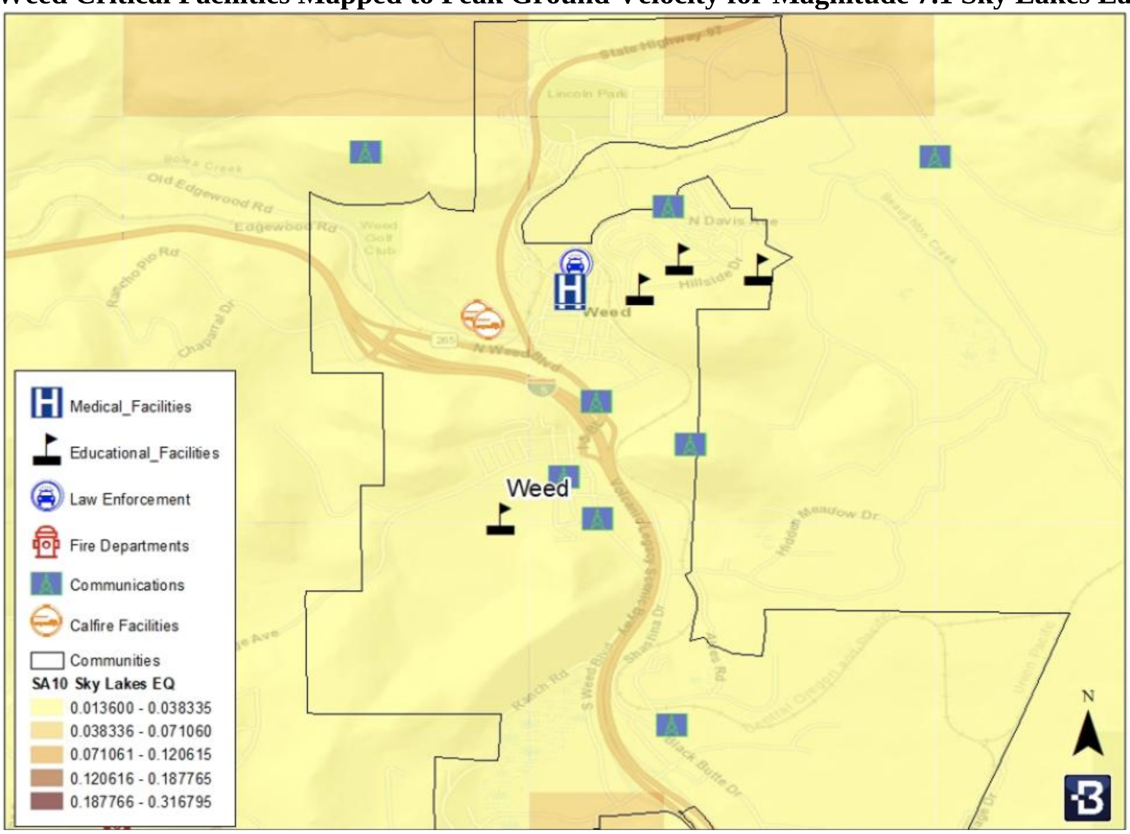
EXHIBIT C

Map 69: Tulelake Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

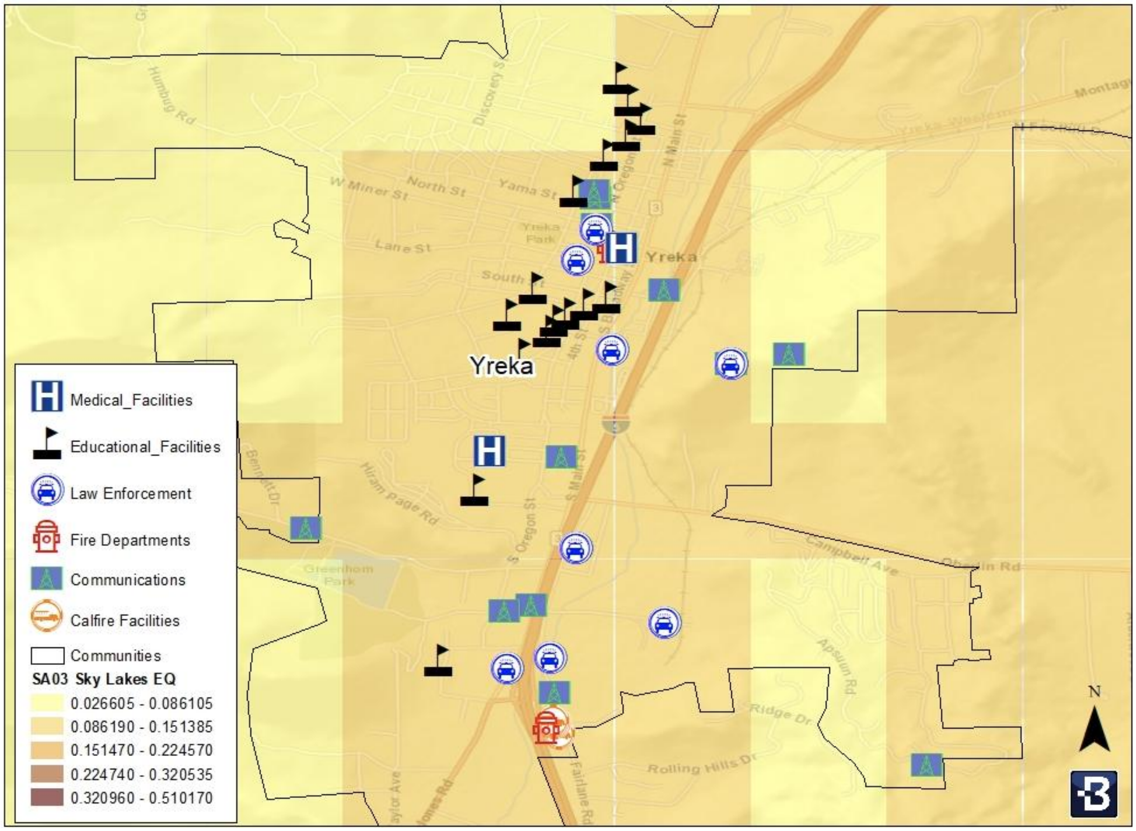
Map 70: Weed Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

EXHIBIT C

Map 71: Yreka Critical Facilities Mapped to Peak Ground Velocity for Magnitude 7.1 Sky Lakes Earthquake



Source: Siskiyou County and BOLDplanning

Mapping concerning medical, education, and response facilities may be found in Section 3.9: Critical Facilities and Infrastructure.

Communication Systems

No comprehensive mapping of communications systems was available for review to compare against known earthquake hazard areas. However, it is assumed that communications lines and towers are in known hazard areas. Of particular concern are 911 and dispatch systems. All jurisdictions are served by a 911 and dispatch system, providing direct dispatching for:

- Law Enforcement
- Emergency Medical Services
- Fire

Earthquakes can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Damage to Infrastructure:** Shaking can cause physical damage to communication infrastructure such as cell towers, antennas, satellite dishes, and power lines. This damage can result in interruptions or complete failure of communication services.
- **Power Outages:** Shaking can lead to power outages by knocking down power lines or damaging electrical substations. Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.
- **Structural Instability:** Shaking can cause structural instability in communication towers and buildings housing communication equipment. If these structures are not properly reinforced, they may collapse or sustain damage, disrupting communication services.

EXHIBIT C

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.8.6.

Environmental and Agricultural Impacts
Earthquakes in Siskiyou County are anticipated to have a limited impact on the agricultural community. However, a disruption in transportation networks could hamper the ability to transport commodities in a timely manner.

Although difficult to quantify, the potential impacts from earthquakes can be numerous. Earthquake-induced impacts can include habitat damage from landslides, degradation of water quality from an influx of soils or debris, and the release of hazardous materials

Cascading Impacts
Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with earthquakes may include:

- Fires from various causes, including downed power lines and broken gas pipelines
- Landslides
- Infrastructure failure
- Dam failure
- Power outages
- Hazardous materials release

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Dorris:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a high peak ground velocity which may result in increased damages, injuries, and deaths. With 20.5% of citizens living in poverty, earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. The remoteness of the jurisdiction, along with limited road access, is also a concern as access may be hampered due to roadway damages. The jurisdiction has an identified EAL of $453,000, causing a consistent strain on budgets.
- **Dunsmuir:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a relatively low peak ground velocity which help minimize damages, injuries, and deaths. With 16.1% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. The jurisdiction has an identified EAL of $242,000, causing a consistent strain on budgets.
- **Etna:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a relatively low peak ground velocity which help minimize damages, injuries, and deaths. With 15.6% of citizens living in poverty, earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. The remoteness of the jurisdiction, along with limited road access, is also a concern as access may be hampered due to roadway damages. The jurisdiction has an identified EAL of $610,000, causing a consistent strain on budgets.
- **Fort Jones:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a moderate peak ground velocity which may result in increased damages, injuries, and deaths. With 23.4% of citizens living in poverty, earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or

repair damaged structures or to seek needed medical attention. The remoteness of the jurisdiction, along with limited road access, is also a concern as access may be hampered due to roadway damages. Additionally, the jurisdiction has an identified EAL of $368,000, causing a consistent strain on budgets.

- **Happy Camp CSD:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a relatively low peak ground velocity which help minimize damages, injuries, and deaths. With 21.0% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. The remoteness of the jurisdiction, along with limited road access, is also a concern as access may be hampered due to roadway damages. Additionally, the jurisdiction has an identified EAL of $624,000, causing a consistent strain on budgets.
- **Lake Shastina CSD** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a moderate peak ground velocity which may result in increased damages, injuries, and deaths. Additionally, the jurisdiction has an identified EAL of $190,000, causing a consistent strain on budgets. Limited road access is also a concern as access may be hampered due to roadway damages.
- **McCloud CSD:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a moderate peak ground velocity which may result in increased damages, injuries, and deaths. With 13.3% of citizens living in poverty, earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. The remoteness of the jurisdiction, along with limited road access, is also a concern as access may be hampered due to roadway damages. Additionally, the jurisdiction has an identified EAL of $239,000, causing a consistent strain on budgets.
- **Montague:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a moderate peak ground velocity which may result in increased damages, injuries, and deaths. With 17.2% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. Additionally, the jurisdiction has an identified EAL of $368,000, causing a consistent strain on budgets.
- **Mt. Shasta** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a relatively low peak ground velocity which helps minimize damages, injuries, and deaths. With 18.4% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. Additionally, the jurisdiction has an identified EAL of $130,000, causing a consistent strain on budgets.
- **Tulelake:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a high peak ground velocity which may result in increased damages, injuries, and deaths. With 41.8% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. The remoteness of the jurisdiction, along with limited road access, is also a concern as access may be hampered due to roadway damages. Additionally, the jurisdiction has an identified EAL of $354,000, causing a consistent strain on budgets.
- **Weed:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a moderate peak ground velocity which may result in increased damages, injuries, and deaths. With 32.7% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. Additionally, the jurisdiction has an identified EAL of $656,000, causing a consistent strain on budgets.
- **Yreka:** Hazus mapping for a Magnitude 7.1 Sky Lakes Fault Zone Earthquake indicates a moderate peak ground velocity which may result in increased damages, injuries, and deaths. With 22.6% of citizens living in poverty, drought is a concern as access to water may become more expensive due to supply limitations. earthquakes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair

damaged structures or to seek needed medical attention. Additionally, the jurisdiction has an identified EAL of $170,000, causing a consistent strain on budgets.

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 69: Earthquake Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Earthquakes may cause injury or death to people from vehicle accidents, falling objects, or structural failure. There may be a large number of people seeking treatment for traumatic injuries. Ground shaking may result in broken service lines or pipelines, triggering the release of hazardous or waste materials.
Impact on Responders	The extent of the damage to infrastructure such as roads and bridges and communications can greatly impact first responders' ability to access or transport victims. Equipment, facilities, or other assets may be damaged and restrict first responders' capacity to respond to calls for assistance.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Earthquakes could potentially impact critical infrastructure resulting in power outages, access to roadways or public transportation, and damage to facilities or infrastructure.
Delivery of Services	Delivery of services may be impacted by dangerous transportation conditions, causing food, water, and resource systems to be delayed or halted.
Property, Facilities, and Infrastructure	Unreinforced masonry structures are inherently vulnerable to seismic forces. All critical facilities and transportation corridors and pipelines can be impacted. Ground shaking can lead to the collapse of buildings and bridges, and disrupt all utility services.
Impact on Environment	Earthquakes have the potential to trigger secondary hazards such as fire, flash flooding, hazardous materials release, slope failure, and dam failures, all potentially devastating to the environment. These secondary hazards can completely wipe out habitats and environments, cause significant injury to animals or livestock, or contaminate certain components of the environment.
Economic Conditions	Earthquakes pose a fiscal impact on the local and county governments, even if some of those costs can be recouped through federal grant reimbursements. Local, county, and state resources may be drained by response and recovery efforts. Additionally, a severe earthquake would affect the ability of businesses to maintain operations. If the private sector is not able to re-establish operations this would also impact the local economy.
Public Confidence in Governance	Governmental response, on all levels, requires direct actions that must be immediate and effective to maintain public confidence. If local government takes a long time to begin recovery operations, or for the public to see recovery operations, this will have a negative impact on the public's confidence in governance.

5.10.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, should any population increase occur, potentially vulnerable populations could face disproportionate effects from an earthquake.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires. Current building codes require considerations for earthquake hardening, and any renovation to existing housing stock will require adherence to these provisions.

Earthquakes will continue to be considered for any future jurisdictional development or renovation, including earthquake hardening of current structures during renovations. In addition, jurisdictions will help areas adapt by encouraging the usage of seismic resistant materials and designs during infrastructure renovation and construction.

5.10.8 Mitigation Opportunities

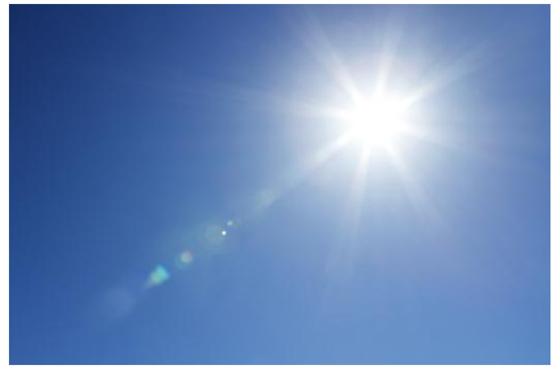
The following table presents examples of potential actions that can be instituted for mitigating the earthquake hazard.

Table 70: Example Earthquake Mitigation Actions

Category	Example Action
Planning and Regulation	Adopt and enforce updated building code provisions to reduce earthquake damage risk.
	Develop and distribute guidelines or passing ordinances that require developers and building owners to locate lifelines, buildings, critical facilities, and hazardous materials out of areas subject to significant seismic hazards.
	Support financial incentives, such as low interest loans or tax breaks, for home and business owners who seismically retrofit their structures.
	Develop an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s homes and masonry buildings.
	Use GIS to map hazard areas, at-risk structures, and associated hazards (e.g., liquefaction and landslides) to assess high-risk areas.
	Establish a school survey procedure and guidance document to inventory structural and non-structural hazards in and around school buildings.
	Create an earthquake scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within a community to develop earthquake mitigation priorities.
Infrastructure	Conduct seismic retrofitting for critical public facilities most at risk to earthquakes.
	Use flexible piping when extending water, sewer, or natural gas service.
	Install shutoff valves and emergency connector hoses where water mains cross fault lines.
	Strength and retrofit non-reinforced masonry buildings and non-ductile concrete facilities that are particularly vulnerable to ground shaking.
	Retrofit building veneers to prevent failure.
	Install window film to prevent injuries from shattered glass.
Education	Develop an outreach program about earthquake risk and mitigation activities in homes, schools, and businesses.
	Offer GIS hazard mapping online for residents and design professionals.
	Conduct information sessions or other forms of outreach on seismic code provisions for new and existing buildings to enhance code use and enforcement by local architects, engineers, contractors, and code enforcement personnel
	Educate homeowners about structural and non-structural retrofitting of vulnerable homes and encouraging retrofit.
	Develop an outreach program to encourage homeowners to secure furnishings, storage cabinets, and utilities to prevent injuries and damage.

EXHIBIT C

5.11 Extreme Heat



5.11.1 Hazard Description

Extreme heat events occur when climate conditions produce temperatures well outside of the predicted norm. These extremes can have severe impacts on human health and mortality, natural ecosystems, agriculture, and other economic sectors.

The Centers for Disease Control and Prevention identifies the following six groups as being especially vulnerable to extreme heat:

- Older Adults (aged 65)
- Infants and Children
- Individuals with Chronic Conditions
- Low-income Individuals
- Athletes
- Outdoor workers

5.11.2 Location & Extent

Siskiyou County experiences a variety of climates due to its diverse geography, which includes mountainous terrain, valleys, and high plateaus. In general, the county can be classified by two major regions, areas with a Mediterranean climate, and areas with a Mountain climate.

In the lower valleys, Siskiyou County experiences a Mediterranean climate, characterized by hot, dry summers and cool, wet winters. Average high temperatures in the summer range from 80°F to 90°F (27°C to 32°C), but they can occasionally exceed 100°F (38°C) during heat waves. Winters are cooler with average highs around 40°F to 50°F (4°C to 10°C). Overnight lows often dip below freezing in these areas. Most rainfall occurs in the winter months, and the county receives around 25 to 50 inches (63 to 127 cm) of rain annually, depending on the location. While lower valleys like Yreka may receive some snow, snowfall is usually light at lower elevations.

The mountainous areas of the county, particularly around Mount Shasta and the Siskiyou Mountains, have a continental mountain climate with colder, snowier winters. Higher elevations are cooler in the summer, with highs ranging from 60°F to 80°F (15°C to 27°C). Winters are much colder, with average highs around 30°F to 40°F (-1°C to 4°C). Overnight lows frequently fall below freezing, and heavy snowfall is common. Areas around Mount Shasta receive significant snowfall, often exceeding 200 inches (508 cm) per year.

While all of Siskiyou County is vulnerable to extreme heat, in general terms mountainous communities are at a much lower risk of extreme heat events. Extreme heat may be defined as follows.

- **Extreme Heat:** Days when the maximum temperature is above 91.4 degrees Fahrenheit.

The following table, using data from NOAA, details the average maximum and average minimum temperatures for Siskiyou County:

Table 71: Siskiyou County Temperature Averages (Degrees Fahrenheit)

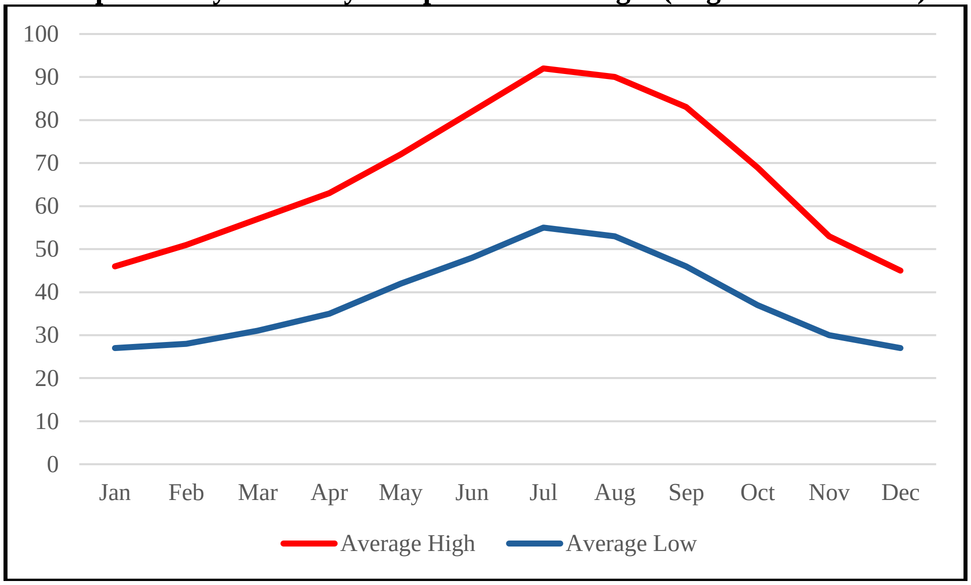
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max Temperature (F)	46	51	57	63	72	82	92	90	83	69	53	45	67
Average Min Temperature (F)	27	28	31	35	42	48	55	53	46	37	30	27	38

Source: NOAA

EXHIBIT C

The following graphs illustrate the above data.

Graph : Siskiyou County Temperature Averages (Degrees Fahrenheit)



Source: NOAA

The MPC view extreme heat as both a local and county-wide hazard. Discussions with the MPC and a review of all available data indicated that while extreme heat is a concern for all participating jurisdictions, some jurisdictions may have a greater concern. The following provides a narrative of the level of jurisdictional concern:

- **Siskiyou County:** Extreme heat identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.
- **Dorris:** Extreme heat identified as a minor community concern as citizens, agriculture, and the environment are potentially vulnerable. Any increase in extreme heat conditions may increase wildfire events. However, the elevation of the jurisdiction is expected to have a mitigating effect on temperatures.
- **Dunsmuir:** Extreme heat identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.
- **Etna:** Extreme heat identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.
- **Fort Jones:** Extreme heat identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.
- **Happy Camp CSD:** Extreme heat identified as a minor community concern as citizens, agriculture, and the environment are potentially vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.
- **Lake Shastina CSD:** Extreme heat identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.
- **McCloud CSD:** Extreme heat identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.
- **Montague:** Extreme heat identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.
- **Mt. Shasta:** Extreme heat identified as a minor community concern as citizens, agriculture, and the environment are potentially vulnerable. Any increase in extreme heat conditions may increase wildfire events. However, the elevation of the jurisdiction is expected to have a mitigating effect on temperatures.

EXHIBIT C

- **Tulelake:** Extreme heat identified as a minor community concern as citizens, agriculture, and the environment are potentially vulnerable. Any increase in extreme heat conditions may increase wildfire events. However, the elevation of the jurisdiction is expected to have a mitigating effect on temperatures.
- **Weed:** Extreme heat identified as a minor community concern as citizens, agriculture, and the environment are potentially vulnerable. Any increase in extreme heat conditions may increase wildfire events. However, the elevation of the jurisdiction is expected to have a mitigation effect on temperatures.
- **Yreka:** Extreme heat identified as a community concern as citizens, agriculture, and the environment are vulnerable. Additionally, an increase in extreme heat conditions may increase wildfire events.

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.11.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced no Presidential Disaster Declarations related to extreme heat.

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Siskiyou County has experienced no Emergency Declarations related to extreme heat.

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. Siskiyou County has experienced no proclamations of a State of Emergency related to extreme heat.

Data from NOAA indicates the following historic high temperatures for Siskiyou County and participating jurisdictions:

Table 72: Siskiyou County and Participating Jurisdictions Historic High Temperatures

County	Historic High Temperature (F)
Siskiyou County	**109**
Dorris	97
Dunsmuir	109
Etna	107
Fort Jones	107
Lake Shastina CSD	101
Montague	101
Mt. Shasta	106
Tulelake	103
Weed	101
Yreka	112

Source: NOAA

Additionally, data from the NCEI from 1950 through 2024 indicates the following recorded extreme temperature events. As these events tend to cover large areas, they are reported as regional:

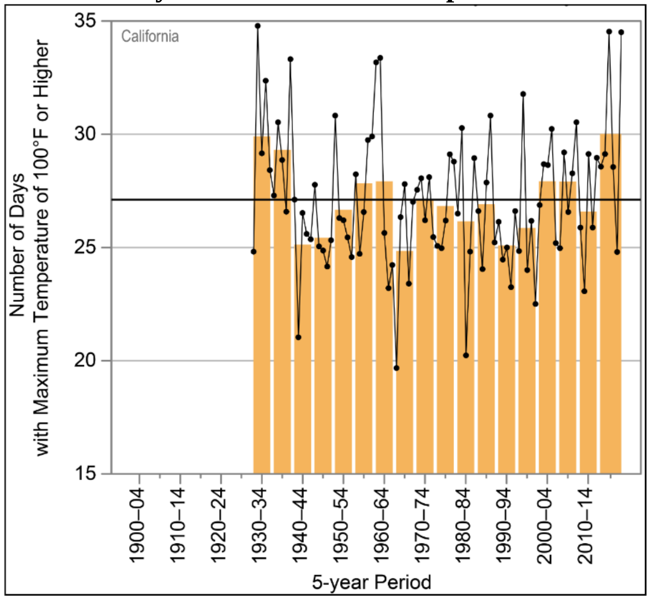
Table 73: Siskiyou County Extreme Temperature Events, 1950 - 2024

Event Type	Number of Events	Property Damage	Deaths	Injuries
Excessive Heat	12	$0	0	0

Source: NOAA NCEI

According to the NOAA NCEI State Climate Summary 2022 for California, in the 126-year period of record (1895–2020), the six warmest years have all occurred since 2014 (2014, 2015, 2016, 2017, 2018, and 2020). The 2015–2020 period saw the highest number of extremely hot days and included the years with the second- and third-highest values (2017 and 2020).

Chart 22: Number of Days with Maximum Temperature of 100° F or Higher



Source: NOAA NCEI State Climate Summary 2022 for California

5.11.4 Probability of Future Events

The following tables, using data from the NCEI, indicate the yearly probability of an extreme heat event, the number of deaths or injuries, and estimated property damage for all Siskiyou County participating jurisdictions based on 75 years' worth of reporting data:

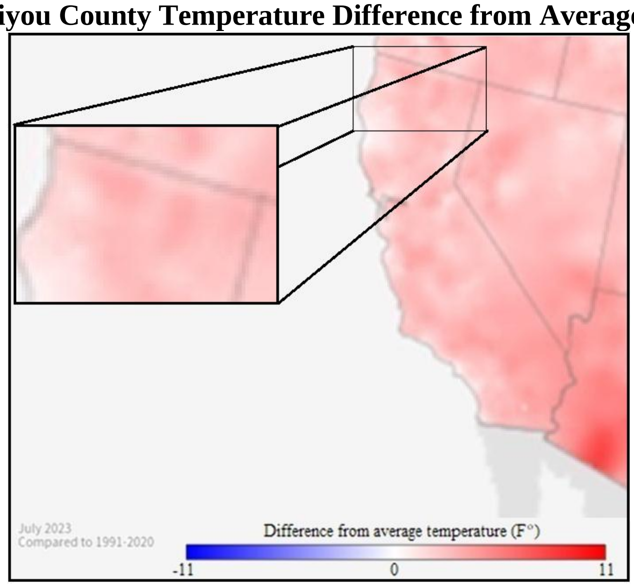
Table 74: Siskiyou County NCEI Extreme Heat Event Probability Summary

County	Number of Events	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Siskiyou	12	<1	0	0	$0	$0

Source: NCEI

However, available data suggests that both the average high temperatures and the record high temperature will likely continue to increase over the coming years as indicated by the following map from NOAA indicating the temperature difference from average from 1991-2020:

Map 72: Siskiyou County Temperature Difference from Average, 1991 – 2020



Source: NOAA

EXHIBIT C

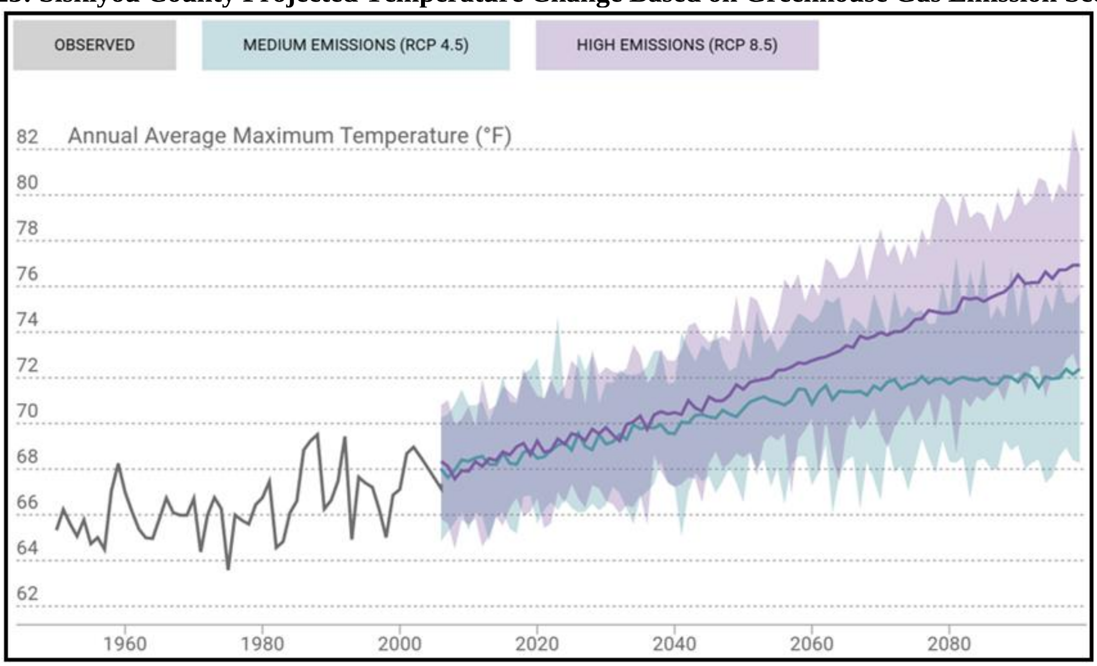
Additionally, according to Cal Adapt's Local Climate Snapshot Tool, by the end of the century, under high emissions scenarios, Siskiyou County annual average maximum temperature is expected to reach highs of 68.7 degrees Fahrenheit, up 8.9 degrees Fahrenheit from the baseline average of 59.8 degrees Fahrenheit. Additionally, extreme heat days, or days when the maximum temperature is above 91.4 degrees Fahrenheit, are expected to increase from four days per year to 53 days per year by the end of the century.

5.11.5 Projected Changes in Location, Intensity, Frequency, and Duration

When discussing extreme temperatures, climate change should be considered as it may markedly change future events. Recent climate modeling results indicate that extreme heat events may become more common for Siskiyou County and participating jurisdictions. Recent multiyear periods have been among some of the warmest on record for Siskiyou County. Rising average temperatures produce a more variable climate system which may result in an increase in the frequency and severity of some extreme weather events including longer and hotter heat waves. Additionally, rising temperatures can harm air quality and amplify existing threats to human health. Warmer weather can increase the production of ground-level ozone, a pollutant that causes lung and heart problems. Heat stress is expected to increase as climate change brings hotter summer temperatures and more humidity. Certain people are especially vulnerable, including children, the elderly, the sick, and those living below the poverty line.

The following climate models, from the Cal-Adapt Local Climate Change Snapshot for Siskiyou County and participating jurisdictions make predictions for the period of 2006 to 2100. Two future climate projections using medium and high greenhouse gas and aerosol emissions scenarios are presented. These scenarios are known as Representative Concentration Pathways, with each representing a standardized set of assumptions about emissions trajectory in the coming years. The Medium Emissions Scenario represents a mitigation scenario where global CO2 emissions peak by 2040 and then decline. The High Emissions Scenario represents a scenario where CO2 emissions continue to rise throughout the 21st century.

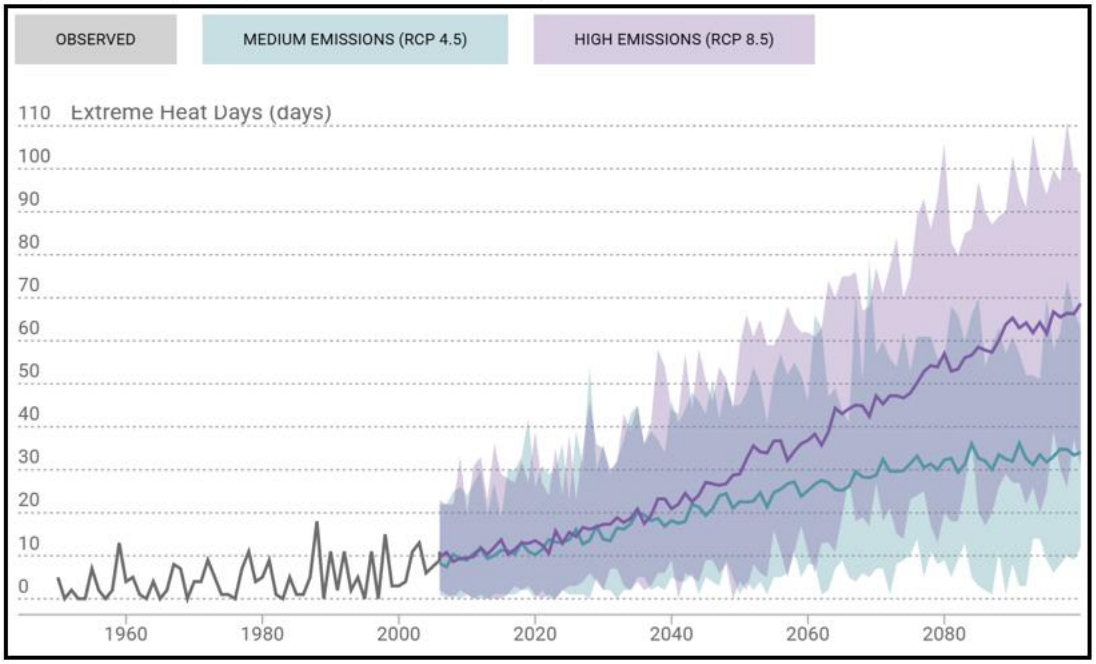
Chart 23: Siskiyou County Projected Temperature Change Based on Greenhouse Gas Emission Scenarios



Source: Cal-Adapt Local Climate Change Snapshot for Siskiyou County

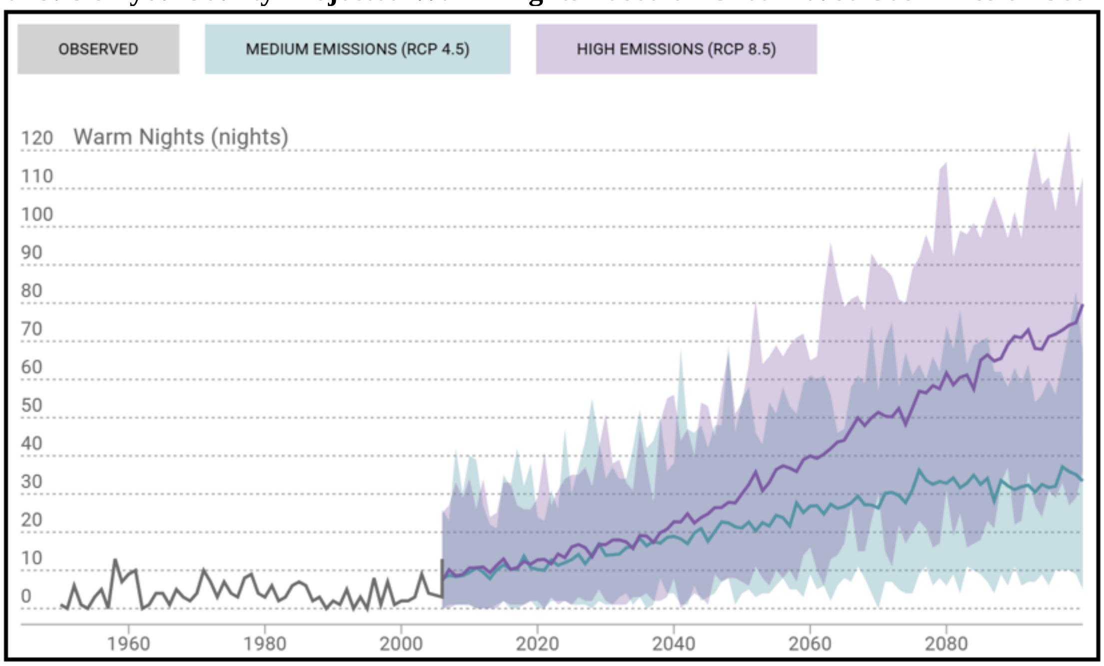
EXHIBIT C

Chart 24: Siskiyou County Projected Extreme Heat Days Based on Greenhouse Gas Emission Scenarios



Source: Cal-Adapt Local Climate Change Snapshot for Siskiyou County

Chart 25: Siskiyou County Projected Warm Nights Based on Greenhouse Gas Emission Scenarios



Source: Cal-Adapt Local Climate Change Snapshot for Siskiyou County

5.11.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Siskiyou County and all participating jurisdictions from extreme heat. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Siskiyou County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

EXHIBIT C

Table 75: Participating Jurisdiction Extreme Heat Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Relatively Low	43.5	1.6
Dorris	06093000200	Relatively Low	39.7	0.5
Dunsmuir	06093001100	Relatively Low	22.1	1.3
Etna	06093000800	Relatively Low	47.9	0.1
Fort Jones	06093000701	Relatively Low	44.2	2.2
Happy Camp CSD	06093001300	Relatively Low	31.0	2.4
Lake Shastina CSD	06093000902	Relatively Low	36.1	1.8
McCloud CSD	06093001200	Relatively Low	18.1	0.7
Montague	06093000300	Relatively Moderate	52.5	1.3
Mt. Shasta	06093001003	Very Low	17.5	1.3
Tulelake	06093000100	Relatively Low	30.8	0.5
Weed	06093000901	Relatively Low	38.7	2.1
Yreka	06093000703	Relatively Low	30.7	2.2

Source: FEMA NRI

Table 76: Participating Jurisdiction Extreme Heat Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Extreme Heat EAL
Siskiyou County	All	Relatively Low	43.1	$43,000
Dorris	06093000200	Relatively Low	35.1	$3,200
Dunsmuir	06093001100	Relatively Low	20.9	$713
Etna	06093000800	Relatively Low	45.7	$189
Fort Jones	06093000701	Relatively Low	43.4	$5,500
Happy Camp CSD	06093001300	Relatively Low	28.0	$1,700
Lake Shastina CSD	06093000902	Relatively Low	37.1	$3,600
McCloud CSD	06093001200	Relatively Low	18.9	$423
Montague	06093000300	Relatively Moderate	49.2	$7,800
Mt. Shasta	06093001003	Relatively Low	19.8	$562
Tulelake	06093000100	Relatively Low	27.6	$1,600
Weed	06093000901	Relatively Low	33.0	$2,700
Yreka	06093000703	Relatively Low	28.8	$1,900

Source: FEMA NRI

Population

A primary concern with this hazard is human health safety issues, as extreme heat can be a direct cause of death to citizens of all jurisdictions within the county. Specific at-risk groups include outdoor workers, farmers, young children, and senior citizens. Impacts on human health can include:

- **Heat Exhaustion and Heat Stroke:** Prolonged exposure to high temperatures can lead to heat exhaustion, characterized by heavy sweating, weakness, and dizziness. If untreated, it can escalate to heat stroke, a life-threatening condition with symptoms like confusion, high body temperature, and loss of consciousness.
- **Respiratory Issues:** High temperatures can worsen air quality, increasing levels of ozone and allergens, which can exacerbate asthma and other respiratory conditions.
- **Cardiovascular Strain:** Extreme heat can put additional stress on the heart, increasing the risk of heart attacks and other cardiovascular problems, particularly in older adults.
- **Dehydration:** Heat can lead to increased fluid loss through sweating, which can result in dehydration, affecting bodily functions and overall health.

EXHIBIT C

The following table discusses potential impacts on human health related to excessive heat by temperature range:

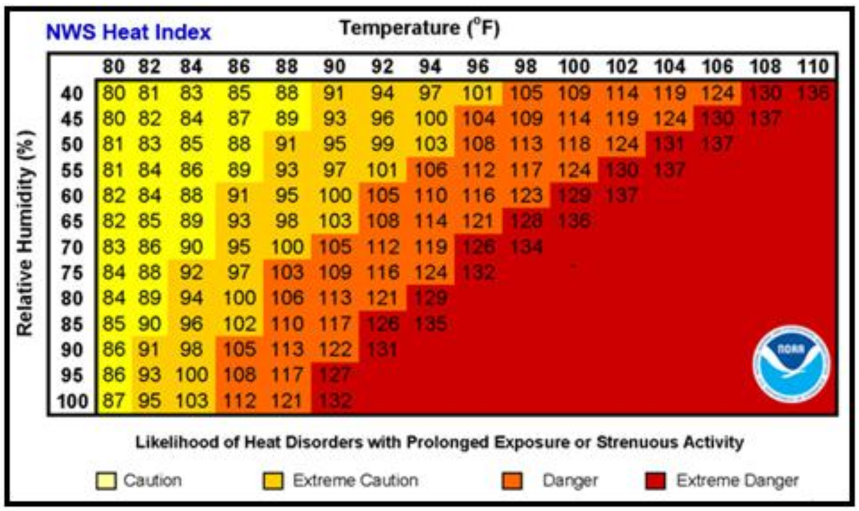
Table 77: Extreme Heat Impacts on Human Health

Heat Index Temperature	Potential Impact on Human Health
80-90° F	Fatigue possible with prolonged exposure and/or physical activity
90-105° F	Sunstroke, heat cramps, and heat exhaustion possible
105-130° F	Heatstroke/sunstroke is highly likely with continued exposure

Source: National Weather Service Heat Index Program

Exposure to direct sun can increase Heat Index values by as much as 15°F. The zone above 105°F corresponds to a Heat Index that may cause increasingly severe heat disorders with continued exposure and/or physical activity. The following graph, from the NWS, indicates Heat Index values.

Chart 26: Heat Index


NWS 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

Source: NWS

Extreme heat may disproportionately affect socially vulnerable populations, exacerbating pre-existing inequalities and making recovery more difficult for these groups. Extreme heat may disproportionately impact vulnerable populations in the following ways:

- **Elderly Individuals:** Older adults often have reduced physiological resilience to heat due to age-related factors and chronic health conditions, making them more susceptible to heat-related illnesses.
- **Children: Young** children are less able to regulate their body temperature and are at a higher risk for heat exhaustion and dehydration.
- **Low-Income Communities:** Those in low-income neighborhoods may lack access to air conditioning, adequate housing, or resources to stay cool, increasing their risk during heat events.
- **People with Chronic Health Conditions:** Individuals with cardiovascular, respiratory, or other chronic health issues may face heightened risks from extreme heat, as their bodies may struggle to cope with elevated temperatures.
- **Homeless Individuals:** People experiencing homelessness often have limited access to shelter and cooling facilities, making them particularly vulnerable during heat waves.

All Siskiyou County and participating jurisdictions citizens are vulnerable to the impacts of extreme heat. Please see Section 3.3: Population Data and Section 3.4: Socially Vulnerable and At-Risk Populations for data concerning jurisdictional populations.

EXHIBIT C

Buildings and Structures
In general, buildings and structures, including historic buildings, will not be impacted by short-term extreme heat events. It is possible that long-term heat events could cause impacts, including:

- **Thermal Expansion:** High temperatures can cause building materials, such as metal and concrete, to expand. This can lead to warping, cracking, and structural stress.
- **Roof Damage:** Prolonged exposure to extreme heat can deteriorate roofing materials, leading to leaks, reduced lifespan, and increased maintenance costs.
- **Foundation Issues:** Prolonged heat can affect the moisture content in the soil surrounding a building's foundation, potentially leading to shifting or settling.

Transportation and Electrical Infrastructure
Extreme heat can have numerous impacts on both transportation and electrical distribution systems, often leading to challenges that require proactive management. The impacts of extreme heat on transportation systems may include:

- **Road Surface Damage:** High temperatures can cause asphalt to soften, leading to ruts, cracks, and buckling. This can compromise road safety and require costly repairs.
- **Railway Tracks:** Steel tracks can expand in extreme heat, leading to potential warping or misalignment (known as "sun kinks"), which can disrupt train services and pose safety risks.
- **Bridges and Overpasses:** Expansion joints may be affected, and excessive heat can lead to structural stress, potentially compromising safety and necessitating inspections or repairs.
- **Traffic Signals and Signage:** Heat can affect the functionality of electronic traffic signals and signage, leading to malfunctions that could result in traffic disruptions or accidents.
- **Public Transit Systems:** Buses and trains may face increased operational challenges due to overheating engines and equipment failures, which can impact schedules and reliability.

Extreme heat can impact both the electrical generation capacity and transmission. The impacts of extreme heat on electrical systems may include:

- **Increased Demand:** High temperatures typically lead to increased use of air conditioning, resulting in a surge in electricity demand that can strain the grid.
- **Transformer Overheating:** Electrical transformers can overheat during extreme heat events, leading to failures or outages.
- **Power Lines:** Extreme heat can cause power lines to sag due to thermal expansion, increasing the risk of contact with trees or other objects, which can result in outages or fires.
- **Substation Performance:** High temperatures can impair the performance of substations, potentially leading to overloads and failures.
- **Energy Efficiency:** Excessive heat can reduce the efficiency of power generation, particularly for fossil fuel and nuclear plants, leading to decreased output during peak demand times.
- **Renewable Energy Impact:** While solar panels can generate more energy in high temperatures, their efficiency can drop significantly beyond certain heat thresholds.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities
Water and wastewater utilities are vulnerable to extreme events due to the potential for plant damages and distribution system damages. Impacts may include:

EXHIBIT C

- **Pipe bursts and leaks:** Heat can cause soil to dry and shift, leading to cracks or bursts in aging water distribution pipes. Temperature fluctuations also lead to expansion and contraction in pipes, potentially increasing the risk of failure.
- **Reduced efficiency of equipment:** Pumps, motors, and other mechanical systems in water treatment facilities may become less efficient or experience overheating during prolonged high temperatures.
- **Reduced water availability:** In open water storage or reservoirs, high temperatures lead to greater evaporation, reducing the overall available water supply. This may lead to restrictions or necessitate sourcing from alternative supplies.
- **Changes in treatment efficiency:** Biological treatment processes in wastewater treatment plants can be disrupted due to temperature, impacting the breakdown of organic matter and nutrient removal processes.

Information concerning the costs to repair or reconstruct water and wastewater infrastructure may be found in Section 5.8.6.

Medical, Education, and Response Facilities
While extreme temperatures may result in a temporary increase in patients, it is considered unlikely that any influx would overwhelm current medical capabilities. Depending on educational facility capability, extreme temperatures may necessitate the closure of the facility for the duration of the event. These closures are expected to have additional economic consequences as caregivers may be required to miss or modify work. First response facilities are expected to be unimpacted.

Mapping concerning medical, education, and response facilities may be found in Section 3.9: Critical Facilities and Infrastructure.

Communication Systems
Extreme heat can disrupt this vital communications system, affecting reliability and functionality. Extreme heat can lead to power outages due to down power lines or damaging electrical substations. Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.

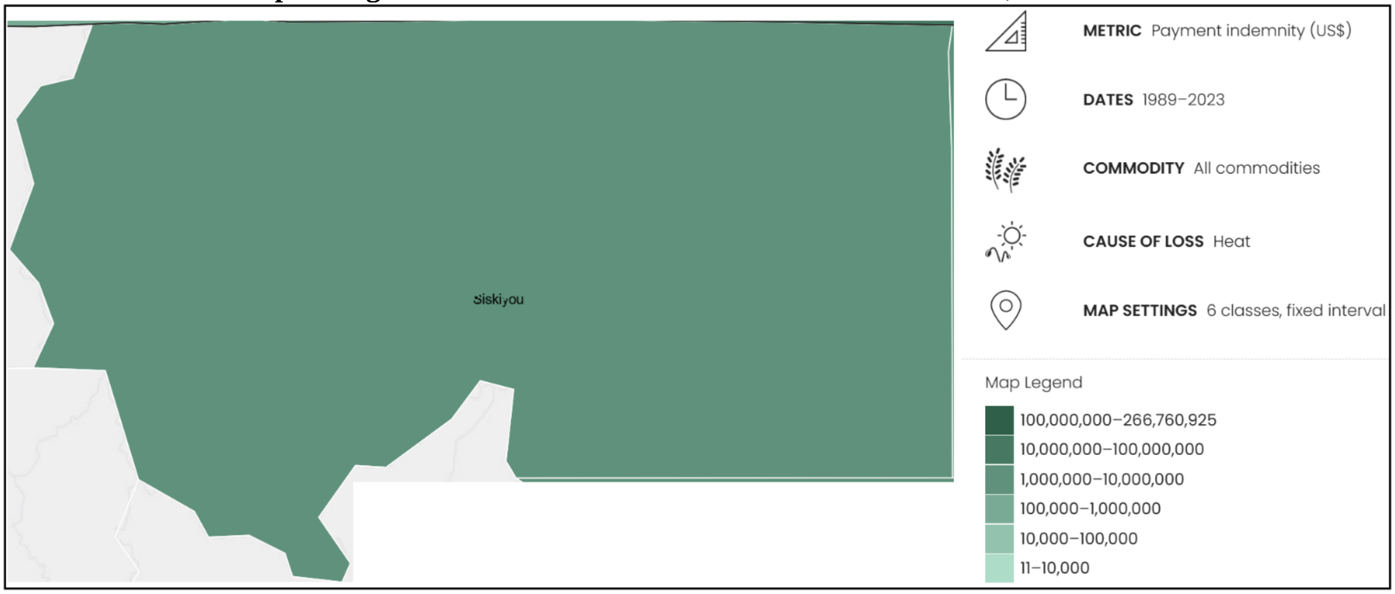
The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.8.6.

Environmental and Agricultural Impacts
Extreme heat can cause significant damage to the local environment by dehydrating vegetation and wildlife, which may result in cascading effects to the surrounding environment, such as drought, wildfires, mudslides, or landslides. Extreme temperatures may severely decrease the yield of the agricultural sector. The yield of cash crops may be reduced, livestock may be adversely impacted by extreme heat, or grazing losses may be incurred by farmers or ranchers; potentially resulting in decreased food security. In the event of significant agricultural losses caused by extreme heat or drought, some assistance may be available to impacted farms or ranches.

Extreme heat conditions can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to extreme heat conditions from 1989 - 2023:

EXHIBIT C

Map 73: Agricultural Losses Due to Extreme Heat Conditions, 1989 - 2023



Source: United States Department of Agriculture

Jurisdictional Concerns:

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Dorris:** Due to higher elevation, Dorris has not had any adverse impacts from extreme heat events. Additionally, it is expected that the higher elevation will naturally mitigate future regional occurrences.
- **Dunsmuir:** With 16.1% of citizens living in poverty, extreme heat is a concern as increase energy costs and lack of air conditioning in housing causing cooling difficulties. Additionally, extreme heat may impact tourism and impact popular community events like the Dunsmuir Steampunk Festival or River and Rail Brewfest, lowering potential community revenue.
- **Etna:** With 15.6% of citizens living in poverty, extreme heat is a concern as increase energy costs and lack of air conditioning in housing causing cooling difficulties. It is anticipated that extreme heat conditions may also increase the community’s wildfire danger. Additionally, extreme heat may impact tourism and impact popular community events like the Trails End Music Festival, lowering potential community revenue.
- **Fort Jones:** With 23.4% of citizens living in poverty, extreme heat is a concern as increase energy costs and lack of air conditioning in housing causing cooling difficulties. It is anticipated that extreme heat conditions may also increase the community’s wildfire danger. Additionally, extreme heat may impact tourism and impact popular community events like the Fort Jones Fall Festival, lowering potential community revenue.
- **Happy Camp CSD:** Due to higher elevation, Happy Camp CSD has not had any adverse impacts from extreme heat events. Additionally, it is expected that the higher elevation will naturally mitigate future regional occurrences.
- **Lake Shastina CSD:** With 13.8% of citizens above the age of 75, extreme heat is a concern as the elderly have been identified as being disproportionately vulnerable to extreme temperatures. It is anticipated that extreme heat conditions may increase the community’s wildfire danger. Additionally, extreme heat conditions may impact tourism and recreation industries.
- **McCloud CSD:** With 13.3% of citizens living in poverty, extreme heat is a concern as increase energy costs and lack of air conditioning in housing causing cooling difficulties. And, with 15.3% of citizens above the age of 75, extreme heat is a concern as the elderly have been identified as being disproportionately vulnerable to

EXHIBIT C

extreme temperatures. It is anticipated that extreme heat conditions may also increase the community’s wildfire danger.

- **Montague:** With 17.2% of citizens living in poverty, extreme heat is a concern as increase energy costs and lack of air conditioning in housing causing cooling difficulties. It is anticipated that extreme heat conditions may also increase the community’s wildfire danger. Additionally, extreme heat may and impact popular community events like the Montague Hot Air Balloon Fair and Montague Freedom Festival, lowering potential community revenue.
- **Mt. Shasta:** Due to higher elevation Mt. Shasta has not had any adverse impacts from extreme heat events. Additionally, it is expected that the higher elevation will naturally mitigate future regional occurrences.
- **Tulelake:** Due to higher elevation Tulelake has not had any adverse impacts from extreme heat events. Additionally, it is expected that the higher elevation will naturally mitigate future regional occurrences.
- **Weed:** With 32.7% of citizens living in poverty, extreme heat is a concern as increase energy costs and lack of air conditioning in housing causing cooling difficulties. And, with 10.6% of citizens above the age of 75, extreme heat is a concern as the elderly have been identified as being disproportionately vulnerable to extreme temperatures. It is anticipated that extreme heat conditions may also increase the community’s wildfire danger.
- **Yreka:** With 22.6% of citizens living in poverty, extreme heat is a concern as increase energy costs and lack of air conditioning in housing causing cooling difficulties. It is anticipated that extreme heat conditions may also increase the community’s wildfire danger. Additionally, extreme heat may impact tourism and impact popular community events like the Siskiyou Golden Fair, lowering potential community revenue.

Cascading Impacts

Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with extreme may include:

- Drought conditions, or worsening of drought conditions
- Road and rail disruptions
- Heat-related illnesses and mortality
- Power outages
- Water shortage and/or diminished water quality
- Increased wildfires

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 78: Extreme Temperature Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Extreme temperatures can have severe consequences for health, particularly for the elderly and young. Loss of electricity may impact heating or air conditioning leading to poorly tolerated indoor temperatures. Physical effects of extreme heat can cause major health problems and may lead to injury or death.
Impact on Responders	Responders may be susceptible to temperature-related illness. High temperatures may damage instruments or equipment necessary for response activities. Responders may face dangerous road conditions leading to accidents and prolonged response times.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. This hazard may impact an agency’s ability to implement continuity operations due to power outages.

Table 78: Extreme Temperature Consequence Analysis

Subject	Potential Impacts
Delivery of Services	Extreme temperatures can impact efficient delivery or inability of goods or services due to potential health impacts on workers. Equipment and vehicles may be damaged, and the delivery of services may be delayed due to poor travel conditions
Property, Facilities, and Infrastructure	Facility integrity is at risk with regards to power cables and stations being overused and limiting operations. This could lead to limits on facility heating or cooling.
Impact on Environment	Extreme temperatures can cause significant damage to the local environment and result in habitat loss, invasive species, and changes in migration. Extreme temperatures may severely decrease the yield of cash crops. Impacts on water supply may include an increase in frequency of harmful algal blooms and occurrence of cyanobacteria.
Economic Conditions	Extreme temperatures may drain local resources. Under some conditions, some of the costs can be recouped through federal grant reimbursements.
Public Confidence in Governance	Governmental response, on all levels, requires direct actions that must be immediate and effective to maintain public confidence.

5.11.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. Should any population increase occur, potentially vulnerable populations could face disproportionate effects from extreme heat. Of particular concern are the increasing number of unhoused persons within the county, who according to data from the 2023 NorCal Continuum of Care point in Time Report have increased by 112% from 2019 to 2023.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires. Current building codes require considerations for extreme heat, and any renovation to existing housing stock will require adherence to these provisions.

5.11.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the extreme heat hazard.

Table 79: Example Extreme Heat Mitigation Actions

Category	Example Action
Planning and Regulation	Adopt and enforce updated building code provisions to properly insulate structures.
	Support financial incentives, such as low interest loans or tax breaks, for home and business owners who retrofit their structures to mitigate heat.
	Develop an inventory of public and commercial buildings that may be used for cooling shelters.
Infrastructure	Encourage installation of green roofs, which provide shade and remove heat from the roof surface and surrounding air.
	Use cool roofing products that reflect sunlight and heat away from a building.
Natural Systems Protection	Increase tree plantings around buildings to shade parking lots and along public rights-of-way.
Education	Develop an outreach program about extreme heat risk and mitigation activities in homes, schools, and businesses.
	Educate homeowners about retrofitting homes and encouraging retrofit to mitigate heat.

5.12 Flood

5.12.1 Hazard Description

Flooding is the overflow or accumulation of water on normally dry land, often caused by heavy rainfall, snowmelt, or the failure of natural or artificial barriers. Flooding can lead to the inundation of homes, roads, farmland, and other areas, causing damage to property, disruption of daily life, and potential threats to human safety and the environment.

A floodplain is a flat or gently sloping area adjacent to a river, stream, or other water body. These areas act as a buffer during periods of heavy rainfall or snowmelt, absorbing excess water and preventing it from rushing downstream too quickly. In its common usage, a floodplain refers to areas inundated by the 100-year flood, the flood that has a 1% chance of being equaled or exceeded in any given year, and the 500-year flood, the flood that has a 0.2% chance of being equaled or exceeded in any given year. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the NFIP.

5.12.2 Location and Extent

A variety of factors affect the severity of flooding within Siskiyou County. These include topography, weather characteristics, development, and geology. Intense flooding may create extreme damage and disruption in any jurisdiction affected.

Flash Flooding

Flash flooding occurs during heavy or extended periods of rain, generally when the ground is unable to rapidly absorb the water. Most flash flooding in Siskiyou County is caused by intense and stationary storm events and atmospheric rivers. Heavy sustained rain can create rapid flooding very quickly, and flooding can occur miles away from where the rain fell. Factors that can contribute to the severity of flash flooding include rainfall intensity, duration, drainage condition, and ground conditions (paved or unpaved). Flash floods are particularly dangerous to people and property, as six inches of moving water can knock a person down and two feet can lift a vehicle. As there is often little warning of a flash flood event, they are the cause of most flood fatalities.

Riverine Flooding

Riverine flooding refers to the overflow of water from a river or a stream onto adjacent land areas. This type of flooding occurs when the water level in a river or stream rises significantly and exceeds its banks, inundating the surrounding areas. The severity of riverine flooding can be influenced by the amount and intensity of rainfall in the watershed, the size, shape, and slope of the river or stream channel, and the presence of dams on the river system.

Urban Flooding

FEMA defines urban flooding as ‘the inundation of property in a built environment, particularly in more densely populated areas, caused by rain falling on increased amounts of impervious surfaces and overwhelming the capacity of drainage systems.” In Siskiyou County, urban flooding has consistently increased due to a number of factors, including the filling for development of natural wetlands and waterways, the reduction of permeable surfaces, and the aging and insufficient capacity of stormwater systems.

To establish floodplains, FEMA adopted the Base Flood Elevation (BFE), which is the computed elevation that floodwater is anticipated to rise during a flood that has a 1% chance of occurring in any given year. The BFE establishes the regulatory requirement for the elevation or floodproofing of structures, and the relationship between the BFE and a given structure’s elevation determines the flood insurance premium through the NFIP.

FEMA, through the Risk Mapping, Assessment, and Planning (Risk MAP) program, works with partners to assess and map these flood risks producing Flood Insurance Rate Maps (FIRMs). As an additional benefit, the FIRMs serve as the basis for NFIP regulations and flood insurance purchase requirements.

SFHAs are defined as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood. The FIRM depicts the SFHA, including the 1%-annual-chance flood. These areas are labeled on the map as zone, as explained in the following table:

The following table details FEMA's FIRM flood zone classifications.

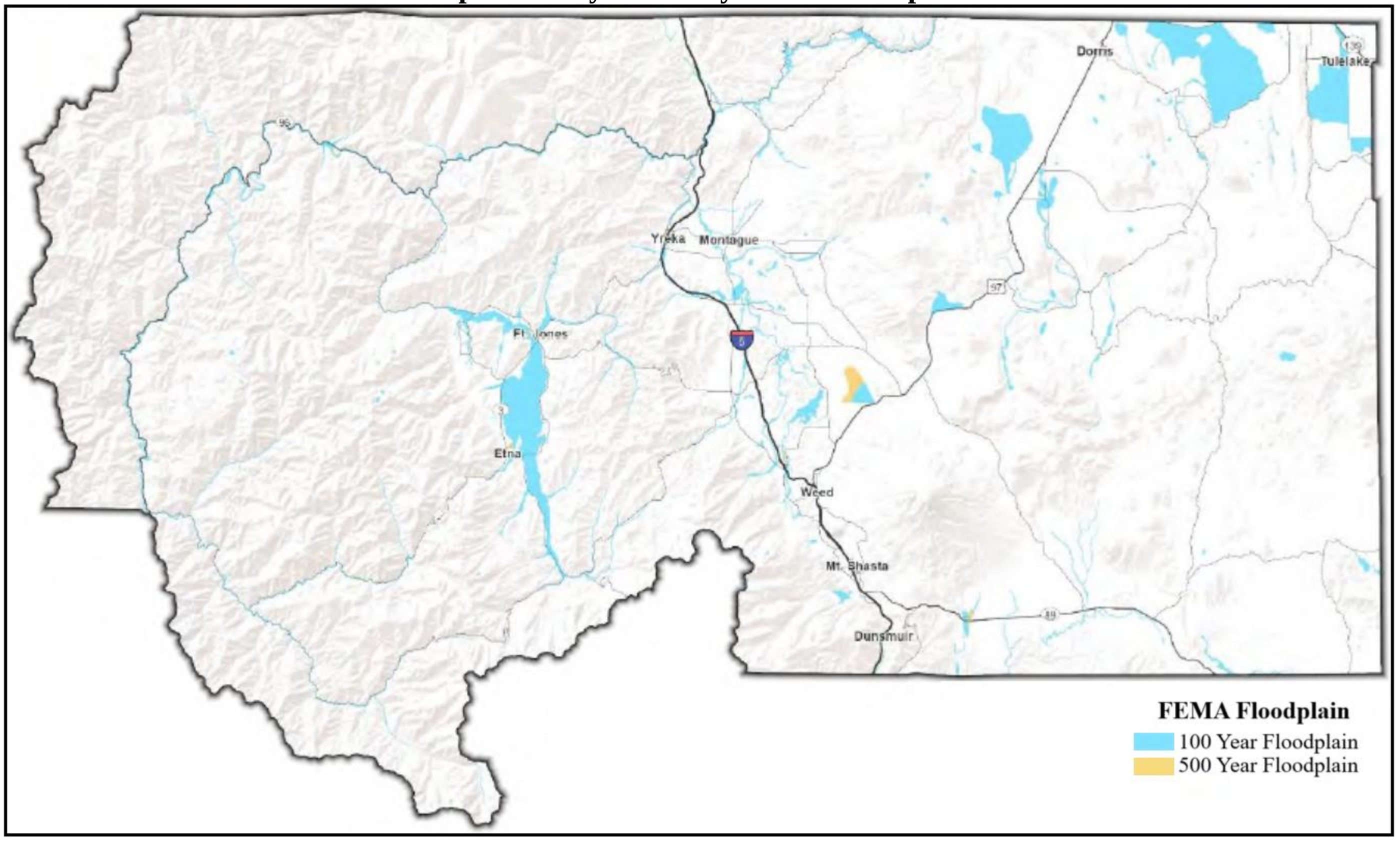
Table 80: Flood Zone Classifications

Zone	Description
A	The 1%-annual-chance or base floodplain. There are six (6) types of A Zones.
AE	The base floodplain where base flood elevations are provided.
AH	Shallow flooding base floodplain. BFEs are provided.
AO	The base floodplain with sheet flow, ponding, or shallow flooding. Base flood depths (feet above ground) are provided.
AR	The base floodplain that results from the decertification of a previously accredited flood protection system that is in the process of being restored to provide a 1%-annual-chance or greater level of flood protection.
A99	Area to be protected from base flood by levees or Federal Flood Protection Systems under construction. BFEs are not determined.
B or Shaded X	Areas between the limits of the base flood and the 0.2% annual-chance (or 500-year) flood.
C or Unshaded X	Areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2% annual-chance flood

Source: FEMA

The following maps use FEMA FIRM data to depict the location of identified flood zones within Siskiyou County.

Map 74: Siskiyou County FEMA Floodplains



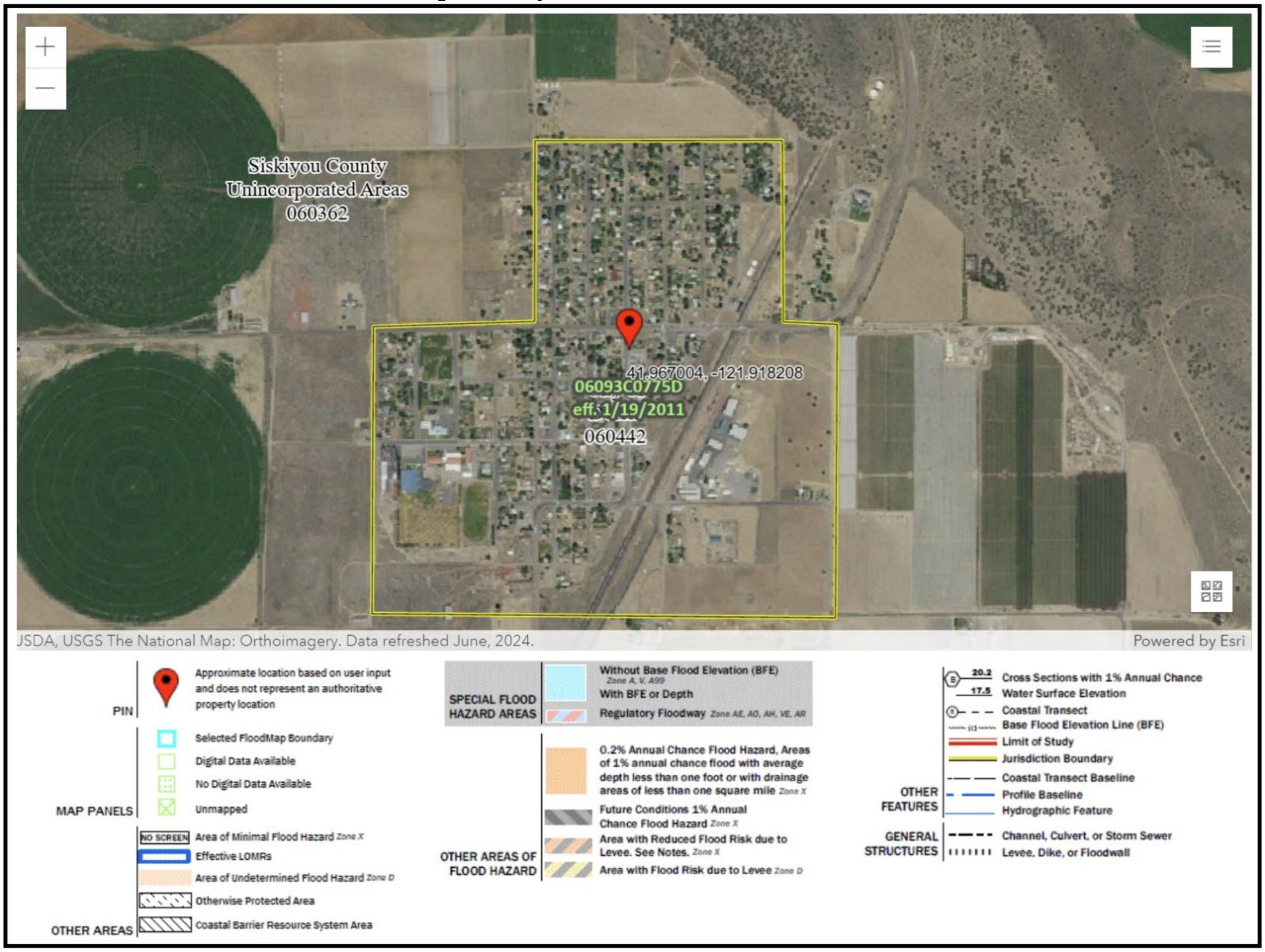
Source: FEMA

The following maps for all participating jurisdictions are FEMA FIRMettes, small, customized sections of a larger FIRM. FIRMettes are typically used to identify flood zones and assess flood risks for a specific area, and they offer:

- **Customized Area:** Unlike full FIRMs, which cover large areas, a FIRMette is a focused, zoomed-in version of the map for a smaller, specific location.
- **Flood Zones:** It shows the flood zones for the selected area.
- **Elevation Information:** It may include BFEs, which help determine flood risks and insurance requirements.
- **Official Use:** FIRMettes are legally recognized and used in flood insurance determinations and community planning.

EXHIBIT C

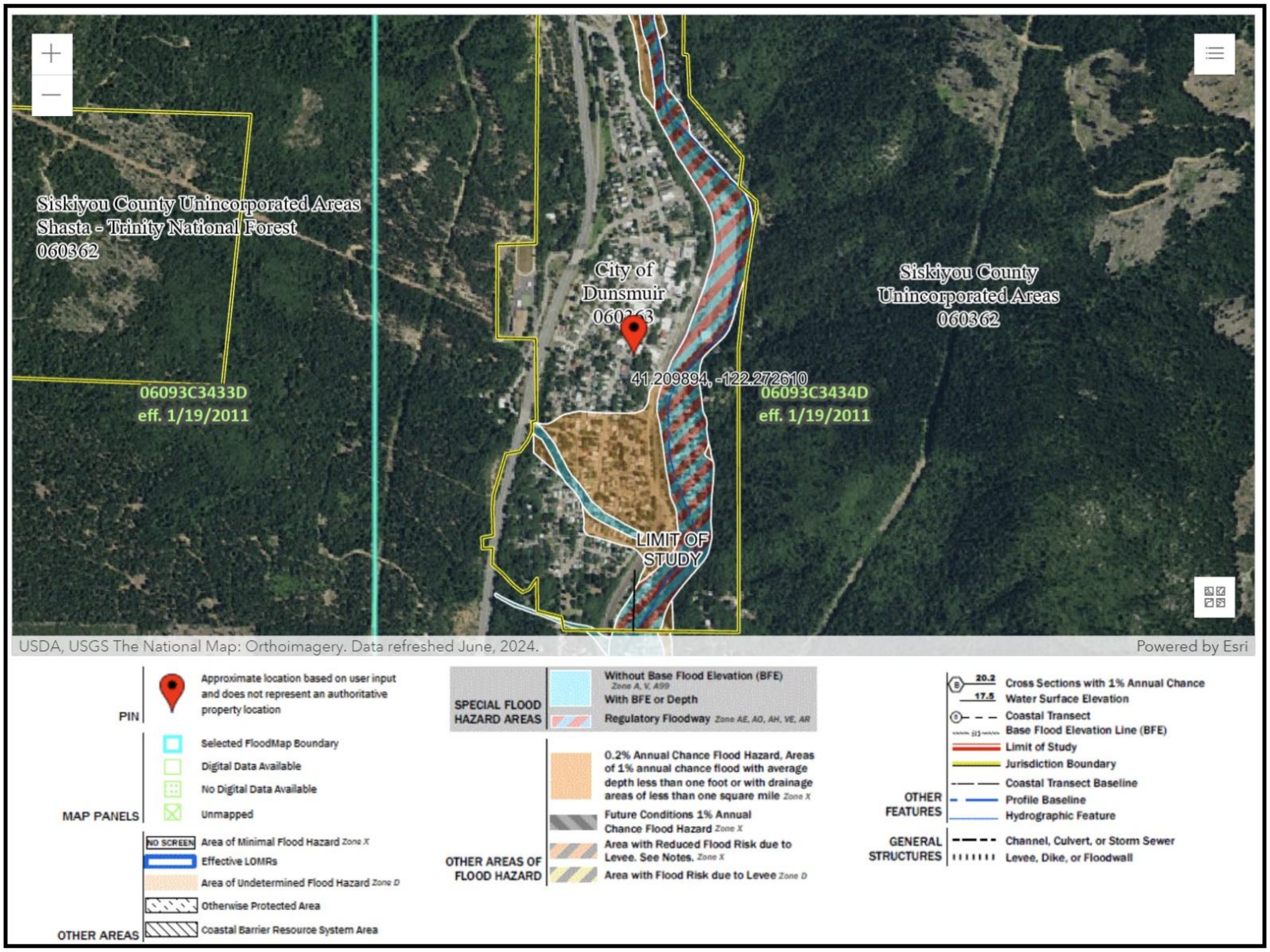
Map 75: City of Dorris FEMA FIRMette



Source: FEMA

EXHIBIT C

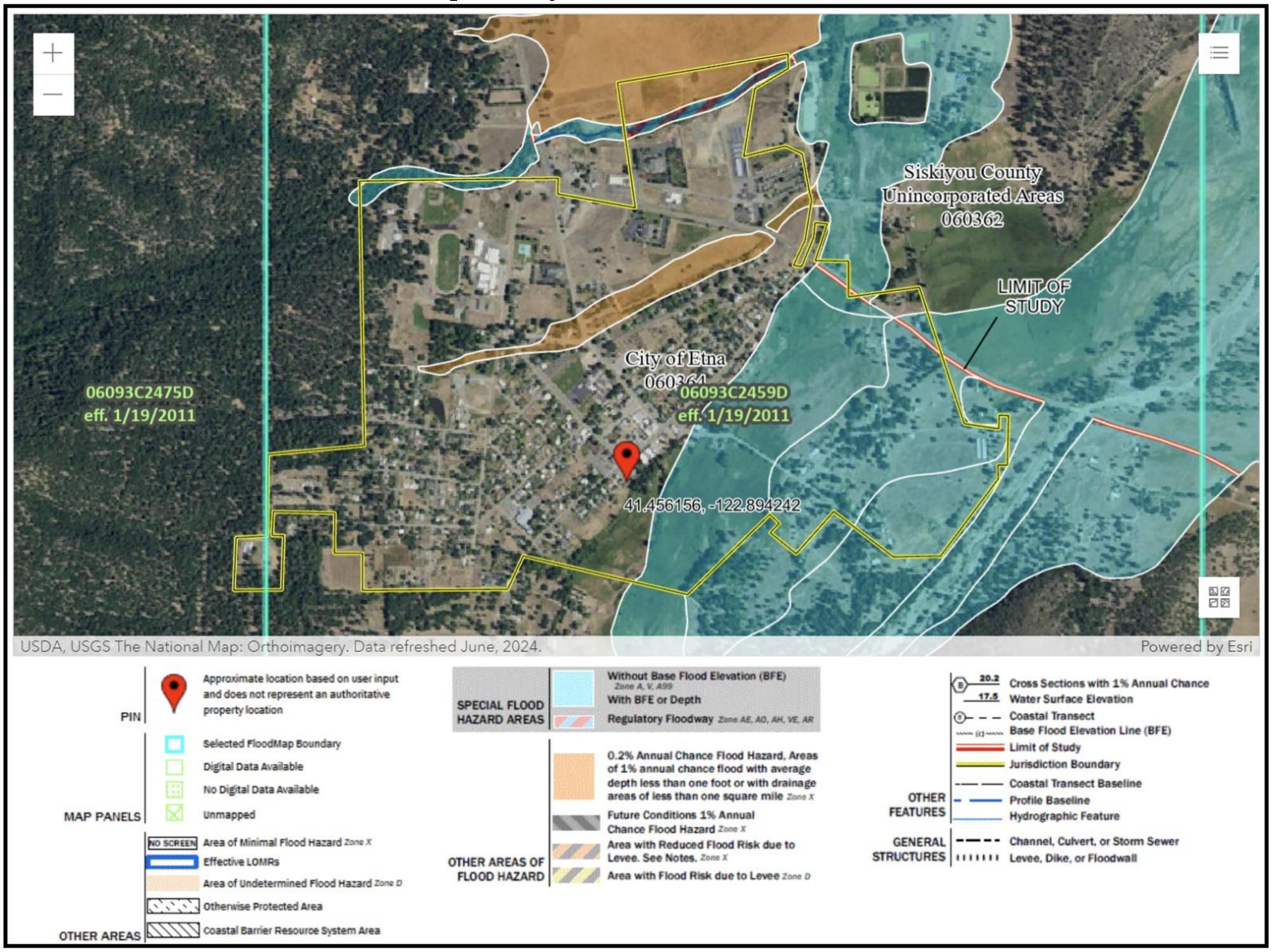
Map 76: City of Dunsmuir FEMA FIRMette



Source: FEMA

EXHIBIT C

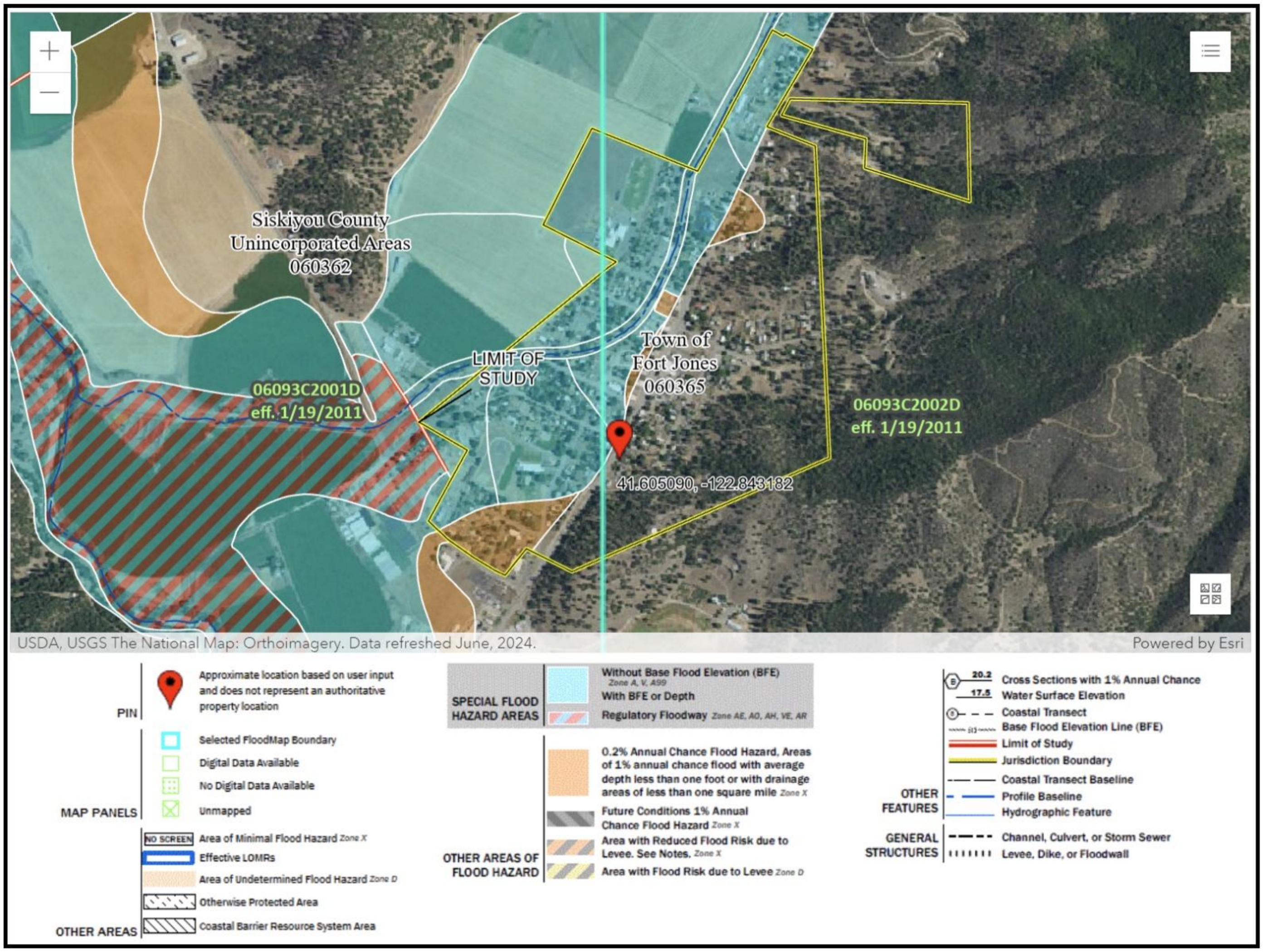
Map 77: City of Etna FEMA FIRMette



Source: FEMA

EXHIBIT C

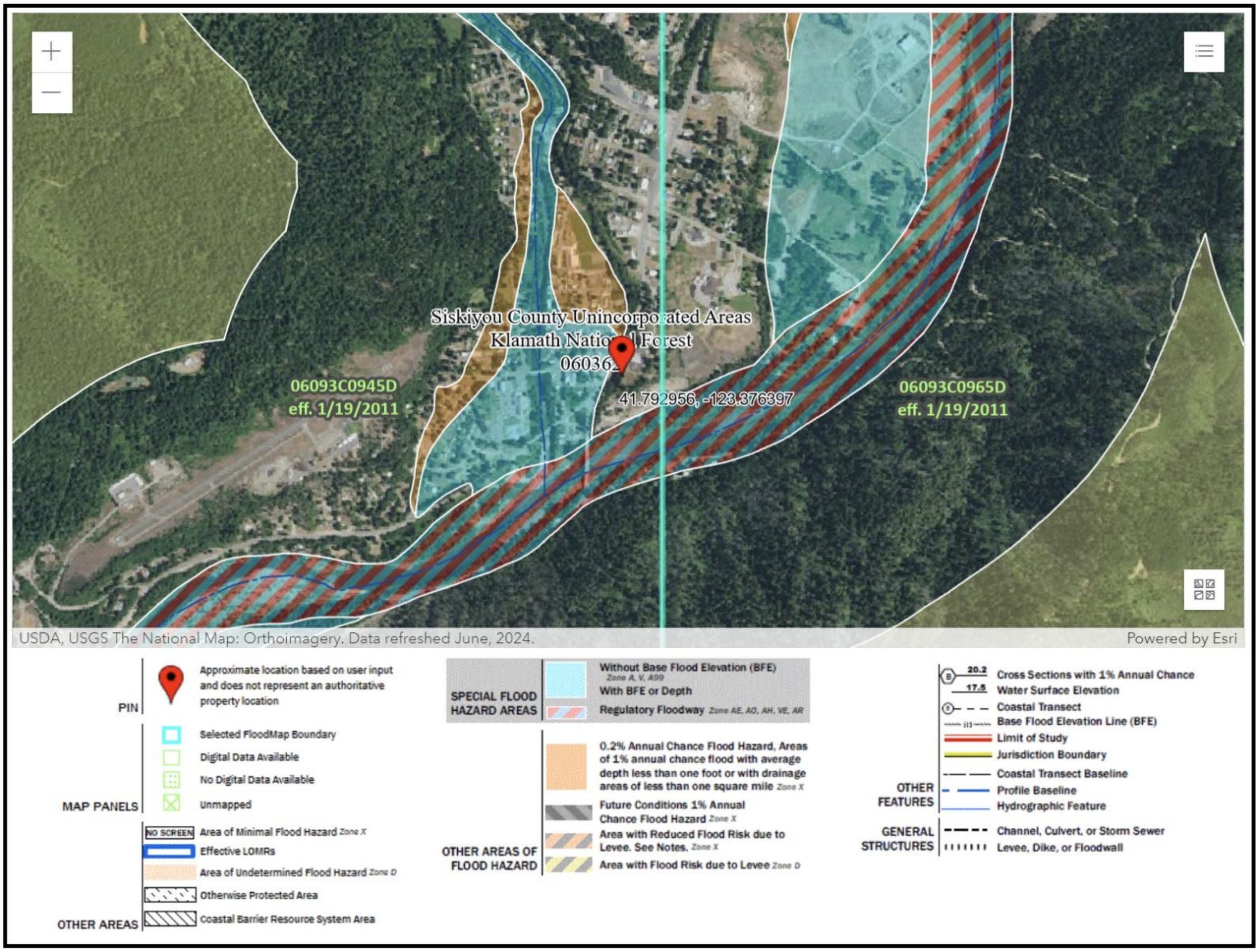
Map 78: Town of Fort Jones FEMA FIRMette



Source: FEMA

EXHIBIT C

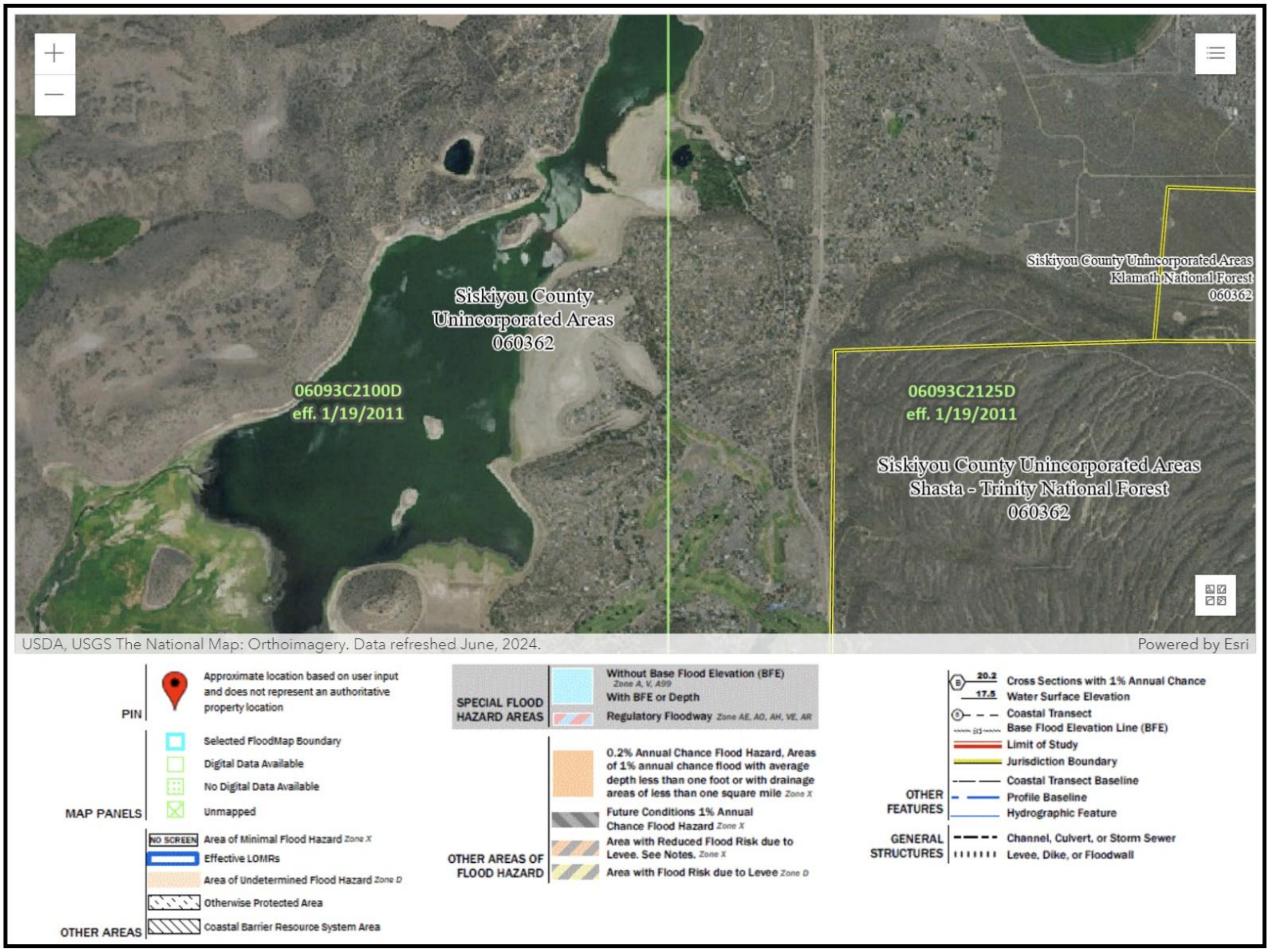
Map 79: Happy Camp CSD FEMA FIRMette



Source: FEMA

EXHIBIT C

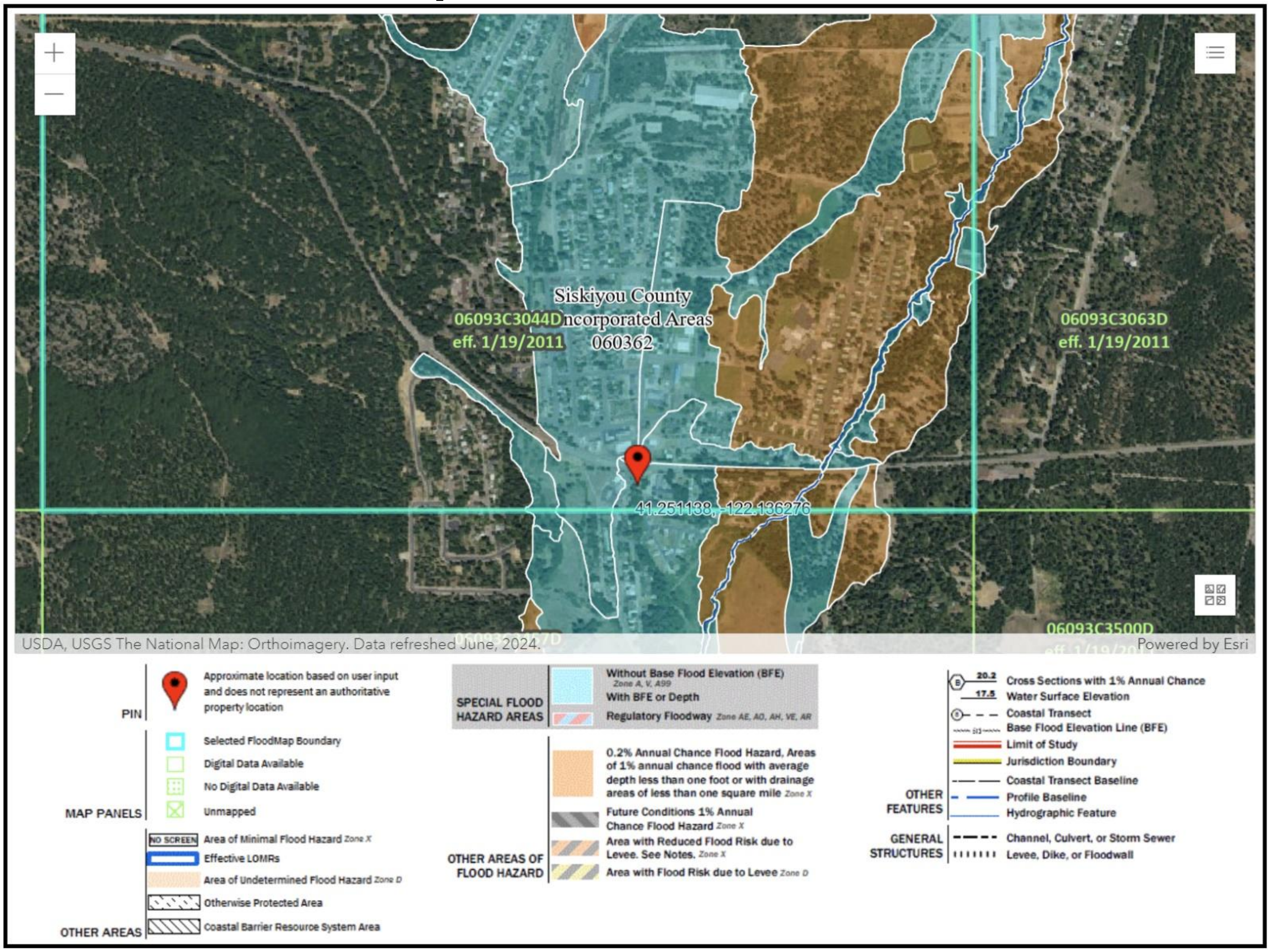
Map 80: Lake Shastina CSD FEMA FIRMette



Source: FEMA

EXHIBIT C

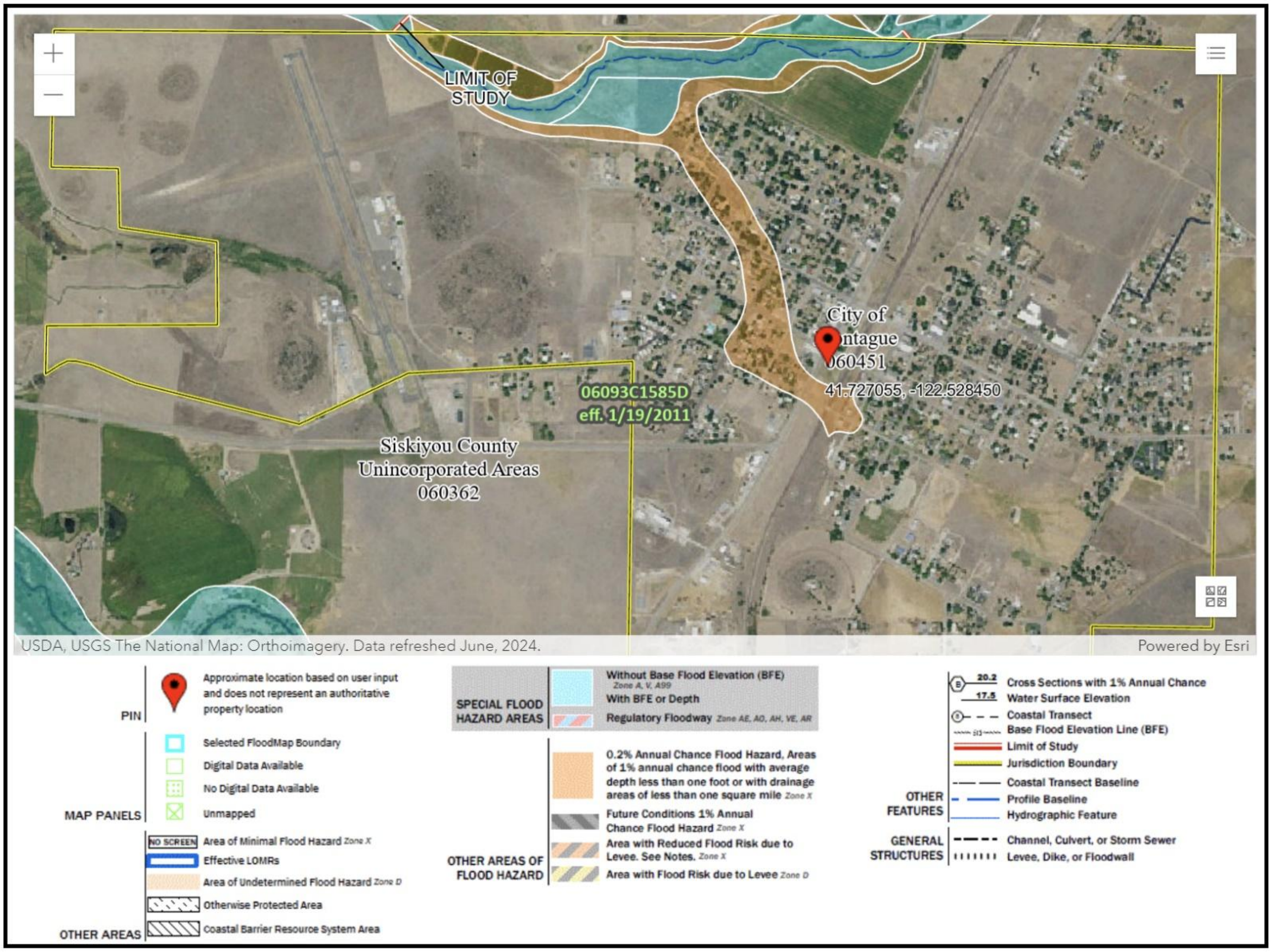
Map 81: McCloud CSD FEMA FIRMette



Source: FEMA

EXHIBIT C

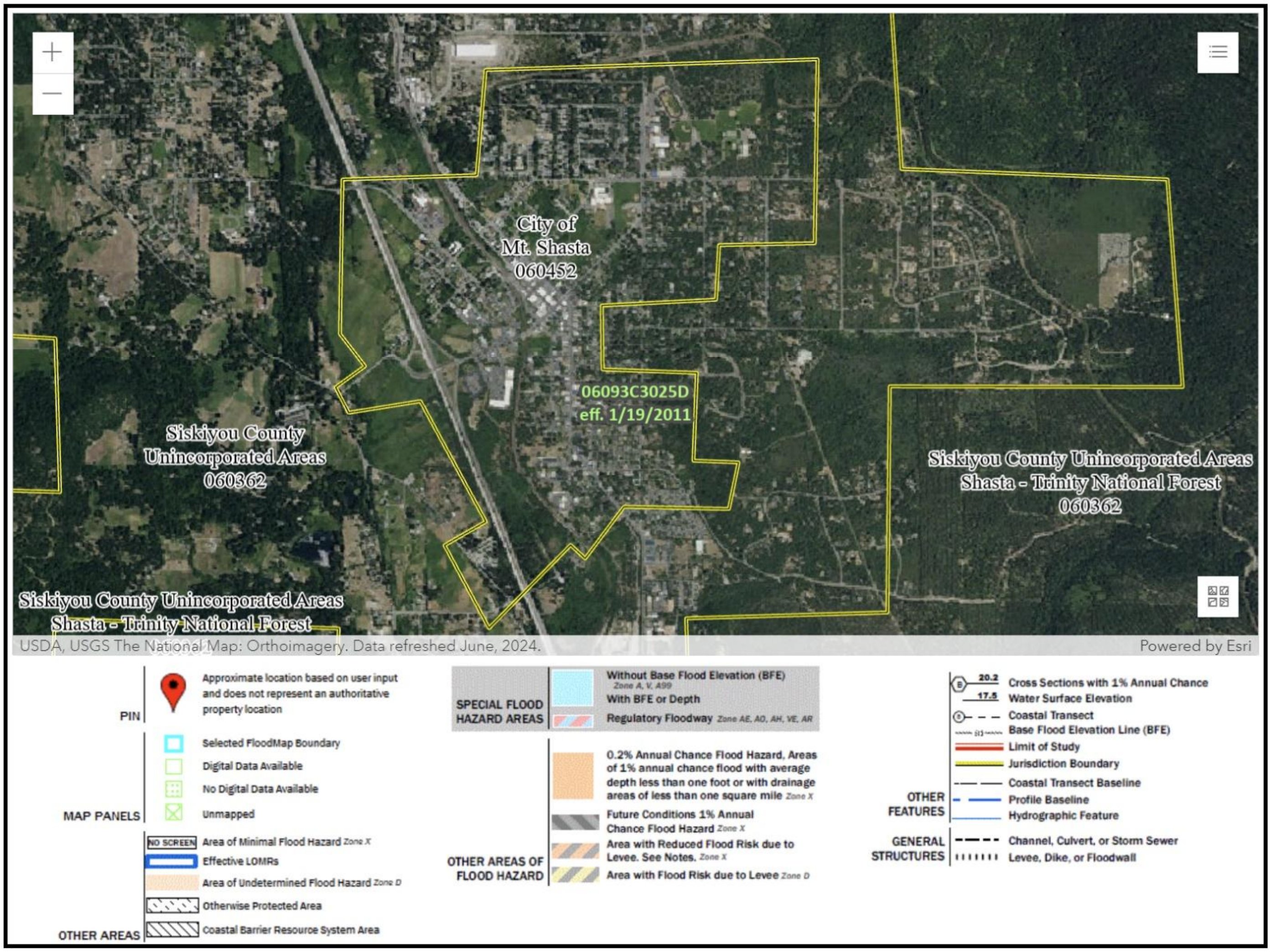
Map 82: City of Montague FEMA FIRMette



Source: FEMA

EXHIBIT C

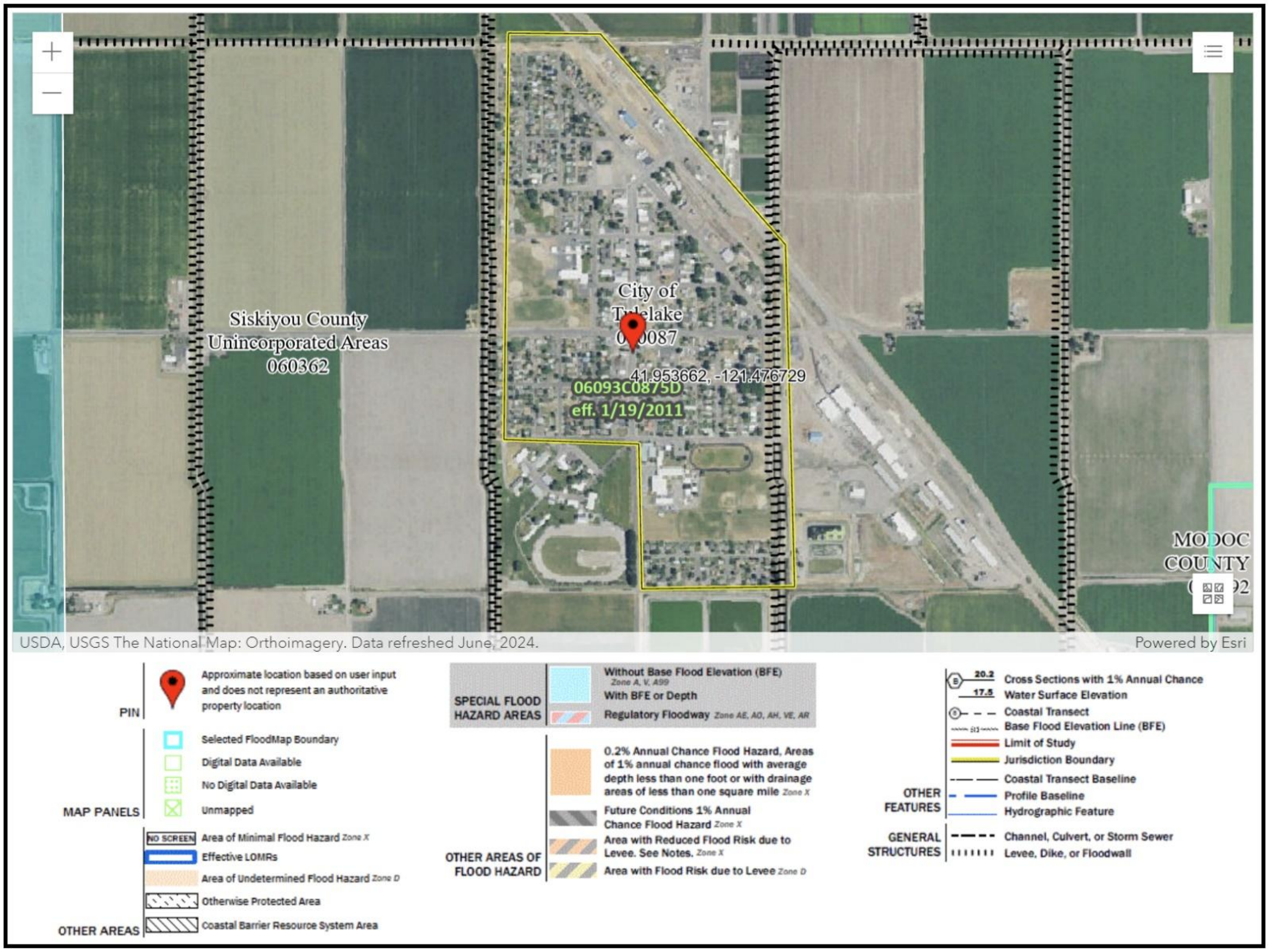
Map 83: City of Mt. Shasta FEMA FIRMette



Source: FEMA

EXHIBIT C

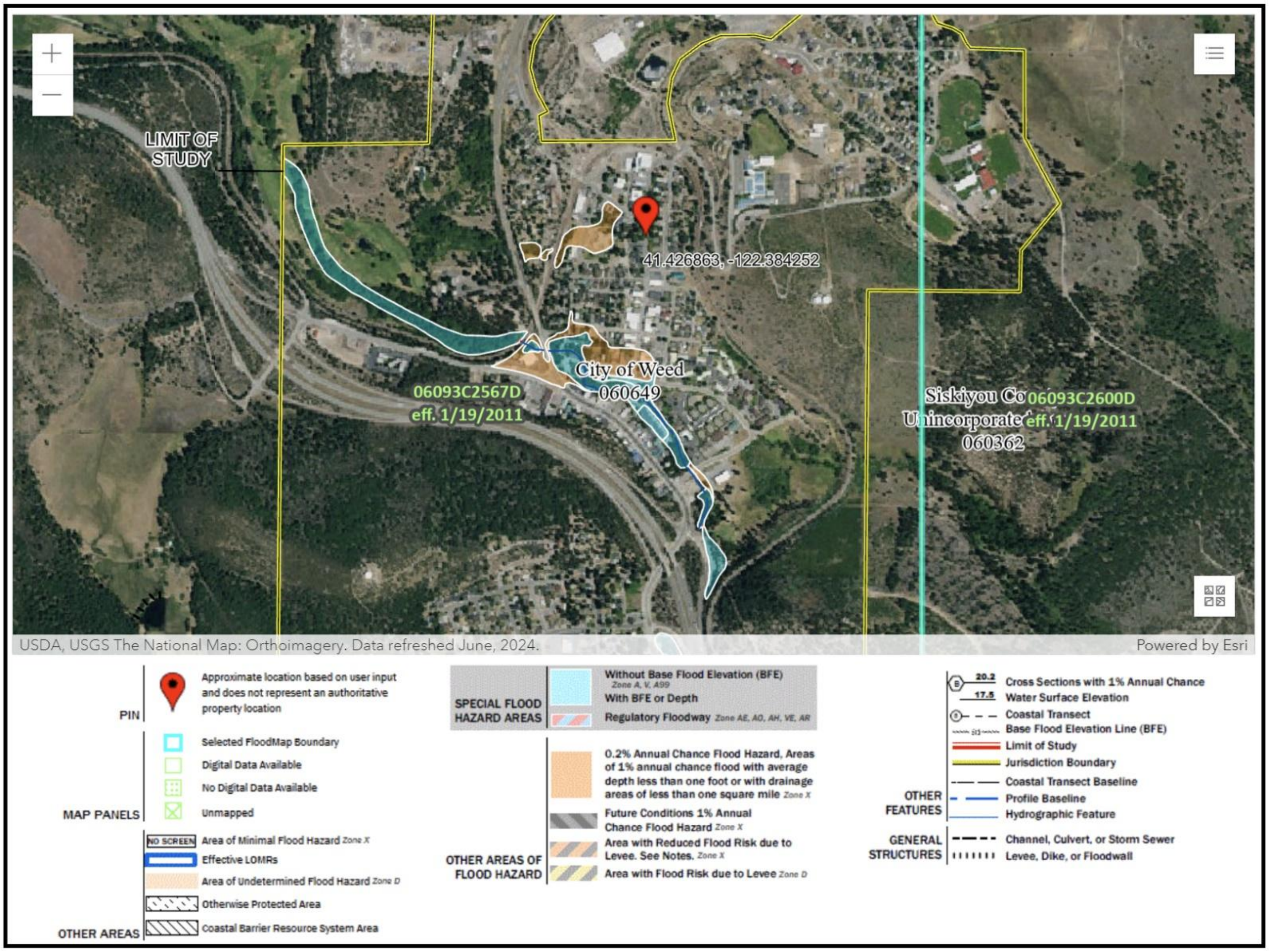
Map 84: City of Tulelake FEMA FIRMette



Source: FEMA

EXHIBIT C

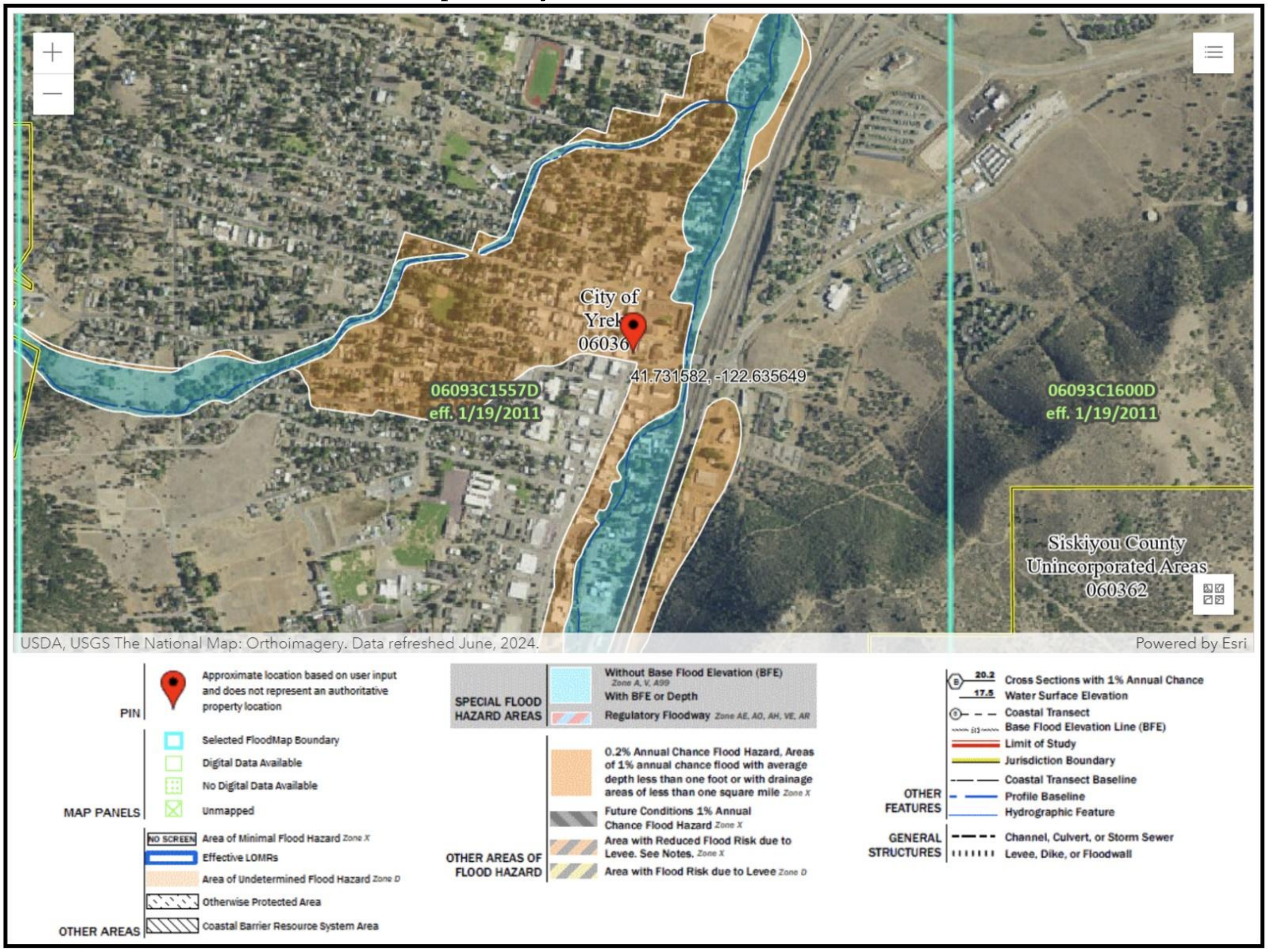
Map 85: City of Weed FEMA FIRMette



Source: FEMA

EXHIBIT C

Map 86: City of Yreka FEMA FIRMette



Source: FEMA

Siskiyou County has several areas that are prone to flooding, primarily due to its complex topography, rivers, and seasonal weather patterns. Major flooding areas in the county include regions along the Klamath River, Shasta River, Sacramento River, and Scott River, as well as certain low-lying areas and valley regions. Key flood-prone areas include:

- **Klamath River Basin:** Located in Northern Siskiyou County, along the Oregon border, this area is particularly prone to flooding during periods of heavy rain or rapid snowmelt in the mountains. Flooding along the Klamath River has affected communities such as Happy Camp, Horse Creek, and Seiad Valley.
- **Shasta River Basin:** The Shasta River flows from Mount Shasta through the Shasta Valley, affecting towns such as Lake Shastina CSD, Weed, Yreka and Montague. This river is known to flood during heavy rain or rapid snowmelt events. The Shasta River basin is prone to overflow, particularly in low-lying areas and farmland.
- **Scott River Basin:** The Scott River flow through the Scott Valley region, including the towns of Etna, Fort Jones, and surrounding agricultural lands. The Scott River can flood agricultural areas and communities during significant rain events. These floods can be destructive due to the valley's flat terrain, which leads to water pooling.
- **Tulelake Valley Areas:** Located in the northeastern part of Siskiyou County near the Oregon border, and encompassing Tulelake and Butte Valley, these areas are susceptible to flooding from nearby water bodies and poorly draining agricultural lands.

EXHIBIT C

- **Upper Sacramento River**: The river runs through Dunsmuir, and during times of extreme weather, can overflow its banks, impacting homes, roads, and businesses near the river.

Discussions with the MPC and a review of all available data indicated that while flooding is a concern for all participating jurisdictions, levels of concern may vary. The following provides a narrative of the level of jurisdictional concern:

- **Siskiyou County:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, wildfire burn scars have increased concern over flash flooding.
- **Dorris** Flooding is a minor concern for this jurisdiction as Dorris has no identified Special Flood Hazard Areas. However, flash flooding is a community concern.
- **Dunsmuir:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, wildfire burn scars have increased concern over flash flooding.
- **Etna:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, wildfire burn scars have increased concern over flash flooding.
- **Fort Jones:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, wildfire burn scars have increased concern over flash flooding.
- **Happy Camp CSD:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, wildfire burn scars have increased concern over flash flooding.
- **Lake Shastina CSD:** Flooding is a minor concern for this jurisdiction as it has no identified Special Flood Hazard Areas. However, flash flooding is a community concern.
- **McCloud CSD:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, wildfire burn scars have increased concern over flash flooding.
- **Montague:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, wildfire burn scars have increased concern over flash flooding.
- **Mt. Shasta:** Flooding is a minor concern for this jurisdiction as it has no identified Special Flood Hazard Areas. However, flash flooding is a community concern.
- **Tulelake:** Flooding is a minor concern for this jurisdiction as it has no identified Special Flood Hazard Areas. However, flash flooding is a community concern.
- **Weed:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, wildfire burn scars have increased concern over flash flooding.
- **Yreka:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, historic wildfire burn scars have increased concern over flash flooding.

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.12.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced 11 Presidential Disaster Declarations related to flooding, reflected in the following table.

Table 81: Siskiyou County Presidentially Declared Flood Disasters

Designation	Declaration Date	Incident Type	Individual and Public Assistance	Mitigation Dollars Obligated	Estimated Damage, Siskiyou County
DR-4570-CA	11/21/2023	Hurricanes (Tropical Storm Hilary)	$5,891,570	$72,286	
DR-4683-CA	1/14/2023	Severe Winter Storms, **Flooding**, Landslides, and Mudslides	$152,481,240	$11,290,426	-

EXHIBIT C

Table 81: Siskiyou County Presidentially Declared Flood Disasters

Designation	Declaration Date	Incident Type	Individual and Public Assistance	Mitigation Dollars Obligated	Estimated Damage, Siskiyou County
DR-4308-CA	4/1/2017	Severe Winter Storms, **Flooding**, Mudslides	$427,999,655	$15,012,050	-
DR-4301-CA	2/14/2017	Severe Winter Storms, **Flooding**, and Mudslides	$130,483,948	$22,708,200	-
DR-1884-CA	3/8/2010	Severe Winter Storms, **Flooding**, and Debris and Mud Flows	$28,353,445		-
DR-1628-CA	2/3/2006	Severe Storms, **Flooding**, Mudslides, and Landslides	$163,229,337		$7,000,000
DR-1155-CA	1/4/1997	Severe Storms, **Flooding**	-	-	$5,500,000
DR-1046-CA	3/12/1995	California Severe Winter Storms, **Flooding**, Landslides, Mud Flows	-	-	$11,241,379
DR-979-CA	2/3/1993	California Severe Storm, Winter Storm, Mud & Landslides, **Flooding**	-	-	-
DR-412-CA	1/25/1974	California Severe Storms, **Flooding**	-	-	-
DR-283-CA	2/16/1970	California Severe Storms, **Flooding**	-	-	-
DR-183-CA	12/24/1964	California Heavy Rains, **Flooding**	-	-	$1,785,714

Source: FEMA and Siskiyou County
-: Not reported

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Siskiyou County has experienced no Emergency Declarations related to flooding.

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. The following table details flood proclamations for Siskiyou County:

Table 82: Siskiyou County California Proclamations of State of Emergency

Designation	Declaration Date	Incident Type	Damages*
2007-01	12/29/2007	Flood	-

Source: Cal OES
*: Damages reported for all impacted counties, tribal reservations, and cities
-: Not reported

In addition to the above, the following table presents NCEI identified flood events in Siskiyou County from 1950 to 2024:

Table 83: NCEI Flood Events, 1950 - 2024

Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Flood	12	$7,000,000	1
Flash Flood	17	$0	1

Source: NCEI

EXHIBIT C

Recent events of note include:

- **August 19, 2023:** Tropical Storm Hilary had a notable impact on Siskiyou County. Heavy rain from the storm caused localized flash flooding, mudslides, and landslides. Critical infrastructure, such as Everitt Memorial Highway, roads, storm drains, and culverts, suffered damage. The heavy rains Aug. 19 also caused flooding and mudslides that damaged roads in the area of several fires burning this summer in the western part of the county along the Highway 96 and Klamath River corridor, according to the county's emergency proclamation. Debris flows exacerbated the situation, particularly in areas with burn scars from previous wildfires. Power outages, road closures, and evacuation orders were also issued in some parts of the county due to the storm's severity.
- **June 8, 2023:** Downpours from a slow-moving thunderstorm created flash flooding on Humbug Creek Road in north central Siskiyou County. This area is part of the McKinney burn scar.
- **August 2, 2022:** Thunderstorms with very heavy rain moved through an area near the McKinney wildfire in the evening. Rainfall was estimated to be between 1 and 3 inches in an hour. This created a debris flow down Humbug Creek, on the eastern edge of the fire. Four vehicles were reported swept off a culvert over Humbug Creek, and videos showed the swiftly rising water in the area. One person had to be rescued from a partially submerged vehicle. He sustained injuries but survived.
- **December 31, 2005:** A 19-year-old woman drowned in Yreka Creek after being swept away during an attempted crossing on foot. Her body was discovered about a mile downstream the next day. Estimated total damage in Siskiyou County was $7,000,000 with 79 homes and businesses damaged.

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event, the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages.

5.12.4 Probability of Future Incidents

Based on historical occurrences, Siskiyou County will continue to experience flood events on an annual basis. The definition of each flood zone's classification is used for the purpose of calculating the yearly probability of a riverine flood. Jurisdictions with property in a 100-year floodplain can expect a 1% annual chance of flooding within the designated areas. Jurisdictions with property in a 500-year floodplain can expect a 0.2% annual chance of flooding within the designated areas. FEMA FIRMs can be consulted to provide assistance in determining flooding probability for jurisdictions within Siskiyou County.

The following tables, using data from the NCEI, indicate the yearly probability of a flood or flash flood event, the number of deaths or injuries, and estimated property damage for Siskiyou County based on 75 years' worth of reporting data:

Table 84: Siskiyou County NCEI Flood and Flash Flood Event Probability Summary

Event Type	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Flash Flood	12	<1	1	<1	$7,000,000	$93,333
Flood	17	<1	1	<1	$0	$0

Source: NCEI

5.12.5 Projected Changes in Location, Intensity, Frequency, and Duration

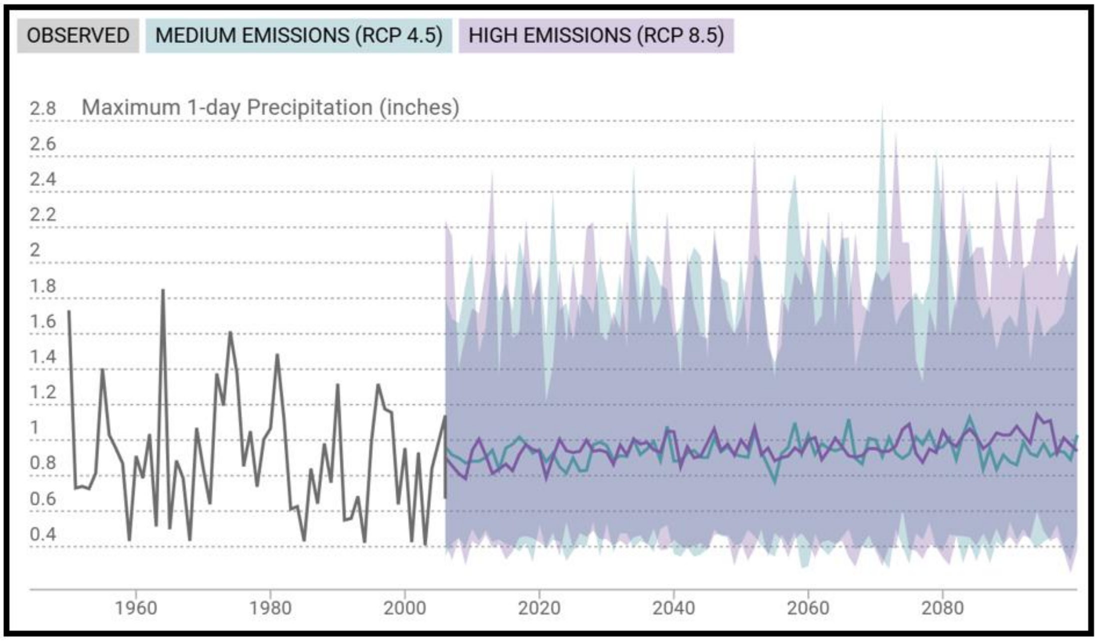
The location, intensity, frequency, and duration of flooding are influenced by a combination of natural and human-induced factors. Continued urbanization, deforestation, and changes in land use can alter natural drainage patterns along with burn scars from wildfires. The conversion of natural landscapes to impervious surfaces, such as roads and buildings, reduces the ability of the land to absorb water, leading to increased runoff and the potential for urban flooding. Alterations to river channels, including channelization and dam construction, can influence the flow of water. Modifications may lead to changes in river behavior, affecting the potential for both upstream and downstream flooding.

EXHIBIT C

Poorly planned infrastructure, inadequate stormwater management, and the lack of effective drainage systems in urban areas can contribute to localized flooding. The increase in impervious surfaces reduces natural infiltration, leading to more runoff during rainfall events.

The following climate model, from the Cal-Adapt Local Climate Change Snapshot for Siskiyou County make predictions for the period of 2006 to 2100. Two future climate projections using medium and high greenhouse gas and aerosol emissions scenarios are presented. These scenarios are known as Representative Concentration Pathways, with each representing a standardized set of assumptions about emissions trajectory in the coming years. The Medium Emissions Scenario represents a mitigation scenario where global CO_2 emissions peak by 2040 and then decline. The High Emissions Scenario represents a scenario where CO_2 emissions continue to rise throughout the 21st century.

Chart 27: Siskiyou County Projected Maximum 1-day Precipitation Based on Greenhouse Gas Emission Scenarios



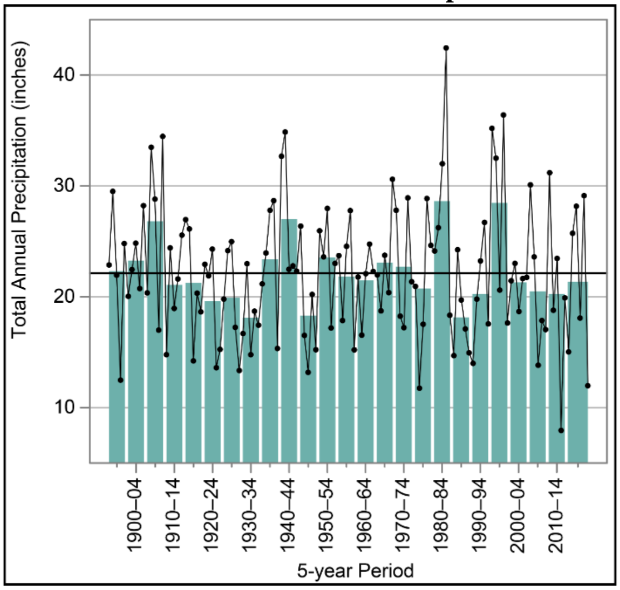
Source: Cal-Adapt Local Climate Change Snapshot for Siskiyou County

While Siskiyou County does not see the average annual precipitation changing significantly in the next 50-75 years, precipitation will likely be delivered in more intense storms and within a shorter wet season

Additionally, the NOAA NCEI State Climate Summary 2022 for California indicates that total annual precipitation varies but has been below average since 2000. There is no long-term trend in winter precipitation or extreme precipitation events.

EXHIBIT C

Chart 28: Total Annual Precipitation



Source: NOAA NCEI Summary 2022 for California

5.12.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Siskiyou County and all participating jurisdictions from riverine flooding. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Siskiyou County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 85: Participating Jurisdiction Riverine Flood Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Relatively Moderate	88.6	1.1
Dorris	06093000200	Relatively High	91.4	1.1
Dunsmuir	06093001100	Relatively Moderate	90.2	1.1
Etna	06093000800	Relatively High	96.6	1.1
Fort Jones	06093000701	Relatively Moderate	89.1	1.1
Happy Camp CSD	06093001300	Relatively High	97.2	1.1
Lake Shastina CSD	06093000902	Relatively Moderate	77.7	1.1
McCloud CSD	06093001200	Relatively High	97.2	1.1
Montague	06093000300	Relatively High	92.5	1.1
Mt. Shasta	06093001003	Very Low	32.0	1.1
Tulelake	06093000100	Relatively Moderate	76.6	1.1
Weed	06093000901	Relatively Moderate	88.6	1.1
Yreka	06093000703	Relatively Low	61.6	1.1

Source: FEMA NRI

Table 86: Participating Jurisdiction Riverine Flood Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Riverine Flood EAL
Siskiyou County	All	Relatively Moderate	87.7	$2,700,000
Dorris	06093000200	Relatively Moderate	88.8	$128,000
Dunsmuir	06093001100	Relatively Moderate	88.1	$119,000
Etna	06093000800	Relatively High	96.4	$411,000

EXHIBIT C

Table 86: Participating Jurisdiction Riverine Flood Expected Annual Loss

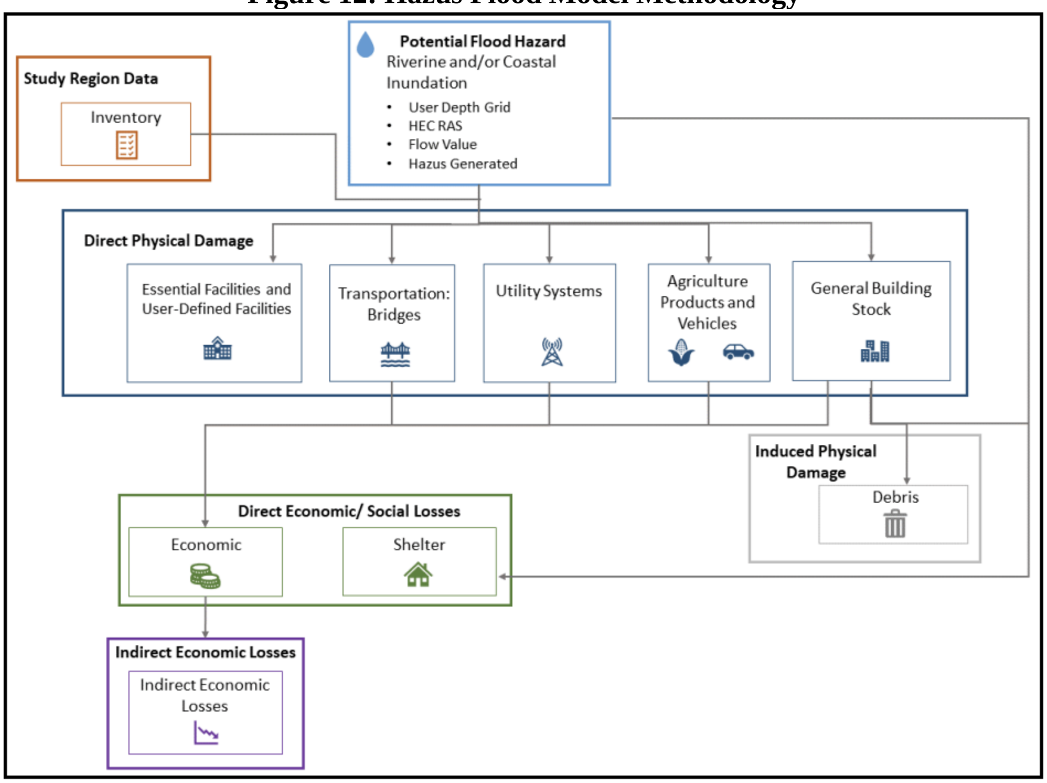
Jurisdiction	Census Tract	EAL	National Percentile	Riverine Flood EAL
Fort Jones	06093000701	Relatively Moderate	88.8	$128,000
Happy Camp CSD	06093001300	Relatively High	96.2	$394,000
Lake Shastina CSD	06093000902	Relatively Moderate	78.4	$51,000
McCloud CSD	06093001200	Relatively High	97.3	$546,000
Montague	06093000300	Relatively High	91.4	$173,000
Mt. Shasta	06093001003	Very Low	34.4	$1,200
Tulelake	06093000100	Relatively Moderate	71.4	$32,000
Weed	06093000901	Relatively Moderate	84.6	$85,000
Yreka	06093000703	Relatively Low	57.9	$13,000

Source: FEMA NRI

FEMA Hazus

For purposes of this plan, a Hazus Flood Model was generated to provide an estimate of the consequences to a flood. The resulting loss estimate generally describes the scale and extent of damage and disruption that may result from the modeled flood event. The Hazus software uses GIS technologies for performing analyses with inventory data and displaying losses and consequences on applicable tables and maps. The following figure provides a graphic representation of the modules that the Hazus Flood Model Methodology is composed of, and their interrelation in deriving estimates.

Figure 12: Hazus Flood Model Methodology



Source: FEMA

The results of the Hazus analysis were utilized to estimate potential losses for flooding. The intent of this analysis was to enable Siskiyou County to estimate where flood losses could occur and the degree of severity using a consistent methodology. The Hazus model helps quantify risk along known flood-hazard corridors as well as lesser streams and rivers that have a drainage area of ten square miles or more.

Hazus determines the displaced population based on the inundation area, not necessarily impacted buildings. As a result, there may be a population vulnerable to displacement even if the structure is not vulnerable to damage. Individuals and

EXHIBIT C

households will be displaced from their homes even when the home has suffered little or no damage either because they were evacuated or there was no physical access to the property because of flooded roadways.

Flood sheltering needs are based on the displaced population, not the damage level of the structure. Hazus determines the number of individuals likely to use government-provided short-term shelters through determining the number of displaced households as a result of the flooding. To determine how many of those households and the corresponding number of individuals will seek shelter in government-provided shelters, the number is modified by factors accounting for income and age. Displaced people using shelters will most likely be individuals with lower incomes and those who do not have family or friends within the immediate area. Since the income and age factors are taken into account, the proportion of displaced population and those seeking shelter will vary from county to county.

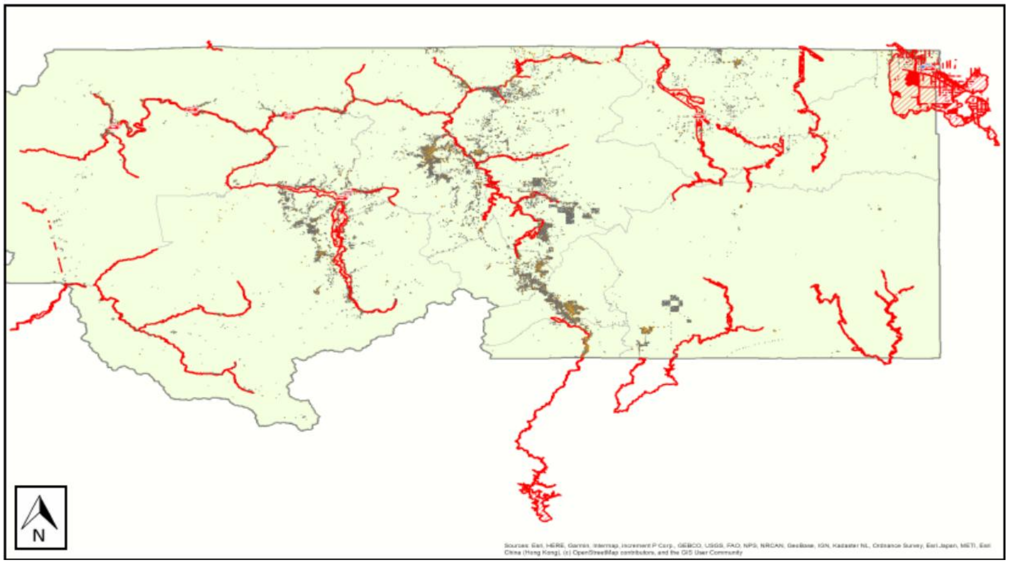
Additionally, Hazus takes into account flood depth when modeling damage (based on FEMA's depth-damage functions). Generated reports capture damage by occupancy class (in terms of square footage impacted) by damage percent classes. Occupancy classes include agriculture, commercial, education, government, industrial, religion, and residential. Damage percentage classes are grouped by 10% increments up to 50%. Buildings that sustain more than 50% damage are considered to be substantially damaged.

The Hazus analysis also provides an estimate of the repair costs for impacted buildings as well as the associated loss of building contents and business inventory. Building damage can also cause additional losses to a community by restricting a building's ability to function properly. Income loss data accounts for losses such as business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by Hazus using a methodology based on the building damage estimates.

The damaged building counts generated by Hazus are susceptible to rounding errors and are likely the weakest output of the model due to the use of census blocks for analysis. Generated reports include this disclaimer: "Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results." Additionally, losses are not calculated for individual buildings, but instead are based on the performances of entire classes of buildings obtained from the general building stock data. In the flood model, the number of grid cells (pixels) at each flood depth value is divided by the total number of grid cells in the census block. The result is used to weigh the flood depths applied to each specific occupancy type in the general building stock. First floor heights are then applied to determine the damage depths to analyze damages and losses.

The following map illustrates the extent of the Hazus scenario:

Map 87: Hazus Flood Scenario Extent



Source: FEMA Hazus

The following table provides the HAZUS results for damaged buildings, destroyed buildings, and total economic loss for Siskiyou County:

Table 87: Siskiyou County Hazus Flood Scenario Economic Impacts

Damaged Buildings	Destroyed Buildings	Total Economic Loss	Debris Generation
363	223	$672,930,000	$672,930,000

Source: FEMA Hazus

The following table provides the HAZUS results for displaced households, damaged buildings, destroyed buildings, and total economic loss for Siskiyou County:

Table 88: Siskiyou County Hazus Flood Scenario Displaced Population

Displaced Households	Persons Seeking Shelter	Displaced Population
780	363	223

Source: FEMA Hazus

The Hazus model indicated that the following number of critical facilities are estimated to be damaged or suffer loss of use from the flood scenario.

Table 89: Siskiyou Hazus Flood Scenario Number of Critical Facilities Damaged or Impacted

Emergency Operations Centers	Fire Stations	Hospitals	Police Stations	Schools
0	3	0	10	7

Source: FEMA Hazus

Population

A primary concern with this hazard is human health safety issues, as extreme heat can be a direct cause of death. Specific at-risk groups include outdoor workers, farmers, young children, and senior citizens. Impacts on human health can include:

- **Loss of Life**: Flooding is one of the leading causes of weather-related fatalities worldwide. Fast-rising floodwaters can lead to drowning and other water-related accidents, resulting in the tragic loss of lives.
- **Injuries:** Floods can cause injuries due to waterborne diseases, contaminated floodwaters, debris, and accidents during evacuation or rescue operations.

EXHIBIT C

- **Displacement:** Many people may be forced to evacuate their homes during floods and will require emergency shelter or temporary housing. Prolonged displacement can be emotionally and economically challenging.
- **Health Risks:** Floodwaters often contain pollutants, sewage, and hazardous materials. Exposure to contaminated water can lead to waterborne diseases, infections, and other health risks.
- **Mental Health Effects:** Survivors of floods may experience a range of emotional and psychological challenges, including post-traumatic stress disorder, anxiety, depression, and grief.
- **Food and Water Shortages:** Floods can contaminate water supplies and disrupt the distribution of food. This can lead to shortages of clean drinking water and essential food items.
- **Impact on Vulnerable Populations:** Vulnerable populations, including the elderly, children, people with disabilities, and those living in poverty, are often disproportionately affected by floods due to limited resources and mobility challenges.

Especially critical is timely evacuation orders, and adherence to those orders. If evacuation is not heeded, or flood waters rise quickly enough, citizens could drown or become trapped for extended periods of time with no access to services or medical care. Of special concern are long-term care and medical facilities where it can take longer to evacuate, or evacuation may be impossible. Additionally, lower income citizens may not have the means to relocate, whether it be lack of transportation or lack of resources to afford temporary shelter.

To provide an estimate of the number of people living in both 100-year and 500-year floodplains, GIS data concerning the number of identified structures with these floodplains and the average household size was utilized. An estimate of population was calculated by multiplying the number of structures by the Siskiyou County average household size of 2.24 persons from the U.S. Census Bureau. The following table provides an estimated population exposed to flooding for all participating jurisdictions:

Table 90: Participating Jurisdiction Estimated Population Exposure to 100-Year and 500-Year Floodplains

Jurisdiction	Structures in 100 Year Floodplain	Population in 100 Year Floodplain	Percent of Total Population	Structures in 500 Year Floodplain	Population in 500 Year Floodplain	Percent of Total Population
Siskiyou County	1,492	3,342	7.7%	1,720	3,853	8.9%
Dorris	0	0	0.0%	0	0	0.0%
Dunsmuir	67	150	8.0%	165	370	19.8%
Etna	42	94	12.5%	53	119	15.7%
Fort Jones	168	376	65.1%	228	511	88.4%
Montague	188	421	28.4%	40	90	6.0%
Mt. Shasta	0	0	0.0%	0	0	0.0%
Tulelake	0	0	0.0%	0	0	0.0%
Weed	10	22	0.8%	33	74	2.8%
Yreka	109	244	3.2%	549	1,230	16.2%

Source: Siskiyou County and U.S. Census Bureau

Buildings and Structures

Floods can have significant and often costly impacts on buildings and structures. These impacts can disrupt essential services, damage infrastructure, and pose safety risks. The extent of the impact depends on factors such as the severity of the flood, the preparedness of the infrastructure, and the effectiveness of flood management measures. Here are some of the common impacts of floods on facilities and critical infrastructure:

- **Foundation Damage:** Floodwaters can erode the soil supporting the foundation, leading to settling, cracks, or even collapse. Scouring and soil liquefaction during floods may undermine the stability of buildings, especially those on weak soils.
- **Wall and Floor Damage:** High water pressure, especially from fast-moving floods, can crack walls, warp floors, and cause floors to collapse.

EXHIBIT C

- **Building Collapse:** If the foundation is significantly compromised, or if water levels rise too quickly, entire buildings may collapse, especially older structures or those not designed for flood resilience.
- **Water Seepage:** Even shallow flooding can cause water to seep into the building's structure, leading to rotting of wooden frames, mold growth, and damage to insulation and electrical systems.
- **Interior Damage:** Drywall, carpets, furniture, and appliances may all be ruined by prolonged exposure to floodwater, which often carries contaminants like sewage and chemicals.
- **Electrical Short Circuits and Fire:** Floodwaters can cause electrical systems to short-circuit, posing risks of fire or electrocution.
- **HVAC and Plumbing System Damage:** Heating, ventilation, and air conditioning systems, as well as plumbing systems, are vulnerable to water damage, potentially leading to the loss of potable water and proper sanitation in the building.
- **Mold:** After the floodwaters recede, mold and mildew can quickly develop in damp environments. This can lead to respiratory problems for occupants and further deterioration of the building materials.
- **Wood Rot and Corrosion:** Prolonged exposure to water can cause wooden materials to rot and metal components, like steel reinforcements, to corrode, weakening the building over time.

To provide an estimate of the number of structures in both 100-year and 500-year floodplains, GIS data concerning the structures and the median value was utilized. An estimate of the value of structures was determined using the Siskiyou County median household value of $231,100 from the U.S. Census Bureau. The following table provides an estimated structures exposed to flooding for all participating jurisdictions:

Table 91: Participating Jurisdiction Estimated Structures Exposure to 100-Year and 500-Year Floodplains

Jurisdiction	Structures in 100 Year Floodplain	Structure Valuation	Structures in 500 Year Floodplain	Structure Valuation
Siskiyou County	1,492	$344,801,200	1,720	$397,492,000
Dorris	0	$0	0	$0
Dunsmuir	67	$15,483,700	165	$38,131,500
Etna	42	$9,706,200	53	$12,248,300
Fort Jones	168	$38,824,800	228	$52,690,800
Montague	188	$43,446,800	40	$9,244,000
Mt. Shasta	0	$0	0	$0
Tulelake	0	$0	0	$0
Weed	10	$2,311,000	33	$7,626,300
Yreka	109	$25,189,900	549	$126,873,900

Source: Siskiyou County and U.S. Census Bureau

Transportation and Electrical Infrastructure

Flooding can have numerous impacts on both transportation and electrical distribution systems. The impacts of flooding on transportation systems may include:

- **Scour and Erosion:** Floodwaters can wash away the supporting soil around and beneath roads, a process known as scour. This can lead to the collapse of the roadbed and destabilization of bridges and overpasses.
- **Undermining of Pavement:** Prolonged exposure to floodwaters can weaken the pavement structure, leading to cracks, potholes, and eventual failure of the roadway. Roads not designed for water drainage are especially susceptible to being washed out.
- **Potholes and Cracks:** Water penetrates cracks in the pavement, weakening the sublayers. Once the floodwaters recede and the weight of vehicles passes over, potholes can quickly form, creating hazards for drivers.
- **Surface Damage:** Asphalt roads, in particular, can become brittle after repeated water exposure, resulting in chunks of road surface breaking off.

EXHIBIT C

- **Bridge Collapse:** Flooding can damage the support structures of bridges, particularly if water levels rise to exert pressure on the bridge's piers. Debris carried by floodwaters can accumulate around bridge structures, further stressing them.
- **Blocked or Collapsed Culverts:** Culverts, which allow water to pass beneath roads, can become blocked by flood debris, leading to water pooling on roads or forcing water to erode the roadbed around the culvert.
- **Road Inundation:** Flash floods or slow-rising waters can make roads impassable, either because of deep standing water or swift currents.
- **Landslides:** In hilly or mountainous regions, flooding increases the risk of mudslides and landslides, which can bury roads and highways under tons of debris, blocking transportation routes and requiring significant cleanup.
- **Debris Flows:** Heavy rains can wash debris, rocks, and soil onto roads, making them impassable and causing further damage to the road surface.
- **Foundation Weakening:** Repeated flooding over time can weaken the structural foundation of roads, even if the damage isn't immediately apparent. This could lead to long-term deterioration of highways and bridges, requiring expensive repairs or reconstruction.

A GIS review indicates the following major roads and interstates pass through 100-year floodplains:

- Interstate 5 (Yreka)
- Highway 3 (Etna, Fort Jones, and Yreka)
- Highway 89 (McCloud CSD)
- Highway 96 (Happy Camp)
- Highway 97 (Weed)
- Highway 263 (Yreka)

Flooding can impact both the electrical generation capacity and transmission. The impacts of extreme heat on electrical systems may include:

- **Flooding of Substations:** Electrical substations, particularly those located in low-lying or flood-prone areas, are vulnerable to flooding. Water ingress into substations can cause short circuits and failures of critical equipment such as transformers, circuit breakers, and switchgear. If a substation is taken offline, large areas could lose power.
- **Transformer Damage:** Floodwaters can compromise oil-insulated transformers by causing leaks or mixing with the oil, which is essential for cooling and insulation. This can lead to transformer failures and extended outages.
- **Downed Power Lines:** Strong flood currents, debris, or trees falling due to saturated soil can bring down power lines, leading to localized or widespread outages.
- **Foundation Erosion:** Transmission towers and utility poles are susceptible to soil erosion during floods, which can undermine their foundations and cause structural instability or collapse.
- **Corrosion of Equipment:** Prolonged exposure to floodwaters can lead to the corrosion of metal components in transmission and distribution systems, shortening the lifespan of equipment and increasing the risk of failure.
- **Water Infiltration:** Electrical equipment, including power meters, transformers, and underground cabling, can experience short circuits if water infiltrates, leading to power outages and potential safety hazards. For example, underground electrical vaults can flood, damaging cables and transformers, and posing fire and electrocution risks.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

EXHIBIT C

Water and Wastewater Facilities
Water and wastewater utilities are vulnerable to flood events due to the potential for plant damages and distribution system damages. Impacts may include:

- **Damage to Water Treatment Plants:** Floodwaters can inundate water treatment plants, damaging pumps, electrical systems, and filtration equipment. This can prevent the proper treatment of drinking water, leading to unsafe water supplies.
- **Damage to Wastewater Treatment Plants:** Wastewater facilities may experience flooding that overwhelms the capacity to treat sewage, leading to raw or partially treated sewage being discharged into nearby water bodies, contaminating them.
- **Damage to Pumping Stations:** Flooded pumping stations can fail, leading to service interruptions in both water distribution and sewage removal. These failures may require costly repairs or replacements.
- **Drinking Water Contamination:** Floodwaters often carry contaminants such as chemicals, sewage, and industrial waste. If this water infiltrates drinking water systems through broken pipes or overwhelmed treatment systems, it can lead to widespread contamination.
- **Backflow of Sewage:** In severe flooding, sewage can backflow into homes, streets, and businesses through overwhelmed or broken sewer systems. This not only poses health risks but also results in costly cleanup.
- **Increased Flow in Sewer Systems:** During floods, combined sewer systems (which handle both stormwater and sewage) can be overwhelmed by the sheer volume of water. This leads to combined sewer overflows where untreated sewage is discharged directly into rivers, harming the environment and public health.
- **Overwhelmed Stormwater Systems:** Flooding can overwhelm stormwater management systems, causing backups that flood streets and neighborhoods. In older urban areas, this may also overwhelm the sewer system, as stormwater and sewage often share the same infrastructure.

Both the Dunsmuir and Yreka wastewater treatment facilities are located within a 100-year floodplain, and are vulnerable to flood events. The City of Tulelake wastewater treatment facility is not located with any identified flood zones. Information concerning the costs to repair or reconstruct water and wastewater infrastructure may be found in Section 5.8.6.

Medical, Education, and Response Facilities
A GIS analysis of medical, educational, and response facilities within the 100-year floodplain indicates the following:

Table 92: Participating Jurisdiction Medical, Fire, and Response Facilities in 100-Year Floodplain

Jurisdiction	Medical Facilities	Educational Facilities	Fire Facilities	Police Facilities
Siskiyou County	0	7	3	0
Dorris	0	0	0	0
Dunsmuir	0	0	0	0
Etna	0	0	0	0
Fort Jones	0	2	0	0
Happy Camp CSD	0	0	0	0
Lake Shastina CSD	0	0	0	0
McCloud CSD	0	0	0	0
Montague	0	0	0	0
Mt. Shasta	0	0	0	0
Tulelake	0	0	0	0
Weed	0	0	0	0
Yreka	0	2	0	0

Source: Siskiyou County and U.S. Census Bureau

EXHIBIT C

While flooding may result in a temporary increase in patients, it is considered unlikely that any influx would overwhelm current medical capabilities.

Depending on the educational facility capability and location, flooding may necessitate the closure of the facility for the duration of the event due to damages or lack of access. These closures are expected to have additional economic consequences as caregivers may be required to miss or modify work.

Mapping concerning medical, education, and response facilities may be found in Section 3.9: Critical Facilities and Infrastructure.

Communication Systems

No comprehensive mapping of communications systems was available for review to compare against known flood hazard areas. However, it is assumed that communications lines and towers are in known hazard areas. Flooding can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- Physical Damage to Infrastructure: Flood waters can cause physical damage to communication infrastructure such as cell towers, antennas, satellite dishes, and power lines. This damage can result in interruptions or complete failure of communication services.
- Power Outages: Flood waters can lead to power outages by knocking down power lines or damaging electrical substations. Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.
- Structural Instability: Flood waters can cause structural instability in communication towers and buildings housing communication equipment. If these structures are not properly reinforced, they may collapse or sustain damage, disrupting communication services.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.8.6.

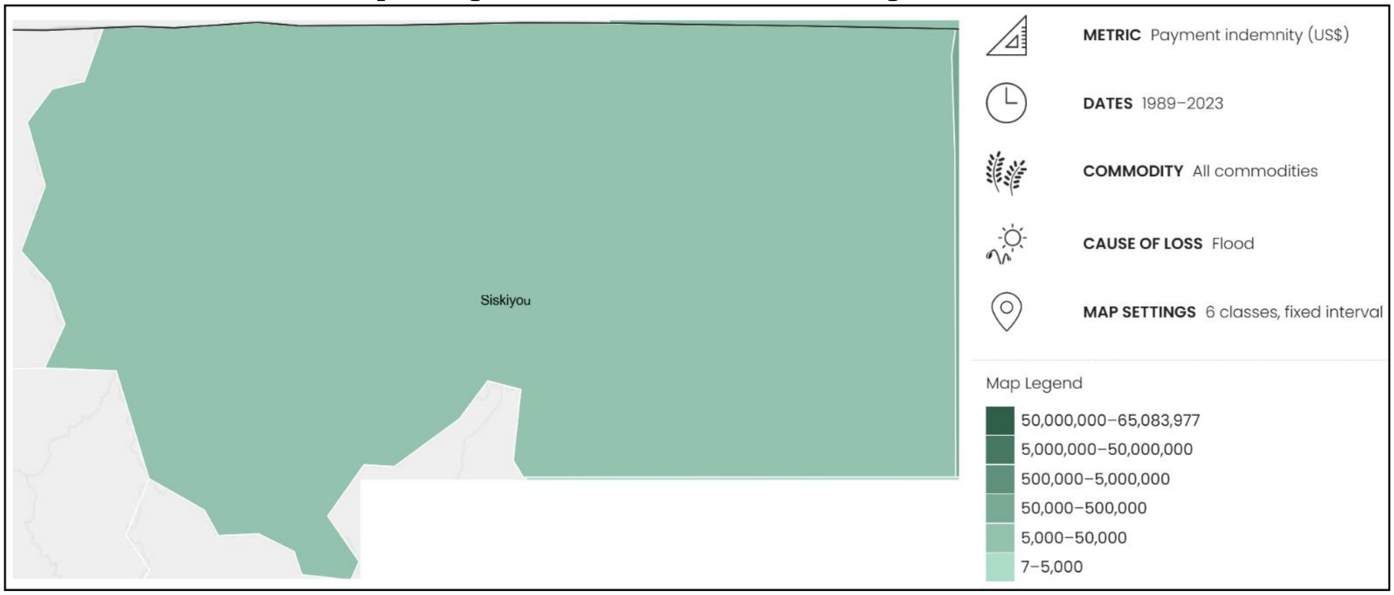
Environmental and Agricultural Impacts

Environmental impacts from flooding can be far reaching. Of particular concern is flood related runoff, potentially carrying sewage, pesticides, or hazardous chemicals, which can cause long lasting environmental harm. Expected negative outcomes could include changes in habitat, a decrease of available food, and an increase in the spread of vector-associated disease due to standing water.

Flooding can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to flooding from 1989 - 2023:

EXHIBIT C

Map 88: Agricultural Losses Due to Flooding, 1989 - 2023



Source: United States Department of Agriculture

Jurisdictional Concerns:

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Dorris:** With limited services, flash flooding may cut the community off from necessary services due to limited road access.
- **Dunsmuir Area:** Dunsmuir has experienced the six large floods since 1911. These occurred, in decreasing order of magnitude, in January 1974, February 1940, January 1914, December 1964, March 1916 and December 1955. Discharge from the 1974 event was estimated to have a recurrence interval of approximately 50 years. The 1964 event was estimated to have a recurrence interval of 15 years. Damage from the 1974 flood in Dunsmuir was estimated to be $5,000,000, with 25 homes destroyed. A bridge connecting downtown constricted flow from the Sacramento River, causing an increase in water surface elevation of approximately three feet upstream of the bridge. The backwater effect only extended a short distance upstream because of the steep channel slope. Alder Creek that enters the City of Dunsmuir near Oak Street and Elinore Way has overflowed and caused widespread shallow flooding of city streets and street-level homes. Although this unnamed creek has a small drainage area, the floodwaters have high velocities due to the steep slopes, and flow paths are unpredictable due to the street pattern and topography. With 16.1% of citizens living in poverty, flooding and the associated property damage may disproportionately impact them due to underinsurance. Additionally, flood events may impact tourism and impact popular community events like the Dunsmuir Steampunk Festival, River and Rail Brewfest, lowering potential community revenue.
- **Etna Area:** In the City of Etna, flooding occurred along Etna Creek in 1955, 1964, and 1974. The largest flood occurred in December 1964, with a recurrence interval of 50 years. The January 1974 flood was estimated to have a recurrence interval of 30 years, based on flow records for the Scott River. The principal flood problem on Etna Creek is that the main channel capacity has been blocked by natural dams, shifting most of the flow out onto the floodplain. The dams are caused by debris lodging in the channel, followed by the buildup of cobbles and gravel. Etna Creek's main channel must be cleared of debris, gravel, rocks and vegetation after each major flood event. The overbank flow is mainly on the left-bank floodplain between the creek and the low bank where the majority of the city is located. The overflows vary due to the location of vegetation and obstructions. During past flood events, efforts have been made to divert the creek back into the main channel

EXHIBIT C

by building levees of river rock and gravel. These efforts have not been successful. With 15.6% of citizens living in poverty, flooding and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism and impact popular community events like the Trails End Music Festival, lowering potential community revenue.

- **Fort Jones Area:** In the Fort Jones area, five substantial floods occurred between 1953 and 1974. The largest flood occurred in January 1974, with an estimated recurrence interval of 50 years. During large flood events, the channel capacity of Moffett Creek is exceeded in the vicinity of Marble View Avenue and the overflow spreads out onto the very flat floodplain and continues flowing as a broad, shallow sheet flow. Much of the residential area of Fort Jones is subject to this shallow flooding. Sheet flow tends to pond behind the Scott River Road embankment, where some overtop the road and returns to the channel. With 23.4% of citizens living in poverty, flooding and the associated property damage may disproportionately impact them due to underinsurance. Additionally, flooding may impact tourism and impact popular community events like the Fort Jones Fall Festival, lowering potential community revenue. With limited services, severe weather may cut the community off from necessary services due to limited road access.
- **Happy Camp CSD:** With 21.0% of citizens living in poverty, flooding and the associated property damage may disproportionately impact them due to underinsurance. Additionally, flooding may impact tourism and, lowering potential community revenue. With limited services, flooding may cut the community off from necessary services due to limited road access
- **Lake Shastina CSD:** Flash flood conditions may impact tourism and recreation industries, impacting community revenue.
- **McCloud Area:** A significant flood occurred in the unincorporated area of McCloud between December 1996 and January 1997. Over 11 inches of precipitation fell on a deep snowpack, triggering flooding of Panther and Squaw Valley Creeks. Anecdotal evidence suggests that flooding was the worst occurring in the area in over 50 years. Panther Creek experienced flows heavily laden with sediment, but Squaw Valley Creek experienced relatively clear flows carrying considerable woody debris. With 13.3% of citizens living in poverty, flooding and the associated property damage may disproportionately impact them due to underinsurance. Flood conditions may impact tourism and recreation industries.
- **Montague Area:** Historical flood data is lacking for Montague, but local residents report that a combination of culverts in place prior to a bridge built over the Oregon Slough in 1965 were inadequate to pass floodwaters. Water was observed ponding upstream until it ran over the road, causing road and embankment erosion. The current bridge is adequate to convey a 100-year flood event. Trees and debris collected behind the Yreka Western Railroad Bridge during the flood of 1964 and the culverts through the embankments could not carry the flow, which resulted in erosion of the embankment. The 1974 flood reached the level of the old sewage treatment pond, but bank erosion was not evident. With 17.2% of citizens living in poverty, flooding and the associated property damage may disproportionately impact them due to underinsurance. Additionally, flooding may impact tourism and impact popular community events like the Montague Hot Air Balloon Fair and Montague Freedom Festival, lowering potential community revenue.
- **Mt. Shasta:** Flash flood conditions may impact tourism and recreation industries, such as the Mt. Shasta Blackberry Festival, impacting community revenue.
- **Tulelake:** With 41.8% of citizens living in poverty, flash flooding and the associated property damage may disproportionately impact them due to underinsurance. Additionally flash floods may impact tourism, impacting potential community revenue. With limited services, any flood event may cut the community off from necessary services due to limited road access.
- **Weed Area:** According to local residents and city officials, the largest flood in Weed occurred in January 1974. Flooding also occurred in December 1964. Due to the lack of magnitude and duration data, no frequencies can be determined for these flood events. Overflow from Boles Creek and North Fork Boles Creek caused shallow flooding during the 1974 event as culvert capacities were exceeded. Water from this event also ponded upstream from the US Highway 97 embankment. Local runoff and stormwater issues have caused shallow flooding in the vicinity of the Weed Convalescent Hospital, but no major flooding has occurred from Beaughton Creek.

With 32.7% of citizens living in poverty, flooding and the associated property damage may disproportionately impact them due to underinsurance. Additionally, flooding may impact tourism and impact popular community events.

- **Yreka Area** Flood problems on Yreka Creek have historically consisted of damage to bridges and erosion of stream banks. The erosion has in turn caused problems with structures along the banks. Yreka Creek caused flooding of the buildings along Main Street in 1861 and in 1927 flooding damaged water mains, barns, garages, outbuildings and a newly constructed sewer line. Humbug Gulch has also contributed to flooding along the city streets and in 1964 the stream flooded several houses at Yama, North and Gold Streets. With 22.6% of citizens living in poverty, flooding and the associated property damage may disproportionately impact them due to underinsurance. Additionally, flooding may impact tourism and impact popular community events like the Siskiyou Golden Fair, lowering potential community revenue.

Cascading Impacts

Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with extreme may include:

- Infrastructure and utility failure
- Economic disruption
- Flood related illnesses and mortality
- Power outages
- Population displacement
- Environmental degradation

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 93: Flood Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Significant flooding events can lead to the damage and loss of homes, property, and businesses. Flash flooding and excessive rainfall may lead to dangerous conditions on roadways. Closures of medical facilities is a major public health concern if flooding damages those facilities. Water sources may become contaminated, and water or sewer systems may be disrupted. Vector-associated disease may increase.
Impact on Responders	Responders may be called on to evacuate people from impacted areas, as well as close roads, attend to the injured, and direct traffic. First responders may face challenges with transportation and access to a location. Flash floods and mudslides due to heavy rainfall can also injure first responders, as well as delay response operations.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Floods which create power outages, debris damage, and road closures are not uncommon. Flooding may impact an agency’s ability to maintain operations due to impacts on power, communications, equipment, and records.
Delivery of Services	Flooding can cause road and bridge closures, as well as disrupt transit services, impacting the ability to deliver goods and services. Exposure to flood waters may also damage or destroy physical goods such as food, clothing, and hygiene products.
Property, Facilities, and Infrastructure	Flooding can cause significant property destruction. Floods can disrupt normal daily activities due to the potential impact on schools, hospitals, and other public

EXHIBIT C

Table 93: Flood Consequence Analysis

Subject	Potential Impacts
	infrastructure. Transportation infrastructure can be damaged which could impact the freedom of movement or provision of utilities. Water sources can become contaminated. Water and sewer systems may be disrupted. Solid-waste collection and disposal may also be impacted, causing dangerous public health risks.
Impact on Environment	Rising waters from flooding impact the environment by spreading pollution, inundating water and wastewater treatment plants, and disrupting wildlife. Standing water following a flood event can facilitate the spread of vector-associated diseases.
Economic Conditions	Significant and repeated flooding can lower property value throughout the state, which can have a deleterious effect on the tax base. Furthermore, flooding drains response resources, which can be costly during a large flooding event for disaster reimbursement
Public Confidence in Governance	Ineffective flooding response can decrease the public's confidence in the ability to respond and govern. Multi-level government response requires direct actions that must be immediate and effective to maintain public confidence. Efficiency in response and recovery operations is critical in keeping public confidence high.

5.12.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, should any population increase occur, potentially vulnerable populations could face disproportionate effects from a flood event.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires. Current building codes, and where applicable flood ordinances, require considerations for building and renovating in flood prone areas.

Flooding will continue to be considered for any future jurisdictional development or renovation, including potentially relocating facilities prone to flooding. In addition, jurisdictions will help areas adapt by encouraging the usage of flood smart designs during infrastructure renovation and construction.

5.12.8 National Flood Insurance Program Communities

The NFIP is a federal program, managed by FEMA, which exists to provide flood insurance for property owners in participating communities, to improve floodplain management practices, and to develop maps of flood hazard areas. The following table presents NFIP participating communities:

Table 94: Siskiyou County NFIP Communities

Community	Initial Flood Hazard Boundary Map Identified	Initial Flood Insurance Rate Map Identified	Current Effective Map Date
Siskiyou County	11/15/1977	5/17/1982	1/19/2011
Dunsmuir	5/24/1974	12/4/1979	1/19/2011
Etna	2/22/1974	3/4/1980	1/19/2011
Fort Jones	4/5/1974	4/15/1980	1/19/2011
Montague	3/26/1976	9/17/1980	1/19/2011
Weed	1/20/1981	1/20/1982	1/19/2011
Yreka	3/22/1974	11/18/1981	1/19/2011

Source: FEMA NFIP

The Community Rating System (CRS) is a voluntary program within the NFIP that provides insurance premium discounts to policy holders based on a jurisdiction's adherence to floodplain management activities that exceed minimum NFIP requirements. As of this plan, no participating jurisdictions within Siskiyou County are CRS participants.

5.12.9 FEMA Flood Policy and Loss Data

Siskiyou County flood policy information was sourced from FEMA's Flood Insurance Data and Analytics. The number of flood insurance policies in effect may not include all structures at risk of flooding, and it is likely that some properties are under-insured. The flood insurance purchase requirement is for flood insurance in the amount of federally backed mortgages, not the entire value of the structure. Additionally, contents coverage is not required. The following table shows the details of NFIP policy statistics for Siskiyou County:

Table 95: Siskiyou County NFIP Coverage

Jurisdiction	Number of Policies in Force	Total Coverage
Siskiyou County	195	$49,029,300
Dunsmuir	14	$2,896,200
Etna	15	$2,807,100
Fort Jones	38	$6,855,400
Weed	3	$1,250,000
Yreka	31	$8,059,000

Source: FEMA Flood Insurance Data and Analytics

The following table details the change in NFIP coverage from 2019 to 2024 for Siskiyou County:

Table 96: Siskiyou County NFIP Coverage Changes

Jurisdiction	Policies in Force 2019	Policies in Force 2024	Change in Policies, 2019 - 2024	Total Coverage 2019	Total Coverage 2024	Change in Coverage, 2019 - 2024
Siskiyou County	336	195	-141	$65,070,700	$49,029,300	-$16,041,400
Dunsmuir	33	14	-19	$5,860,100	$2,896,200	-$2,963,900
Etna	17	15	-2	$3,230,200	$2,807,100	-$423,100
Fort Jones	71	38	-33	$11,446,600	$6,855,400	-$4,591,200
Weed	4	3	-1	$686,500	$1,250,000	$563,500
Yreka	64	31	-33	$13,376,200	$8,059,000	-$5,317,200

Source: FEMA

5.12.10 Repetitive Loss Structures

The NFIP defines a Repetitive Loss property as:

- Any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. At least two of the claims must be more than 10 days apart.

The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended, 42 U.S.C. 4102a. A Severe Repetitive Loss property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or
- For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both of the above, at least two of the referenced claims must have occurred within any ten-year period and must be greater than ten days apart. The following table details repetitive loss properties for Siskiyou County:

Table 97: Siskiyou County Repetitive Loss Properties

Jurisdiction	Number of Repetitive Loss Properties	Property Type	Mitigated	NFIP Insured	Number of Losses	Loss Amount
Siskiyou County	2	Residential	0	0	4	$9,299

Source: FEMA

No Severe Repetitive Loss properties were noted in Siskiyou County.

5.12.11 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the flood hazard.

Table 98: Example Flood Mitigation Actions

Category	Example Action
Planning and Regulation	Determine and enforcing acceptable land use and limit exposure in flood hazard areas.
	Develop a floodplain management plan and updating it regularly.
	Establish a green infrastructure program to link, manage, and expand existing parks, preserves, greenways, etc.
	Prohibit or limiting floodplain development through regulatory and/or incentive-based measures.
	Limit the percentage of allowable impervious surface within developed parcels.
	Encourage the use of porous pavement, vegetative buffers, and islands in large parking areas.
	Complete a stormwater drainage study for known problem areas.
	Develop engineering guidelines for drainage from new development.
	Design a “natural runoff” or “zero discharge” policy for stormwater in subdivision design.
	Regularly document the amount of flood-prone property preserved as open space.
	Conduct NFIP community workshops to provide information and incentives for property owners to acquire flood insurance.
	Revise the floodplain ordinance to incorporate cumulative substantial damage requirements.
Infrastructure	Install, re-route, or increase the capacity of a storm drainage system.
	Increase capacity of stormwater detention and retention basins.
	Require developers to construct on-site retention basins for excessive stormwater and as a firefighting water source.
	Routinely clean debris from support bracing underneath low-lying bridges.
	Elevate structures so that the lowest floor, including the basement, is raised above the base flood elevation.
	Raise utilities or other mechanical devices above expected flood levels.
	Elevate roads and bridges above the base flood elevation to maintain dry access.
	Floodproof water and wastewater treatment facilities located in flood hazard areas.
	Require that all critical facilities including emergency operations centers, police stations, and fire department facilities be located outside of flood-prone areas.
Natural Systems	Establish and managing riparian buffers along rivers and streams.
	Protect and preserve wetlands to help prevent flooding in other areas.
	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.
	Protect and enhance landforms that serve as natural mitigation features
Education	Encourage homeowners to purchase flood insurance.
	Annually distribute flood protection safety pamphlets or brochures to the owners of flood-prone property.
	Educate citizens about safety during flood conditions, including driving on flooded roads.
	Encourage homeowners to install backflow valves to prevent reverse-flow flood damages.

EXHIBIT C

5.13 Landslide

5.13.1 Hazard Description

A landslide is the movement of rock, soil, and debris down a slope due to gravity. It occurs when the stability of a slope changes from a stable to an unstable condition, often triggered by natural events such as heavy rain, earthquakes, volcanic activity, or human activities like deforestation or construction. Landslides can vary in speed and the materials involved, ranging from slow-moving soil shifts to fast and destructive flows of debris and rock. Types of landslides include:

- **Flows:** Flows occur when materials, like soil, rock, or debris, behave more like a fluid due to the addition of water. These can range from slow to extremely rapid.
  - Debris Flow: Fast-moving flow composed of a mix of water, soil, and debris. These are common in mountainous areas after heavy rains.
  - Mudflow: A specific type of debris flow that contains a large amount of fine materials like silt and clay, often occurring in areas with little vegetation.
  - Earthflow: A slower-moving flow made mostly of fine-grained materials such as clay or silt.
- **Slides:** Slides involve the downward movement of soil or rock along a defined surface or plane, like a layer of weak material.
  - Rotational Slide (Slump): The material moves along a concave surface, creating a backward rotation of the slope. This type is more common in softer, clay-rich soils.
  - Translational Slide: Material moves along a relatively flat or slightly inclined surface. These slides can be shallow or deep and tend to be faster than rotational slides.
- **Falls:** Falls occur when rock or debris becomes detached from a steep slope or cliff and free-falls due to gravity.
- **Lateral Spreads:** Lateral spreads occur when loose, water-saturated soil spreads horizontally due to liquefaction, often triggered by earthquakes.

In general, landslides may be characterized a shallow or deep-seated. The difference between shallow and deep-seated landslides lies primarily in their depth, causes, speed, and the type of materials involved. Each type presents unique challenges in terms of risk, behavior, and mitigation strategies. General differences are as follows:

Table 99: Comparison of Shallow and Deep-Seated Landslides

Factor	Shallow Landslides	Deep-Seated Landslides
Depth	Less than 10 meters (33 feet).	Greater than 10 meters (33 feet).
Material	Loose soil, debris, weathered rock.	Bedrock or consolidated materials.
Speed	Often fast-moving, can happen suddenly.	Slower movement, can happen over longer periods.
Triggers	Intense rainfall, snowmelt, or earthquakes.	Geological processes, erosion, tectonic activity.
Types	Debris flows, soil slides.	Rotational slides, translational slides.
Impacts	Immediate, localized damage to surface infrastructure.	Large-scale damage over time to deeper and larger areas.

Source: United States Geological Survey and California Department of Conservation

Common triggers of landslides may include:

- **Heavy Rainfall:** Prolonged or intense rain saturates the ground, reducing the stability of slopes and leading to slides or flows.
- **Earthquakes:** The shaking from an earthquake can dislodge unstable soil or rock, triggering landslides.
- **Wildfires:** Wildfires make the landscape more susceptible to landslides. When rainstorms pass through, the water liquefies unstable, dry soil and burned vegetation.

EXHIBIT C

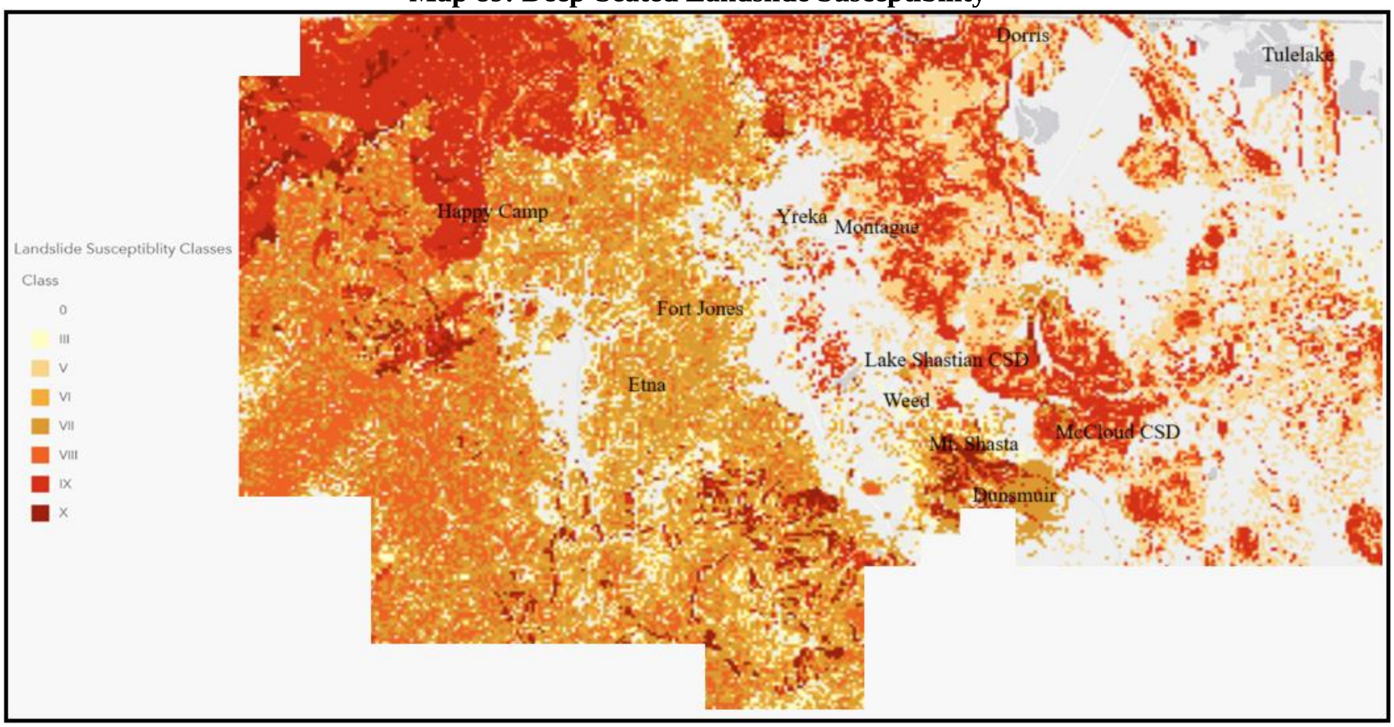
- **Volcanic Activity:** Eruptions can cause the collapse of volcanic slopes or trigger lahars (volcanic mudflows).
- **Human Activities:** Deforestation, mining, construction, and the alteration of natural landscapes can destabilize slopes, increasing the likelihood of landslides.

While not typically considered a landslide, an avalanche is a type of mass material movement, specifically involving the rapid descent of snow, often mixed with ice and debris, down a mountainside. Avalanches are triggered by factors such as heavy snowfall, rapid temperature changes, or disturbances (like human activity or natural vibrations). Due to the similarities in potential causes and movement, the avalanche hazard is included under the landslide hazard.

5.13.2 – Location and Extent

The following map, from the California Department of Conservation, shows the relative likelihood of deep-seated landsliding based on estimates of rock strength and steepness of slopes within Siskiyou County. This landslide susceptibility map is intended to provide a general overview of where landslides are more likely to occur and is not appropriate for evaluation of landslide potential at any specific site. The map creates classes of landslide susceptibility (0 to 10, low to high). These classes express the generalization that on very low slopes, landslide susceptibility is low even in weak materials, and that landslide susceptibility increases with slope and in weak rocks:

Map 89: Deep-Seated Landslide Susceptibility



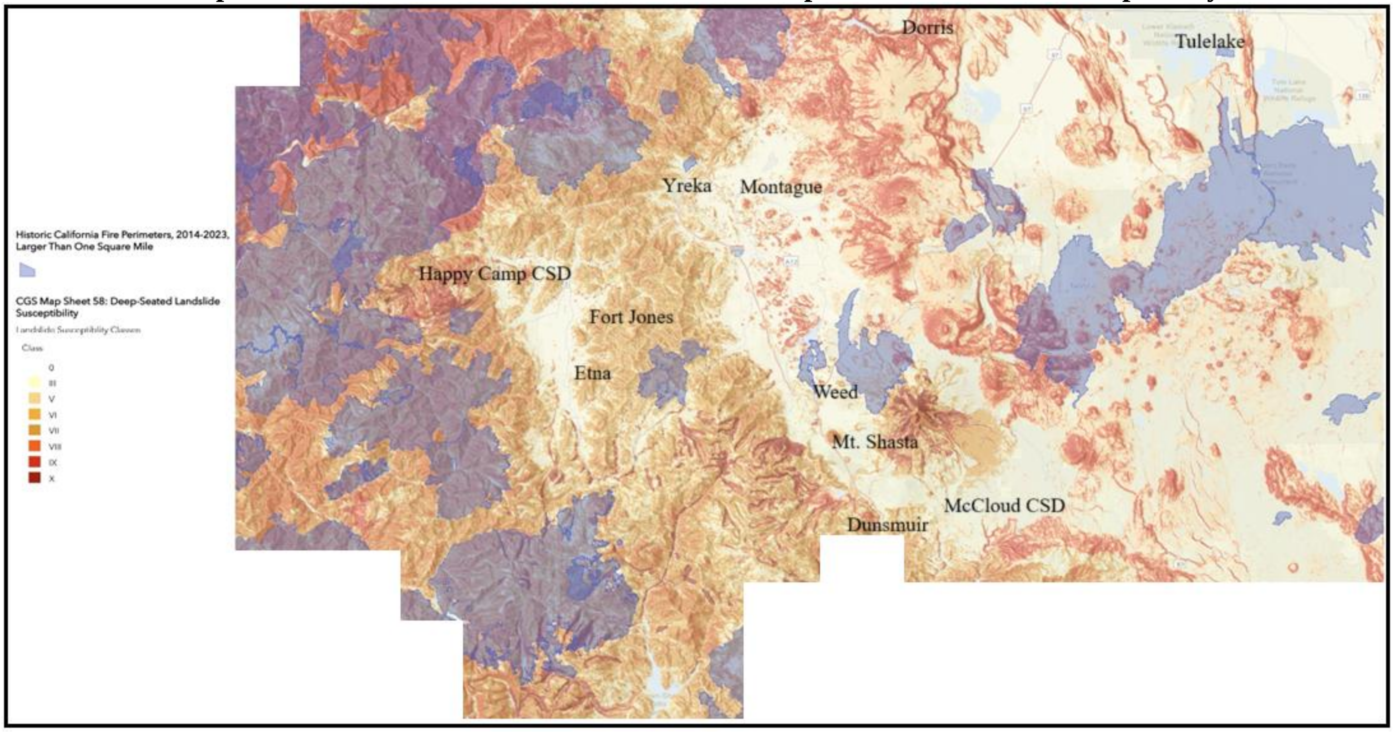
Source: California Department of Conservation

Public Comment: *Post-fire debris flow is a major concern.*

Wildfire impacted areas may be particularly susceptible to deep-seated landslides, typically in the first decade following a fire. The following map shows the past ten years of large wildfires (area at least one square mile) with an overlay of the Susceptibility to Deep-Seated Landslides map for Siskiyou County. This map does not include information on landslide triggering events nor does it address susceptibility to shallow landslides such as debris flows. This map is not appropriate for evaluation of landslide potential at any specific site:

EXHIBIT C

Map 90: Historic Wildfire Areas as Related to Deep-Seated Landslide Susceptibility



Source: California Department of Conservation

The extent of a landslide is typically measured by determining its length, width, and depth using surveying techniques like GPS, terrestrial laser scanning, aerial photography, and satellite imagery, which allows for mapping the landslide's overall area and volume.

Although avalanches can occur on any steep slope given the right conditions, certain types of locations are naturally more dangerous. Some key characteristics of avalanche prone areas include:

- **Slope Angle:** Slopes between 30° to 45° degrees are most prone to avalanches. However, under the correct conditions avalanches can occur on slopes as shallow as 25° or as steep as 60° degrees.
- **Slope Direction:** The direction a slope faces can impact snowpack stability, with certain aspects more likely to accumulate unstable layers of snow.
- **Terrain Features:** Some terrain features can channel the force of an avalanche (chutes, bowls) increasing the risk for anyone caught in its path.
- **Lack of Vegetation:** A lack of vegetation can indicate an area prone to avalanches.

In general, avalanches are rated by their destructive potential, considering their mass, volume, and the area they impact:

- **Size 1 (Sluff):** Small and harmless to people.
- **Size 2 (Small):** Large enough to bury or injure a person.
- **Size 3 (Medium):** Large enough to bury a car, destroy a small building, or snap trees. Dangerous to humans and infrastructure.
- **Size 4 (Large):** Can destroy a railway car, several buildings, or a substantial portion of a forest. Significant destructive power.
- **Size 5 (Very Large):** The largest avalanches; capable of leveling a village or a large area of forest. Extremely rare and catastrophic.

EXHIBIT C

The North American Public Avalanche Danger Scale is a system that rates avalanche danger and provides general travel advice based on the likelihood, size, and distribution of expected avalanches. It consists of five levels, from least to highest amount of danger. Although the danger ratings are assigned numerical levels, the danger increases exponentially between levels.

Figure 13: North American Public Avalanche Danger Scale

North American Public Avalanche Danger Scale

Avalanche danger is determined by the likelihood, size, and distribution of avalanches.
Safe backcountry travel requires training and experience. You control your risk by choosing when, where, and how you travel.

Danger Level	Travel Advice	Likelihood	Size and Distribution
5 - Extreme	**Extraordinarily dangerous avalanche conditions.** Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Very large avalanches in many areas.
4 - High	**Very dangerous avalanche conditions.** Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 - Considerable	**Dangerous avalanche conditions.** Careful snowpack evaluation, cautious route-finding, and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 - Moderate	**Heightened avalanche conditions on specific terrain features.** Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 - Low	**Generally safe avalanche conditions.** Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Source: Avalanche.org

Discussions with the MPC and a review of all available data indicated that the landslide hazard is poorly documented and understood, and is presently not a hazard of concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Dorris:** Not identified as a hazard of concern based on extremely limited available data.
- **Dunsmuir:** Identified as a community concern due to jurisdiction topography.
- **Etna** Not currently identified as a hazard of concern based on extremely limited available data.
- **Fort Jones:** Not currently identified as a hazard of concern based on extremely limited available data.
- **Happy Camp CSD:** Identified as a community concern due to jurisdiction topography.
- **Lake Shastina CSD:** Not currently identified as a hazard of concern based on extremely limited available data.
- **McCloud CSD:** Identified as a community concern due to jurisdiction topography.
- **Montague:** Not currently identified as a hazard of concern based on extremely limited available data.
- **Mt. Shasta:** Not currently identified as a hazard of concern based on extremely limited available data.
- **Tulelake** Not currently identified as a hazard of concern based on extremely limited available data.
- **Weed:** Not currently identified as a hazard of concern based on extremely limited available data.
- **Yreka:** Not currently identified as a hazard of concern based on extremely limited available data.

For a description of currently available assets within each jurisdiction, see Section 3.9.

EXHIBIT C

5.13.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced seven Presidential Disaster Declarations related to landslides, reflected in the following table.

Table 100: Siskiyou County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual and Public Assistance	Mitigation Dollars Obligated
DR-4683-CA	1/14/2023	Severe Winter Storms, Flooding, **Landslides, and Mudslides**	$152,481,240	$11,290,426
DR-4308-CA	4/1/2017	Severe Winter Storms, Flooding, **Mudslides**	$427,999,655	$15,012,050
DR-4301-CA	2/14/2017	Severe Winter Storms, Flooding, and **Mudslides**	$130,483,948	$22,708,200
DR-1884-CA	3/8/2010	Severe Winter Storms, Flooding, and **Debris and Mud Flows**	$28,353,445	-
DR-1628-CA	2/3/2006	Severe Storms, Flooding, **Mudslides**, and Landslides	$163,229,337	-
DR-1046-CA	3/12/1995	California Severe Winter Storms, Flooding, **Landslides, Mud Flows**	-	-
DR-979-CA	2/3/1993	California Severe Storm, Winter Storm, **Mud and Landslides**, Flooding	-	-

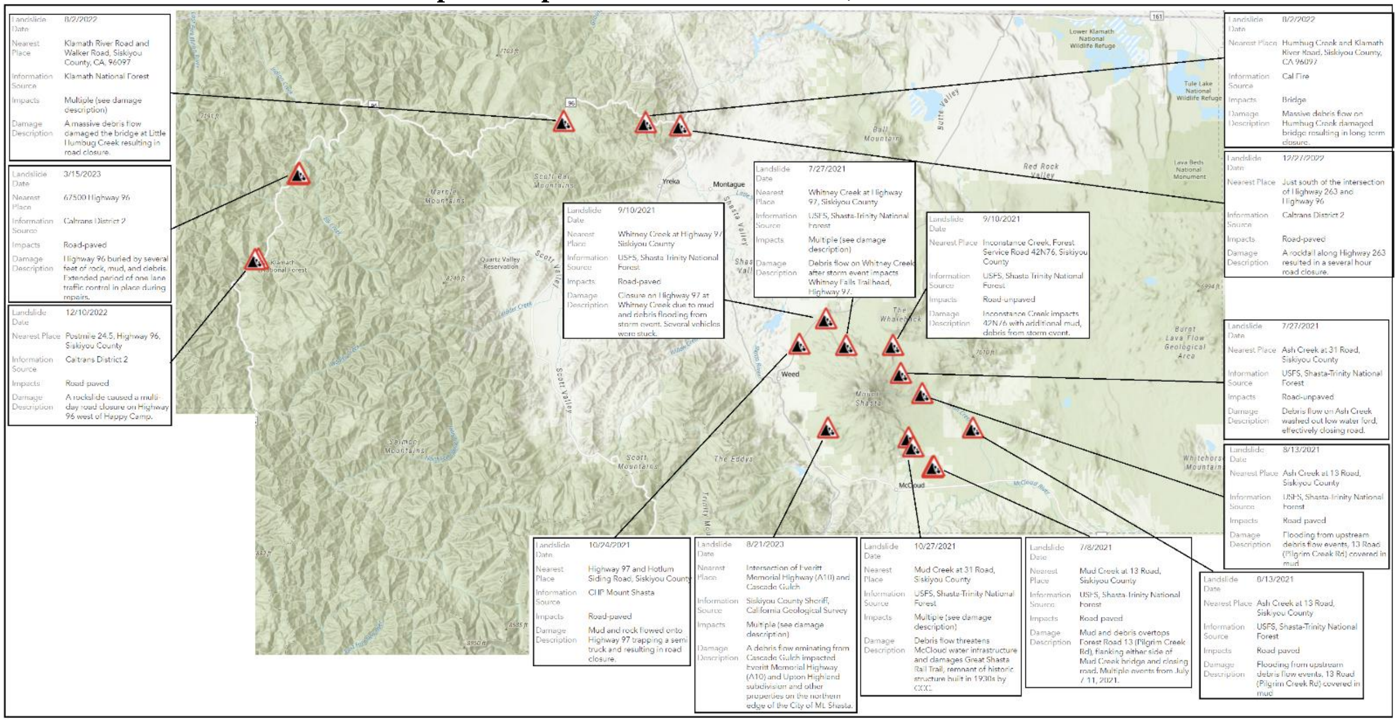
Source: FEMA
-: Not reported

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Siskiyou County has experienced no Emergency Declarations related to landslides.

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. Siskiyou County has experienced no proclamations of a State of Emergency related to landslides.

The following map, from the California Department of Conservation, details the location and impacts of recent reported landslide events in Siskiyou County from 2021 to 2024:

Map 91: Reported Landslide Events, 2021 - 2024



Source: California Department of Conservation

Events of note include:

- **April 30, 2024:** An avalanche at 13,000 feet on Mount Shata resulted in the rescue of two climbers/skiers.
- **August 2023:** Heavy rain caused debris flows that resulted in substantial damage and unparalleled ecological destruction across the Shasta and Klamath watershed, ultimately impacting the river, tributaries, and Mount Shasta's alluvial plain. Mudslides damaged roads in the area of several fires burning this summer in the western part of the county along the Highway 96 and Klamath River corridor
- **January 11, 2023**: State Route 96 was closed roughly four miles west of Happy Camp due to a slide.
- **February 3, 2021:** An avalanche near Etna Summit buried two skiers, killing one of them.
- **December 13, 2022:** A portion of State Route 96 was covered by an active rockslide near Happy Camp.
- **December 25, 2019:** A landslide impacted a stretch of State Route 96, resulting in intermittent road closure. Boulders and other debris were spotted rolling down the hill next to the highway about four miles west of Happy Camp.

5.13.4 Probability of Future Events

Predicting the probability of landslide occurrence is tremendously challenging due to the large number of factors involved. Based on available data from the California Geological Survey, Siskiyou County has had 15 reported landslide events from 2021 – 2024, equating to an average of four events per year. However, it is important to note that many landslides go unreported, and this the number of actual events is likely higher.

The Mount Shasta Avalanche Center reported 22 avalanches for the 2023 -2024 season, with no data available for earlier seasons. This equates to an average of 22 events per year. However, it is important to note that many avalanches go unreported, and this the number of actual events is likely higher.

5.13.5 Projected Changes in Location, Intensity, Frequency, and Duration

Climate change is expected to significantly influence the occurrence and intensity of landslides. One of the primary drivers of landslides is water saturation, particularly during or after intense rainfall. Climate change is expected to lead to more extreme weather events and including heavy rainstorms, which can trigger both shallow and deep-seated

EXHIBIT C

landslides. Increased rainfall, especially over short periods, can saturate soil, reduce slope stability, and increase landslide susceptibility. As precipitation patterns become more erratic, flash floods can also trigger debris flows or rapid shallow landslides, particularly in areas with steep terrain or previous wildfire scars.

Warmer temperatures can cause snow to melt faster in mountainous regions. Rapid snowmelt saturates the soil quickly, increasing the risk of landslides. This effect is often observed during springtime when large volumes of melting snow combine with rain. As temperatures rise and precipitation patterns shift, some areas may experience changes in vegetation cover. In regions where vegetation cover decreases, slopes become less stable, increasing landslide risk.

Climate change has contributed to longer and more intense wildfire seasons. Wildfires remove vegetation that stabilizes slopes and helps absorb rainwater. Without this vegetation, the exposed soil is more prone to erosion and landslides, particularly during subsequent heavy rainfalls. Burned areas are especially vulnerable to debris flows and landslides for several years after a fire, as the land recovers and vegetation regrows. The loose, ashy soil in these areas is highly unstable when exposed to rain.

Climate change significantly impacts avalanche occurrence by altering snowpack characteristics, precipitation patterns, and temperature dynamics. Increasing temperatures can lead to a denser, wetter snowpack, which is less stable and more prone to wet avalanches. As temperatures rise, precipitation that would have fallen as snow may instead fall as rain, destabilizing the existing snowpack and increasing the likelihood of avalanches. Additionally, climate change is associated with more extreme weather events, including heavy snowstorms that rapidly overload the snowpack, triggering avalanches.

5.13.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Siskiyou County and all participating jurisdictions from landslides. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Siskiyou County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 101: Participating Jurisdiction Landslide Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Siskiyou County	All	Relatively Moderate	92.1	0.1
Dorris	06093000200	Relatively Moderate	87.3	0
Dunsmuir	06093001100	Relatively High	98.2	0
Etna	06093000800	Relatively High	96.0	0
Fort Jones	06093000701	Relatively High	96.3	0
Happy Camp CSD	06093001300	Relatively High	98.6	0
Lake Shastina CSD	06093000902	Relatively High	96.3	0
McCloud CSD	06093001200	Relatively High	98.8	0
Montague	06093000300	Relatively High	97.1	0
Mt. Shasta	06093001003	Relatively Moderate	83.8	0
Tulelake	06093000100	Relatively Low	66.0	0
Weed	06093000901	Relatively High	99.0	0
Yreka	06093000703	Relatively Low	45.6	0

Source: FEMA NRI

EXHIBIT C

Table 102: Participating Jurisdiction Landslide Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Landslide EAL
Siskiyou County	All	Relatively Moderate	88.7	$147,000
Dorris	06093000200	Relatively Moderate	81.4	$2,600
Dunsmuir	06093001100	Relatively High	97.6	$13,000
Etna	06093000800	Relatively High	95.3	$7,900
Fort Jones	06093000701	Relatively High	96.1	$9,000
Happy Camp CSD	06093001300	Relatively High	98.1	$15,000
Lake Shastina CSD	06093000902	Relatively High	96.7	$10,000
McCloud CSD	06093001200	Relatively High	98.9	$26,000
Montague	06093000300	Relatively High	96.5	$9,700
Mt. Shasta	06093001003	Relatively Moderate	83.7	$3,000
Tulelake	06093000100	Relatively Low	59.9	$686
Weed	06093000901	Relatively High	98.6	$21,000
Yreka	06093000703	Relatively Low	44.5	$89

Source: FEMA NRI

Table 103: Participating Jurisdiction Avalanche Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Siskiyou County	All	Very Low	10.1	0
Dorris	06093000200	Very Low	9.8	0
Dunsmuir	06093001100	Very Low	12.0	0
Etna	06093000800	Very Low	8.3	0
Fort Jones	06093000701	Very Low	6.6	0
Happy Camp CSD	06093001300	Very Low	13.7	0
Lake Shastina CSD	06093000902	Very Low	4.7	0
McCloud CSD	06093001200	Very Low	4.7	0
Montague	06093000300	Very Low	11.0	0
Mt. Shasta	06093001003	Very Low	9.7	0
Tulelake	06093000100	Not Applicable	0	0
Weed	06093000901	Very Low	19.0	0
Yreka	06093000703	Not Applicable	0	0

Source: FEMA NRI

Table 104: Participating Jurisdiction Avalanche Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Avalanche EAL
Siskiyou County	All	Very Low	12.0	$37,000
Dorris	06093000200	Very Low	11.0	$37,000
Dunsmuir	06093001100	Very Low	11.0	$37,000
Etna	06093000800	Very Low	11.0	$37,000
Fort Jones	06093000701	Very Low	11.0	$37,000
Happy Camp CSD	06093001300	Very Low	11.0	$37,000
Lake Shastina CSD	06093000902	Not Applicable	0	$0
McCloud CSD	06093001200	Very Low	11.0	$37,000
Montague	06093000300	Very Low	11.0	$37,000
Mt. Shasta	06093001003	Very Low	11.0	$37,000
Tulelake	06093000100	Not Applicable	0	$0
Weed	06093000901	Very Low	11.0	$37,000
Yreka	06093000703	Not Applicable	0	$0

Source: FEMA NRI

EXHIBIT C

Population
Although major landslides occur infrequently in Siskiyou County, a large landslide could have profound impacts on people, affecting their physical, emotional, and social well-being. The impacts can be broken down into the following categories:

- **Physical Impact:** Landslides can cause injuries and deaths, usually caused by falling debris striking a structure or vehicle. The extent of these injuries depends on the size of the landslide, building standards, and preparedness in the affected area. Access to Medical Services: Impacted persons may be cut off from medical care access due to road damage.
- **Emotional and Psychological Impact:** Survivors often experience psychological stress, anxiety, and trauma from the sudden and unpredictable nature of landslides can cause long-lasting fear, especially in areas where movement can continue for days or weeks.
- **Social and Economic Impact:** Economic losses can be devastating, especially for people whose businesses, jobs, or properties are destroyed or cut off due to road closures. The destruction of infrastructure such as transportation and utilities (electricity, water, gas) can disrupt daily life for extended periods.

Landslides may disproportionately affect socially vulnerable populations, exacerbating pre-existing inequalities and making recovery more difficult for these groups. Landslides may disproportionately impact these groups in the following ways:

- **Increased Risk of Injury and Death:** Many low-income communities are located in areas with higher landslide risk due to lower land prices. Vulnerable populations, especially in under-resourced areas, may live in buildings not built to modern safety standards, increasing their risk during seismic events.
- **Delayed or Inadequate Emergency Response:** Socially vulnerable populations may experience delayed access to rescue efforts, medical care, and emergency shelters due to geographic isolation, discrimination, or lack of resources like transportation. Rural, low-income, or marginalized communities may not receive the same level of emergency response as wealthier urban areas.
- **Economic Impact and Prolonged Recovery:** Landslides can disrupt working conditions, particularly for those in informal employment such as day laborers or small business owners. Socially vulnerable populations often lack savings or insurance to cushion the economic blow of losing their homes or jobs.

The loss of utility and communications services can also have a large impact on individuals. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values:

Table 105: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

No comprehensive mapping concerning known or potential landslide area has been completed for Siskiyou County or participating jurisdictions. As such, an estimated population vulnerable to landslides cannot be determined as of this plan.

Buildings and Structures
Buildings and structures can be damaged during landslides due to the intense ground movement. The severity of the damage depends on factors such as the size, distance from the landslide, local soil conditions, and the building's design,

EXHIBIT C

materials, and age. Soil movement can cause rigid components such as walls, beams, and foundations can crack or split. In severe cases, load-bearing walls may fail, leading to partial or complete building collapse. The vertical supports (columns) and horizontal supports (beams) may fail due to excessive forces, leading to the collapse of floors or entire sections of buildings.

Of particular concern to all jurisdictions are unreinforced masonry buildings. An unreinforced masonry building is constructed of brick or masonry with no steel reinforcing bars. Because these buildings were not built using modern building codes, they are much more likely to experience damage or collapse during a landslide. As of this plan, no survey has been conducted to determine the number of unreinforced masonry buildings in Siskiyou County or participating jurisdictions.

No comprehensive mapping concerning known or potential landslide area has been completed for Siskiyou County or participating jurisdictions. As such, an estimated number and value of structures, including historic buildings, vulnerable to landslides cannot be determined as of this plan.

Governmental Operations

Large scale impacts would not be expected on continued government operations, aside from transportation system disruptions impacting commutes to facilities.

Transportation and Electrical Infrastructure

Landslides can have numerous impacts on both transportation and electrical distribution systems. The impacts of landslides on transportation systems may include:

- **Roads and Highways:** Landslides can cause cracking, buckling, and collapse of roads, highways, and bridges. In severe cases, transportation networks are cut off, hindering emergency response, evacuation, and the transportation of goods.
- **Bridges and Tunnels:** Bridges are especially vulnerable to collapse during landslides due to the extreme forces exerted on their structures. Older bridges not built to modern codes are at higher risk of failure. Tunnels can also collapse or become blocked by debris, cutting off access to critical routes.
- **Railways:** Rail systems can be severely impacted by landslides, as tracks may buckle or become misaligned, leading to derailments.

A landslide can impact both the electrical generation capacity and transmission. The impacts of a landslide on electrical systems may include:

- **Power Plants:** Landslides can damage power generation facilities causing a cessation of services and costly repairs.
- **Transmission Lines:** Power transmission lines and substations can be damaged by extensive soil movement, resulting in prolonger power outages.
- **Grid Instability:** Damage to power infrastructure can lead to cascading failures within the electrical grid. Substations, transformers, and electrical distribution networks can be knocked offline.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities

Water and wastewater utilities are vulnerable to landslide events due to the potential for plant damages and distribution system damages. Impacts may include:

- **Water Supply:** Landslides can rupture water pipes and damage water treatment facilities, leading to water shortages or contamination. In many cases, people are left without clean drinking water, and authorities must rely on temporary solutions like bottled water or emergency water delivery.
- **Wastewater Systems:** Sewer lines and wastewater treatment plants are particularly vulnerable to ground movement. Ruptured sewer lines can lead to sewage leaks, contaminating groundwater and local water sources. Damage to wastewater treatment plants can lead to untreated sewage being released into waterways.

Mapping and details concerning operators of water and wastewater utility providers may be found in Section 5.9.6.

Medical, Education, and Response Facilities

A landslide could significantly disrupt medical, education, and response facilities and operations at various levels. These impacts are especially pronounced in the immediate aftermath, where response efforts, infrastructure damage, and communication breakdowns can severely hamper functions. Impacts may include:

- **Damage to Facility:** Landslides can damage or destroy facilities, causing a significant impact on services.
- **Response Disruptions:** Emergency response, including search and rescue operations and medical assistance may be severely impacted due to the road closures.
- **Communication Breakdowns:** Landslides can damage communication networks, including internet and phone services, preventing effective communication and hindering the dissemination of critical information.
- **Budget Strains:** The cost of responding to and recovering from a landslide can put pressure on budgets.

Mapping concerning medical, education, and response facilities may be found in Section 3.9: Critical Facilities and Infrastructure.

Communication Systems

No comprehensive mapping of communications systems was available for review to compare against known landslide hazard areas. However, it is assumed that communications lines and towers are in known hazard areas. Landslides can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Damage to Infrastructure:** Soil movement can cause physical damage to communication infrastructure such as cell towers, antennas, satellite dishes, and power lines. This damage can result in interruptions or complete failure of communication services.
- **Power Outages:** Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.
- **Structural Instability:** Soil movement can cause structural instability in communication towers and buildings housing communication equipment, disrupting communication services.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.8.6.

Environmental and Agricultural Impacts

Landslides in Siskiyou County are anticipated to have a limited impact on the agricultural community. However, a disruption in transportation networks could hamper the ability to transport commodities in a timely manner.

Although difficult to quantify, the potential environmental impacts can include habitat damage and degradation of water quality from an influx of soils or debris.

Jurisdictional Concerns:
As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. Additionally, no comprehensive mapping of slide prone areas has been completed by any participating jurisdiction. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Dunsmuir:** With 16.1% of citizens living in poverty, the occurrence of a landslide may have a disproportionate impact on citizens of the community due to underinsurance. Additionally, community access and response activities could be impacted slide debris impacting community roads.
- **Happy Camp CSD:** With 21.0% of citizens living in poverty, the occurrence of a landslide may have a disproportionate impact on citizens of the community due to underinsurance. Additionally, community access and response activities could be impacted slide debris impacting community roads.
- **McCloud CSD:** With 13.3% of citizens living in poverty, the occurrence of a landslide may have a disproportionate impact on citizens of the community due to underinsurance. Additionally, community access and response activities could be impacted slide debris impacting community roads.

Cascading Impacts
Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with earthquakes may include:

- Infrastructure failure
- Dam failure
- Power outages
- Hazardous materials release

Consequence Analysis
This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 106: Landslide and Avalanche Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Landslides may cause injury or death to people from vehicle accidents, falling objects, or structural failure. Ground movement may result in broken service lines or pipelines, triggering the release of hazardous materials or waste materials.
Impact on Responders	The extent of the damage to infrastructure such as roads and bridges and communications can greatly impact the ability to access or transport victims. Equipment, facilities, or other assets may be damaged and restrict first responders' capacity to respond to calls for assistance.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Landslides could potentially impact critical infrastructure resulting in power outages, and damage to facilities or infrastructure.
Delivery of Services	Delivery of services may be impacted by dangerous transportation conditions, causing food, water, and resource systems to be delayed or halted.
Property, Facilities, and Infrastructure	Unreinforced masonry structures are inherently vulnerable to external forces. All critical facilities and transportation corridors and pipelines can be impacted. Ground movement can lead to the collapse of buildings and bridges, and disrupt utility services.

EXHIBIT C

Table 106: Landslide and Avalanche Consequence Analysis

Subject	Potential Impacts
Impact on Environment	Landslides have the potential to trigger secondary hazards such as fire, hazardous material release, or dam failures. These can destroy habitats and environments, cause significant injury to animals or livestock, or contaminate the environment.
Economic Conditions	Landslides pose a fiscal impact on the local and county governments. Local, county, and state resources may be drained by response and recovery efforts. Additionally, a severe landslide would affect the ability of businesses to maintain operations. If the private sector is not able to re-establish operations this would also impact the local economy.
Public Confidence in Governance	Governmental response, on all levels, requires direct actions that must be immediate and effective to maintain public confidence. If local government takes a long time to begin recovery operations, or for the public to see recovery operations, this will have a negative impact on the public's confidence in governance.

5.13.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, any additional growth within landslide prone areas would place additional populations at risk. Should any population increase occur, potentially vulnerable populations could face disproportionate effects from a landslide.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. Of particular concern when considering housing data is mobile home residences. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires. Future land use planning should be proactive to address future hazard conditions, and restrict development in known landslide prone areas.

5.13.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the landslide hazard.

Table 107: Example Landslide and Avalanche Mitigation Actions

Category	Example Action
Planning and Regulation	Use GIS to identify and map landslide and avalanche hazard areas.
	Develop and maintain a database to track community vulnerability to landslides and avalanches.
	Locate utilities and critical facilities outside of areas susceptible to slides to decrease the risk of service disruption.
	Develop and implement a landslide management plan.
Infrastructure	Prevent landslides with proper bank stabilization, sloping or grading techniques, planting vegetation on slopes, terracing hillsides, or installing riprap boulders or geotextile fabric.
	Use bioengineered bank stabilization techniques.
Natural Systems	Plant native vegetation on slopes to enhance stability.
	Stabilize cliffs with terracing or plantings of grasses or other plants to hold soil together.
Education	Notify property owners located in high-risk areas.
	Offer GIS hazard mapping online for residents and design professionals
	Disclose the location of high-risk areas to buyers.

EXHIBIT C

5.14 Severe Weather

5.14.1 Hazard Description

Severe weather comprises the hazardous and damaging weather effects often found in violent storm fronts and severe winter storms. They can occur together or separate, they are common and usually not hazardous, but on occasion they can pose a threat to life and property.

This plan defines severe weather as a combination of the following as defined by NOAA and the NWS:

- **Hail:** Precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud.
- **Lightning:** A visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud.
- **Thunderstorm Winds:** The same classification as high or strong winds but accompanies a thunderstorm. It is also referred to as a straight-line wind to differentiate from rotating or tornado associated wind. Additionally, these winds can rapidly create dust storms that severely impact visibility.

Severe weather has been so consistent throughout modern history that much of the vulnerability is mitigated. However, this section is not concerned with everyday wind, lightning, or mild precipitation. This section is concerned with common storm elements when they behave such that they pose a threat to property and life.

Severe winter weather encompasses multiple effects caused by winter storms and conditions. Included are strong winds, ice storms, heavy or prolonged snow, sleet, and extreme temperatures. Winter storms can be increasingly hazardous in areas and regions that only see winter storms intermittently.

This plan defines severe winter weather as one or a combination of the following as defined by NOAA and the NWS.

- **Ice Storm:** An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication and can make travel extremely dangerous. Significant ice accumulations are usually accumulations of ¼" or greater.
- **Heavy Snow:** This generally means snowfall accumulating to 4" or more in depth in 12 hours or less; or snowfall accumulating to 6" or more in depth in 24 hours or less.
- **Winter Storm:** Hazardous winter weather in the form of heavy snow, freezing rain, or heavy sleet. It may also include extremely low temperatures and increased wind.
- **Cold Wave/Extreme Cold:** As described by NWS, a cold wave is a rapid fall in temperature within a 24-hour period requiring substantially increased protection to agriculture, industry, commerce, and social activities. As evidenced by past incidents across the U.S., extreme cold can cause impact to human life and property.

5.14.2 – Location and Extent

Severe weather can rapidly descend on an area, but in many cases is predictable. Most weather forecasts focus on changing conditions that may lead to the onset of severe storms. All of Siskiyou County, including all participating jurisdictions, is susceptible to severe weather, but occurrence is infrequent.

The NWS classifies thunderstorms, often the generator of hail, lightning and high winds, using the following categories.

- **Marginal:** Isolated severe weather, limited in duration and/or coverage and/or intensity
- **Slight:** Scattered severe storms possible, short-lived and/or not widespread, isolated intense storms possible
- **Enhanced:** Numerous severe storms possible, more persistent and/or widespread, a few intense

EXHIBIT C

- **Moderate:** Widespread severe storms likely, long-lived, widespread and intense
- **High:** Widespread severe storms expected, long-lived, very widespread and particularly intense

In the United States, hail causes billions of dollars in damage to property each year. Vehicles, roofs of buildings and homes, and landscaping are most commonly damaged by hail. Hail has been known to cause injury and the occasional fatality to humans, often associated with traffic accidents.

Based on information provided by the National Weather Service concerning size, the following table describes potential damage impacts of the various sizes of hail.

Table 108: Hail Size Comparison and Damage Descriptions

Diameter (inches)	Size Description	Potential Damage Impacts
1/4	Pea Size	No damage
1/2	Mothball, peanut, USB Plug	Slight damage to vegetation
3/4	Penny Size	Increased damage to crops and vegetation
7/8	Nickel Size	Severe damage to crops and vegetation, damage begins to glass and plastic
1	Quarter Size	Increased glass damage, damage begins to bodies of vehicles
1 1/4	Half Dollar Size	Large scale glass damage, begin roof damage, risk of injury to exposed persons
1 1/2	Ping Pong Ball Size	Large scale glass damage, begin roof damage, increased risk of injury to exposed persons
1 3/4	Golf Ball Size	Severe roof damage, risk of serious injuries to exposed persons
2	Lime or Medium Sized Hen Egg	Potential structural damage, risk of very severe injuries to exposed persons
2 1/2	Tennis Ball Size	Extensive structural damage, risk of very severe injuries or death to exposed persons

Source: National Weather Service

A recent report by the Insurance Information Institute says lightning strikes caused $1,300,000,000 in damage across the United States in 2021. There is currently no scale to indicate the severity of a lightning strike, but data from NOAA indicates that there approximately 25,000,000 cloud-to-ground lightning strikes per year in the United States.

To measure wind speed and its correlating potential for damage, experts use the Beaufort scale as shown below.

Table 109: Beaufort Scale

Beaufort Number	Wind Speed (mph)	Effects on Land
0	Under 1	Calm, smoke rises vertically
1	1-3	Smoke drift indicates wind direction, vanes do not move
2	4-7	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Leaves, small twigs in constant motion. Light flags extended.
4	13-18	Dust, leaves and loose paper raised up; small branches move
5	19-24	Small trees begin to sway
6	25-31	Large branches of trees in motion, whistling heard in wires
7	32-38	While trees in motion, resistance felt in walking against the wind
8	39-46	Twigs and small branches broken off trees
9	47-54	Slight structural damage occurs, slate blown from roofs
10	55-63	Seldom experienced on land, trees broken, structural damage occurs
11	64-72	Very rarely experienced on land, usually with widespread damage

EXHIBIT C

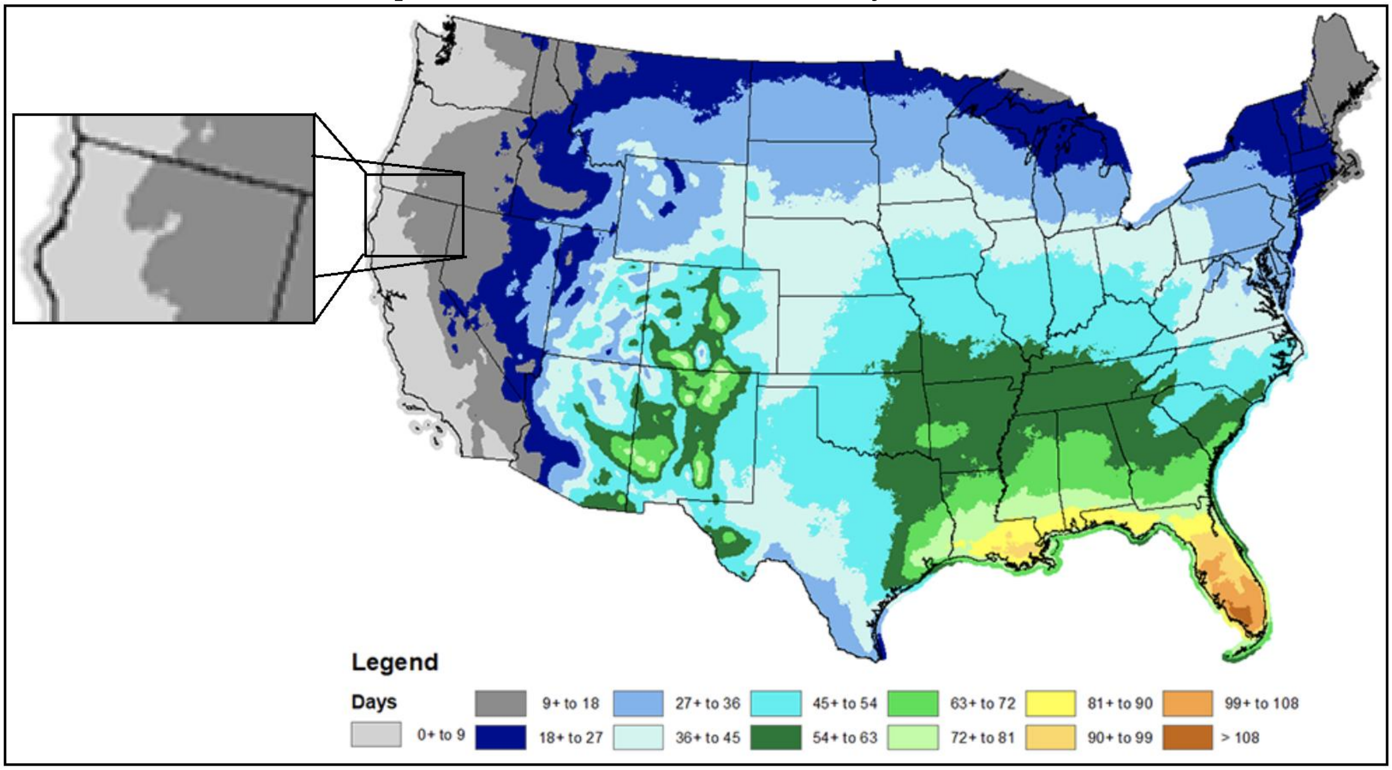
Table 109: Beaufort Scale

Beaufort Number	Wind Speed (mph)	Effects on Land
12	73 or higher	Violence and destruction

Source: NOAA

The infrequent nature of thunderstorms makes hail, lightning, and high wind a relatively uncommon occurrence for Siskiyou County. The following map, from NOAA, indicates annual mean thunderstorm days from 1993 to 2018.

Map 92: Annual Mean Thunderstorm Days, 1993-2018

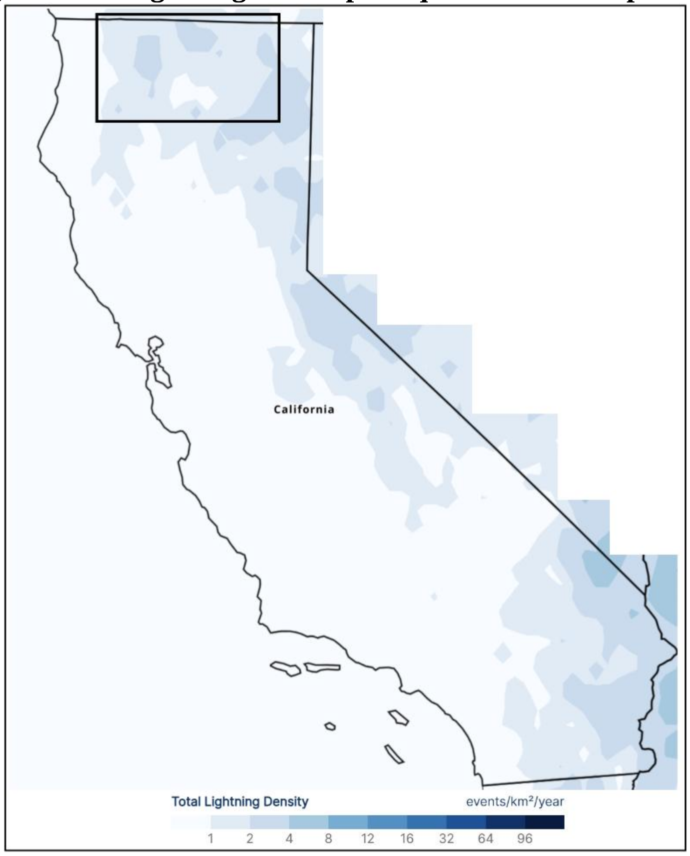


Source: NOAA

The following map, from Vaisala, indicates the average annual light events per square kilometer per year for Siskiyou County:

EXHIBIT C

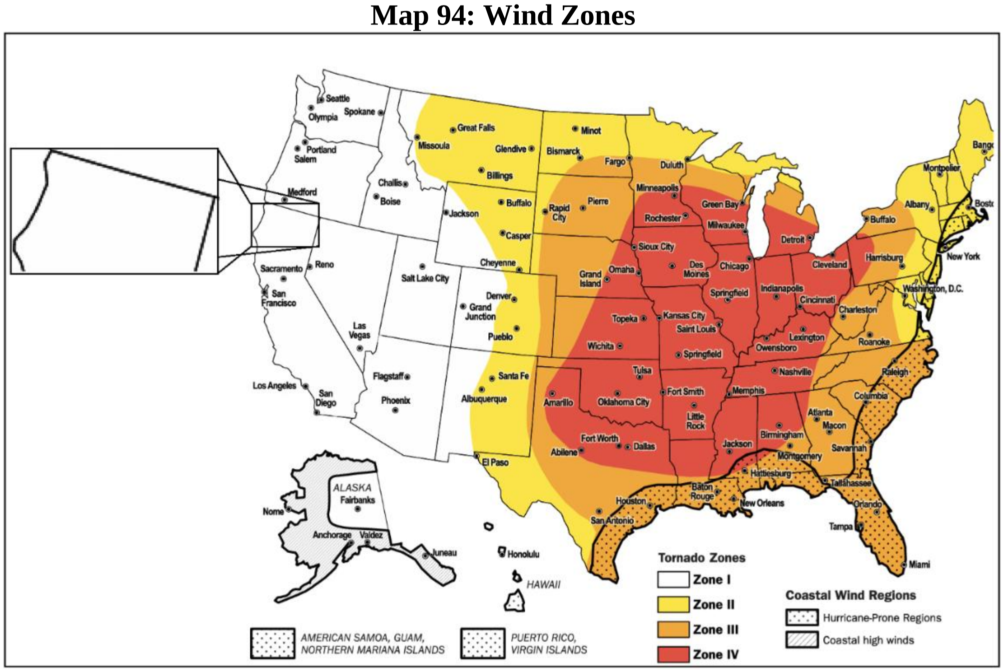
Map 93: Average Annual Lightning Events per Square Kilometer per Year, 2016 - 2023



Source: Vaisala

The following maps from FEMA indicate the highest possible expected wind speeds for Siskiyou County.

Map 94: Wind Zones



Source: FEMA

Severe winter weather occurs regularly throughout Siskiyou County. These events occur on a large geographic scale, often affecting multiple counties, regions, and states. Winter storms typically form with some warning and are often

EXHIBIT C

anticipated. Like other large storm fronts, the severity of a storm is not as easily predicted due to myriad factors that can influence its impact. Although meteorologists estimate the amount of snowfall a winter storm will drop, it is not known exactly how much snow will fall, whether or not it will form an ice storm, or how powerful the winds will be until the storm is already affecting a community.

The Northeast Snowfall Impact Scale is a scale used to assess and rank the impact of snowfall events in the northeastern United States, but allows for an idea of intensity for Siskiyou County and participating jurisdictions. It was developed by NOAA to provide a standardized way of measuring the societal and economic impacts of snowstorms. The scale takes into account factors such as snowfall amount, population density, and the area affected by the storm to determine its impact. The scale has five categories, each with its own associated impacts:

Table 110: Snowfall Impact Scale

Category	Description	Impacts
1	Notable	Light to moderate snowfall. Limited impacts on transportation and daily life. Typically localized to small areas.
2	Significant	Moderate to heavy snowfall. Widespread impacts on transportation, including delays and disruptions. Some school and business closures. Widespread power outages are rare.
3	Major	Heavy snowfall, often exceeding one foot or more. Significant transportation disruptions, including major highway closures. Widespread school and business closures. Power outages may occur, especially in areas with wet, heavy snow.
4	Crippling	Extreme snowfall, often exceeding two feet or more. Severe and prolonged transportation disruptions, including highway closures. Widespread school and business closures for an extended period. Widespread and prolonged power outages, especially in areas with ice accumulation.
5	Extreme	Exceptional snowfall, often exceeding three feet or more. Complete paralysis of transportation systems, including major highways and airports. Extended school and business closures. Widespread and prolonged power outages with significant damage to the electrical infrastructure.

Source: NOAA

The scale provides information for emergency management, public safety agencies, and the public to understand the potential impacts of a snowstorm and to prepare accordingly. It helps to quantify and communicate the severity of winter weather events, especially where snowfall can have a major impact on daily life and the economy.

Ice storms are characterized by the accumulation of freezing rain or freezing drizzle, which coats surfaces with a layer of ice. These storms can have significant impacts on transportation, infrastructure, and the environment. Ice storms occur when there's a layer of warm air above a layer of cold air near the surface. Precipitation falls as rain in the warm layer and then freezes upon contact with surfaces at or below freezing temperatures in the cold layer. The most common type of precipitation during an ice storm is freezing rain. This is rain that falls as a liquid but freezes upon contact with cold surfaces, forming a layer of ice.

The Sperry–Piltz Ice Accumulation Index is an ice accumulation and ice damage prediction index that, when combined with NWS data, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms.

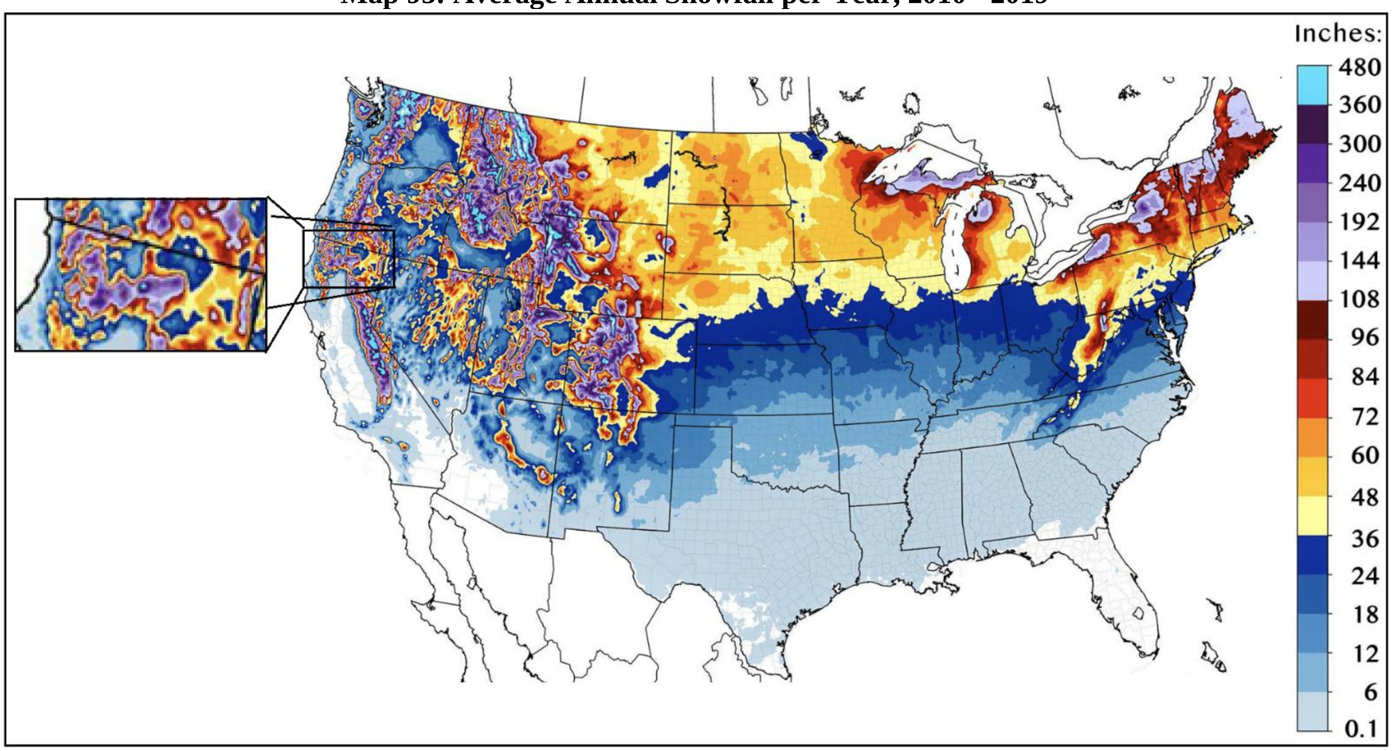
Figure 14: Sperry–Piltz Ice Accumulation Index

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Source: Sperry–Piltz Ice Accumulation Index

The following map from the NOAA National Operational Hydrologic Remote Sensing Center indicates the average annual snowfall for Siskiyou County from 2010 - 2019:

Map 95: Average Annual Snowfall per Year, 2010 - 2019



Source: NOAA National Operational Hydrologic Remote Sensing Center

EXHIBIT C

The MPC views severe weather as both a local and county-wide hazard. Discussions with the MPC and a review of all available data indicated severe weather is a community concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Siskiyou County:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Dorris:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Dunsmuir:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Etna:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Fort Jones:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Happy Camp CSD:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Lake Shastina CSD:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **McCloud CSD:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Montague:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Mt. Shasta:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Tulelake:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Weed:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.
- **Yreka:** Severe weather identified as a community concern as citizens, structures, and infrastructure are vulnerable. Continuing climate change may result in an increase in their intensity, raising community concern.

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.14.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced 11 Presidential Disaster Declarations related to severe weather and severe winter weather events reflected in the following table:

Table 111: Siskiyou County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual and Public Assistance	Mitigation Dollars Obligated
DR-4570-CA	11/21/2023	**Hurricanes** (Tropical Storm Hilary)	$5,891,570	$72,286
DR-4683-CA	1/14/2023	**Severe Winter Storms**, Flooding, Landslides, and Mudslides	$152,481,240	$11,290,426

EXHIBIT C

Table 111: Siskiyou County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual and Public Assistance	Mitigation Dollars Obligated
DR-4308-CA	4/1/2017	**Severe Winter Storms**, Flooding, Mudslides	$427,999,655	$15,012,050
DR-4301-CA	2/14/2017	**Severe Winter Storms**, Flooding, and Mudslides	$130,483,948	$22,708,200
DR-1884-CA	3/8/2010	**Severe Winter Storms**, Flooding, and Debris and Mud Flows	$28,353,445	
DR-1628-CA	2/3/2006	**Severe Storms**, Flooding, Mudslides, and Landslides	$163,229,337	
DR-1155-CA	1/4/1997	**Severe Storms**, Flooding	-	-
DR-1046-CA	3/12/1995	**California Severe Winter Storms**, Flooding, Landslides, Mud Flows	-	-
DR-979-CA	2/3/1993	**California Severe Storm**, **Winter Storm**, Mud and Landslides, Flooding	-	-
DR-412-CA	1/25/1974	**California Severe Storms**, Flooding	-	-
DR-283-CA	2/16/1970	**California Severe Storms**, Flooding	-	-

Source: FEMA
-: Not reported

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Siskiyou County has experienced no Emergency Declarations related to severe weather or severe winter weather events.

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. The following table details severe weather and severe winter weather event proclamations for Siskiyou County:

Table 112: Siskiyou County California Proclamations of State of Emergency

Designation	Declaration Date	Incident Type	Damages*
2023-09	09/12/2023	Tropical Storm Hilary	-
2023-01	01/04/2023	Winter Storm	$1,234,636,773
2017-03	03/07/2017	Severe Storms	$1,038,319,506
2017-01	01/23/2017	Severe Storms	$186,874,243
2007-02	01/12/2007	Freeze	$2,700,400
97-01	01/02/1997	Winter Storm	-
-	04/17/1972	Freeze	$111,517,260

Source: Cal OES
*: Damages reported for all impacted counties, tribal reservations, and cities
-: Not reported

Additionally, the following table presents NCEI identifies severe weather and severe winter weather events and the resulting damage totals in Siskiyou County from 1950 to 2024:

EXHIBIT C

Table 113: NCEI Siskiyou County Severe Weather Events, 1950 - 2024

County	Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Siskiyou	Hail	20	$300,000 (crop)	0
	Lightning	2	$0	1
	Thunderstorm Winds	16	$200,000	0
	Blizzard	9	$0	0
	Extreme Cold	29	$0	0
	Ice Storm	2	$0	0

Source: NCEI

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event, the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Additionally, deaths and injuries may be underreported as they may be a result of a concurrent event, such as a person driving unsafely during heavy rain and passing away.

Recent notable events include:

- **March 10, 2023:** A major winter storm led to the closure of Interstate 5 in Yreka.
- **February 24, 2023:** A major winter storm led to the closure of Interstate 5 from Ashland to the Oregon border. Some areas received over three feet of snow, closing other parts of the interstate near Weed. Mount Shasta, Weed and Dunsmuir saw up to 24 to 36 inches in some areas
- **July 23, 2003:** A thunderstorm developed over the Scott Valley around this time. While radar reports did not indicate that this storm was severe, a wet microburst propagated from it, bringing estimated 80+ mph winds to the area near the Greenview airport. A subsequent NWS Storm Survey discovered damaged structures and trees, the largest of which were compromised by wood rot. Greenview airport recorded a peak gust of 54 mph with the event. Interviews with residents yielded numerous reports of golf ball sized hail and hourly rainfall totals exceeding 1.50 inches. No spotter reports were reported to Medford during this event, and no warning was issued.
- **May 23, 2018:** A man working in a bucket truck was struck by lightning on this day. He was around 20 feet above the ground next to a 45-foot-tall tree when the tree was struck. The lightning arced from the tree and hit him in the head and shoulder area. He was severely injured but survived.

5.14.4 Probability of Future Events

Predicting the probability of severe weather occurrences is tremendously changing due to the large number of factors involved and the random nature of formation. Data and mapping from NOAA indicate that Siskiyou County can expect between 0 - 18 severe weather events per year. Additionally, Siskiyou County can expect, depending on location within the county, 18" – 240" of snow per year.

Based on historical occurrences, Siskiyou County will continue to experience severe weather events on an annual basis. The following tables, using data from the NCEI, indicate the yearly probability of a severe weather component events, the number of deaths or injuries, and estimated property damage :

Table 114: Siskiyou County NCEI Severe Weather Event Probability Summary

Event	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Hail	20	<1	0	0	$300,000 (crop)	$2,500
Lightning	2	<1	1	<1	$0	$4,000

EXHIBIT C

Table 114: Siskiyou County NCEI Severe Weather Event Probability Summary

Event	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Thunderstorm Winds	16	<1	0	0	$200,000	$2,667
Blizzard	9	<1	0	0	$0	$0
Extreme Cold	29	<1	0	0	$0	$0
Ice Storm	2	<1	0	0	$0	$0

Source: NCEI

5.14.5 Projected Changes in Location, Intensity, Frequency, and Duration

Climate change can have several impacts on severe weather, although the precise details can vary depending on regional climate patterns and other factors. In general, it is believed that climate change can alter the timing and seasonality of severe weather. In some cases, this may mean more severe weather events occurring earlier or later in the year.

Climate change can lead to increased temperatures and moisture levels in the atmosphere, which can provide favorable conditions for the development of severe weather. This can result in a higher frequency of severe weather events and an increase in their intensity. As a result of increased temperatures, warmer air can hold more moisture, leading to increased rainfall during severe weather. This can elevate the risk of flash flooding, particularly in areas prone to heavy precipitation. Changes in atmospheric circulation patterns associated with climate change can lead to stronger winds within thunderstorms. This can result in more powerful wind gusts, increasing the risk of wind damage and downed trees and power lines.

Climate change can influence the conditions necessary for hail formation. Warmer temperatures at the surface and greater instability in the atmosphere can contribute to larger and more damaging hailstones. Additionally, changes in atmospheric conditions can affect the frequency and distribution of lightning strikes. More lightning can increase the risk of wildfires in dry regions.

Climate change is altering the frequency and intensity of severe winter weather, creating seemingly paradoxical outcomes. While global temperatures are rising, warmer air holds more moisture, which can lead to increased snowfall during winter storms in colder regions. Simultaneously, disruptions in atmospheric patterns, such as the weakening of the polar vortex, can cause frigid Arctic air to spill into mid-latitudes, resulting in extreme cold snaps. Additionally, regions accustomed to consistent winter conditions such as Siskiyou County may experience more variability, with abrupt shifts between mild and severe weather. These changes complicate infrastructure planning, disrupt ecosystems, and increase risks for human populations unprepared for such extremes.

It is important to note that while there is evidence linking climate change to changes in weather patterns that can influence severe weather, predicting specific events remains changing. Climate models provide valuable insights into long-term trends, but individual severe weather events are influenced by a complex interplay of factors.

5.14.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Siskiyou County and all participating jurisdictions from severe weather. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Siskiyou County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 115: Participating Jurisdiction Hail Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Very Low	3.9	0.1
Dorris	06093000200	Very Low	32.3	0.1
Dunsmuir	06093001100	Very Low	13.0	0.1
Etna	06093000800	Very Low	24.9	0.1
Fort Jones	06093000701	Very Low	24.6	0.2
Happy Camp CSD	06093001300	Very Low	17.7	0.1
Lake Shastina CSD	06093000902	Very Low	19.8	0.2
McCloud CSD	06093001200	Very Low	7.5	0.1
Montague	06093000300	Very Low	29.3	0.2
Mt. Shasta	06093001003	Very Low	15.8	0.1
Tulelake	06093000100	Very Low	22.0	0.1
Weed	06093000901	Very Low	22.1	0.1
Yreka	06093000703	Very Low	19.3	0.2

Source: FEMA NRI

Table 116: Participating Jurisdiction Hail Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Hail EAL
Siskiyou County	All	Very Low	5.6	$2,000
Dorris	06093000200	Very Low	29.6	$283
Dunsmuir	06093001100	Very Low	11.3	$51
Etna	06093000800	Very Low	24.9	$189
Fort Jones	06093000701	Very Low	25.2	$195
Happy Camp CSD	06093001300	Very Low	15.5	$79
Lake Shastina CSD	06093000902	Very Low	21.5	$141
McCloud CSD	06093001200	Very Low	8.2	$35
Montague	06093000300	Very Low	28.6	$258
Mt. Shasta	06093001003	Very Low	17.2	$94
Tulelake	06093000100	Very Low	19.4	$116
Weed	06093000901	Very Low	18.8	$109
Yreka	06093000703	Very Low	18.2	$103

Source: FEMA NRI

Table 117: Participating Jurisdiction Lightning Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Relatively Low	31.7	3.2
Dorris	06093000200	Relatively Low	31.3	3.9
Dunsmuir	06093001100	Relatively Low	26.8	2.8
Etna	06093000800	Relatively Low	39.2	3
Fort Jones	06093000701	Relatively Moderate	54.3	5.6
Happy Camp CSD	06093001300	Relatively Low	32.1	2.4
Lake Shastina CSD	06093000902	Relatively Low	27.6	2.9
McCloud CSD	06093001200	Very Low	13.5	3
Montague	06093000300	Relatively Low	47.2	3.8
Mt. Shasta	06093001003	Relatively Low	31.3	3.4
Tulelake	06093000100	Relatively Low	20.4	3
Weed	06093000901	Relatively Moderate	51.5	4.1
Yreka	06093000703	Relatively Moderate	52.8	5.2

Source: FEMA NRI

EXHIBIT C

Table 118: Participating Jurisdiction Lightning Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Lightning EAL
Siskiyou County	All	Relatively Low	28.1	$44,000
Dorris	06093000200	Relatively Low	24.6	$1,800
Dunsmuir	06093001100	Relatively Low	22.2	$1,500
Etna	06093000800	Relatively Low	35.4	$3,100
Fort Jones	06093000701	Relatively Moderate	50.3	$5,700
Happy Camp CSD	06093001300	Relatively Low	25.6	$1,900
Lake Shastina CSD	06093000902	Relatively Low	28.1	$2,200
McCloud CSD	06093001200	Very Low	14.0	$723
Montague	06093000300	Relatively Low	41.4	$4,100
Mt. Shasta	06093001003	Relatively Low	31.4	$2,600
Tulelake	06093000100	Very Low	16.5	$940
Weed	06093000901	Relatively Low	39.2	$3,700
Yreka	06093000703	Relatively Moderate	45.8	$4,800

Source: FEMA NRI

Table 119: Participating Jurisdiction Strong Wind Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Very Low	4.0	0
Dorris	06093000200	Very Low	18.7	0.1
Dunsmuir	06093001100	Very Low	9.8	0
Etna	06093000800	Very Low	19.9	0
Fort Jones	06093000701	Very Low	20.8	0.1
Happy Camp CSD	06093001300	Very Low	20.6	0.1
Lake Shastina CSD	06093000902	Very Low	17.8	0.1
McCloud CSD	06093001200	Very Low	10.4	0
Montague	06093000300	Very Low	22.4	0.1
Mt. Shasta	06093001003	Very Low	13.0	0
Tulelake	06093000100	Very Low	14.1	0
Weed	06093000901	Very Low	17.2	0
Yreka	06093000703	Very Low	19.7	0.1

Source: FEMA NRI

Table 120: Participating Jurisdiction Strong Wind Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Strong Wind EAL
Siskiyou County	All	Very Low	6.1	$9,400
Dorris	06093000200	Very Low	18.0	$565
Dunsmuir	06093001100	Very Low	9.4	$196
Etna	06093000800	Very Low	20.4	$848
Fort Jones	06093000701	Very Low	21.4	$1,000
Happy Camp CSD	06093001300	Very Low	19.9	$778
Lake Shastina CSD	06093000902	Very Low	19.6	$730
McCloud CSD	06093001200	Very Low	12.3	$279
Montague	06093000300	Very Low	22.1	$1,200
Mt. Shasta	06093001003	Very Low	15.2	$396
Tulelake	06093000100	Very Low	13.1	$306
Weed	06093000901	Very Low	15.8	$423
Yreka	06093000703	Very Low	19.7	$751

Source: FEMA NRI

Table 121: Participating Jurisdiction Cold Wave Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Relatively Low	55.2	0
Dorris	06093000200	Relatively High	95.6	0
Dunsmuir	06093001100	No Rating	0	0
Etna	06093000800	No Rating	0	0
Fort Jones	06093000701	No Rating	0	0
Happy Camp CSD	06093001300	No Rating	0	0
Lake Shastina CSD	06093000902	No Rating	0	0
McCloud CSD	06093001200	No Rating	0	0
Montague	06093000300	No Rating	0	0
Mt. Shasta	06093001003	No Rating	0	0
Tulelake	06093000100	Relatively High	90.8	0
Weed	06093000901	No Rating	0	0
Yreka	06093000703	No Rating	0	0

Source: FEMA NRI

Table 122: Participating Jurisdiction Cold Wave Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Cold Wave EAL
Siskiyou County	All	Relatively Low	52.1	$59,000
Dorris	06093000200	Relatively High	93.3	$39,000
Dunsmuir	06093001100	No Rating	0	$0
Etna	06093000800	No Rating	0	$0
Fort Jones	06093000701	No Rating	0	$0
Happy Camp CSD	06093001300	No Rating	0	$0
Lake Shastina CSD	06093000902	No Rating	0	$0
McCloud CSD	06093001200	No Rating	0	$0
Montague	06093000300	No Rating	0	$0
Mt. Shasta	06093001003	No Rating	0	$0
Tulelake	06093000100	Relatively Moderate	87.2	$20,000
Weed	06093000901	No Rating	0	$0
Yreka	06093000703	No Rating	0	0

Source: FEMA NRI

Table 123: Participating Jurisdiction Ice Storm Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Not Applicable	Not Applicable	0
Dorris	06093000200	Not Applicable	Not Applicable	0
Dunsmuir	06093001100	Not Applicable	Not Applicable	0
Etna	06093000800	Not Applicable	Not Applicable	0
Fort Jones	06093000701	Not Applicable	Not Applicable	0
Happy Camp CSD	06093001300	Not Applicable	N0t Applicable	0
Lake Shastina CSD	06093000902	Not Applicable	Not Applicable	0
McCloud CSD	06093001200	Not Applicable	Not Applicable	0
Montague	06093000300	Not Applicable	Not Applicable	0
Mt. Shasta	06093001003	Not Applicable	Not Applicable	0
Tulelake	06093000100	Not Applicable	Not Applicable	0
Weed	06093000901	Not Applicable	Not Applicable	0
Yreka	06093000703	Not Applicable	Not Applicable	0

Source: FEMA NRI

Table 124: Participating Jurisdiction Ice Storm Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Ice Storm EAL
Siskiyou County	All	Not Applicable	Not Applicable	$0
Dorris	06093000200	Not Applicable	Not Applicable	$0
Dunsmuir	06093001100	Not Applicable	Not Applicable	$0
Etna	06093000800	Not Applicable	Not Applicable	$0
Fort Jones	06093000701	Not Applicable	Not Applicable	$0
Happy Camp CSD	06093001300	Not Applicable	Not Applicable	$0
Lake Shastina CSD	06093000902	Not Applicable	Not Applicable	$0
McCloud CSD	06093001200	Not Applicable	Not Applicable	$0
Montague	06093000300	Not Applicable	Not Applicable	$0
Mt. Shasta	06093001003	Not Applicable	Not Applicable	$0
Tulelake	06093000100	Not Applicable	Not Applicable	$0
Weed	06093000901	Not Applicable	Not Applicable	$0
Yreka	06093000703	Not Applicable	Not Applicable	$0

Source: FEMA NRI

Table 125: Participating Jurisdiction Winter Weather Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Relatively Low	35.6	11
Dorris	06093000200	Relatively Low	28.8	3.4
Dunsmuir	06093001100	Relatively Moderate	68.2	15.2
Etna	06093000800	Relatively Moderate	71.4	13.4
Fort Jones	06093000701	Relatively Low	49.3	4.4
Happy Camp CSD	06093001300	Relatively Moderate	65.2	12
Lake Shastina CSD	06093000902	Relatively Moderate	73.5	6
McCloud CSD	06093001200	Relatively Low	51.8	14.2
Montague	06093000300	Relatively Low	53.0	9.6
Mt. Shasta	06093001003	Relatively Moderate	73.5	14.7
Tulelake	06093000100	Relatively Low	25.7	5.4
Weed	06093000901	Relatively Moderate	60.1	6.5
Yreka	06093000703	Relatively Low	46.4	3.6

Source: FEMA NRI

Table 126: Participating Jurisdiction Winter Weather Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Winter Weather EAL
Siskiyou County	All	Relatively Low	36.5	$27,000
Dorris	06093000200	Relatively Low	27.2	$208
Dunsmuir	06093001100	Relatively Moderate	62.7	$2,500
Etna	06093000800	Relatively Moderate	68.9	$3,400
Fort Jones	06093000701	Relatively Low	48.1	$1,200
Happy Camp CSD	06093001300	Relatively Low	58.4	$2,000
Lake Shastina CSD	06093000902	Relatively Low	45.4	$1,000
McCloud CSD	06093001200	Relatively Low	51.9	$1,500
Montague	06093000300	Relatively Low	49.5	$1,300
Mt. Shasta	06093001003	Relatively Moderate	74.1	$4,500
Tulelake	06093000100	Very Low	24.6	$130
Weed	06093000901	Relatively Low	51.7	$1,500
Yreka	06093000703	Relatively Low	43.1	$899

Source: FEMA NRI

Population
Severe weather can have a wide range of effects on all jurisdictional citizens, often posing significant risks to life, property, and general well-being. In the absence of proper shelter, hail, lightning, and high winds can cause serious injury. In general, if potentially exposed persons take shelter in a solid, well-constructed structure protection from these severe weather components would be provided. However, old or poorly constructed facilities may be more prone to damage, potentially increasing the impact on economically disadvantaged populations. Some of the potential effects of severe weather on people may include:

- **Death and Injury:** Severe weather can produce lightning and strong winds driving debris. Both of these elements can cause injuries or fatalities.
- **Power Outages:** Lightning strikes, strong winds, and falling trees can lead to power outages, disrupting daily life, and potentially affecting essential services, such as medical equipment and refrigeration.
- **Mental Health Impact:** Severe weather can be frightening and stressful, leading to anxiety and post-traumatic stress disorder in some individuals. The emotional toll of property damage and loss can also be significant.
- **Displacement:** People may need to evacuate their homes or be temporarily displaced due to storm damage, requiring emergency shelter and support.
- **Economic Costs:** Severe weather results in economic costs, including repair and recovery expenses, insurance claims, and potential loss of income due to property damage or work disruptions.
- **Public Safety Response:** Severe weather can strain public safety resources, including emergency services, law enforcement, and medical facilities.

At greater risk may be the vulnerable populations and equity priority communities, including the especially young, the elderly, and those below the poverty level. Hazard occurrences can exacerbate existing vulnerabilities and create new challenges.

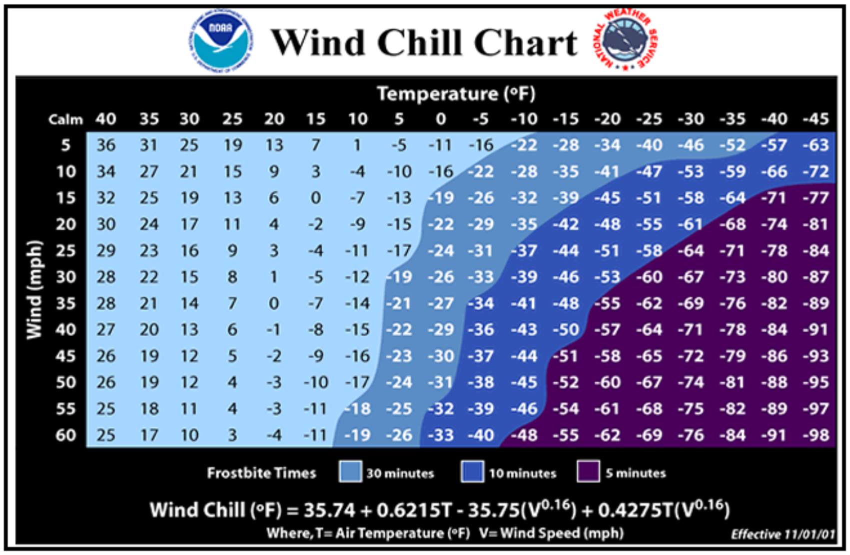
Winter weather, and the extremely cold temperatures that often accompany it, is a threat to anyone exposed to them. Extreme cold can cause frostbite and hypothermia. Bitterly cold temperatures can also burst water and create an excessive demand on providers to deliver energy for household heating. There are also fire dangers associated with home heating. Heavy snow and/or ice can paralyze communities. Roads can become hazardous which may cause accidents, disrupted flow of supplies, and challenges in the delivery of emergency and medical services. Additional impacts on people and the community may include:

- **Injuries and Fatalities:** Slippery sidewalks, roads, and driveways can lead to slip and fall accidents, vehicle crashes, and pedestrian injuries. Exposure to extreme cold temperatures can cause frostbite, hypothermia, and cold-related illnesses, which can be life-threatening.
- **Power Outages:** Heavy snow, ice, and freezing rain can bring down power lines and disrupt electricity supply. Power outages can lead to heating and lighting challenges, particularly in extreme cold conditions.
- **Transportation Disruptions:** Winter storms can make roads and highways treacherous, leading to travel delays, accidents, and stranded motorists. Public transportation services may be disrupted, affecting commuters and essential travel.
- **Stranded or Isolated Communities:** Severe winter weather can leave communities isolated and cut off from emergency services and supplies. Residents may need to shelter in place or rely on local resources until conditions improve.
- **Health Risks:** Exposure to extreme cold can lead to a range of health risks, including frostbite, hypothermia, and cold-related illnesses. Individuals with pre-existing health conditions may face exacerbated risks.
- **Increased Heating Costs:** Cold weather can result in higher heating costs, which can be a financial burden for many households. Low-income individuals and families may struggle to afford adequate heating.
- **Disruption of Essential Services:** Severe winter weather can disrupt essential services such as healthcare, emergency response, and utilities. Hospitals may face increased patient volumes due to weather-related injuries and illnesses.

EXHIBIT C

When extremely cold temperatures are accompanied by strong winds the result can be potentially lethal wind chills. Wind chill is the temperature your body feels when the air temperature is combined with the wind speed and is based on the rate of heat loss from exposed skin caused by the effects of wind and cold. As the speed of the wind increases, it can carry heat away from your body much more quickly, causing skin temperature to drop. The wind chill chart shows the difference between the actual air temperature and the perceived temperature due to wind, and amount of time until frostbite occurs.

Chart 29: Wind Chill Chart



Wind Chill Chart

Temperature (°F)

Wind (mph)	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

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill } (°F) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T = Air Temperature (°F) V = Wind Speed (mph)

Effective 11/01/01

Source: NOAA

All Siskiyou County and participating jurisdiction populations are vulnerable to the impacts of severe weather. Please see Section 3.3: Population Data and Section 3.4: Socially Vulnerable and At-Risk Populations for data concerning jurisdictional populations.

Buildings and Structures

All buildings and structures within Siskiyou County and participating jurisdictions, including historic buildings, can be impacted by severe weather and severe winter weather. However, the location and construction of the facility will have a significant impact on the vulnerability. In general, older structures would be at higher risk of negative impacts. Some of the potential impacts include:

- **Electrical Infrastructure Damage:** Severe weather can damage electrical infrastructure, including power lines, transformers, and substations. This can result in widespread power outages, affecting homes, businesses, hospitals, and other critical facilities.
- **Communication Disruptions:** Severe weather can disrupt telecommunications infrastructure, including cell towers, data centers, and communication networks. This can impact emergency communication and coordination efforts.
- **Safety Risks:** Damage to infrastructure can pose safety risks to workers and the public. Fallen power lines, damaged buildings, and debris can be hazardous.
- **Building Damage:** Heavy snow or ice loads can cause damage to the building.

Governmental Operations

Severe weather and severe winter weather can pose various risks to government operations. These risks can have significant economic and operational consequences, and can include:

- **Power Outages:** Severe weather can lead to power outages by damaging electrical infrastructure such as power lines and substations. Government buildings may lose power, affecting critical operations and services.

EXHIBIT C

- **Flooding:** Heavy rainfall during severe weather or rapid melting of snow during severe winter weather can lead to flooding, which can damage government buildings and disrupt operations. Flood damage may require extensive repairs and cleanup.
- **Communication Disruptions:** Severe weather can damage communication equipment, including telephone lines and computer systems. This can hinder communication between government agencies and the public.
- **Transportation Disruptions:** Severe weather can make roads impassable due to flooding, snow, or ice. This can impact the ability of government employees to commute to work.
- **Budgetary Impact:** The costs associated with repairing and restoring government buildings and infrastructure after severe weather can strain budgets.

Transportation and Electrical Infrastructure
In general, severe weather components do not have a large impact on transportation infrastructure, with the exception of power loss disrupting signaling and poor conditions impacting driving conditions.

Severe weather can have significant impacts on electrical utilities, leading to disruptions in power supply and potential damage to infrastructure. Severe weather can affect electrical utilities in the following ways:

- **Lightning Strikes:** Lightning is a common occurrence during severe weather and poses a substantial risk to electrical infrastructure. Lightning strikes can damage power lines, transformers, substations, and other critical components, leading to power outages.
- **Wind Damage:** High winds associated with severe weather can cause trees, branches, and other debris to fall onto power lines. This can result in downed power lines, structural damage to utility poles, and disruptions in electrical service.
- **Hailstorms:** Severe weather may produce hail, which can damage power lines, transformers, and other equipment. Hailstones can also lead to short circuits and insulation damage on electrical components.
- **Power Surges:** Lightning strikes, strong winds, and other storm-related events can lead to power surges in the electrical grid. These surges can damage electronic devices, appliances, and utility equipment connected to the power supply.

Winter weather can have significant impacts on road infrastructure, creating changing conditions for transportation and necessitating proactive measures for maintenance and safety. Winter storms can impact road infrastructure:

- **Snow Accumulation:** Snowfall can accumulate on road surfaces, creating slippery and hazardous conditions for drivers. Accumulated snow can reduce road visibility and make travel difficult.
- **Ice Formation:** Freezing temperatures can lead to the formation of ice on roadways, increasing the risk of accidents and making roads slippery. Black ice, which is nearly invisible, poses a particular hazard.
- **Snowdrifts:** Strong winds during winter storms can lead to the formation of snowdrifts on roads, especially in open areas. These drifts can obstruct visibility and impede traffic flow.
- **Road Surface Damage:** The freeze-thaw cycle, where melted snow refreezes, can lead to the formation of ice patches and potholes on road surfaces. This cycle can contribute to the deterioration of road infrastructure over time.
- **Freeze-Thaw Cycling:** Alternating freezing and thawing can cause the expansion and contraction of water within pavement cracks, leading to the formation and enlargement of potholes.
- **Snowplow and Deicing Operations:** Snowplows and deicing operations are necessary to clear roads and improve driving conditions. However, the use of salt and chemicals for deicing can contribute to corrosion and deterioration of road surfaces and infrastructure.
- **Infrastructure Stress:** Bridges and overpasses are particularly susceptible to ice formation due to the lack of ground contact. Winter storms can stress these structures, potentially leading to structural issues over time.

EXHIBIT C

Significant cost can be incurred for snow removal from transportation routes. In smaller jurisdictions with fewer resources and equipment, the cost may be on the lower end of the spectrum, ranging from a few thousand dollars to around $10,000 per snow event. In larger counties or urban areas with extensive road networks and higher population densities, the cost can be much higher, potentially ranging from $10,000 to $50,000 or more per snow event.

In general, the priority for snow removal is based on traffic volume, speed limits and road surface types. Preference is generally given in the following order:

- State trunklines
- Primary roads
- Major local roads
- Residential / subdivision streets

Severe weather can have significant impacts on electrical utilities, leading to disruptions in power supply and potential damage to infrastructure. Severe weather can affect electrical utilities in the following ways:

- **Lightning Strikes:** Lightning is a common occurrence during severe weather and poses a substantial risk to electrical infrastructure. Lightning strikes can damage power lines, transformers, substations, and other critical components, leading to power outages.
- **Wind Damage:** High winds associated with severe weather can cause trees, branches, and other debris to fall onto power lines. This can result in downed power lines, structural damage to utility poles, and disruptions in electrical service.
- **Hailstorms:** Severe weather may produce hail, which can damage power lines, transformers, and other equipment. Hailstones can also lead to short circuits and insulation damage on electrical components.
- **Power Surges:** Lightning strikes, strong winds, and other storm-related events can lead to power surges in the electrical grid. These surges can damage electronic devices, appliances, and utility equipment connected to the power supply.

Severe winter weather can impact electrical utilities in various ways, potentially leading to disruptions in service. These impacts include:

- **Power Outages:** Low temperatures can strain electrical systems, leading to increased demand for heating systems. This heightened demand can overload power grids, resulting in power outages.
- **Equipment Failure:** Electrical equipment, such as cables and switches, may experience higher stress during extremely cold weather, increasing the likelihood of equipment failures.
- **Icing on Power Lines:** Ice accumulation on power lines can lead to increased weight, potentially causing lines to sag or break. This can result in power outages and safety hazards.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities
In general, severe weather and severe winter weather components do not have a large impact on water and wastewater infrastructure and operations. However, the cascading impacts from an event such as power loss disrupting pumping and treatment capabilities, localized flooding from heavy overwhelming drainage systems, or frozen pipes in water distribution systems may cause system disruptions.

EXHIBIT C

Medical, Education, and Response Facilities

Severe weather and severe winter weather can significantly impact emergency response infrastructure, creating challenges for first responders and organizations involved in managing and mitigating the effects of severe weather events. Sever weather can impact emergency response through:

- **Transportation Disruptions:** Debris or snow and ice accumulation on roads can hinder the ability of emergency vehicles to navigate and reach affected areas promptly. Hazardous road conditions may result in delays in response times.
- **School Closures:** Severe weather can lead to the closure of schools due to hazardous conditions. This can strain caregivers and result in lower work attendance.
- **Communication Disruptions:** Severe weather can disrupt communication networks, affecting the ability of emergency responders to coordinate and communicate effectively. Downed power lines and damage to communication infrastructure contribute to these disruptions.
- **Power Outages:** Severe weather, including high winter and ice storms, can lead to power outages. Emergency response facilities, such as command centers and fire stations, may lose power, affecting their operational capabilities.
- **Exposure:** Emergency responders face increased health and safety risks in severe weather conditions. Exposure to hail, high winds, extreme cold, snow, and ice can impact the well-being of responders and affect their ability to provide effective assistance.
- **Resource Allocation Challenges:** Severe weather often requires the allocation of additional resources, including personnel, equipment, and supplies, to address immediate needs. This can strain emergency response organizations and impact their ability to respond to other concurrent incidents.
- **Increased Demand for Services:** Severe weather can result in an increased demand for emergency services, including medical assistance, search and rescue operations, and responses to accidents. Emergency response organizations may need to manage a higher volume of incidents simultaneously. Severe winter weather can increase the demand for emergency shelters, particularly in cases of widespread power outages. Setting up and managing these shelters can strain resources.

Communication Systems

All communication systems within Siskiyou County are at risk to severe weather and severe winter weather. Severe storms and winter weather can disrupt vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Infrastructure Damage:** High winds, heavy rainfall, and other severe weather conditions can cause physical damage to communication infrastructure such as cell towers, antennas, cables, and data centers. This damage can result in network outages and disruptions.
- **Power Outages:** Severe storms often lead to power outages, which can affect the operation of communication networks. Without a stable power supply, cell towers, data centers, and other critical components may become non-functional, leading to service interruptions.
- **Lightning Strikes:** Lightning poses a threat to communication infrastructure. Direct strikes or induced surges can damage electronic equipment, leading to the need for repairs or replacements and causing downtime.
- **Signal Interference:** Severe storms can create electromagnetic interference that disrupts radio signals used in wireless communication. This interference can lead to poor signal quality, dropped calls, and slower data speeds.
- **Loss of Backhaul Connectivity:** Severe weather events can damage the backhaul infrastructure that connects various communication nodes. This backbone infrastructure is crucial for transmitting data between local and regional networks, and any disruption can impact overall network performance.
- **Communication Tower Instability:** High winds and extreme weather conditions can compromise the stability of communication towers. If towers are not designed to withstand severe weather, they may collapse, leading to network outages.

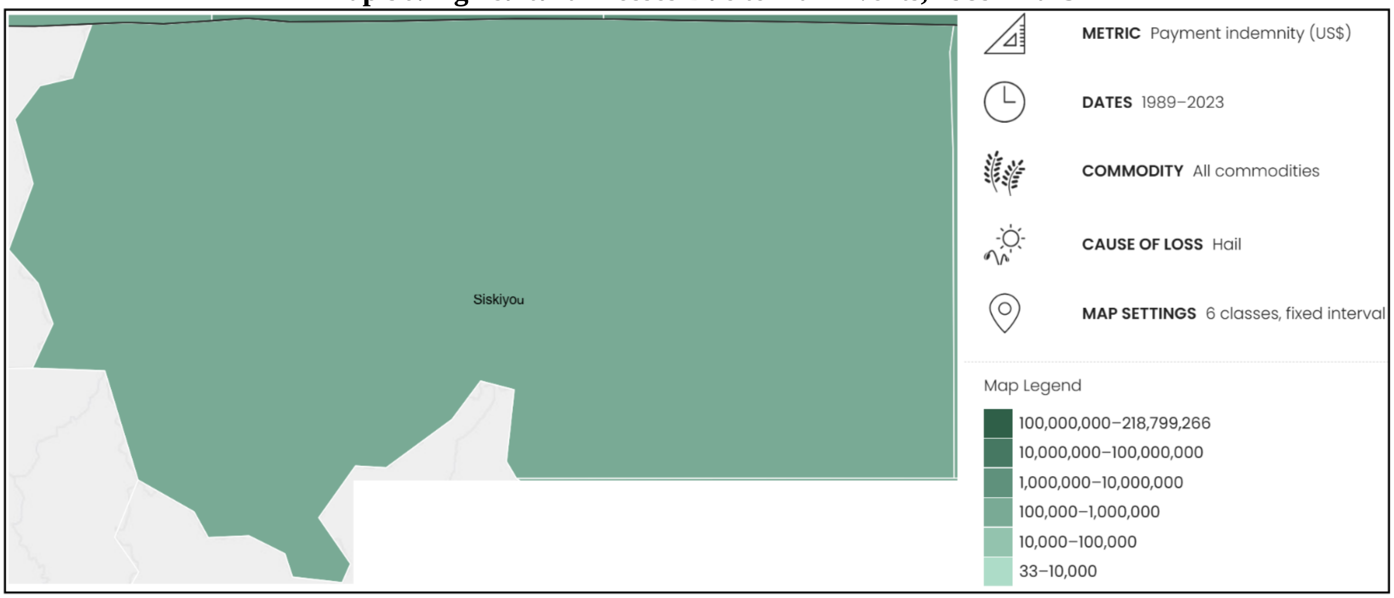
- **Network Congestion:** In the event of a disaster, communication networks may experience a surge in usage as people attempt to contact emergency services, friends, and family. This increased demand can lead to network congestion, making it difficult for users to connect.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.8.6.

Environmental and Agricultural Impacts

Hail events can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to hail events from 1989 - 2023:

Map 96: Agricultural Losses Due to Hail Events, 1989 - 2023

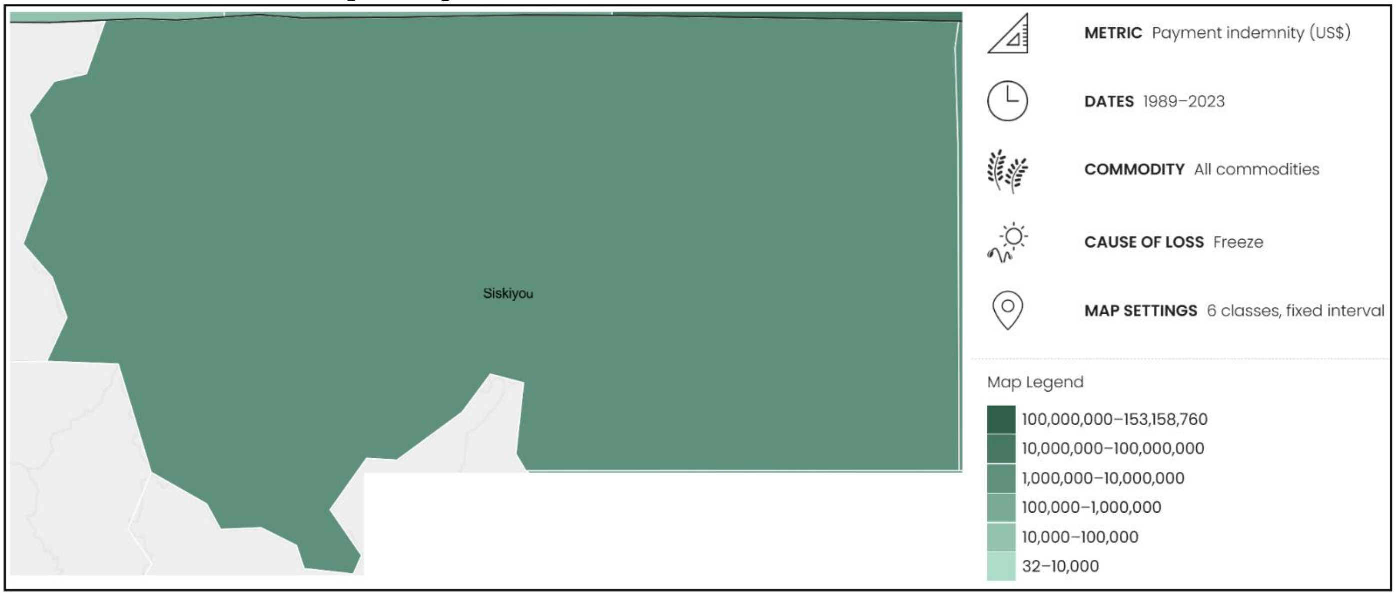


Source: USDA

Severe winter weather conditions can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to freeze events from 1989 - 2023:

EXHIBIT C

Map 97: Agricultural Losses Due to Freeze Events, 1989 - 2023



Source: USDA

Severe weather can pose various risks to the environment. These risks can have both short-term and long-term impacts on natural ecosystems. Severe weather can produce heavy rainfall over a short period of time, leading to flash floods and riverine flooding. This can result in soil erosion, damage to aquatic habitats, and the displacement of aquatic organisms. Large hailstones can damage crops, vegetation, and natural habitats. Hail can strip leaves from trees and plants, reducing their ability to photosynthesize and grow. It can also damage wildlife habitats. Severe weather often produces strong straight-line winds. These winds can uproot trees, damage forests, and disrupt animal habitats. They can also scatter debris and cause structural damage to buildings, which can lead to further environmental issues if hazardous materials are released. Lightning is a common occurrence during severe weather and can spark wildfires. These wildfires can have significant ecological impacts, including habitat destruction, loss of wildlife, and changes in the local ecosystem.

Severe winter weather can have various impacts on the environment, particularly in regions prone to cold and snowy winters. These impacts can affect ecosystems, wildlife, and natural resources and can include habitat disruption, reduction of food sources, changes in migration patterns, and damage to foliage (especially if a spring storm). Additionally, the use of salt and de-icing chemicals on roads and sidewalks can have negative environmental impacts. These chemicals can find their way into nearby water bodies, leading to water pollution and harm to aquatic ecosystems. Snowmelt can also introduce pollutants from roadways and urban areas into rivers and streams, leading to reduced water quality. Elevated sediment levels and changes in water temperature can also affect aquatic life.

Jurisdictional Concerns:
As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Dorris:** With limited services, severe weather may cut the community off from necessary services due to limited road access.
- **Dunsmuir:** With 16.1% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather events may impact tourism and impact popular community events like the Dunsmuir Steampunk Festival, River and Rail Brewfest, lowering potential community revenue.
- **Etna:** With 15.6% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism and

EXHIBIT C

impact popular community events like the Trails End Music Festival, lowering potential community revenue. With limited services, severe weather may cut the community off from necessary services due to limited road access

- **Fort Jones:** With 23.4% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism and impact popular community events like the Fort Jones Fall Festival, lowering potential community revenue. With limited services, severe weather may cut the community off from necessary services due to limited road access.
- **Happy Camp CSD:** With 21.0% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism, lowering potential community revenue. With limited services, severe weather may cut the community off from necessary services due to limited road access
- **Lake Shastina CSD:** Severe weather conditions may impact tourism and recreation industries.
- **McCloud CSD:** With 13.3% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Severe weather conditions may impact tourism and recreation industries.
- **Montague:** With 17.2% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism and impact popular community events like the Montague Hot Air Balloon Fair and Montague Freedom Festival, lowering potential community revenue.
- **Mt. Shasta:** Severe weather conditions may impact tourism and recreation industries, such as the Mt. Shasta Blackberry Festival.
- **Tulelake:** With 41.8% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism, impacting potential community revenue. With limited services, severe weather may cut the community off from necessary services due to limited road access.
- **Weed:** With 32.7% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism and impact popular community events.
- **Yreka:** With 22.6% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism and impact popular community events like the Siskiyou Golden Fair, lowering potential community revenue.

Cascading Impacts

Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with severe weather may include:

- Direct physical damage to buildings and structures:
- Transportation infrastructure disruption
- Power outages and electrical grid disruption
- Communication system disruption
- Transportation and supply chain disruptions
- Environmental and ecological damage
- Economic impacts and business closures
- Emergency services overload

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 127: Severe Weather Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Severe weather can cause extensive property damage, loss of utility service, and injury to the public. Those most at-risk are low-income and homeless individuals without proper shelter.
Impact on Responders	First responders may be unable to access roadways due to flooding, trees, or debris. Exposure to lightning, flooding, and high winds may cause injuries to first responders. Vehicles and resources may be damaged, leading to impaired response activities. In addition, road conditions may become hazardous as a result of the by-products
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Severe Weather may impact an agency's ability to maintain continuity of operations due to power outages, flooding, and wind damage. If the activation of alternate facilities was required, travel may be difficult as well as computer/network access due to long-term power outages caused by severe weather.
Delivery of Services	Delivery of services may be impaired by flooding, obstruction, and damage to roadways and resources. The ability to deliver goods and services will be impacted locally, regionally, or statewide depending on the magnitude of the event. Goods, equipment, and vehicles may become damaged during transport.
Property, Facilities, and Infrastructure	Power lines and power generators are most at risk from severe weather and impacts could result in isolated power outages or full-scale blackouts. Building and vehicle damage can occur from hail and other debris created by severe weather. Properties and critical facilities also may face foundational and physical damage due to flooding, lightning strike, or excessive winds, delaying response and recovery operations.
Impact on Environment	Waste and debris from damaged treatment infrastructure or hazardous materials facilities could contaminate sources of water and food. Debris can impact and contaminate wildlife and natural areas. Lightning strikes may also ignite fires, leading to destruction of agricultural crops, critical ecosystems, and natural habitats.
Economic Conditions	Flooding, high winds, lightning, and hail can stress local resources. Even if some of the costs can be recouped through federal reimbursements (federal disaster declaration), there is a fiscal impact on the local government.
Public Confidence in Governance	Ineffective response can decrease the public's confidence in the ability to respond and govern. Governmental response across local, state, regional, and federal levels require direct actions that must be immediate and effective to maintain public confidence.

Table 128: Severe Winter Weather Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Freezing temperatures coupled with heavy snow accumulation can cause dangerous travel conditions, leading to accidents and road closures. Downed power lines can lead to a loss of electricity and heat, with the young and the elderly especially vulnerable. Extremely cold temperatures may lead to hypothermia and death.
Impact on Responders	Dangerous road conditions create transportation challenges for first responders. First responders will need to control their own exposure to the elements for prolonged periods of time and will need to continuously seek heat and shelter to stay warm. Equipment may also be damaged or destroyed due to cold temperatures, heavy wind, ice, and heavy snowfall, which may lead to a decrease in response capabilities.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary. Severe winter weather may impact an agency's ability to maintain operations due to power outages and transportation difficulties. If the activation of alternate facilities was

EXHIBIT C

Table 128: Severe Winter Weather Consequence Analysis

Subject	Potential Impacts
	required, travel may be difficult. Additionally, computer/network and other communication access may be impacted due to power outages.
Delivery of Services	The ability to deliver services can be impacted locally, regionally, or statewide depending on the severity of the severe winter weather event. Dangerous road conditions may lead to roadway and bridge closures, as well as transit service disruptions. Businesses and places of commerce may completely shut down, which leads to the disruption of goods and services.
Property, Facilities, and Infrastructure	Transportation, governmental operations, and communications may be heavily disrupted. Roads and bridges may be heavily impacted by severe winter weather, and may be completely obstructed by downed trees, powerlines, and snow accumulation. Snow and ice can impact access to homes and critical facilities such as hospitals, schools, and supermarkets. Power loss can lead to disruption of critical infrastructure and technology.
Impact on Environment	Heavy snow and ice accumulation can weigh down and damage vegetation, tree limbs, and power lines. Flooding may also occur after the rapid melting of a heavy snowfall, causing bodies of water to flood, damaging the surrounding areas. Exposure to extreme winter weather may result in animal death. Chemicals used to treat roadways may contaminate natural environments and water reservoirs if used in large quantities.
Economic Conditions	Severe winter weather poses a fiscal impact on the governments, even if some of those costs can be recouped through federal grant reimbursements. Local, county, and state resources may be drained by a severe winter weather event.
Public Confidence in Governance	The public's confidence in governance is affected by immediate local and state response through direct and effective actions. Efficiency in response and recovery operations is critical in keeping public confidence high.

5.14.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, any additional growth would place additional populations at risk. Should any population increase occur, potentially vulnerable populations could face disproportionate effects.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. Of particular concern when considering housing data is mobile home residences. Mitigating this concern, all jurisdictions have seen a consistent decline in the percentage of mobile homes as part of housing stock. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires.

Future land use planning should be proactive to address future hazard conditions. Current building codes provide for sound construction practices to mitigate potential impacts of severe weather. A continued enforcement of building codes is expected to decrease future vulnerability.

5.14.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the extreme heat hazard.

EXHIBIT C

Table 129: Example Severe Weather Mitigation Actions

Category	Example Action
Planning and Regulation	Review building codes and structural policies to ensure they are adequate to protect older structures from wind damage.
	Require tie-downs with anchors and ground anchors appropriate for the soil type for manufactured homes.
	Incorporate passive ventilation in the site design. Passive ventilation systems use a series of vents in exterior walls or at exterior windows to allow outdoor air to enter the home in a controlled way.
	Establish standards for all utilities regarding tree pruning around lines.
	Inspect utility poles to ensure they meet specifications and are wind resistant.
	Ensure the development and enforcement of building codes for roof snow loads.
Infrastructure	Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.
	Install and maintain surge protection on critical electronic equipment.
	Retrofit buildings with load-path connectors to strengthen the structural frames.
	Avoid placing flag poles or antennas near buildings.
	Protect traffic lights and other traffic controls from high winds.
	Add building insulation to walls and attics.
Natural Systems	Properly maintain stream and river channels to ensure flow.
	Use living snow fences (e.g., rows of trees or other vegetation) to limit blowing and drifting of snow over critical roadway segments.
Education	Develop a lightning brochure for distribution by recreation equipment retailers or outfitters in mountainous areas.
	Educate design professionals to include wind mitigation during building design.
	Instruct property owners on how to properly install temporary window coverings before a storm.
	Produce and distribute family and traveler emergency preparedness information about severe winter weather hazards.
	Organize outreach to vulnerable populations, including establishing and promoting accessible heating centers in the community.

EXHIBIT C

5.15 Subsidence

5.15.1 Hazard Description

Land subsidence is the gradual sinking or sudden lowering of the Earth's surface due to the loss of support beneath the ground. It is typically caused by natural processes or human activities, such as groundwater extraction, mining, oil and gas extraction, and the collapse of underground cavities. It leads to a change in elevation and slope of the land, which can result in significant environmental and structural damage. Causes of land subsidence include:

- **Groundwater Extraction:** The most common cause of subsidence, especially in agricultural regions. When large amounts of groundwater are pumped out, the land above the depleted aquifer compacts and lowers.
- **Mining:** Underground mining removes material that supports the overlying layers of earth. When the support is removed, the ground may collapse, causing subsidence.
- **Oil and gas extraction:** Similar to groundwater extraction, removing oil and gas can lead to a drop in pressure underground, causing the surface to sink.
- **Karst topography:** In areas where the bedrock is limestone, gypsum, or salt, natural dissolution of these minerals by water can create sinkholes or underground voids, leading to localized land subsidence.
- **Tectonic activity:** Earthquakes or slow tectonic shifts can cause subsidence in some regions.

Subsidence may manifest in many ways, including:

- **Regional Subsidence:** Subsidence over a wide area, such as an entire city or agricultural region, often as a result of extensive groundwater extraction or oil and gas withdrawal.
- **Sinkholes:** These form when the ground collapses into a subterranean cavity or void. These are common in areas with karst geology, where limestone or other soluble rocks dissolve over time.
  - **Cover-Collapse Sinkhole:** A sudden collapse of the surface, usually in areas with unstable bedrock or where water has eroded underground spaces.
  - **Cover-Subsidence Sinkhole:** A more gradual process, where loose material on the surface falls into voids in the bedrock, causing a slow sink.
- **Tectonic Subsidence:** This form of subsidence occurs as a result of geological or tectonic movements, such as earthquakes or volcanic activity, leading to a lowering of the ground.

5.15.2 – Location and Extent

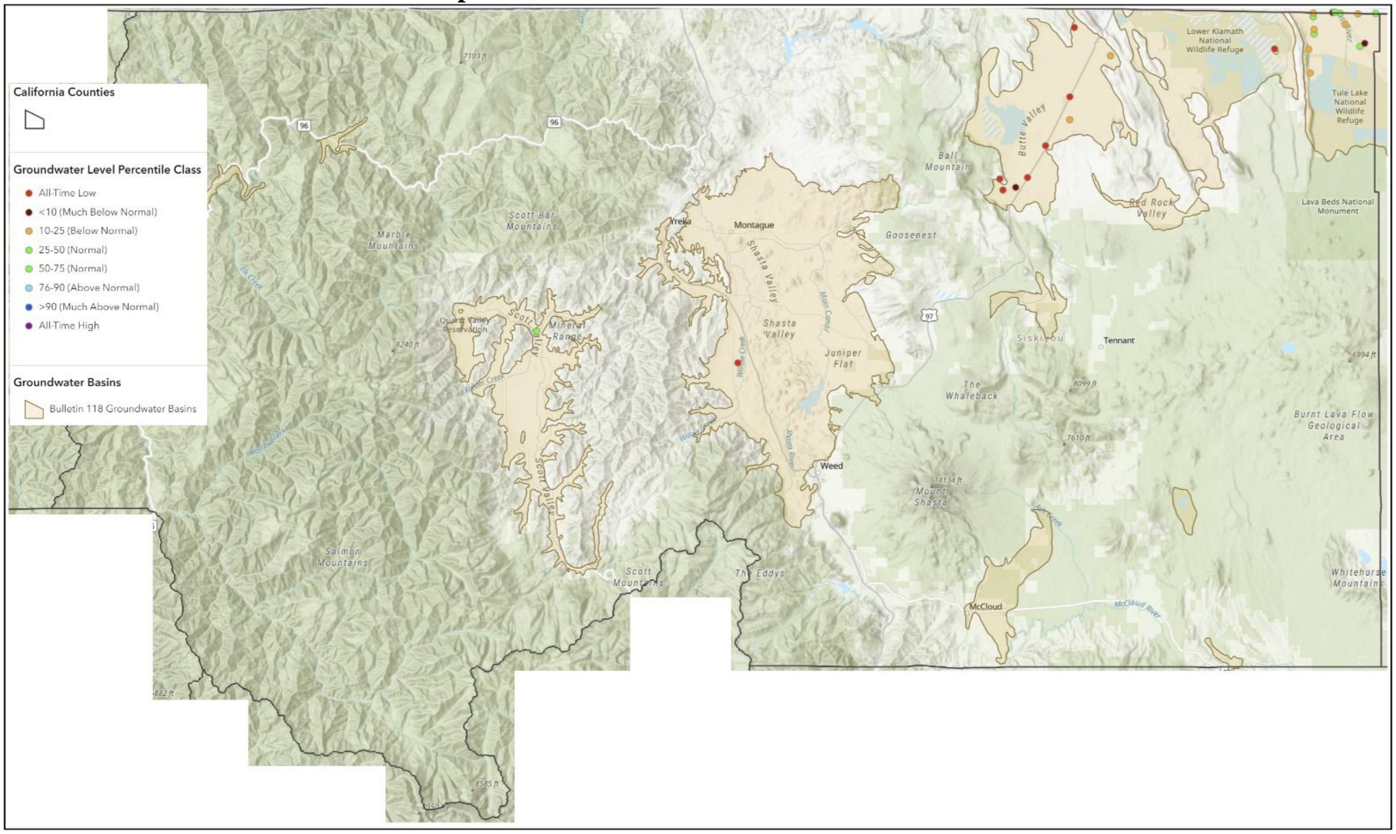
> ***Public Comment:** Tulelake has major subsidence occurring in the community currently…*

Groundwater over extraction is a leading cause of subsidence in Siskiyou County, especially in the areas surrounding Tulelake. Measurements of land-surface elevations, aquifer-system compaction, and water levels are used to determine changes in surface elevation. Elevation change measurements are fundamental to monitoring land subsidence, and conducted using radar, GPS measurements, or surveying, while aquifer-system compaction is measured by using extensometers

The following map, from the California Natural Resources Agency, shows the current groundwater level percentile class for Siskiyou County. Of concern are the areas in and around Tulelake, which are indicated to be at an all-time low:

EXHIBIT C

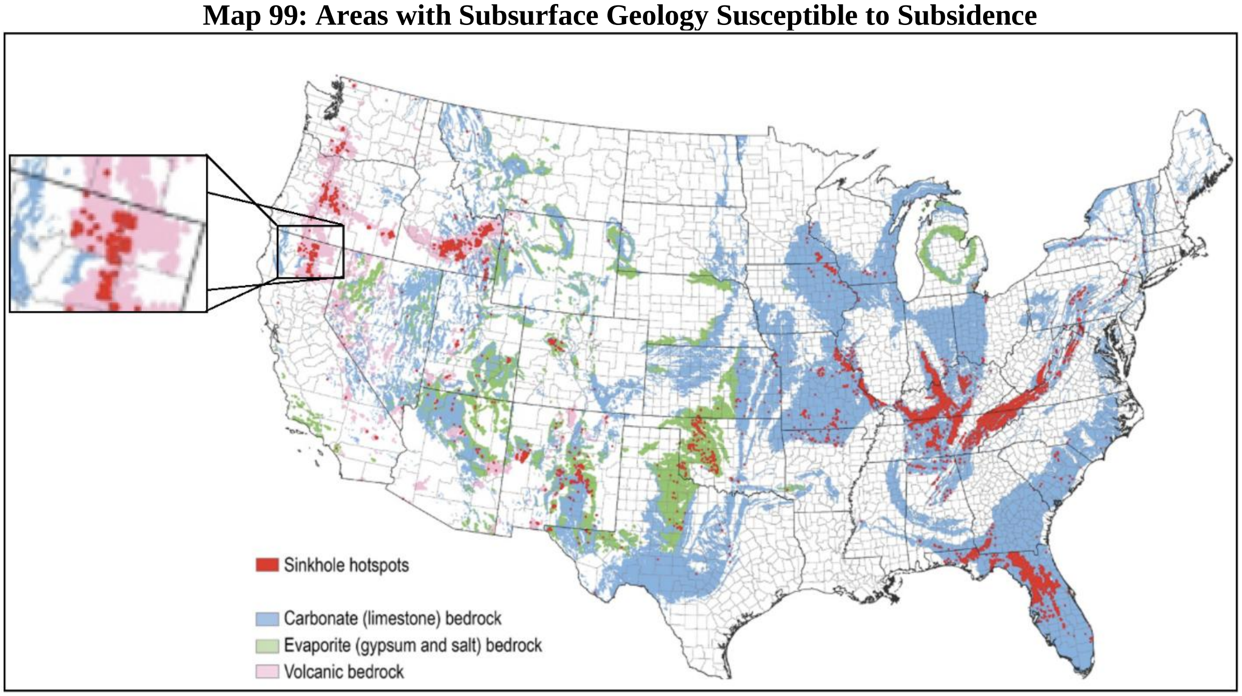
Map 98: Groundwater Level Percentile Class



Source: California Natural Resources Agency

The following map shows karst areas of the continental United States having sinkholes in soluble rocks (carbonates and evaporites), as well as insoluble volcanic rocks that contain sinkholes. The volcanic bedrock areas contain lava tubes that are voids left behind by the subsurface flow of lava, rather than from the dissolution of the bedrock. Hot spots of sinkhole activity are also shown in areas of greater susceptibility:

Map 99: Areas with Subsurface Geology Susceptible to Subsidence



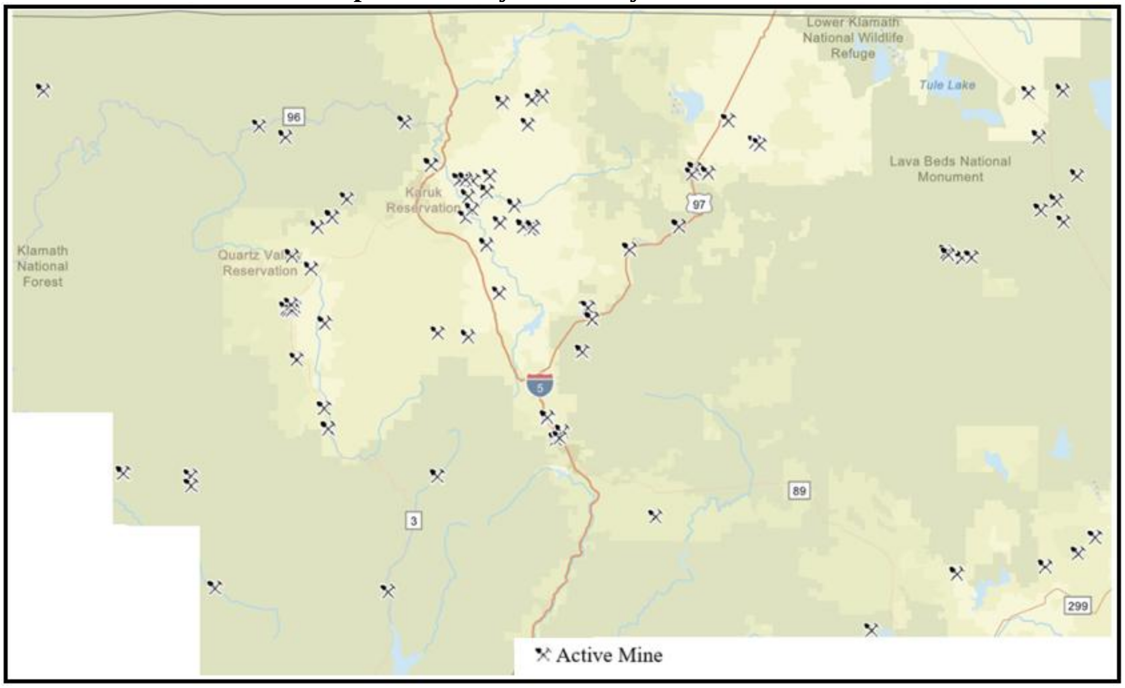
Source: USGS

EXHIBIT C

Mines, both active and abandoned, have a significant relationship with land subsidence due to the removal of materials from underground, which reduces the structural integrity of the land above. This relationship can cause the surface to sink or collapse, leading to various environmental and infrastructural impacts.

In active mining operations, land subsidence occurs when underground material, such as coal, minerals, or metals, is extracted, creating voids beneath the surface. The land above these voids may gradually or suddenly collapse as it loses support, leading to subsidence. The California Department of Conservation's Division of Mine Reclamation compiles data on the current status of mines. The following map details the location of all active mines within Siskiyou County:

Map 100: Siskiyou County Active Mines

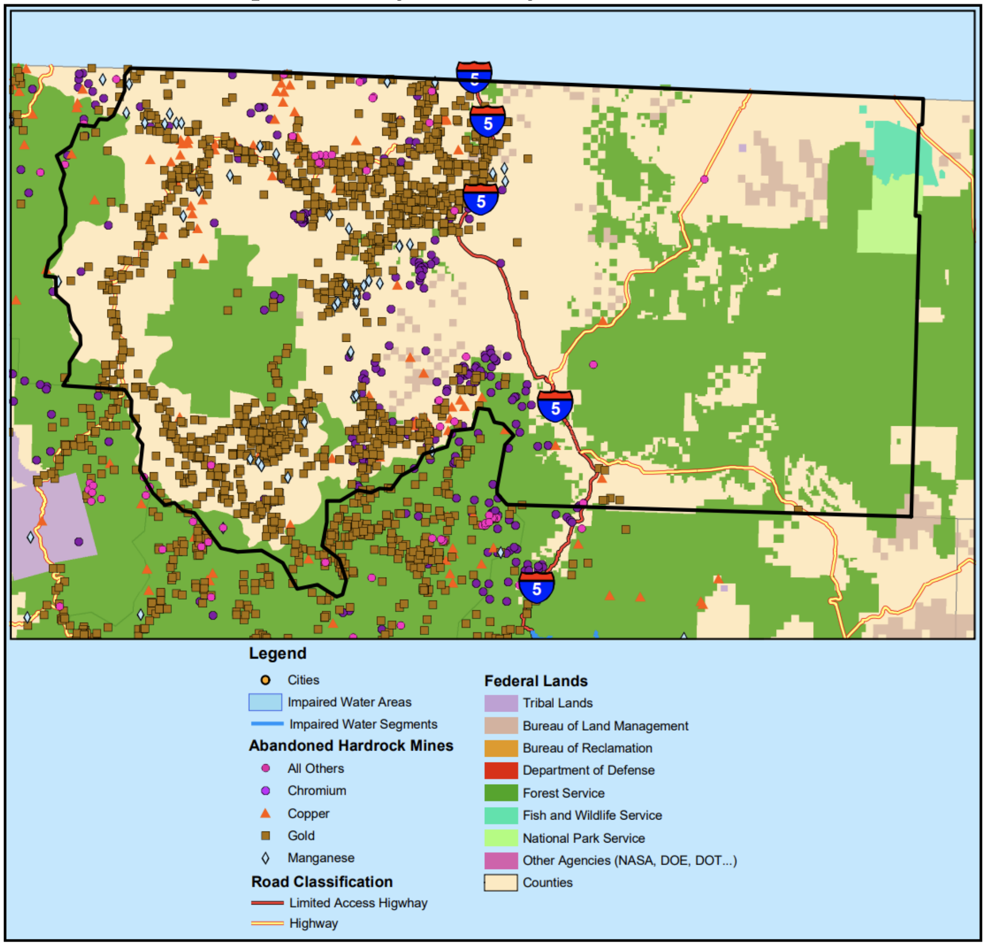


Source: California Department of Conservation

Abandoned mines pose a unique risk for subsidence, as they often go unmonitored once operations cease. Over time, as the supports within the mine (such as wooden pillars or natural supports) degrade, the ground above may collapse without warning. The Mineral Policy Center compiles data on abandoned and closed mines. The following map details the location of abandoned and closed mines within Siskiyou County:

EXHIBIT C

Map 101: Siskiyou County Abandoned Mines



Source: Mineral Policy Center

The MPC views land subsidence as a local level hazard. Discussions with the MPC and a review of all available data indicated land subsidence is not currently a community concern for all participating jurisdictions. However, the MPC is in agreement that additional mapping and studies need to be conducted to fully understand the extent of this hazard. The following provides a narrative of the level of jurisdictional concern:

- **Siskiyou County:** Land subsidence identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change can result in both a greater demand and a shrinking supply of water resources may further exacerbate this problem.
- **Dorris:** Land subsidence identified as a very low community priority.
- **Dunsmuir:** Land subsidence identified as a very low community priority.
- **Fort Jones:** Land subsidence identified as a very low community priority.
- **Happy Camp CSD:** Land subsidence identified as a very low community priority.
- **Lake Shastina CSD:** Land subsidence identified as a very low community priority.
- **McCloud CSD:** Land subsidence identified as a very low community priority.
- **Montague:** Land subsidence identified as a very low community priority.
- **Mt. Shasta:** Land subsidence identified as a very low community priority.
- **Tulelake:** Land subsidence identified as a community concern as citizens, structures, and infrastructure are vulnerable. Current subsidence rates are linked to over extraction of groundwater.
- **Weed:** Land subsidence identified as a very low community priority.
- **Yreka:** Land subsidence identified as a very low community priority.

EXHIBIT C

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.15.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced no Presidential Disaster Declarations related to subsidence.

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Siskiyou County has experienced no Emergency Declarations related to subsidence.

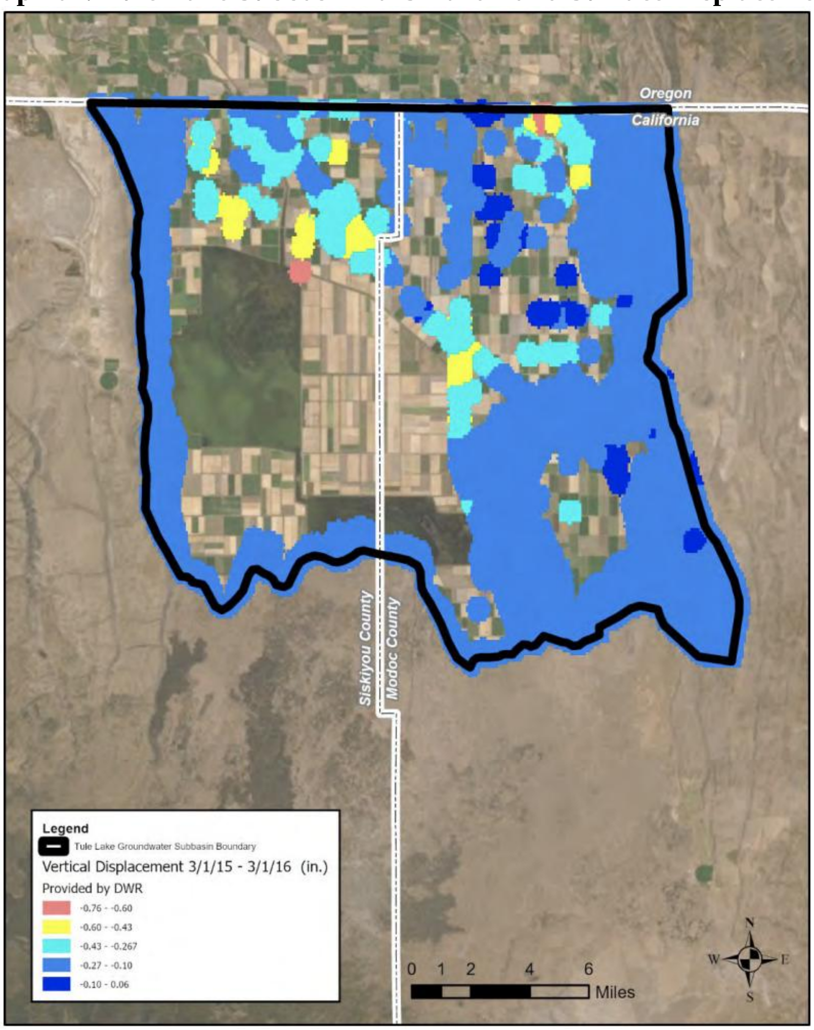
The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. Siskiyou County has experienced no proclamations of a State of Emergency related to subsidence.

The State of California currently does not keep a comprehensive database of subsidence events, including the occurrences of sinkholes. Additionally, mapping of land subsidence due to groundwater over-drafting is generally confined to the agricultural regions of central California.

The NCEI does not track subsidence events.

The following maps, from the Division of Water Resources, show land surface displacement for the area around Tulelake for 2015 to 2016 and 2018 to 2019, generally caused by groundwater over extraction:

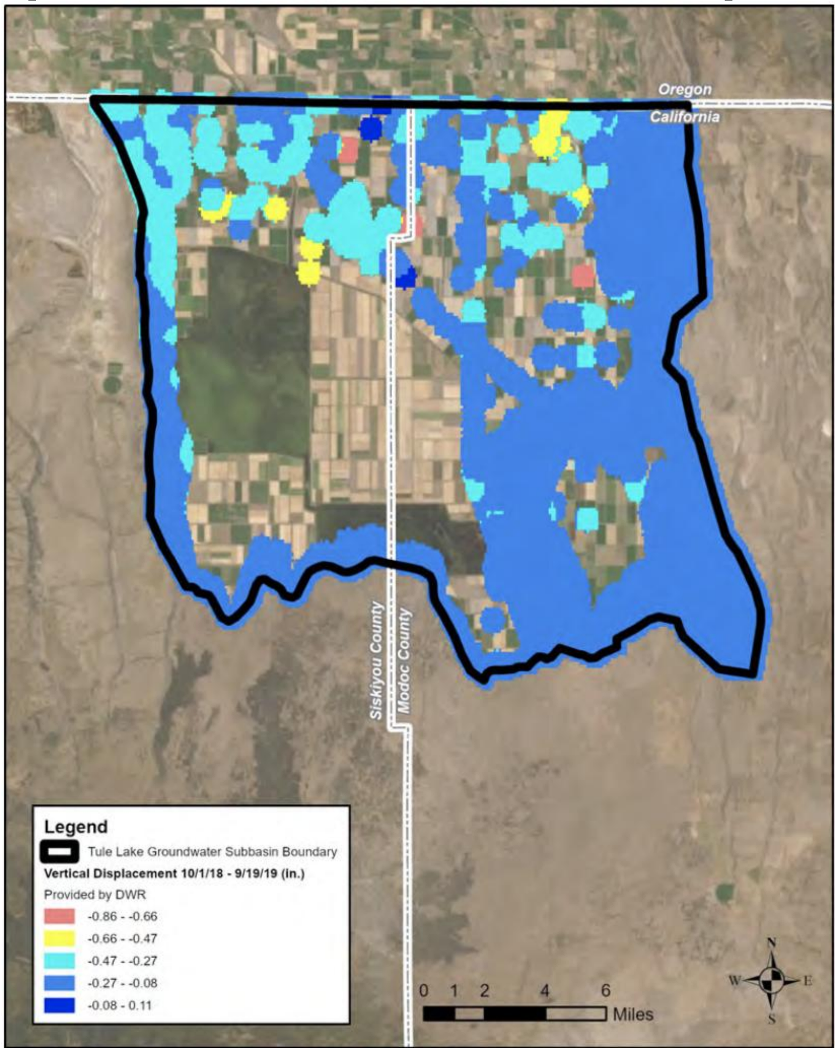
Map 102: Tule Lake Subbasin 2015-2016 Land Surface Displacement



Source: 2012 Tule Lake Groundwater Sustainability Plan

EXHIBIT C

Map 103: Tule Lake Subbasin 2018-2019 Land Surface Displacement



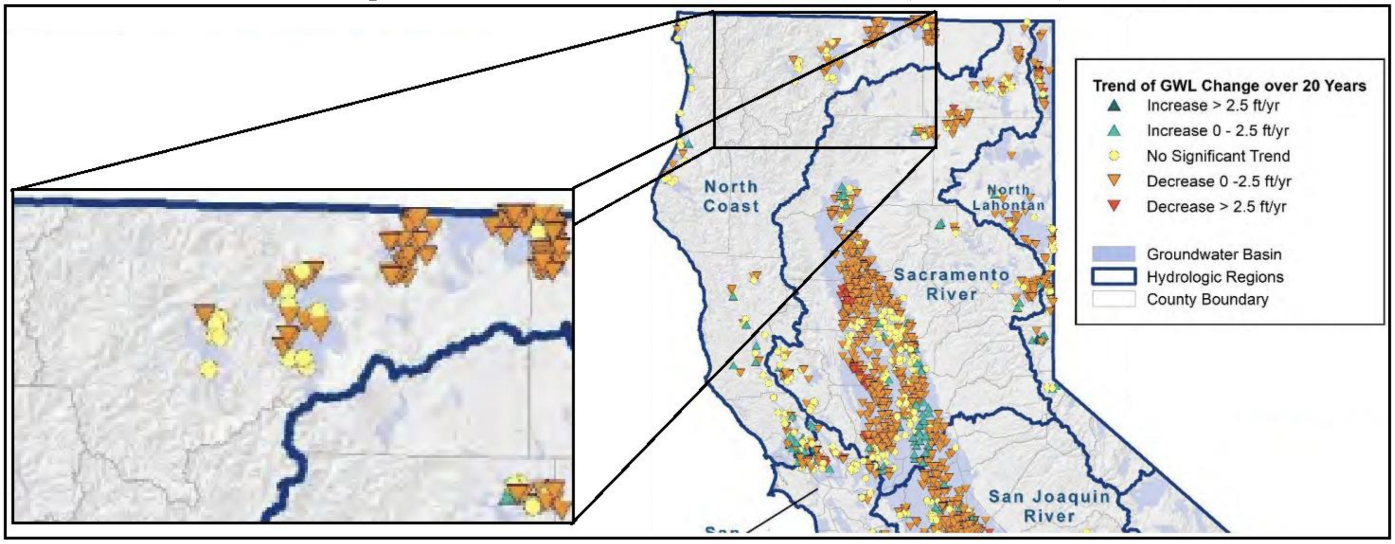
Source: 2012 Tule Lake Groundwater Sustainability Plan

5.15.4 Probability of Future Events

Predicting the probability of subsidence occurrences is tremendously challenging due to the large number of factors involved and the oftentimes random nature of occurrence. Continued over-reliance on groundwater for domestic and agricultural uses would continue to exacerbate future subsidence occurrences. The following map from the Division of Water Resources shows the 20-year groundwater level trend (2000 – 2020) for Siskiyou County:

EXHIBIT C

Map 104: 20-Year Groundwater Level Trend (2000 – 2020)



Source: Division of Water Resources

However, in September 2014, Governor Jerry Brown signed legislation requiring that California's critical groundwater resources be sustainably managed by local agencies, through the Sustainable Groundwater Management Act. In Siskiyou County there are four basins that fall under the requirements of act, the Shasta, Scott and Butte Valley Basins and the Tulelake Subbasin. To carry out the requirements of act, the Siskiyou County Flood Control and Water Conservation District serves as the Groundwater Sustainability Agency for the three basins, and the Siskiyou County Board of Supervisors serves as the member the Tulelake Subbasin, alongside Tulelake Irrigation District, Modoc County and the City of Tulelake. These agencies were required to develop Groundwater Sustainability Plans for each of the basins that assessed the current and projected future conditions of the basins, and established management and monitoring activities and long-term goals. The Scott Valley and Shasta Valley plan have been approved, while Butte Valley and Tulelake are still awaiting a determination. The implementation of these plans is expected to have a net benefit impact on future groundwater extraction.

The continued presence of abandoned and active subsurface mines also poses an on-going concern for subsidence events, especially as these sites continue to age and degrade. However, no survey of the condition of these mines is available to provide reliable data of future conditions.

The continued presence of volcanic bedrock areas containing lava tubes also poses an on-going concern for subsidence events, especially as these areas continue to age and degrade. However, no survey of the condition of these subsurface voids is available to provide reliable data of future conditions.

Based on current conditions and historical events, Siskiyou County will continue to experience subsidence events. However, current data makes predicting the number and nature of these event beyond the scope of this plan.

5.15.5 Projected Changes in Location, Intensity, Frequency, and Duration

The continued growth of agriculture can be linked to increased occurrence of subsidence. The relationship between agriculture and land subsidence is primarily linked to the heavy reliance on groundwater extraction for irrigation. This dependence can lead to significant land subsidence over time as aquifers are drained faster than they can be naturally replenished. Continued agricultural demands for increased crop yields can place more pressure on water resources, particularly during drought periods, when surface water is unavailable. This leads to over-extraction of groundwater, accelerating subsidence. In some cases, land subsidence due to excessive groundwater pumping can permanently reduce the storage capacity of an aquifer, making it impossible to fully replenish. This exacerbates the long-term water scarcity problem in agricultural regions.

EXHIBIT C

Climate change has the potential to significantly impact land subsidence. As climate change contributes to more severe and prolonged droughts, communities may rely more heavily on groundwater to meet water demands. This over-extraction can exacerbate land subsidence in regions where groundwater is already being depleted.

Climate change is expected to cause more extreme and variable precipitation. While overall rainfall may decrease, intense storms may become more frequent. These rapid influxes of water could cause surface erosion and exacerbate conditions that lead to subsidence in areas where the soil is already vulnerable due to over-pumping or mining activities. As temperatures rise, snowpack levels are declining, and more precipitation is falling as rain rather than snow. This change can reduce natural groundwater recharge rates, leading to greater reliance on artificial water storage and extraction methods that can promote subsidence.

5.15.6 Vulnerability and Impact

FEMA NRI

The National Risk Index does not provide rankings for the subsidence hazard.

Population

Subsidence events are rarely a direct cause of death, with the exception of rapidly occurring sinkholes. However, they can cause emotional and economic impacts in people in the impacted areas.

- **Physical Impact:** Sinkholes can cause injuries and deaths, usually caused by the opening swallowing a structure or vehicle. The extent of these injuries depends on the size of the sinkhole, building standards, and preparedness in the affected area.
- Access to Medical Services: Impacted persons may be cut off from medical care access due to road damage.
- **Emotional and Psychological Impact:** Survivors often experience psychological stress, anxiety, and trauma from the sudden and unpredictable nature of landslides can cause long-lasting fear, especially in areas where movement can continue for days or weeks.
- **Social and Economic Impact:** Economic losses can be devastating, especially for people whose businesses, jobs, or properties are destroyed or cut off due to road closures. The destruction of infrastructure such as transportation and utilities (electricity, water, gas) can disrupt daily life for extended periods.

Subsidence may disproportionately affect socially vulnerable populations, exacerbating pre-existing inequalities and making recovery more difficult for these groups. Subsidence may disproportionately impact these groups in the following ways:

- **Increased Risk of Injury and Death:** Many low-income communities are located in areas with higher subsidence risk due to lower land prices. Vulnerable populations, especially in under-resourced areas, may live in buildings not built to modern safety standards, increasing their risk during seismic events.
- **Delayed or Inadequate Emergency Response:** Socially vulnerable populations may experience delayed access to rescue efforts, medical care, and emergency shelters due to geographic isolation, discrimination, or lack of resources like transportation. Rural, low-income, or marginalized communities may not receive the same level of emergency response as wealthier urban areas.
- **Economic Impact and Prolonged Recovery:** Subsidence can disrupt working conditions, particularly for those in informal employment such as day laborers or small business owners. Socially vulnerable populations often lack savings or insurance to cushion the economic blow of losing their homes or jobs.

The loss of utility and communications services can also have a large impact on individuals. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values:

EXHIBIT C

Table 130: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology

As no comprehensive mapping of potential subsidence areas has been completed for Siskiyou County, an estimate of populations that could be impacted is not possible at this time.

Buildings and Structures

Buildings and structures can be damaged during subsidence events due to the intense ground movement. The severity of the damage depends on factors such as the size, local soil conditions, and the building's design, materials, and age. Soil movement can cause rigid components such as walls, beams, and foundations can crack or split. In severe cases, load-bearing walls may fail, leading to partial or complete building collapse. The vertical supports (columns) and horizontal supports (beams) may fail due to excessive forces, leading to the collapse of floors or entire sections of buildings.

Of particular concern to all jurisdictions are unreinforced masonry buildings. An unreinforced masonry building is constructed of brick or masonry with no steel reinforcing bars. Because these buildings were not built using modern building codes, they are much more likely to experience damage or collapse during a subsidence event. As of this plan, no survey has been conducted to determine the number of unreinforced masonry buildings in Siskiyou County or participating jurisdictions.

As no comprehensive mapping of potential subsidence areas has been completed for Siskiyou County, an estimate of buildings and structures, including historic buildings, that could be impacted is not possible at this time.

Governmental Operations

Large scale impacts would not be expected on continued government operations, aside from transportation system disruptions impacting commutes to facilities.

Transportation and Electrical Infrastructure

Subsidence events can have numerous impacts on both transportation and electrical distribution systems. The impacts of subsidence events on transportation systems may include:

- **Roads and Highways:** Subsidence events can cause cracking, buckling, and collapse of roads, highways, and bridges. In severe cases, transportation networks are cut off, hindering emergency response, evacuation, and the transportation of goods.
- **Bridges and Tunnels:** Bridges are especially vulnerable to collapse during subsidence events due to the extreme forces exerted on their structures. Older bridges not built to modern codes are at higher risk of failure. Tunnels can also collapse or become blocked by debris, cutting off access to critical routes.
- **Railways:** Rail systems can be severely impacted by subsidence events, as tracks may buckle or become misaligned, leading to derailments.

A subsidence event can impact both the electrical generation capacity and transmission. The impacts of a subsidence event on electrical systems may include:

- **Power Plants:** A subsidence event can damage power generation facilities causing a cessation of services and costly repairs.

EXHIBIT C

- **Transmission Lines:** Power transmission lines and substations can be damaged by extensive soil movement. This can result in prolonged power outages, which disrupt communication, emergency services, and basic living conditions.
- **Grid Instability:** Damage to power infrastructure can lead to cascading failures within the electrical grid. Substations, transformers, and electrical distribution networks can be knocked offline.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities

Water and wastewater utilities are vulnerable to subsidence events due to the potential for plant damage and distribution system damages. Impacts may include:

- **Water Supply:** Subsidence events can rupture water pipes and damage water treatment facilities, leading to water shortages or contamination. In many cases, people are left without clean drinking water, and authorities must rely on temporary solutions like bottled water or emergency water delivery.
- **Wastewater Systems:** Sewer lines and wastewater treatment plants are particularly vulnerable to ground movement. Ruptured sewer lines can lead to sewage leaks, contaminating groundwater and local water sources. Damage to wastewater treatment plants can lead to untreated sewage being released into waterways, causing public health hazards.

Mapping and details concerning operators of water and wastewater utility providers may be found in Section 5.9.6.

Medical, Education, and Response Facilities

A subsidence event could significantly disrupt medical, education, and response facilities and operations at various levels. These impacts are especially pronounced in the immediate aftermath, where response efforts, infrastructure damage, and communication breakdowns can severely hamper functions. Impacts may include:

- **Damage to Facility:** Subsidence events can damage or destroy facilities, causing a significant drop or cessation of services.
- **Response Disruptions:** Emergency response, including search and rescue operations and medical assistance may be severely impacted due to the road closures.
- **Communication Breakdowns:** Subsidence events can damage communication networks, including internet and phone services, preventing effective communication and hindering the dissemination of critical information.
- **Budget Strains:** The cost of responding to and recovering from a subsidence event can put significant pressure on budgets.

Mapping concerning medical, education, and response facilities may be found in Section 3.9: Critical Facilities and Infrastructure.

Communication Systems

No comprehensive mapping of communications systems was available for review to compare against known subsidence hazard areas. However, it is assumed that communications lines and towers are in known hazard areas. Subsidence events can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Damage to Infrastructure:** Soil movement can cause physical damage to communication infrastructure such as cell towers, antennas, satellite dishes, and power lines. This damage can result in interruptions or complete failure of communication services.
- **Power Outages:** Soil movement can lead to power outages by knocking down power lines or damaging electrical substations. Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.
- **Structural Instability:** Soil movement can cause structural instability in communication towers and buildings housing communication equipment. If these structures are not properly reinforced, they may collapse or sustain damage, disrupting communication services.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.8.6.

Environmental and Agricultural Impacts

Subsidence events in Siskiyou County are anticipated to have a limited impact on the agricultural community. However, a disruption in transportation networks could hamper the ability to transport commodities in a timely manner. Additionally, subsidence often occurs due to excessive groundwater extraction. As aquifers are depleted and the ground sinks, the capacity of these aquifers to store water is permanently reduced.

Jurisdictional Concerns:

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Tulelake:** Tulelake has seen over two feet of subsidence due to groundwater usage and withdrawal. While not formally quantified, impacts on subsurface utilities and building foundations have been anecdotally reported.

Cascading Impacts

Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with earthquakes may include:

- Fires from various causes, including downed power lines and broken gas pipelines
- Infrastructure failure
- Dam failure
- Power outages

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

EXHIBIT C

Table 131: Subsidence Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Subsidence events may cause injury or death to people from vehicle accidents, falling objects, or structural failure. Ground movement may result in broken service lines or pipelines, triggering the release of hazardous materials or waste materials.
Impact on Responders	The extent of the damage to infrastructure such as roads and bridges and communications can greatly impact first responders' ability to access or transport victims. Equipment, facilities, or other assets may be damaged and restrict first responders' capacity to respond to calls for assistance.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Subsidence events could potentially impact critical infrastructure resulting in power outages, access to roadways or public transportation, damage to facilities or infrastructure, including alternate locations.
Delivery of Services	Delivery of services may be impacted by dangerous transportation conditions, causing food, water, and resource systems to be delayed or halted.
Property, Facilities, and Infrastructure	Unreinforced masonry structures are inherently vulnerable to external forces. All critical facilities and transportation corridors and pipelines can be impacted. Ground movement can lead to the collapse of buildings and bridges, and disrupt utility service.
Impact on Environment	Subsidence events have the potential to trigger secondary hazards such as fire, hazardous material release, or dam failures. These secondary hazards can destroy habitats and environments, cause significant injury to animals or livestock, or contaminate certain components of the environment.
Economic Conditions	Subsidence events pose a fiscal impact on the local and county governments, even if some of those costs can be recouped through federal grant reimbursements. Local, county, and state resources may be drained by response and recovery efforts. Additionally, a severe event could affect the ability of businesses to maintain operations. If the private sector is not able to re-establish operations this would also impact the local economy.
Public Confidence in Governance	Governmental response, on all levels, requires direct actions that must be immediate and effective to maintain public confidence. If local government takes a long time to begin recovery operations, or for the public to see recovery operations, this will have a negative impact on the public's confidence in governance.

5.15.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, any additional growth would place additional populations at risk. Should any population increase occur, potentially vulnerable populations could face disproportionate effects.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires.

Additionally, in September 2014, Governor Jerry Brown signed legislation requiring that California's critical groundwater resources be sustainably managed by local agencies, through the Sustainable Groundwater Management Act.

EXHIBIT C

5.15.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the extreme heat hazard.

Table 132: Example Subsidence Mitigation Actions

Category	Example Action
Planning and Regulation	Use GIS to map areas that are susceptible to subsidence.
	Use ground-penetrating radar to detect lava tubes and map their location.
	Prohibit the development in areas that have been identified as at-risk to subsidence.
	Monitor areas at risk to subsidence by remaining aware of changes in groundwater levels.
	Implement regulations and practices to limit excessive groundwater extraction
	Update building codes to require subsidence-resistant construction techniques.
Infrastructure	Acquire and demolish or relocate buildings and infrastructure in high-risk areas.
	Replace impermeable surfaces with permeable surfaces that allow water to infiltrate the ground naturally, reducing soil compaction and subsidence.
	Incorporate structural designs that can resist loading associated with subsidence.
	Fill or buttress subterranean open spaces (abandoned mines) to prevent or alleviate collapse.
	In subsidence-prone areas, use deeper foundations that reach stable layers of bedrock to reduce the risk of structural damage.
Natural Systems	Encourage the restoration of natural wetlands to aid in groundwater replenishment and prevent subsidence.
	In regions prone to soil erosion or compaction, plant vegetation with deep roots to help stabilize the soil and prevent subsidence.
Education	Promote community awareness of subsidence risks and impacts.
	Offer GIS hazard mapping online for residents and design professionals.

EXHIBIT C

5.16 Volcanic Activity

5.16.1 Hazard Description

A volcanic hazard refers to the dangers posed by volcanic activity, which can have severe and widespread impacts on human life, infrastructure, and the environment. These hazards arise from different types of volcanic phenomena, including eruptions, ashfall, lava flows, pyroclastic flows, and more. Volcanic hazards are typically divided into primary and secondary hazards:

Primary Volcanic Hazards:

- Lava Flows: Streams of molten rock (lava) that flow from a volcanic vent during an eruption. Lava flows can destroy everything in their path but generally move slowly enough that people can evacuate. However, property damage can be extensive.
- Ashfall (Tephra): Fine particles of volcanic ash ejected into the atmosphere can travel vast distances. Ashfall can cause respiratory issues, contaminate water supplies, damage agriculture, and cause structural damage when it accumulates on buildings. Ash can also disrupt air travel, as it can damage aircraft engines.
- Pyroclastic Flows: Fast-moving, hot clouds of gas, ash, and volcanic debris that flow down the sides of a volcano. Pyroclastic flows are highly destructive and deadly, with temperatures reaching over 1,000°C. They can incinerate anything in their path and cover large areas in volcanic material.
- Volcanic Gas Emissions: Volcanic eruptions release gases like sulfur dioxide, carbon dioxide, and water vapor. These gases can be hazardous to health, causing respiratory problems, and can contribute to environmental issues like acid rain.

Secondary Volcanic Hazards:

- Lahars: Volcanic mudflows or debris flows that occur when volcanic ash and debris mix with water from rainfall, melting snow, or ice. Lahars can travel rapidly down river valleys, destroying infrastructure, homes, and crops. They can occur long after an eruption, posing an ongoing threat.
- Volcanic Landslides: The sudden collapse of part of a volcano's slope, which can trigger debris avalanches. These can be triggered by volcanic eruptions, earthquakes, or heavy rainfall and can cause significant destruction.

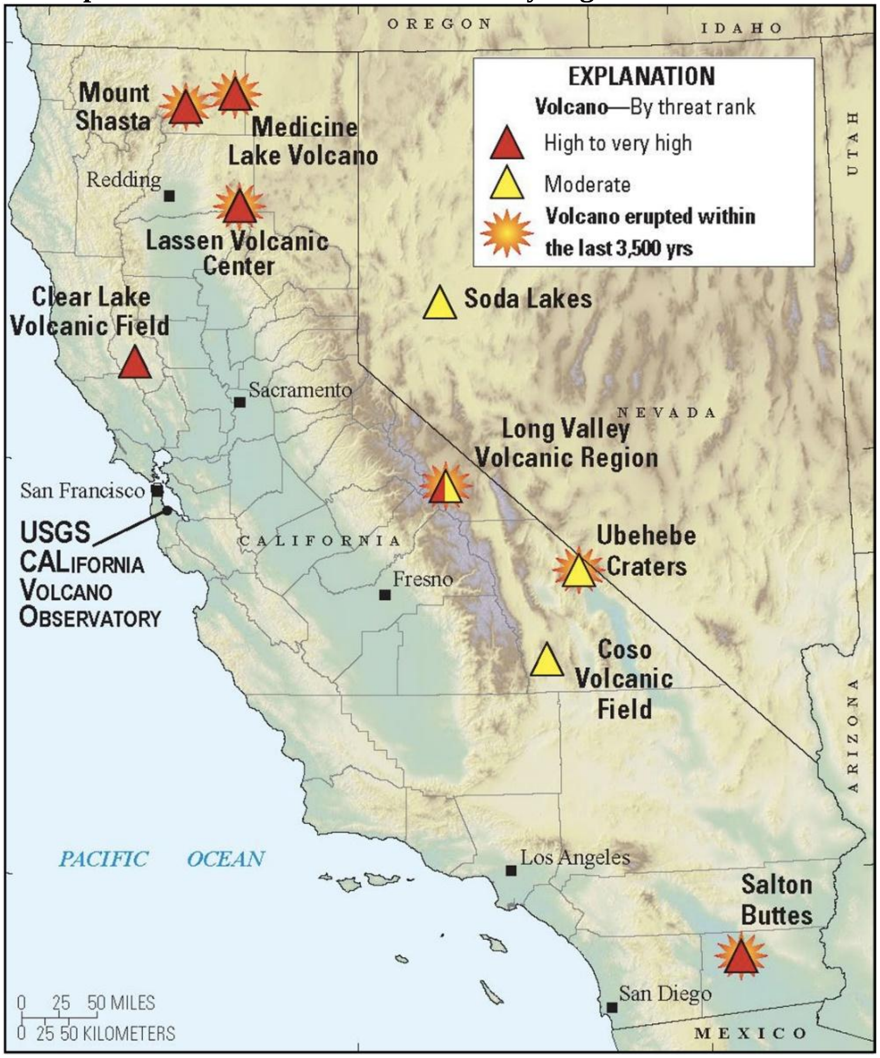
5.16.2 – Location and Extent

Mount Shasta is a prominent stratovolcano located in Siskiyou County, and it rises to an elevation of 14,179 feet (4,322 meters), making it the second-highest peak in the Cascade Range and the fifth highest in California. Mount Shasta is a classic example of a stratovolcano, characterized by its steep, conical shape and built up from alternating layers of lava, volcanic ash, and other volcanic materials. Mount Shasta is a complex volcano consisting of four overlapping volcanic cones, with the main summit and several subsidiary peaks, including Shastina, which has its own crater. This type of volcano is known for explosive eruptions.

Threat rankings issued by the USGS identify volcanoes of concern in California, including Mt. Shasta in Siskiyou County. These volcanoes are assigned a risk value, from moderate to high and very high. The following map, from the USGS, indicates the location and threat level of these volcanoes, with starbursts indicating volcanoes that have erupted in the last 3,500 years:

EXHIBIT C

Map 105: Location of Moderate to Very High Threat Volcanoes



Source: USGS

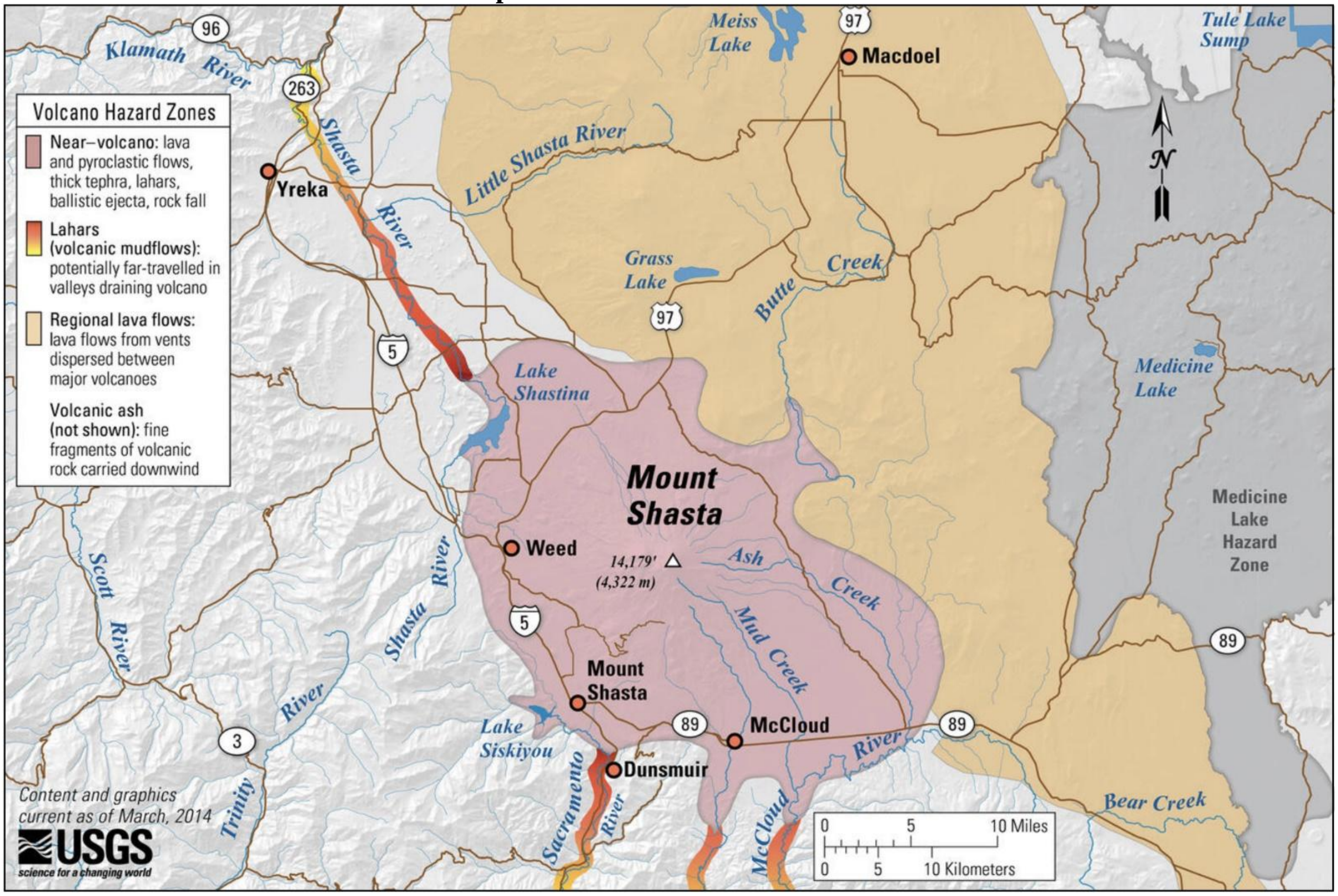
Mount Shasta is not considered to be a large tephra producer like Mount St. Helens. Probabilistic tephra productions maps are not available for Mount Shasta, so analysis of this risk exposure was not performed. It should be assumed that volcanic activity could produce some degree of tephra accumulation within Siskiyou County. However, since the degree of that potential is not currently known, this risk assessment focuses on exposure to the lahars, debris avalanches, and pyroclastic flows.

Lahars, debris avalanches, and pyroclastic flows from an eruption could impact areas surrounding Mount Shasta. These volcanic flows could travel down any of the creeks or valleys that drain Mount Shasta or any suitable slope. Anything and anyone in the path of these volcanic flows is potentially exposed to damage, injury, or death.

The following map, from the USGS, illustrates the expected extent of pyroclastic flows and lahars from a Mount Shasta eruption.

EXHIBIT C

Map 106: Mt. Shasta Hazard Zones

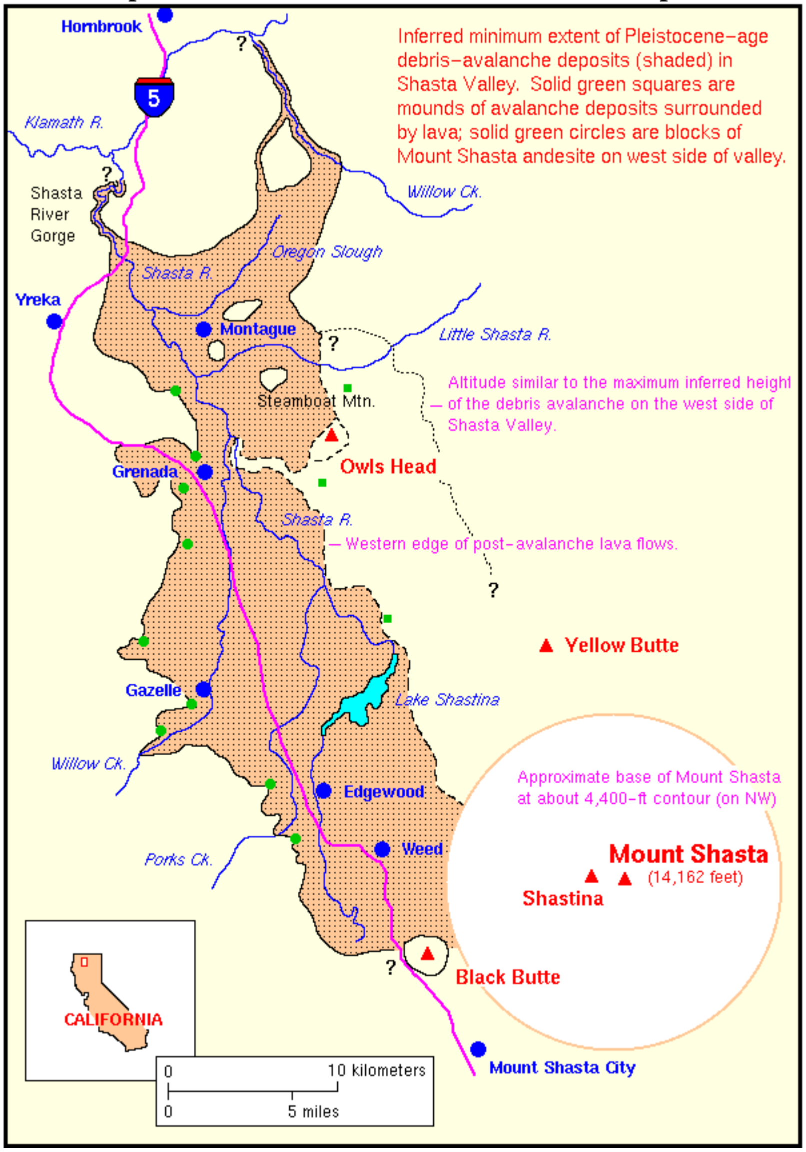


Source: USGS

According to the USGS, a very large debris avalanche occurred 300,000 to 380,000 years ago. The deposits of a large debris avalanche extend northward from the base of Mount Shasta across the floor of Shasta Valley. The northern extent of the deposit is near Montague, about 30 miles from the summit. The deposits cover about 261 square miles, and their estimated volume is 11 cubic miles, according to the Cascades Volcano Observatory. The following map, from the USGS, shows the extent of this debris avalanche:

EXHIBIT C

Map 107: Mount Shasta Debris Avalanche Deposit



Source: USGS

The MPC views the volcanic hazard as both a local and county-wide hazard. Discussions with the MPC and a review of all available data indicated a volcanic eruption is a community concern for some participating jurisdictions, with some participating jurisdictions less likely to be impacted by a future eruption. The following provides a narrative of the level of jurisdictional concern:

- **Siskiyou County:** Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. This is due to the presence of historic regional lava flows, lahar pathways, pyroclastic flows, thick tephra, ballistic ejecta, and rock falls.
- **Dorris:** Volcanic eruption identified as a low community concern. This is due to data indicating that Mount Shasta is not considered to be a large tephra producer and thus an eruption is unlikely to impact the jurisdiction.
- **Dunsmuir:** Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. This is due to the proximity of historic regional lava flows and historic lahar pathways.
- **Etna:** Volcanic eruption identified as a low community concern. This is due to data indicating that Mount Shasta is not considered to be a large tephra producer and thus an eruption is unlikely to impact the jurisdiction.
- **Fort Jones:** Volcanic eruption identified as a low community concern. This is due to data indicating that Mount Shasta is not considered to be a large tephra producer and thus an eruption is unlikely to impact the jurisdiction.

EXHIBIT C

- **Happy Camp CSD:** Volcanic eruption identified as a low community concern. This is due to data indicating that Mount Shasta is not considered to be a large tephra producer and thus an eruption is unlikely to impact the jurisdiction.
- **Lake Shastina CSD:** Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. This is due to the proximity of historic regional lava flows, lahar pathways, pyroclastic flows, thick tephra, ballistic ejecta, and rock falls.
- **McCloud CSD:** Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. This is due to the proximity of historic regional lava flows, lahar pathways, pyroclastic flows, thick tephra, ballistic ejecta, and rock falls.
- **Montague:** Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. This is due to the proximity of historic regional lava flows and historic lahar pathways.
- **Mt. Shasta:** Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. This is due to the proximity of historic regional lava flows, lahar pathways, pyroclastic flows, thick tephra, ballistic ejecta, and rock falls.
- **Tulelake:** Volcanic eruption identified as a low community concern. This is due to data indicating that Mount Shasta is not considered to be a large tephra producer and thus an eruption is unlikely to impact the jurisdiction.
- **Weed:** Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. This is due to the proximity of historic regional lava flows, lahar pathways, pyroclastic flows, thick tephra, ballistic ejecta, and rock falls.
- **Yreka:** Volcanic eruption identified as a community concern as citizens, structures, and infrastructure are vulnerable. This is due to the proximity of historic lahar pathways.

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.16.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced no Presidential Disaster Declarations related to volcanic activity.

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Siskiyou County has experienced no Emergency Declarations related to volcanic activity.

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. Siskiyou County has experienced no proclamations of a State of Emergency related to volcanic activity.

The following detail recent regional volcanic eruptions:

- **May 18, 1980:** The Mount St. Helens eruption released 23 square miles of volcanic material that buried the North Fork of the Toutle River. There were 57 human fatalities.
- **May 22, 1915**: An explosive eruption at Lassen Peak produced a pyroclastic flow that devastated an area as far as four miles northeast of the summit. The eruption also generated lahars that traveled more than 12 miles

5.16.4 Probability of Future Events

According to the USGS, activity for Mt. Shasta over the last 300,000 years includes long intervals of quiet interrupted by shorter spans of frequent eruptions. In the last few millennia, smaller eruptions have broken out at the volcano's summit and from vents on its upper east flank. The most recent full eruption occurred about 3,200 years ago, producing block and ash flows on the volcano's north flank. However, in the last 1,000 years, more than 70 mudflows have inundated stream channels. The record of eruptions over the last 10,000 years suggests that, on average, at least one eruption occurs every 600 to 800 years at Mt. Shasta.

5.16.5 Projected Changes in Location, Intensity, Frequency, and Duration

Due to the very long-term nature of geological process, including volcanic activity, the volcanic activity hazard for Siskiyou County is not expected to change during the life of this plan.

5.16.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Siskiyou County and all participating jurisdictions from volcanic activity. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Siskiyou County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 133: Participating Jurisdiction Volcanic Activity Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Events per Year
Siskiyou County	All	Relatively Moderate	78.7	0
Dorris	06093000200	Relatively Moderate	67.4	0
Dunsmuir	06093001100	Relatively Moderate	67.2	0
Etna	06093000800	Relatively Moderate	71.8	0
Fort Jones	06093000701	Relatively Moderate	72.9	0
Happy Camp CSD	06093001300	Relatively Moderate	62.7	0
Lake Shastina CSD	06093000902	Relatively Moderate	63.7	0
McCloud CSD	06093001200	Relatively Moderate	62.5	0
Montague	06093000300	Relatively Moderate	76.9	0
Mt. Shasta	06093001003	Relatively Moderate	80.27	0
Tulelake	06093000100	Relatively Moderate	63.2	0
Weed	06093000901	Relatively High	87.3	0
Yreka	06093000703	Relatively Moderate	67.9	0

Source: FEMA NRI

Table 134: Participating Jurisdiction Volcanic Activity Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Volcanic Activity EAL
Siskiyou County	All	Relatively Moderate	81.1	$1,100,000
Dorris	06093000200	Relatively Moderate	67.0	$55,000
Dunsmuir	06093001100	Relatively Moderate	67.6	$58,000
Etna	06093000800	Relatively High	72.2	$86,000
Fort Jones	06093000701	Relatively High	74.3	$98,000
Happy Camp CSD	06093001300	Relatively Moderate	62.4	$41,000
Lake Shastina CSD	06093000902	Relatively Moderate	68.9	$64,000
McCloud CSD	06093001200	Relatively Moderate	66.9	$54,000
Montague	06093000300	Relatively High	75.0	$102,000
Mt. Shasta	06093001003	Relatively High	79.3	$125,000
Tulelake	06093000100	Relatively Moderate	62.5	$41,000
Weed	06093000901	Relatively High	79.1	$124,000
Yreka	06093000703	Relatively Moderate	68.9	$64,000

Source: FEMA NRI

Population

Although volcanic activity, notably eruptions, happen very infrequently in Siskiyou County, a large eruption could have profound impacts on people, affecting their physical, emotional, and social well-being. The impacts can be broken down into the following categories:

EXHIBIT C

- **Physical Impact**
    - Injuries and Fatalities: Volcanic activity often lead to serious injuries and deaths, usually caused by collapsing buildings, falling debris, or fires triggered by broken gas lines. The extent of these injuries depends on the magnitude of the quake, building standards, and preparedness in the affected area.
    - Access to Medical Services: Hospitals and emergency services can become overwhelmed by the sudden influx of injured people. In some cases, healthcare facilities may also be damaged, reducing their capacity to provide care.
- **Emotional and Psychological Impact**
    - Trauma and Anxiety: Survivors often experience psychological stress, anxiety, and trauma from the event. The sudden and unpredictable nature of volcanic activity can cause long-lasting fear, especially in areas where aftershocks continue for days or weeks.
    - Post-Traumatic Stress Disorder: People who have lost loved ones, their homes, or have experienced life-threatening situations may develop Post-Traumatic Stress Disorder, affecting their long-term mental health.
- **Social and Economic Impact**
    - Displacement: Many people may be left homeless after major volcanic activity due to the destruction of homes. Temporary shelters may be set up, but displaced families can experience difficult living conditions, lacking access to food, clean water, and sanitation.
    - Loss of Livelihood: Economic losses can be devastating, especially for people whose businesses, jobs, or properties are destroyed. In regions where many rely on agriculture or small businesses, the economic recovery can take years.
    - Community Disruption: The destruction of infrastructure such as schools, transportation, and utilities (electricity, water, gas) can disrupt daily life for extended periods. Recovery efforts can take months or even years, affecting education, jobs, and community cohesion.

Volcanic activity may disproportionately affect socially vulnerable populations, exacerbating pre-existing inequalities and making recovery more difficult for these groups. Volcanic activity may disproportionately impact these groups in the following ways:

- **Increased Risk of Injury and Death**
    - Housing in Unsafe Areas: Socially vulnerable groups are more likely to live in poorly constructed housing, which is more prone to damage during volcanic activity.
    - Lack of Access to Resistant Infrastructure: Vulnerable populations, especially in under-resourced areas, may live in buildings not built to modern safety standards, increasing their risk during volcanic events.

- **Delayed or Inadequate Emergency Response**
    - Limited Access to Emergency Services: Socially vulnerable populations may experience delayed access to rescue efforts, medical care, and emergency shelters due to geographic isolation, discrimination, or lack of resources like transportation. Rural, low-income, or marginalized communities may not receive the same level of emergency response as wealthier urban areas.
    - Language Barriers: Non-English-speaking populations or those with limited literacy may struggle to receive or understand emergency alerts, evacuation instructions, or recovery information, increasing their vulnerability during and after volcanic activity.
- **Economic Impact and Prolonged Recovery**
    - Loss of Livelihoods: Volcanic activity can disrupt working conditions, particularly for those in informal employment such as day laborers or small business owners. Socially vulnerable populations often lack savings or insurance to cushion the economic blow of losing their homes or jobs.

  - Housing and Relocation Issues: Low-income households are less likely to have insurance or the financial means to repair or rebuild their homes. As a result, they may face prolonged displacement and be forced to live in overcrowded or substandard shelters for extended periods.
- **Mental Health and Social Support Challenges**
  - Psychological Impact: Vulnerable populations may have less access to mental health care and social services to help them cope with the trauma.
  - Weakened Social Networks: Socially vulnerable populations often rely on tight-knit community networks for support. Volcanic activity displacement can disrupt these networks, making recovery more difficult for individuals who lose access to family, friends, and community support systems.
- **Barriers to Recovery Resources**
  - Disparities in Aid Distribution: Vulnerable populations may face challenges accessing recovery assistance, such as government aid, housing assistance, and loans. Bureaucratic obstacles, discrimination, or lack of information can prevent marginalized groups from receiving the help they need.
  - Exclusion from Decision-Making: Marginalized groups are often excluded from post-disaster decision-making processes, meaning their specific needs and challenges may not be addressed in recovery planning. This can lead to inequitable rebuilding and recovery efforts, further disadvantaging these populations.

Additionally, older adults may have limited mobility, making it difficult for them to evacuate during volcanic activity or seek assistance afterward. They may also suffer more from disruptions to medical care or loss of essential services. Volcanic activity can severely impact people with disabilities who may need specialized evacuation assistance, accessible emergency shelters, and medical care. Often, emergency plans do not fully consider the needs of people with physical or cognitive disabilities. Children are particularly vulnerable during disasters because they rely on adults for safety and care. Displacement from homes, schools, and social networks can cause long-term developmental and psychological effects on children.

The loss of utility and communications services can also have a large impact on individuals. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values:

Table 135: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

To provide an estimate of the number of people at risk to volcanic activity, GIS data concerning the number of identified structures with these areas and the average household size was utilized. An estimate of population was calculated by multiplying the number of structures by the Siskiyou County average household size of 2.24 persons from the U.S. Census Bureau.

For population exposure development purposes, it was noted that Siskiyou County is most exposed to lahars, debris avalanches, and pyroclastic flows from a Mt. Shasta eruption. Anyone in the path of these flows is potentially exposed to injury or death. While most of the County would be exposed to ash fall and tephra accumulation in the event of a volcanic eruption, this vulnerability and impact analysis focuses on exposure to the lahar hazard and debris avalanche areas.

The following table provides an estimated population exposed to lahars, debris avalanche, and pyroclastic flow areas for all participating jurisdictions:

Table 136: Participating Jurisdiction Estimated Population Exposure to Volcanic Flow Hazards

Jurisdiction	Estimated Population in Potential Volcanic Flow Areas	Percent of Total Population
Siskiyou County	2,800	6.4%
Dorris	0	0.0%
Dunsmuir	1,870	100.0%
Etna	0	0.0%
Fort Jones	0	0.0%
Happy Camp CSD	0	0.0%
Lake Shastina CSD	2,401	100.0%
McCloud CSD	1,279	100.0%
Montague	1,484	100.0%
Mt. Shasta	3,250	100.0%
Tulelake	0	0.0%
Weed	2,662	100.0%
Yreka	7,589	100.0%

Source: Siskiyou County and U.S. Census Bureau

Buildings and Structures

Buildings and structures can be damaged during a volcanic activity due to the lahars, debris avalanche, pyroclastic flow, intense ground shaking, and surface rupture. The severity of the damage depends on factors such as the volcanic activity's magnitude, distance from the eruption, and the building's design, materials, and age. Here are the main ways in which buildings and structures can be damaged and the types of damage that can occur:

- **Ashfall:** Fine volcanic ash can accumulate on rooftops and other structures, potentially causing roofs to collapse under the weight if the ash is wet or thick. Ash can clog ventilation systems, damage electrical components, and reduce air quality indoors. Even light ashfall can corrode metals, disrupt machinery, and necessitate costly cleaning and repairs.
- **Pyroclastic Flows:** These fast-moving, superheated clouds of gas and volcanic debris can destroy buildings instantly. Pyroclastic flows are extremely dangerous because they can travel at speeds of over 100 miles per hour, incinerating or burying structures in their path. Buildings made of wood, concrete, or steel are usually no match for the extreme temperatures and force of these flows.
- **Lava Flows:** While lava flows typically move slowly enough for evacuation, they can cause total destruction to anything in their path. Buildings in the direct path of lava flows will be completely consumed or encased by molten rock, leading to irreparable damage.
- **Volcanic Gases:** Buildings and their contents can suffer from corrosion due to exposure to volcanic gases, such as sulfur dioxide and hydrogen sulfide. Long-term exposure can degrade materials like metals and plastics.
- **Lahars:** The force of a lahar can erode soil and foundations, leading to building collapse. In areas prone to lahars, the heavy debris can destabilize the ground, increasing the risk of landslides and further structural failures.

To provide an estimate of the number of residential structures in areas of potential lahars, debris avalanche, pyroclastic flow, GIS data concerning the residential structures and the median value was utilized. An estimate of the value of residential structures was determined using the Siskiyou County median household value of $231,100 from the U.S. Census Bureau. The following table provides an estimated structures exposed to volcanic flow for all participating jurisdictions:

EXHIBIT C

Table 137: Participating Jurisdiction Estimated Residential Structures Exposure to Volcanic Flow Hazards

Jurisdiction	Estimated Residential Structures in Potential Volcanic Flow Areas	Valuation
Siskiyou County	1,250	$288,875,000
Dorris	0	$0
Dunsmuir	1,091	$252,130,100
Etna	0	$0
Fort Jones	0	$0
Happy Camp CSD	0	$0
Lake Shastina CSD	569	$131,495,900
McCloud CSD	574	$132,594,000
Montague	1,906	$440,476,600
Mt. Shasta	361	$83,427,100
Tulelake	0	$0
Weed	3,668	$847,674,800
Yreka	0	$0

Source: Siskiyou County and U.S. Census Bureau

Governmental Operations

Volcanic activity can significantly disrupt governmental operations at various levels. These impacts are especially pronounced in the immediate aftermath, where response efforts, infrastructure damage, and communication breakdowns can severely hamper government functions. Impacts to governmental operations may include:

- **Damage to Government Buildings:** Volcanic activity can damage or destroy government offices, courts, police stations, fire departments, and other essential facilities. This makes it difficult for public officials and emergency responders to coordinate disaster response efforts.
- **Emergency Management Strain:** Governments are responsible for coordinating emergency responses, including search and rescue operations, medical assistance, and evacuations. Volcanic activity can overwhelm local government capacities, particularly in communities that lack preparedness plans or resources. The scale of the disaster often requires the involvement of state or federal agencies, further complicating coordination.
- **Communication Breakdowns:** Volcanic activity can damage communication networks, including internet and phone services, preventing effective communication between government officials, emergency responders, and the public. This hinders the dissemination of critical information such as evacuation routes, safety guidelines, and status updates.
- **Budget Strains:** The cost of responding to and recovering from a volcanic event can put significant pressure on government budgets. Resources may need to be diverted from other programs to fund disaster relief, infrastructure repair, and rebuilding efforts. Governments often face additional costs for temporary housing, rebuilding public facilities, and providing social services to displaced populations.
- **Economic Disruption:** Volcanic activity can severely disrupt local and regional economies, affecting government revenues from taxes and fees. The temporary shutdown of businesses, loss of jobs, and damage to the tax base can lead to budget shortfalls, making it harder for governments to finance recovery efforts.
- **Accountability and Criticism:** The effectiveness of a government's response to a volcanic event can impact public trust and confidence. If governments are perceived as slow or inadequate in their disaster response, they may face public criticism, protests, or political fallout. Conversely, a well-coordinated and effective response can strengthen public trust in leadership.
- **Education and Social Services:** Schools, which are often public institutions, may be destroyed or damaged, delaying the education of children. Government-run social services, including food distribution and welfare programs, may be strained or interrupted, especially as the need for these services often increases post-disaster.

Transportation and Electrical Infrastructure
Volcanic activity can have numerous impacts on both transportation and electrical distribution systems. The impacts of volcanic activity on transportation systems may include:

- **Roads and Highways:** Volcanic activity can cause cracking, buckling, and the collapse of roads, highways, and bridges. Debris and ash can make roads impassable. In severe cases, transportation networks are cut off, hindering emergency response, evacuation, and the transportation of goods.
- **Bridges and Tunnels:** Bridges are especially vulnerable to collapse during volcanic activity due to the potential force of lahars, debris avalanche, and pyroclastic flow exerted on their structures. Older bridges not built to modern codes are at higher risk of failure. Tunnels can also collapse or become blocked by debris, cutting off access to critical routes.
- **Railways:** Rail systems can be severely impacted by volcanic activity, as tracks may buckle or become misaligned, leading to derailments or become blocked due to debris and ash.

Volcanic activity can impact both the electrical generation capacity and transmission. The impacts of volcanic activity on electrical systems may include:

- **Power Plants:** Volcanic activity can damage power generation facilities causing a cessation of services and costly repairs. Solar generation plants may suffer drops in capacity due to ash on panels and in the air.
- **Transmission Lines:** Power transmission lines and substations can be damaged by ground shaking and debris flow, especially in areas with unstable soils. This can result in prolonged power outages, which disrupt communication, emergency services, and basic living conditions.
- **Grid Instability:** Damage to power infrastructure can lead to cascading failures within the electrical grid. Substations, transformers, and electrical distribution networks can be knocked offline.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities
Water and wastewater utilities are vulnerable to volcanic events due to the potential for plant damage and distribution system damages. Impacts may include:

- **Water Supply:** Volcanic activity can rupture underground water pipes and damage water treatment facilities, leading to water shortages or contamination. In many cases, people are left without clean drinking water, and authorities must rely on temporary solutions like bottled water or emergency water delivery.
- **Wastewater Systems:** Sewer lines and wastewater treatment plants are particularly vulnerable to ground movement. Ruptured sewer lines can lead to sewage leaks, contaminating groundwater and local water sources. Damage to wastewater treatment plants can lead to untreated sewage being released into waterways, causing public health hazards.

Medical, Education, and Response Facilities
Volcanic activity can significantly disrupt medical, education, and response facilities and operations at various levels. These impacts are especially pronounced in the immediate aftermath, where response efforts, infrastructure damage, and communication breakdowns can severely hamper functions. Impacts may include:

- **Damage to Facility:** Volcanic activity can damage or destroy facilities, causing a significant drop or cessation of services.
- **Services Strain:** Emergency response, including search and rescue operations and medical assistance may be severely impacted due to the number of casualties.

- **Capacity Strain:** Volcanic activity can overwhelm capacities, particularly in communities that lack preparedness plans or resources. The scale of the disaster often requires the involvement of state or federal agencies, further complicating coordination.
- **Communication Breakdowns:** Volcanic activity can damage communication networks, including internet and phone services, preventing effective communication and hindering the dissemination of critical information.
- **Budget Strains:** The cost of responding to and recovering from a volcanic event can put significant pressure on budgets.
- **School Closure:** A volcanic event may result in long term school closures, straining the capacity of caregivers.

Mapping concerning medical, education, and response facilities may be found in Section 3.9: Critical Facilities and Infrastructure.

Communication Systems

No comprehensive mapping of communications systems was available for review to compare against known volcanic activity hazard areas. However, it is assumed that communications lines and towers are in known hazard areas. Volcanic activity can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Damage to Infrastructure:** Volcanic flow and shaking can cause physical damage to communication infrastructure such as cell towers, antennas, satellite dishes, and power lines. This damage can result in interruptions or complete failure of communication services.
- **Power Outages:** Volcanic flow and shaking can lead to power outages by knocking down power lines or damaging electrical substations. Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.
- **Structural Instability:** Volcanic flow and shaking can cause structural instability in communication towers and buildings housing communication equipment. If these structures are not properly reinforced, they may collapse or sustain damage, disrupting communication services.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.8.6.

Environmental and Agricultural Impacts

A volcanic event can have severe and wide-ranging impacts on agriculture and the environment, often with both immediate and long-term consequences.

Volcanic ash can bury crops, suffocating plants and causing mechanical damage to leaves and stems. This can destroy entire fields, leading to immediate crop loss. Even light ashfall can block sunlight, reducing photosynthesis and stunting plant growth. Ash particles can also contaminate soil, lowering its fertility and damaging crops like rice, corn, and vegetables. Volcanic ash can introduce toxic elements, such as fluoride, into the soil, contaminating water sources and plants. High concentrations of these elements can poison livestock and render crops inedible. Ash-contaminated pastures may no longer be safe for grazing animals. Livestock may suffer from inhaling ash or consuming contaminated vegetation and water. Prolonged exposure to ashfall can cause respiratory problems, poisoning, and starvation, particularly when grazing areas are covered in ash.
Volcanic eruptions can decimate forests and vegetation. Hot gases, lava flows, and pyroclastic flows can incinerate entire ecosystems. The loss of vegetation can lead to increased soil erosion and reduced biodiversity. Volcanic gases such as sulfur dioxide (SO_2), carbon dioxide (CO_2), and hydrogen sulfide (H_2S) can lead to acid rain, which acidifies soil and water bodies. Acid rain damages ecosystems, killing plants, fish, and microorganisms critical for ecological balance. Additionally, large volcanic eruptions can inject ash and aerosols into the atmosphere, cooling the climate

EXHIBIT C

temporarily by blocking sunlight. This phenomenon, known as volcanic winter, can reduce crop yields over large areas and affect ecosystems globally. In some cases, volcanic events can benefit agriculture over the long term. Volcanic ash, after initial damage, can enhance soil fertility by adding nutrients like phosphorus, potassium, and trace minerals.

Jurisdictional Concerns:
As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Dunsmuir:** Due to the proximity of Mt. Shasta, and due to the proximity of historic regional lava flows and historic lahar pathways, all populations would be at risk to a volcanic eruption. Additionally, due to limited road systems, an evacuation of citizens would be problematic, especially if any major road systems like Interstate 5 were impacted. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. This is due to the
- **Lake Shastina CSD:** Due to the proximity of Mt. Shasta, and due to the proximity of historic regional lava flows and historic lahar pathways, all populations would be at risk to a volcanic eruption. Additionally, due to limited road systems, an evacuation of citizens would be problematic, especially if any major road systems like Interstate 5 were impacted. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation.
- **McCloud CSD:** Due to the proximity of Mt. Shasta, and due to the proximity of historic regional lava flows, lahar pathways, pyroclastic flows, thick tephra, ballistic ejecta, and rock falls, all populations would be at risk to a volcanic eruption. Additionally, due to limited road systems, an evacuation of citizens would be problematic, especially if any major road systems like Interstate 5 were impacted. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation.
- **Montague:** Due to the proximity of Mt. Shasta, and due to the proximity of historic regional lava flows and historic lahar pathways, all populations would be at risk to a volcanic eruption. Additionally, due to limited road systems, an evacuation of citizens would be problematic, especially if any major road systems like Interstate 5 were impacted. The presence of vulnerable populations, including the elderly, the very young, and citizens with a disability, and citizens in poverty would further exacerbate timely evacuation.
- **Mt. Shasta:** Due to the proximity of Mt. Shasta, and due to the proximity of historic regional lava flows, lahar pathways, pyroclastic flows, thick tephra, ballistic ejecta, and rock falls, all populations would be at risk to a volcanic eruption. Additionally, due to limited road systems, an evacuation of citizens would be problematic, especially if any major road systems like Interstate 5 were impacted. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation.
- **Weed:** Due to the proximity of Mt. Shasta, and due to the proximity of historic regional lava flows, lahar pathways, pyroclastic flows, thick tephra, ballistic ejecta, and rock falls, all populations would be at risk to a volcanic eruption. Additionally, due to limited road systems, an evacuation of citizens would be problematic, especially if any major road systems like Interstate 5 were impacted. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation.
- **Yreka:** All populations would be at risk to a volcanic eruption due to the proximity of Mt. Shasta. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. This is due to the proximity of historic lahar pathways near jurisdictional boundaries.

EXHIBIT C

Cascading Impacts

Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with volcanic activity may include:

- Mudflows and landslides
- Seismic activity
- Infrastructure failure
- Agricultural failure
- Long-term health impacts
- Water quality issues
- Long-term economic impacts

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 138: Volcanic Activity Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Volcanic activity may cause injury or death to people from volcanic flows, ash inhalation, ejected debris, or structural failure. There may be a large number of people seeking treatment for traumatic injuries. Ground shaking may result in broken service lines or pipelines, triggering the release of hazardous materials or waste materials.
Impact on Responders	The extent of the damage to infrastructure such as roads and bridges and communications can greatly impact first responders' ability to access or transport victims. Equipment, facilities, or other assets may be damaged and restrict first responders' capacity to respond to calls for assistance.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Earthquakes could potentially impact critical infrastructure resulting in power outages, access to roadways or public transportation, damage to facilities or infrastructure, including alternate locations.
Delivery of Services	Delivery of services may be impacted by dangerous transportation conditions, causing food, water, and resource systems to be delayed or halted.
Property, Facilities, and Infrastructure	All critical facilities and transportation corridors and pipelines can be impacted. Debris and volcanic flow and ground shaking can lead to the collapse of buildings and bridges and can disrupt utility service.
Impact on Environment	Volcanic events have the potential to trigger secondary hazards such as fire, landslides, hazardous materials release, slope failure, and dam failures, all potentially devastating to the environment. These secondary hazards can completely wipe out habitats and environments, cause significant injury to animals or livestock, or contaminate certain components of the environment.
Economic Conditions	Volcanic activity can pose a fiscal impact on the local and county governments, even if some of those costs can be recouped through federal grant reimbursements. Local, county, and state resources may be drained by response and recovery efforts. Additionally, a severe activity would affect the ability of businesses to maintain operations. If the private sector is not able to re-establish operations this would also impact the local economy.
Public Confidence in Governance	Governmental response, on all levels, requires direct actions that must be immediate and effective to maintain public confidence. If local government takes a long time to begin recovery operations, or for the public to see recovery operations, this will have a negative impact on the public's confidence in governance.

EXHIBIT C

5.16.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, any additional growth would place additional populations at risk. Should any population increase occur, potentially vulnerable populations could face disproportionate effects.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to 2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires.

5.16.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the volcanic activity hazard.

Table 139: Example Volcanic Activity Mitigation Actions

Category	Example Action
Planning and Regulation	Develop and distribute guidelines or passing ordinances that require developers and building owners to locate lifelines, buildings, critical facilities, and hazardous materials out of areas subject to significant volcanic hazards.
	Develop an inventory all buildings that are in potential volcanic flow areas.
	Use GIS to map hazard areas, at-risk structures, and associated to assess high-risk areas.
	Create a volcanic eruption scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within a community to develop mitigation priorities.
Infrastructure	Use flexible piping when extending water, sewer, or natural gas service.
	Install shutoff valves and emergency connector hoses for water mains in hazard areas.
	Install window film to prevent injuries from shattered glass.
Education	Develop an outreach program about volcanic activity risk and mitigation activities in homes, schools, and businesses.
	Offer GIS hazard mapping online for residents and design professionals

EXHIBIT C

5.17 Wildfire

5.17.1 Hazard Description

The National Weather Service defines a wildfire as any free burning uncontainable wildland fire not prescribed for the area which consumes the natural fuels and spreads in response to its environment. They can occur naturally and through human action. Population de-concentration in the U.S. has resulted in rapid development in the outlying fringe of urban areas and in rural areas with attractive recreational and aesthetic amenities, especially forests. This expansion has increased the likelihood that wildfires will threaten life and property.

According to the National Park Service there are three classifications of wildfires:

- **Surface Fire:** Burning which may spread rapidly and ignite leaf litter, fallen branches and other fuels located at ground level.
- **Ground Fire:** Burning of organic matter in the soil beneath the surface.
- **Crown Fire:** Burning through the top layer (canopy) of trees and shrubs. Crown fires, which can be very intense and difficult to contain, require strong winds, steep slopes, and large amounts of fuel to burn.

Wildfires are strongly influenced by multiple factors, including:

- **Weather:** Factors such as relative humidity, wind speed, ambient temperature and precipitation all influence the formation and growth of wildfires.
- **Topography:** Natural features, such as canyons or ridges, can increase the spread rate of a fire by funneling or drawing heated air and fire.
- **Fuel Type, Distribution and Moisture:** Available fuels, the spacing and density of available fuels, and fuel moisture content can determine spread rates and intensity of wildfires.
- **Drought Conditions:** Drought tends to increase both the likelihood and severity of wildfires.

Fire science distinguishes between wildland fires and wildland urban interface (WUI) fires**.** The primary difference between a wildland fire and a WUI fire lies in their location and the type of areas they impact:

- **Wildland Fire:**
  - Definition: A wildland fire occurs in undeveloped, natural areas such as forests, grasslands, and shrublands. It is driven by natural fuels like trees, grass, brush, and dead vegetation.
  - Characteristics: These fires are often started by natural causes (lightning) or human activity (campfires, equipment use). They can spread rapidly depending on fuel, weather conditions (wind and temperature), and topography.
  - Impact Area: Wildland fires primarily affect forests and other natural ecosystems, causing habitat loss, ecosystem changes, and environmental damage, though they can also impact air quality over a large region.
- **WUI Fire:**
  - Definition: A WUI fire occurs where wildland areas meet or intermingle with human development. It involves not only natural vegetation but also structures (homes, businesses, infrastructure).
  - Characteristics: These fires are especially dangerous because they can ignite homes, buildings, and other man-made structures, often in suburban or rural areas where homes are built near forests or brush.
  - Impact Area: WUI fires are particularly destructive to property and can result in large-scale evacuations and property loss. They are challenging for firefighters because of the dual threat to both natural landscapes and human communities.

5.17.2 – Location and Extent

Public Comment: *Wildfire is a priority.*

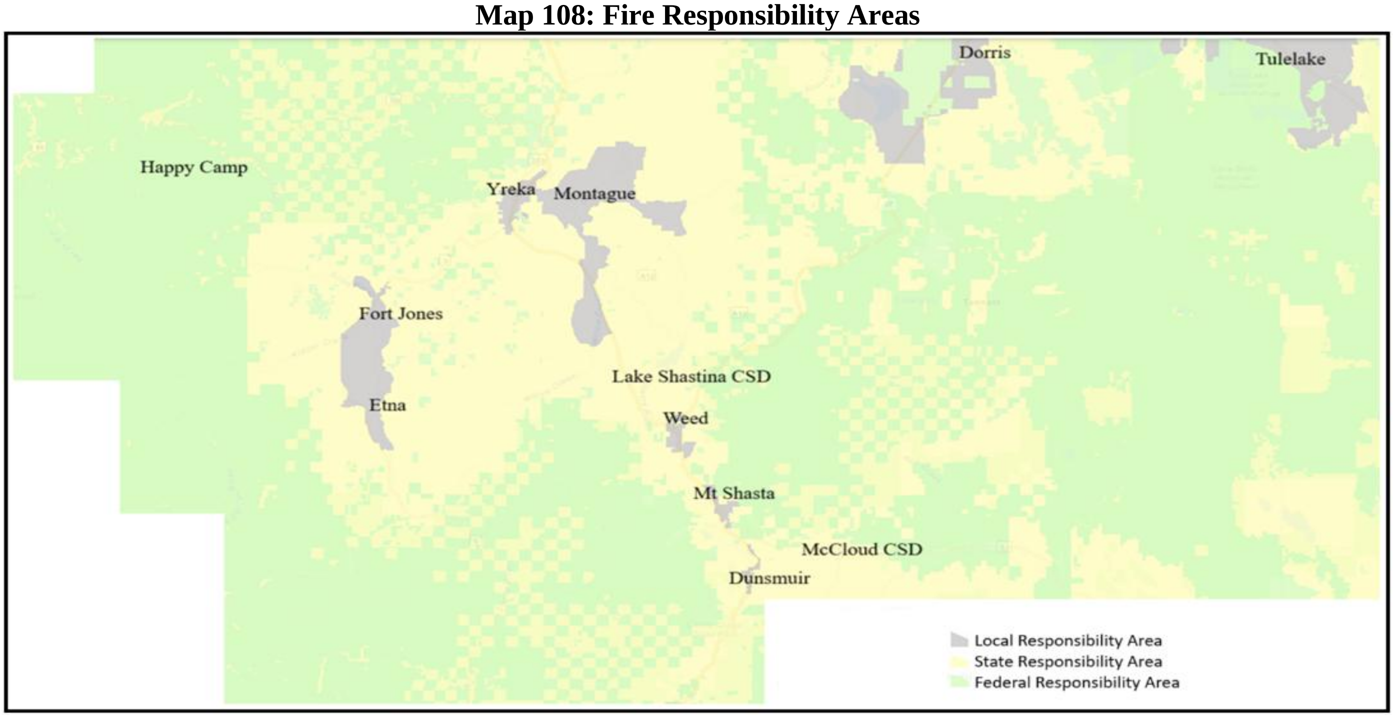
Siskiyou County highly susceptible to wildfires due to its diverse landscapes, which include dense forests, grasslands, and mountainous terrain. Jurisdictions in areas with extensive vegetation, such as the Klamath National Forest and the Shasta-Trinity National Forest, are particularly vulnerable. Regions with steep slopes, like those near Mount Shasta and the Marble Mountains, are at increased risk due to the tendency of fires to spread rapidly uphill. Jurisdictions at higher risk include rural communities like Weed, Dunsmuir, and Happy Camp, where proximity to the WUI increases risk.

For fire response local, state, tribal, and federal organizations have primary legal (and financial) responsibility for wildland fire protection. In many instances, two fire organizations have dual primary responsibility on the same parcel of land, one for wildland fire protection and the other for structural or improvement fire protection. This layering of responsibility and resulting dual policies, rules, practices has been addressed by California state legislature adopted Public Resource Code Section 4291.5 and Health and Safety Code Section 13108.5 establishing the following responsibility areas:

- **Local Responsibility Area:** Primarily the responsibility of the local jurisdiction such as local fire departments and districts or by CAL FIRE under contract to local governments. These areas can include land in cities, cultivated agriculture land, and WUI areas where the financial and jurisdictional responsibility for improvement and wildland fire protection is that of a local government agency.
- **State Responsibility Area:** Primarily the responsibility of CAL FIRE, these areas are defined as lands that are in county unincorporated areas, are not federally owned, have wildland vegetation cover rather than agricultural uses, have watershed and/or range/forage value, and have housing densities not exceeding three units per acre.
- **Federal Responsibility Area**: Primarily the responsibility of a federal government agency such as the U.S. Forest Service or Bureau of Land Management. These areas are fire-prone wildland areas that are owned or managed by a federal agency who have primary financial and rule-making jurisdictional authority. In many instances, these areas are interspersed with private landownership or lease where fire protection for is usually not the responsibility of the federal land management agency but rather a local agency.

The following map, from the CAL FIRE State Responsibility Area Viewer, details areas of responsibility within Siskiyou County:

Map 108: Fire Responsibility Areas



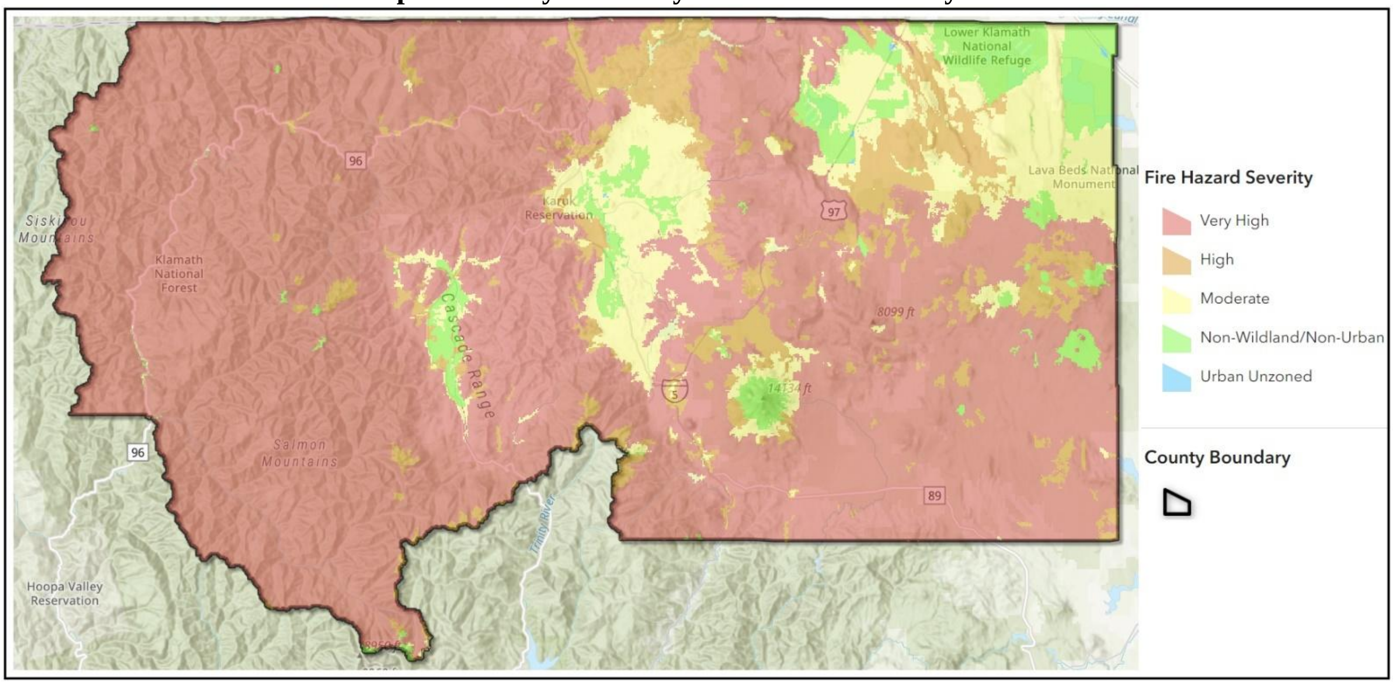
Source: CAL FIRE State Responsibility Area Viewer

EXHIBIT C

Direct Protection Areas delineate the dividing lines between land that will be provided wildland fire protection by State, Federal, and Local agencies. The Cooperative Fire Management Agreement between the federal agencies and CAL FIRE is the primary mechanism that provides the framework for wildland fire protection responsibilities statewide. Through this mechanism the state has been divided into practical Direct Protection Areas corresponding with each agency's responsibility. The participating agencies submit proposal for changes to their DPA where necessary.

In an effort to codify wildfire risk, CAL FIRE is required to classify the severity of fire hazard in areas. The Fire Hazard Severity Zone 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, moderate, high, and very high. The following map, from Siskiyou County, details current severity zones:

Map 109: Siskiyou County Fire Hazard Severity Zones

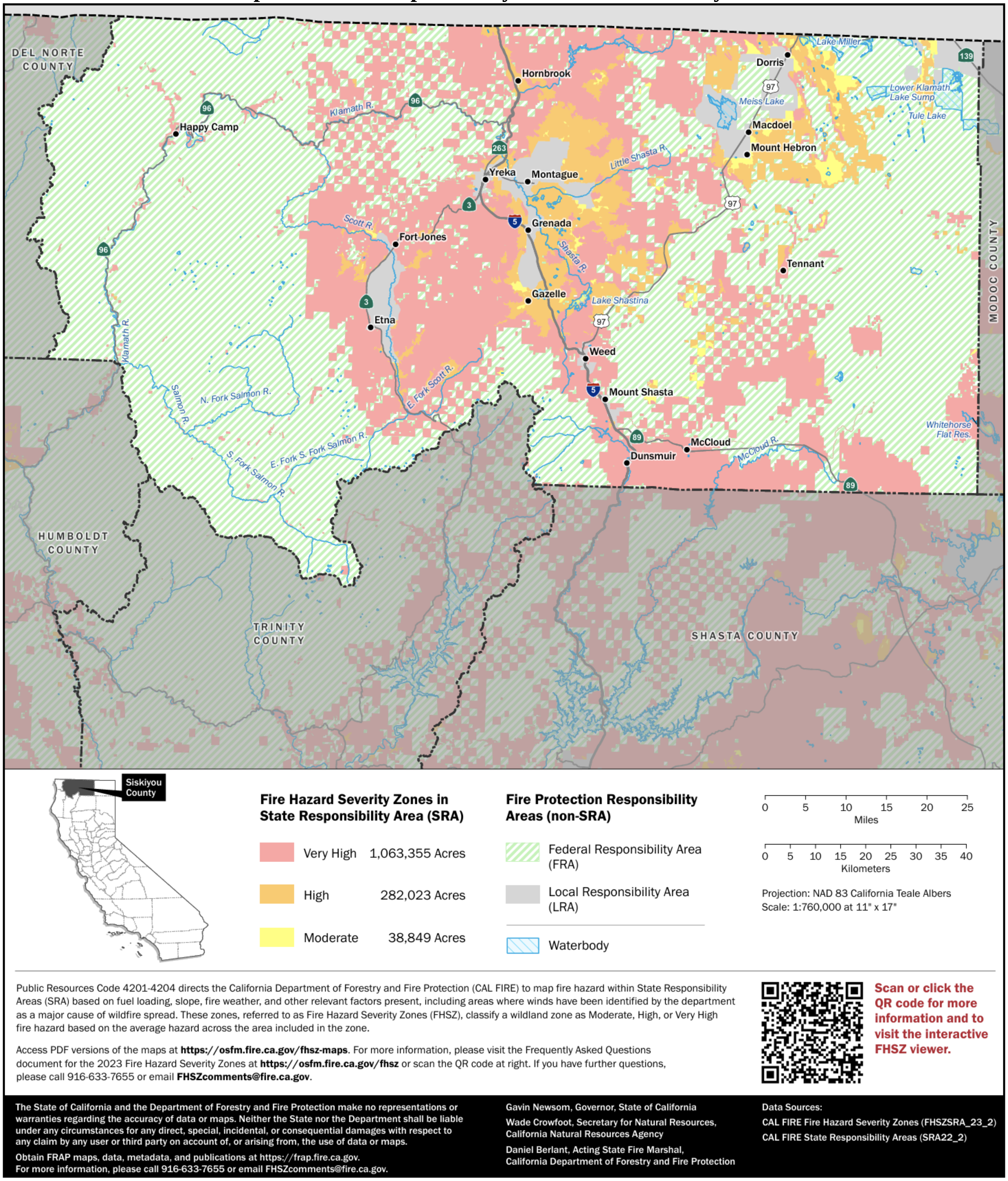


Source: Siskiyou County

The following map, from CAL FIRE, details the current severity zones in State Responsibility Areas:

EXHIBIT C

Map 110: State Responsibility Fire Hazard Severity Zones



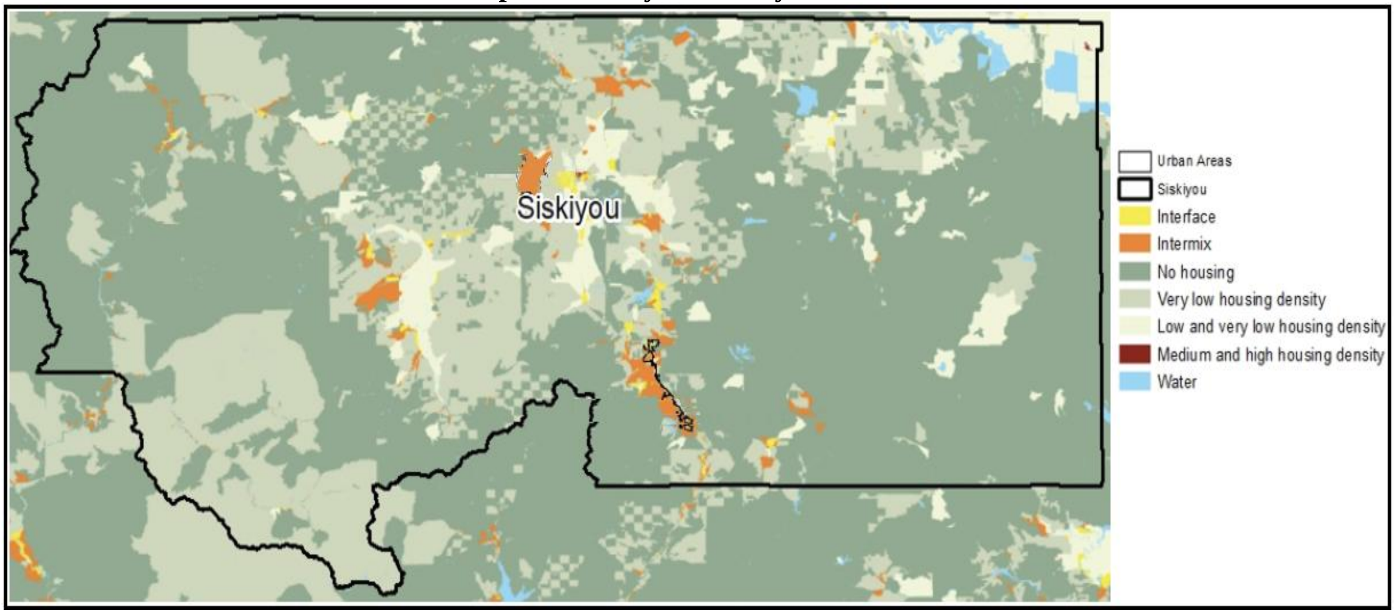
Source: CAL FIRE

The WUI is the area where human improvements such as homes, ranches and farms come in contact with the wildlands. The WUI creates an environment in which fire can move readily between structure and vegetation fuels, often resulting in massive fires, or conflagrations, that may lead to widespread evacuations. The expansion of the WUI in recent decades has significant implications for wildfire management and its impact. There are two types of WUI, intermixed and interface. Intermix WUI are areas where housing and vegetation intermingle, and interface WUI are areas with housing

EXHIBIT C

in the vicinity of dense, contiguous wildland vegetation. The following map illustrates WUI areas throughout the Siskiyou County:

Map 111: Siskiyou County WUI Areas



Source: Siskiyou Couty, CAL FIRE

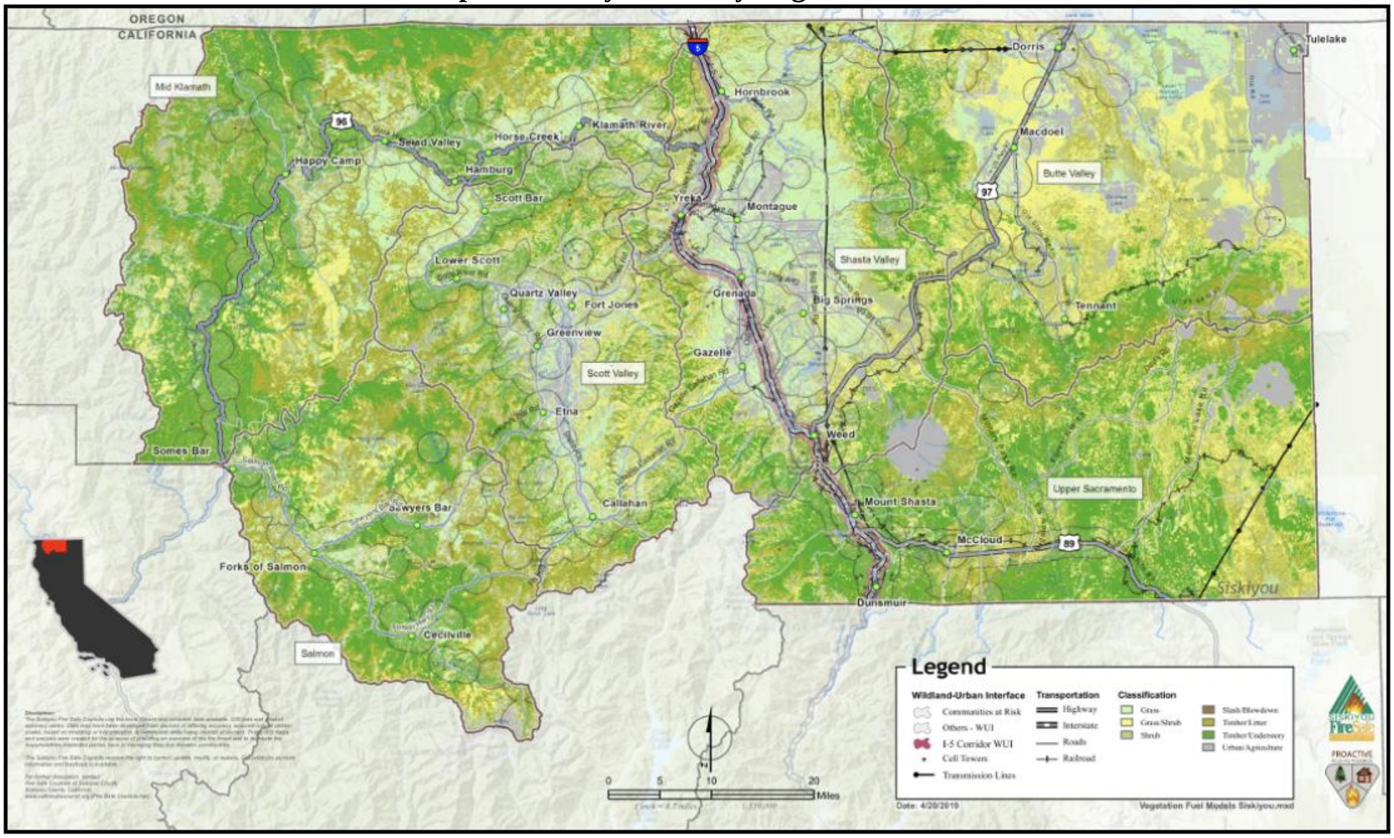
Vegetation types are closely related to wildfire occurrence because they directly influence the availability of fuel, the intensity of the fire, and its potential spread. Different vegetation types have distinct characteristics in terms of flammability, moisture content, and fuel load, all of which determine how easily they can catch fire and how a wildfire behaves. The following provides an overview of how specific vegetation types impact wildfire occurrence:

- **Grasslands:** Dominated by fine, fast-drying fuels like grasses, they have a relatively low fuel load but dry out quickly and ignite easily. Fires in grasslands tend to spread rapidly but burn with lower intensity because the available fuel is less dense. The fast-moving nature of grass fires can make them dangerous, especially in windy conditions.
- **Shrublands:** These areas consist of dense shrubs, small trees, and brush with a high content of oils and resins, which are highly flammable. Chaparral is particularly common in California and other Mediterranean climates. Fires in chaparral ecosystems are intense, producing extreme heat and flames that can rapidly spread. These fires often exhibit "crown fire" behavior, where the fire moves through the canopy, jumping from shrub to shrub.
- **Forests:** Forests provide heavy fuel loads in the form of trees, dead wood, leaf litter, and underbrush. The type of forest plays a significant role in fire behavior. Coniferous Forests, particularly with species like pines and firs, tend to have higher resin content, making them highly flammable. They also shed needles that dry out and accumulate on the forest floor, increasing fire risk. Deciduous Forests typically have lower flammability due to higher moisture content in leaves and less resin. However, during dry seasons, they can still support wildfires, especially if there's significant leaf litter. Forest fires can vary from low-intensity surface fires that burn ground-level fuels to high-intensity crown fires that spread through the tree canopy.
- **Dry Forests:** These ecosystems, such as pinyon-juniper woodlands or oak woodlands, are characterized by low-density tree cover, and can have significant understory fuels, especially in drought conditions. Fires in these areas are moderate to high intensity and can spread quickly if the understory is dense or dry.
- **Urban and Agricultural Areas:** While urban areas are not typically thought of as wildland, many are located near or within WUI zones, where wildfires from surrounding natural vegetation can spread into developed areas. Fires in these areas can spread from wildlands into structures, significantly increasing the damage potential. Vegetation in agricultural lands can also burn, especially during dry periods.

EXHIBIT C

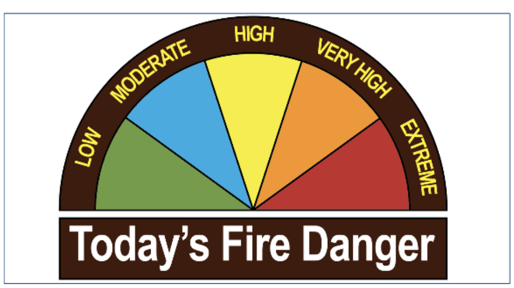
The following map, from the Siskiyou County Community Wildfire Protection Plan, details vegetation cover throughout the county:

Map 112: Siskiyou County Vegetation Cover



Source: Siskiyou County Community Wildfire Protection Plan

The duration of a wildfire depends on the weather conditions, how dry it is, the availability of fuel to spread, and the ability of responders to contain and extinguish the fire. Historically, some wildfires have lasted only hours, while other fires have continued to spread and grow for an entire season. They spread quickly and often begin unnoticed until they have grown large enough to signal by dense smoke. If fuel is available, and high wind speeds hit, a wildfire can spread over a large area in a very short amount of time. These factors make the difference between small upstart fires easily controlled by local fire services to fires destroying thousands of acres requiring multiple state and federal assets for containment and suppression.



The National Fire Danger Rating System allows fire managers to estimate today's or tomorrow's fire danger for a given area. It combines the effects of existing and expected states of selected fire danger factors into one or more qualitative or numeric indices that reflect an area's fire protection needs. It links an organization's readiness level (or pre-planned fire suppression actions) to the potential fire problems of the day. The following is a brief explanation of the different fire danger levels based on criteria established by the National Fire Danger Rating System.

EXHIBIT C

Table 140: National Fire Danger Rating System

Rating	Description
Low	Fuels do not ignite easily from small embers, but a more intense heat source, such as lightning, may start fires in duff or dry rotten wood. Fires in open, dry grasslands may burn easily a few hours after a rain, but most wood fires will spread slowly, creeping or smoldering. Control of fires is generally easy.
Moderate	Fires can start from most accidental causes, but the number of fire starts is usually pretty low. If a fire does start in an open, dry grassland, it will burn and spread quickly on windy days. Most wood fires will spread slowly to moderately. Average fire intensity will be moderate except in heavy concentrations of fuel, which may burn hot. Fires are still not likely to become serious and are often easy to control.
High	Fires can start easily from most causes and small fuels (such as grasses and needles) will ignite readily. Unattended campfires and brush fires are likely to escape. Fires will spread easily, with some areas of high intensity burning on slopes or concentrated fuels. Fires can become serious and difficult to control unless they are put out while they are still small.
Very High	Fires will start easily from most causes. The fires will spread rapidly and have a quick increase in intensity, right after ignition. Small fires can quickly become large fires and exhibit extreme fire intensity, such as long-distance spotting and fire whirls. These fires can be difficult to control and will often become much larger and longer-lasting fires.
Extreme	Fires of all types start quickly and burn intensely. All fires are potentially serious and can spread very quickly with intense burning. Small fires become big fires much faster than at the "very high" level. Spot fires are probable, with long-distance spotting likely. These fires are very difficult to fight and may become very dangerous and often last for several days.

Source: Wildfire Fire Assessment System

The severity of wildfire depends on several quickly changing environmental factors. It is impossible to strategically estimate the severity of a wildfire as these factors, including drought conditions and wind speed, have such a great influence on the wildfire conditions. The Characteristic Fire Intensity Scale within identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on a weighted average of four percentile weather categories. The following table details the range of wildfire intensity:

Table 141: Characteristic Fire Intensity Scale

Class	Description
Class 1- Very Low	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
Class 2- Low	Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
Class 3- Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
Class 4 - High	Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers are generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property
Class 5- Very High	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Source: Southern Wildfire Risk Assessment Summary Report

A Red Flag Warning is an alert issued by the National Weather Service to indicate that critical fire weather conditions are either occurring or expected shortly. A Red Flag Warning is typically issued when the following conditions are met:

- **Low relative humidity (often below 15%):** Dry air makes vegetation more likely to ignite and sustain fire.
- **High winds (usually sustained winds above 25 mph):** Winds can quickly spread embers and flames, helping fires move faster and become more intense.
- **Dry vegetation:** Vegetation such as grass, shrubs, and trees become highly flammable when moisture levels are low, creating ideal conditions for fires to ignite and spread.
- **High temperatures:** Hot weather exacerbates dryness and lowers fuel moisture, increasing fire potential.

When a Red Flag Warning is issued, it means that the potential for wildfire ignition and rapid spread is extremely high. The warning often leads to heightened preparedness among firefighting agencies and advisories for the public to avoid activities that could spark fires, such as outdoor burning or using machinery that could create sparks.

The MPC views wildfire as a local, county-wide, and regional hazard. Discussions with the MPC and a review of all available data indicated wildfire is a community concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Siskiyou County:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Dorris:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Dunsmuir:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Etna:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Fort Jones:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Happy Camp CSD:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Lake Shastina CSD:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **McCloud CSD:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Montague:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Mt. Shasta:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Tulelake:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.

EXHIBIT C

- **Weed:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.
- **Yreka:** Wildfire identified as a community concern as citizens, structures, and infrastructure are vulnerable. Additionally, continuing climate change resulting in higher temperatures and increased occurrence of drought conditions is likely to exacerbate this concern.

For a description of currently available assets within each jurisdiction, see Section 3.9.

5.17.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Siskiyou County has experienced two Presidential Disaster Declarations related to wildfire events reflected in the following table.

Table 142: Siskiyou County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual and Public Assistance	Mitigation Dollars Obligated
DR-4569-CA	10/16/2020	California Wildfires	$207,894,170	$33,655,435
DR-4142-CA	08/29/2013	Wildfire (Karuk Reservation)	$444,517	-

Source: FEMA
-: Not reported

The Governor, or the Governor's Authorized Representative, may submit a request for a fire management assistance declaration as required. FEMA will approve declarations for fire management assistance when it is determined that a fire or fire complex on public or private forest land or grassland threatens such destruction as would constitute a major disaster. Research indicates that there have been six fire management declarations for Siskiyou County since 1953:

Table 143: Siskiyou County Fire Management Declarations

Designation	Declaration Date	Incident Name	Public Assistance	Emergency Work
FM-5450-CA	9/2/2022	California Mill Fire	$8,303,965	$253,281
FM-5393-CA	6/29/2021	California Lava Fire	$3,697,476	$503,088
FM-5361-CA	9/9/2020	California Slater Fire	-	-
FM-5250-CA	9/5/2018	California Klamathon Fire	$18,158,242	$585,590
FM-5079-CA	9/15/2014	California Boles Fire	$5,294,855	$165,882
FM-5068-CA	8/2/2014	California Oregon Gulch Fire	$1,134,200	$22,006

Source: FEMA

The Governor of the State of California, in accordance with the authority vested by the State Constitution and statutes, including the California Emergency Services Act Government Code section 8625, can declare a proclamation of a State of Emergency. The following table details wildfire proclamations for Siskiyou County:

Table 144: Siskiyou County California Proclamations of State of Emergency

Designation	Declaration Date	Incident Type	Damages*
2023-08	08/29/2023	Happy Camp Fire	-
2022-08	09/02/2022	Mill Fire	$84,513,380
2022-07	07/30/2022	McKinney Fire	$15,061,500
2021-04	07/16/2021	Lava Fire	$9,310,474
2020-07	09/10/2020	Wildfire	$245,298,163
2018-04	07/05/2018	Wildfire	$32,808,626
-	09/10/1987	Wildfire	$18,000,000

Source: Cal OES
*: Damages reported for all impacted counties, tribal reservations, and cities

The following table, using data from CAL FIRE, details the occurrence of wildfires for Siskiyou County from 2016 – 2024, along with the administrative unit providing fire management oversight, the location of the event, and the number of acres burned in Siskiyou County:

Table 145: CAL FIRE Recorded Wildfire, 2016 - 2024

Incident Name	Date	Administrative Unit	Location	Acres Burned
Hambone Fire	2024-10-06	CAL FIRE Siskiyou Unit	North Fork of the Salmon River, West of Sawyers Bar, Klamath National Forest	14,754
Shelly Fire	2024-07-03	Klamath National Forest	Cottonwood Creek Rd., 2 miles north of Hornbrook	50
Harry Fire	2024-07-23	CAL FIRE Siskiyou Unit	Community of Copco, South of Oregon Border	35,302
Donomore Fire	2024-07-16	Rogue River-Siskiyou National Forest	near Little Deer Mountain along Highway 97	5,503
Dewey Fire	2024-07-14	CAL FIRE Siskiyou Unit	In the Happy Camp area	0
Paradise Fire	2024-07-15	CAL FIRE Siskiyou Unit	Approx. 18 miles northeast of McCloud, just south of Horse Peak	200
Bogus Fire	2024-07-08	CAL FIRE Siskiyou Unit	City of Weed	516
Springs Fire	2024-06-07	CAL FIRE Siskiyou Unit	5 miles North of the community of Montague on Cooley Rd	181
Cod Fire	2024-06-10	CAL FIRE Siskiyou Unit	Off Hwy 161 & Hwy 97, northeast of Dorris	24
SKU August Lightning Complex	2023-08-15	CAL FIRE Siskiyou Unit	15 miles SW of Happy Camp (Siskiyou County)	2,860
Happy Camp Complex	2023-08-16	Klamath National Forest Service	Hwy 5 at Bailey Hill, 2 mi southeast of Hilt	26
Mill Fire	2022-09-02	CAL FIRE Siskiyou Unit	Table Rock Rd & Harry Cash Rd, Montague	23
Mountain Fire	2022-09-02	CAL FIRE Siskiyou	off Seiad Creek Rd, 5 miles northeast of Seiad Valley	33,867
McKinney Fire	2022-07-29	Klamath National Forest	off Hwy 263, 2 miles north of Yreka	710
Eliza Fire	2022-09-08	Klamath National Forest	off of Moffett Creek Rd and Luce Gulch Rd, northeast of Fort Jones	32
Yeti and Alex Fire	2022-07-29	Klamath National Forest	Whitepine Road and Blue Heron Place, 10 miles east of Hornbrook	46
Grade Fire	2016-08-24	CAL FIRE Siskiyou Unit	Ager Beswick Rd. and Crest Ln. south of Copco Lake	56
Fay Fire	2017-07-05	CAL FIRE Siskiyou Unit	off Campus Dr. and Moonlit Oaks Ave. in Yreka	19
River Complex	2021-07-30	Klamath National Forest	Off Hwy 96 & Dutch Creek Rd, east of Oak Knoll	0
Antelope Fire	2021-08-01	Klamath National Forest	Highway 3 & Fay Lane, south of Etna	496
Refuge Fire	2021-03-27	CAL FIRE/Siskiyou unit	14 miles west of Etna, California in the Marble Mountain Wilderness	0
97 Fire	2022-09-27	CAL FIRE Siskiyou Unit	About 18 miles northwest of Orleans, California in Siskiyou County.	27,276
Coyote Fire	2022-09-07	CAL FIRE Siskiyou Unit	Clear Creek Drainage, 7 miles southwest of Happy Camp (Siskiyou County)	0

EXHIBIT C

Table 145: CAL FIRE Recorded Wildfire, 2016 - 2024

Incident Name	Date	Administrative Unit	Location	Acres Burned
Kelsey Fire	2022-07-30	Klamath National Forest	Lakeview Dr. at Lake Ridge Rd., Pleasant Valley, 3 miles west of Dorris	155
Smokey Fire	2022-08-04	Klamath National Forest	Wards Fork south of Donomore Meadows near the Oregon border.	41
Meamber Fire	2022-07-31	CAL FIRE Siskiyou Unit	5 miles W of Happy Camp, CA	78,698
Shackleford Fire	2022-07-30	CAL FIRE Siskiyou Unit	Siskiyou Wilderness, Six Rivers NF	3,142
Ridge Fire	2022-06-26	Unified Command: CAL FIRE Siskiyou and United States Forest Service	Bradley Ridge, City of Dunsmuir	54
Whitlow Fire	2022-03-25	CALFIRE Siskiyou Unit	off of Owens Rd and Hwy 97, northeast of Dorris	55
Gulch Fire	2022-03-12	CAL FIRE Siskiyou	West of Dunsmuir	54
Evergreen Fire	2022-03-12	CAL FIRE Siskiyou	17 miles east of Cave Junction, Oregon	39,715
McCash Fire	2021-08-18	Six Rivers National Forest	West of Rancho Hills, community of Lake Shastina, north of Weed	127
Lava Fire	2021-06-24	Shasta-Trinity National Forest	off Ager Road, northeast of Montague	27
Hambone Fire	2021-08-06	Shasta-Trinity National Forest	Martin Dr. and Stanton Drive, NE of Lake Shastina	37
Tennant Fire	2021-06-28	Klamath National Forest	Meamber Creek Road, 8 miles west of Fort Jones	12
Bradley Fire	2021-07-11	Shasta Trinity National Forest	Cherry Maple Road Klamath River, NW of Yreka, Klamath National Forest	63
Beswick Fire	2021-06-28	CAL FIRE Siskiyou Unit	Petersburg and Caribou Creek Rd 3 MI SW of Cecilville	215
July Complex	2020-07-24	Modoc National Forest	off Klamathon Road and Copco Road, south of Hornbrook	38,008
Fox Fire	2020-09-16	Klamath National Forest	Shasta Valley Wildlife Area, 4 miles southeast of Montague	224
Shackleford Fire	2020-09-11	CAL FIRE Siskiyou Unit	off Lott Rd and Bunny Ln, 15 miles north of Weed	10
Schoolhouse Fire	2020-09-09	CAL FIRE Siskiyou Unit	1 mile northwest of Iron Gate Dam	15
Badger Fire	2020-07-18	CAL FIRE Siskiyou	Rocky Rd and Harry Cash Rd, 9 miles east of Grenada	17
Klamathon Fire	2018-07-05	CAL FIRE Siskiyou Unit	Deer Run Road, east of Iron Gate Reservoir	10
Lime Fire	2019-09-07	Klamath National Forest	off Highway 96 and Lumgrey Road, West of Gottsville	207
Kidder 2 Fire	2019-09-07	Klamath National Forest	Tree of Heaven Campground, east of Gottsville	83
Tree Fire	2019-07-27	Klamath National Forest	Hwy 96 near the Klamath River Community Hall	35
Community Fire	2019-07-27	Klamath National Forest	Ash Creek and Highway 96, Southwest of Hornbrook	1,872
Bar Fire	2019-09-15	Klamath National Forest	Marble Mountain Wilderness and Kidder Creek, Northwest of Etna	227

EXHIBIT C

Table 145: CAL FIRE Recorded Wildfire, 2016 - 2024

Incident Name	Date	Administrative Unit	Location	Acres Burned
Duzel Fire	2019-09-07	CAL FIRE Siskiyou unit	Near Duzel Rock Lookout, northeast of Etna	15
IronGate Fire	2019-06-16	CAL FIRE Siskiyou Unit	Southwest of Bald Mountain and Klamath Bar, Klamath National Forest	91
Ward Fire	2017-08-13	Rogue-River-Siskiyou National Forest	Badger Mountain Road and Hawkinsville Humbug Road	557
Lumgrey Fire	2019-06-17	USFS Klamath National Forest	Schoolhouse Gap Rd And McAdams Creek Rd	45
Rocky Fire	2019-06-14	CAL FIRE Siskiyou	Shackleford Rd, southwest of Quartz Valley Reservation	50
Shastina Fire	2018-05-09	CAL FIRE Siskiyou Unit	Fox Creek, Southwest of Callahan	2,188
Ager Fire	2018-05-19	CAL FIRE Siskiyou Unit	Lower Klamath Lake Rd and Dorris Brownell Rd	873
Martin Fire	2018-06-03	CAL FIRE Siskiyou Unit	Hotlum Rd and Lumm Rd	26,409
Meamber Fire	2018-06-04	CAL FIRE Siskiyou Unit	Tennant Road and Pengrass Road, South of Mount Hebron	10,580
Cherry Fire	2018-06-27	Klamath National Forest	Ager-Beswick Road and Desavado Road, North of Montague	118
Petersburg Fire	2018-07-01	Klamath National Forest	Highway 89 and Harris Spring Road, east of McCloud in Siskiyou County.	357
Steamboat Fire	2018-07-15	CAL FIRE Siskiyou Unit	Antelope Creek and Forest Road 41N28, south of Tennant	145,632
Lott Fire	2018-07-17	CAL FIRE Siskiyou Unit	Lave Spur and Hambone Island	55
Iron Gate Fire	2018-10-10	CAL FIRE Siskiyou Unit	Ten Bear Mtn McCash Creek	94,962
Owens Fire	2017-08-29	CAL FIRE Siskiyou Unit	Dorris Brownell Road and East Butte Valley Road, southeast of Dorris	113
Bradley Fire	2017-08-28	Shasta-Trinity National Forest	Evergreen Lane & Hwy 97, northeast of Weed.	12
Bradley Fire	2017-08-28	Shasta-Trinity National Forest	East Bear and Bear Lake Rd, northwest of Pondosa	10
Eclipse Complex	2017-08-15	Klamath National Forest	Rainbow ridge , West of Mount Shasta in Siskiyou County.	12
Miller Complex	2017-08-14	Rogue River-Siskiyou National Forest	Hwy 96 and McKinney Creed Road, southwest of Klamath River	60,138
Young Fire	2017-08-07	Six Rivers National Forest	Shackleford Road and Big Meadows Creek, West of Fort Jones	31
Hill Fire	2017-07-29	CAL FIRE Siskiyou Unit	Buker Rd and Punkin Rd, Southwest of Scott Bar	85
Orleans Complex	2017-07-26	Six Rivers National Forest	Meamber Creek Road and Scott River Road, Northwest of Fort Jones	63
Clear Complex (merged into Eclipse Complex)	2017-07-25	Klamath National Forest	Beaver Creek and Forest Road 48N01, west of Hilt	34
Klamath Fire	2017-07-04	Klamath National Forest	Seiad south of HWY 96 and south of the Klamath River	-
King Fire	2017-06-26	CAL FIRE Siskiyou Unit	Woodridge Court and Woodridge Way, City of Weed	3,939

EXHIBIT C

Table 145: CAL FIRE Recorded Wildfire, 2016 - 2024

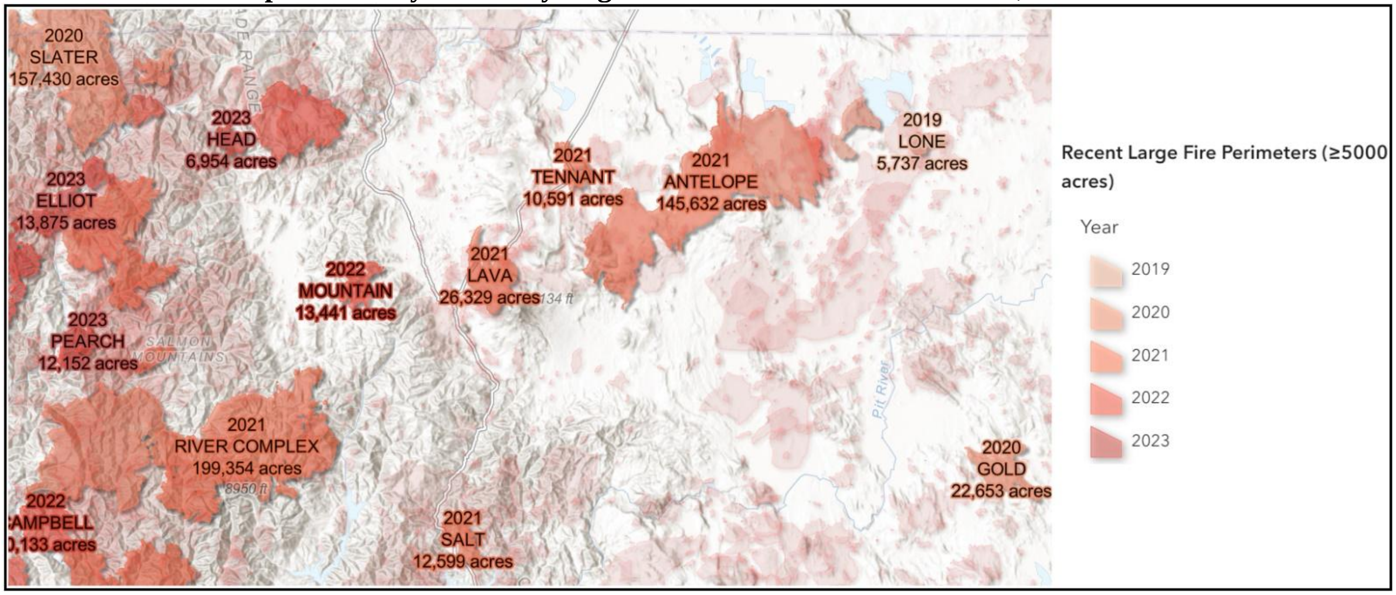
Incident Name	Date	Administrative Unit	Location	Acres Burned
Salmon-August Complex	2017-06-25 T17:00:00Z	CAL FIRE Siskiyou Unit / Klamath National Forest	Gazelle-Callahan Road, east of Gazelle Mountain , southeast of Gazelle	13,440
Bogus Fire	2017-06-18	CAL FIRE Siskiyou Unit	Coyote Ridge, west of Red Rock Lakes, southeast of Dorris	297
Whitepine Fire	2017-06-06	CAL FIRE Siskiyou Unit	Hawkinsville Humbug Rd and Humbug Creek Rd west of Yreka	-
Pony Fire	2016-06-07	USFS Klamath National Forest	Quarry Road and Quarry Lance, Lake Shastina	30
Moffett Fire	2016-09-12	CAL FIRE Siskiyou Unit	Siskiyou County	838
Gap Fire	2016-08-27	USFS Klamath National Forest	Klamath National Forest and Happy Camp Ranger District near Scott Bar	21,725
Table Fire	2016-07-21	CAL FIRE Siskiyou Unit	West of Gazelle	11
Bailey Fire	2016-07-19	CAL FIRE Siskiyou Unit	Cod Drive, Hornbrook	28
Dorris Fire	2015-07-21	CAL FIRE Siskiyou Unit	Greenview	15,520
Cooley Fire	2015-07-13	CAL FIRE Siskiyou Unit	East of Ager	411
Stephens Fire	2015-02-24	Shasta-Trinity National Forest	North of Little Shasta	109
Boles Fire	2014-09-15	CAL FIRE Siskiyou Unit	4500 Block of Ager Road, West of Siskiyou County Airport, Montague	101
Little Deer Fire	2014-07-31	CAL FIRE Siskiyou Unit / USFS-Klamath National Forest	South/East of Donomore Peak, near the California/Oregon border	35
Oregon Gulch Fire (part of the Beaver Complex)	2014-07-30	CAL FIRE Siskiyou Unit / Oregon Dept. of Forestry / Oregon Office of The State Fire Marshal	Harry Cash Road, near Montague.	10
Happy Camp Complex	2014-08-11	US Forest Service - Klamath National Forest	Forest Road 24 and Forest Road 40N57 in the Pondosa and Hambone area	-
Salmon River Complex	2013-07-31	Klamath National Forest	Caldwell Trail and Hill Road, Northwest of Tionesta	83,261
Cottonwood Fire	2013-08-15	CAL FIRE Siskiyou Unit	Scott Salmon Ranger District, west of Callahan	199,359

Source: CAL FIRE
-: Data not reported

Augmenting this data, the CAL FIRE Fire and Resource Assessment Program annually maintains and distributes historical fire perimeter maps. The GIS data is jointly developed with the cooperation of the United States Forest Service Region 5, the Bureau of Land Management, the National Park Service and the Fish and Wildlife Service. Although the database represents the most complete digital record of fire perimeters, it is still incomplete, and users should be cautious when drawing conclusions based on the data. The following map details historic wildfire perimeters for Siskiyou County from 2019 – 2023:

EXHIBIT C

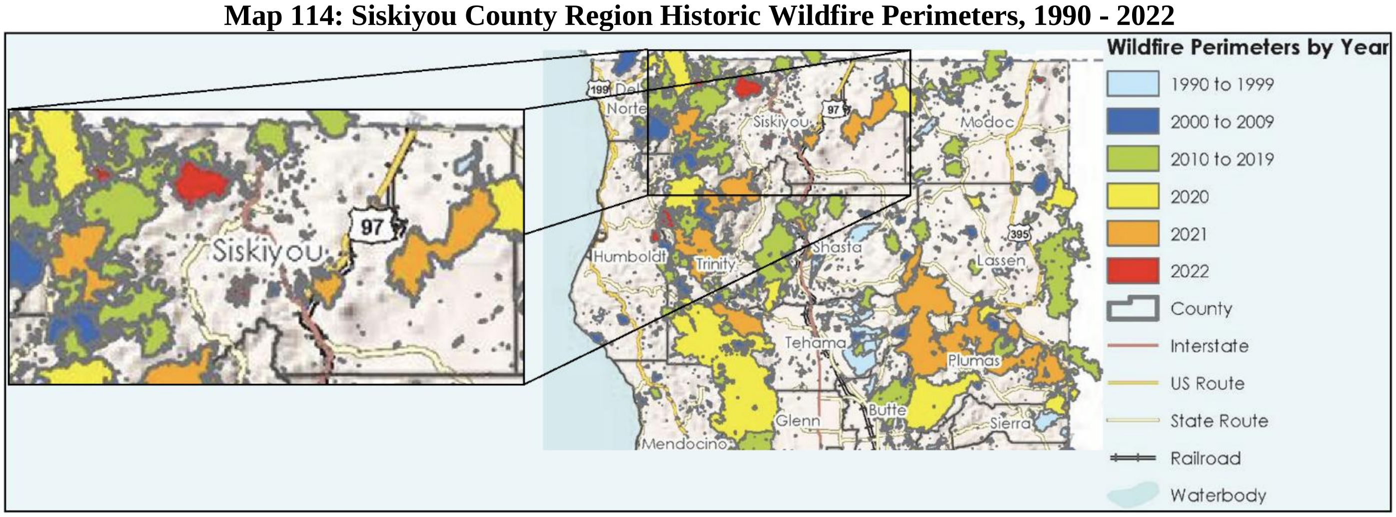
Map 113: Siskiyou County Region Historic Wildfire Perimeters, 2019 - 2023



Source: CAL FIRE Fire and Resource Assessment Program

For longer term perspective, the following map sourced from the 2024 State of California Hazard Mitigation Plan detail historic wildfire boundaries for the Siskiyou County region from 1990 – 2022:

Map 114: Siskiyou County Region Historic Wildfire Perimeters, 1990 - 2022



Source: 2024 State of California Hazard Mitigation Plan

Over the past ten years, large fires have caused significant damage to millions of acres of wildland and several Siskiyou County communities. Two of the largest fires in California recorded history have occurred in Siskiyou County. In 2008, the Klamath Theater Complex Fire burned 192,038 acres and caused two fatalities. In 2014, the Happy Camp Complex Fire burned 134,056 acres. The following list details some of the recent larger wildfires within Siskiyou County:

- **July 3, 2024, Shelley Fire:** The Shelley Fire in Klamath National Forest burned 15,520 acres.
- **August 15, 2023, Smith River Complex:** The Smith River Complex in northern Siskiyou County burned over 95,000 acres.
- **September 2, 2022, Mill Fire:** The Mill Fire burned over 3,900 acres in rural Siskiyou County and including the unincorporated community of Lake Shastina as well as the incorporated City of Weed. Over 5,500 people were evacuated and over 100 structures were lost in the fire along with two reported casualties. The wildfire significantly damaged the community of Lincoln Heights in Weed, which was a historically Black, working-class community

EXHIBIT C

- **July 29, 2022, McKinney Fire:** The McKinney Fire burned 60,392 acres in the unincorporated community of Klamath River and surrounding areas. According to CAL Fire reports, the McKinney Fire destroyed 185 structures, 118 of which were residential houses and caused four casualties.
- **August 1, 2021, Antelope Fire:** The Antelope Fire burned 145,632 acres in the Klamath National Forest. According to CAL Fire reports, the Antelope Fire destroyed 18 residential houses.
- **June 30, 2021, River Complex Fire:** The River Complex 2021 burned over 199,343 acres in Klamath National Forest
- **June 28, 2021, Tennant Fire:** The Tennant fire burned 10,580 acres, destroyed five structures, and caused evacuations in Macdoel.
- **June 24, 2021, Lava Fire:** The Lava Fire burned 26,409 acres over the course of 70 days. The fire, which was started by lightning, burned unincorporated areas northeast of the city of Weed. According to CAL Fire reports, the Lava Fire destroyed 144 homes, which included 15 residential houses and 129 parcels that contained small structures and trailers. At the time of the fire, mandatory evacuations were in place for about 10,000 people.
- **September 8, 2020, Slater Fire:** The Slater Fire burned over 150,000 acres in Happy Camp and surrounding areas. According to CAL Fire reports, the Slater Fire destroyed over 224 homes, many of which consisted of single-family houses, mobile homes, and small outbuildings and detached garages that functioned as living places. The community of Happy Camp lost 40% of its housing stock
- **October 11, 2014, Boles Fire:** The Boles Fire started on October 11, 2014, and burned over 516 acres over the course of 26 days. The fire began just outside the city of Weed and 40 mph winds pushed the flames into the city. The destructive, fast-moving fire forced the evacuation of about 2,000 from the communities of Weed, Carrick, Angel Valley, and Lake Shastina.

5.17.4 Probability of Future Events

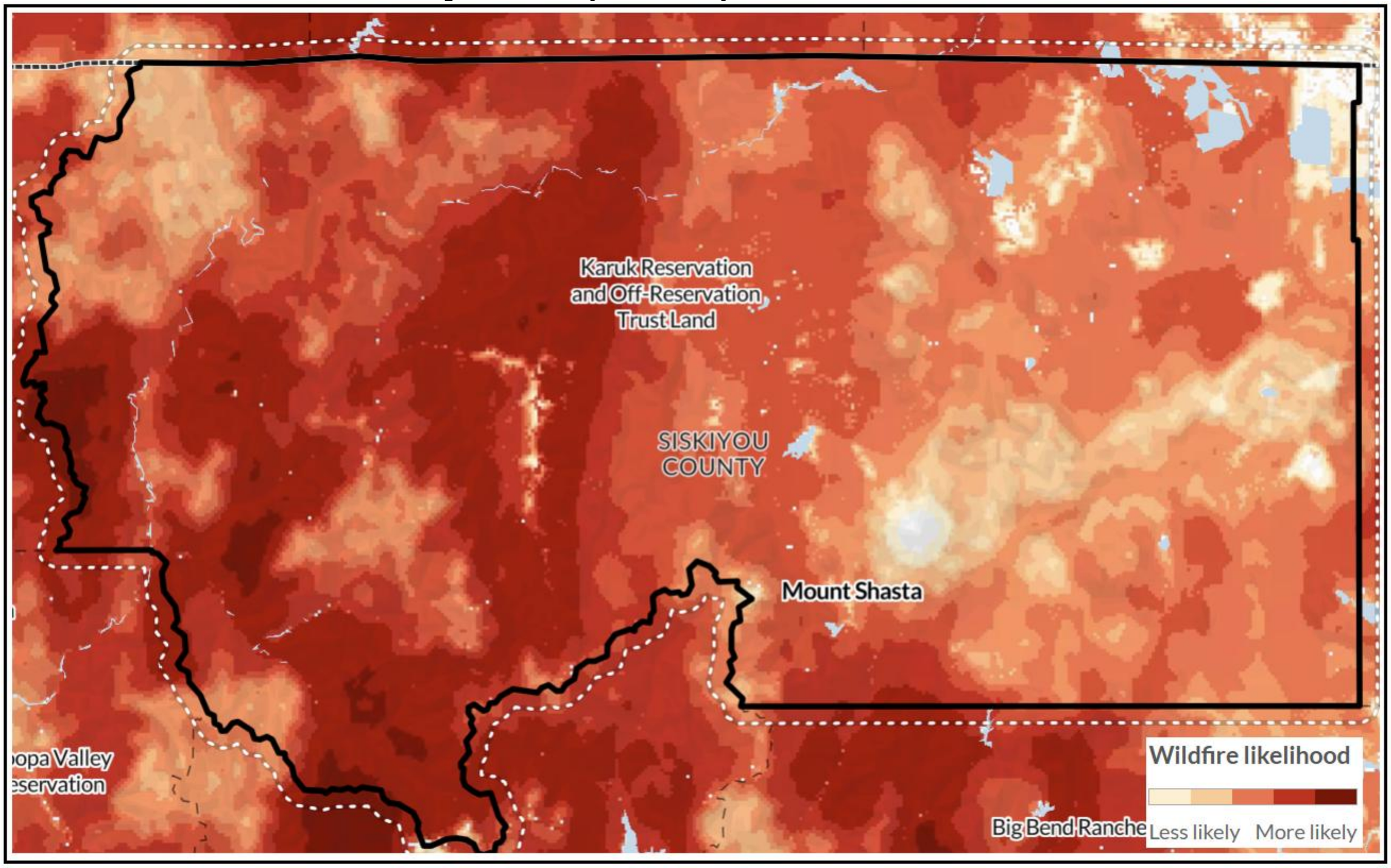
Predicting the probability of wildfire occurrences is tremendously challenging due to the large number of factors involved and the random nature of formation. Available data from CAL FIRE indicates that Siskiyou County has had 71 reported wildfire events burning 872,419 acres during the period 2013 to 2024. This equates to an average of six wildfires per year burning 72,702 acres per year.

NOAA's Wildfire Risk to Communities mapping, which uses the best available science to identify risk, was used to help determine the probability of future wildfires within Siskiyou County. Wildfire likelihood is the probability of a wildfire occurring based on fire behavior modeling across thousands of simulations of possible fire seasons. In each simulation, factors contributing to the probability of a fire occurring, including weather, topography, and ignitions, are varied based on patterns derived from observations in recent decades. Wildfire likelihood is not predictive and does not reflect any currently forecasted weather or fire danger conditions. For communities, tribal areas, and counties, Wildfire Likelihood is summarized and ranked for the risk calculation area. This includes a 2.4 km buffer around populated areas to incorporate the risk of embers. Wildfire likelihood classification is based on the following national percentile rank:

- **Low:** <40th percentile
- **Medium:** >40th and <70th percentile
- **High:** >70th and <90th percentile
- **Very High:** >90th percentile

According to NOAA's Wildfire Risk to Communities Siskiyou County has, on average, greater wildfire likelihood than 97% of counties in the US. The following map indicates the likelihood of a wildfire within Siskiyou County:

Map 115: Siskiyou County Wildfire Likelihood



Source: NOAA's Wildfire Risk to Communities

5.17.5 Projected Changes in Location, Intensity, Frequency, and Duration

Climate change can result in a significant increase in the likelihood and severity of wildfires. The occurrence of more frequent and longer lasting droughts due to climate change can increase the availability of fuels for wildfires through the drying of vegetation. Additionally, both the increased occurrence and continued decline of native species due to lack of precipitation can cause the proliferation of invasive species which can provide quick-burning fuels that contribute to the start and spread of fire.

Climate change may impact the frequency and magnitude of wildfire in the following ways:

- **Increased Frequency:** Warmer temperatures and prolonged periods of drought associated with climate change create conditions that favor more frequent wildfires. Extended fire seasons are becoming the new norm in many regions.
- **Greater Intensity:** Higher temperatures and drier conditions can lead to more intense wildfires. These fires burn hotter and spread more rapidly, making them more challenging to control and extinguish.
- **Longer Fire Seasons:** Climate change is extending the length of fire seasons, leading to earlier starts and later endings. This puts additional stress on firefighting resources and increases the risk of wildfires overlapping with other disasters.
- **Altered Precipitation Patterns:** Changes in precipitation patterns, including more intense rainfall events followed by extended dry periods, can promote the growth of vegetation, which can then become fuel for wildfires during subsequent dry periods.
- **Drought Conditions:** Prolonged droughts associated with climate change reduce soil moisture levels and the availability of water sources. Dry conditions increase the susceptibility of vegetation to ignition.
- **Vegetation Changes:** Climate change can alter the distribution and composition of vegetation, such as the expansion of drought-tolerant species. This can change fuel availability and make ecosystems more fire prone.

EXHIBIT C

- **Insect Infestations:** Warmer temperatures can lead to increased insect infestations in forests. Infested and dead trees provide additional fuel for wildfires.
- **Wildfire Behavior**: Climate change can lead to changes in wildfire behavior, including the development of fire whirls, more extreme fire behavior events, and increased spotting (the spread of embers ahead of the main fire).

While both population and housing levels have remained static, or slightly decreased, in Siskiyou County any continued expansion into WUI areas significantly increases the risk and potential damage from wildfires for several reasons, including:

- **Proximity to Natural Fuels:** As development spreads into previously undeveloped wildland areas, homes and infrastructure are built in close proximity to natural fuels which can ignite during a wildfire. Natural landscapes in WUI zones are often dense with vegetation, providing a continuous fuel source that allows fires to spread quickly from wildland areas to residential zones. This increases the likelihood of structure ignition, as homes are surrounded by flammable vegetation.
- **Increased Human Activity:** Human activities, such as outdoor recreation, construction, and the use of equipment, are more common in WUI areas, and these activities can inadvertently start fires
- **Difficulty in Fire Suppression:** WUI fires are harder to control because firefighting efforts must focus on both the natural landscape and protecting homes and infrastructure. Firefighters face the dual challenge of containing the wildfire and defending structures, which can divert resources and increase the complexity of suppression efforts. Narrow or inaccessible roads in WUI areas can make it difficult for firefighting equipment and personnel to reach homes at risk, delaying response times.

In Siskiyou County, various forest management projects are being implemented to help mitigate the future risk and severity of wildfires. These projects combine techniques such as prescribed burns, thinning of dense forests, and the development of defensible space around communities. The following are some of the key forest management strategies and projects being used:

- **Prescribed Burns:** Controlled burns, or prescribed fires, are intentionally set under specific weather conditions to reduce excess vegetation that can fuel larger wildfires. These burns help mimic the natural fire cycles that were historically suppressed, leading to less fuel buildup. Both Cal Fire and the U.S. Forest Service have expanded the use of prescribed burns, targeting areas that have accumulated significant fuel loads.
- **Forest Thinning:** Thinning involves the removal of smaller trees, deadwood, and brush to reduce the density of forests. By decreasing the amount of available fuel, thinning can lower the intensity of potential fires. Thinning projects are particularly common in the WUI areas, where dense vegetation near communities poses a significant fire risk. Currently, the California Vegetation Treatment Program is working with homeowners in Yreka on fuel thinning projects.
- **Mechanical Fuel Reduction:** In some areas where prescribed burns are not feasible, mechanical methods such as cutting and removing dead or overgrown vegetation are employed. This includes removing hazardous trees, logging dead trees, and clearing brush. This strategy is particularly effective in northern California and areas with large tree populations, where mechanical fuel reduction projects can make a substantial difference in decreasing fire intensity.
- **Collaborative Forest Management Programs:** Public and private agencies work together on collaborative forest management programs to share resources and implement broader fire mitigation strategies. Examples include the Fire Safe Council Siskiyou County, a coalition of public and private sector organizations that share a common, vested interest in wildfire prevention and loss mitigation, federal, state and private agencies, and multiple resource conservation entities.

5.17.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Siskiyou County and all participating

EXHIBIT C

jurisdictions from wildfire. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Siskiyou County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 146: Participating Jurisdiction Wildfire Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Chance per Year
Siskiyou County	All	Relatively High	98.1	0.589%
Dorris	06093000200	Relatively Moderate	90.7	0.182%
Dunsmuir	06093001100	Relatively High	96.7	0.747%
Etna	06093000800	Very High	99.6	1.23%
Fort Jones	06093000701	Very High	99.4	0.900%
Happy Camp CSD	06093001300	Very High	99.5	1.2%
Lake Shastina CSD	06093000902	Relatively High	98.1	0.233%
McCloud CSD	06093001200	Relatively High	97.4	0.498%
Montague	06093000300	Relatively High	98.3	0.370%
Mt. Shasta	06093001003	Relatively High	98.1	0.484%
Tulelake	06093000100	Relatively Moderate	89.8	0.094%
Weed	06093000901	Very High	99.3	0.711%
Yreka	06093000703	Relatively High	96.1	1.66%

Source: FEMA NRI

Table 147: Participating Jurisdiction Wildfire Expected Annual Loss

Jurisdiction	Census Tract	EAL	National Percentile	Wildfire EAL
Siskiyou County	All	Relatively High	97.9	$8,900,000
Dorris	06093000200	Relatively Moderate	89.2	$29,000
Dunsmuir	06093001100	Relatively High	95.9	$174,000
Etna	06093000800	Very High	99.5	$1,700,000
Fort Jones	06093000701	Very High	99.3	$1,100,000
Happy Camp CSD	06093001300	Very High	99.3	$1,100,000
Lake Shastina CSD	06093000902	Relatively Moderate	94.1	$97,000
McCloud CSD	06093001200	Relatively High	97.3	$305,000
Montague	06093000300	Relatively High	97.9	$403,000
Mt. Shasta	06093001003	Relatively High	98.1	$453,000
Tulelake	06093000100	Relatively Moderate	88.1	$22,000
Weed	06093000901	Relatively High	98.9	$772,000
Yreka	06093000703	Relatively High	95.4	$147,000

Source: FEMA NRI

Population

Wildfires have profound and far-reaching impacts on all jurisdictional citizens, affecting physical health, mental well-being, and socio-economic conditions. These impacts can vary depending on the severity, location, and preparedness of the communities affected. Key wildfire impacts include:

- **Health Impacts**
  - Smoke inhalation: Wildfire smoke contains fine particulate matter that can penetrate deep into the lungs and exacerbate respiratory and cardiovascular problems. It is especially dangerous for people with pre-existing conditions like asthma, COPD, or heart disease. Exposure to smoke can cause short-term issues

EXHIBIT C

like coughing, throat irritation, and difficulty breathing, as well as long-term health effects from prolonged exposure.
    - Burn injuries: Direct exposure to flames or heat during evacuations or firefighting efforts can result in serious burn injuries.
    - Mental health: Survivors of wildfires often experience stress, anxiety, depression, and post-traumatic stress disorder, especially those who have lost homes, loved ones, or livelihoods.
- **Economic and Financial Impacts**
    - Property damage: Wildfires can destroy homes, businesses, and infrastructure, leading to significant financial losses. Insurance premiums in wildfire-prone areas often increase, and many homeowners struggle to rebuild after losing their property.
    - Loss of livelihoods: Wildfires can disrupt local economies, particularly in recreation and tourism, agricultural, and forestry-based communities. Employment in affected areas may decline, and businesses may close either temporarily or permanently.
    - Cost of relocation: In cases of long-term displacement, families must bear the costs of relocation, housing, and rebuilding, which can be a financial burden, especially for low-income households.
- **Evacuations and Displacement**
    - Evacuations: Wildfires often force mass evacuations, leaving people displaced from their homes for extended periods. Evacuations can be stressful, especially if there is little warning, leading to rushed departures where families leave behind essential belongings or pets. Additionally, their can be challenge sin reaching remote communities with information concerning evacuations.
    - Long-term displacement: In severe cases, entire communities may be permanently displaced if homes are destroyed or if areas are deemed too hazardous to return to, leading to loss of community and social networks.
- **Social and Community Disruption**
    - Community dislocation: Wildfires can cause permanent damage to communities, forcing people to relocate and resulting in the breakdown of social networks and support systems.
    - Loss of heritage: In some cases, wildfires destroy culturally significant sites, landmarks, and natural heritage, such as forests and ecosystems that communities may depend on or cherish.

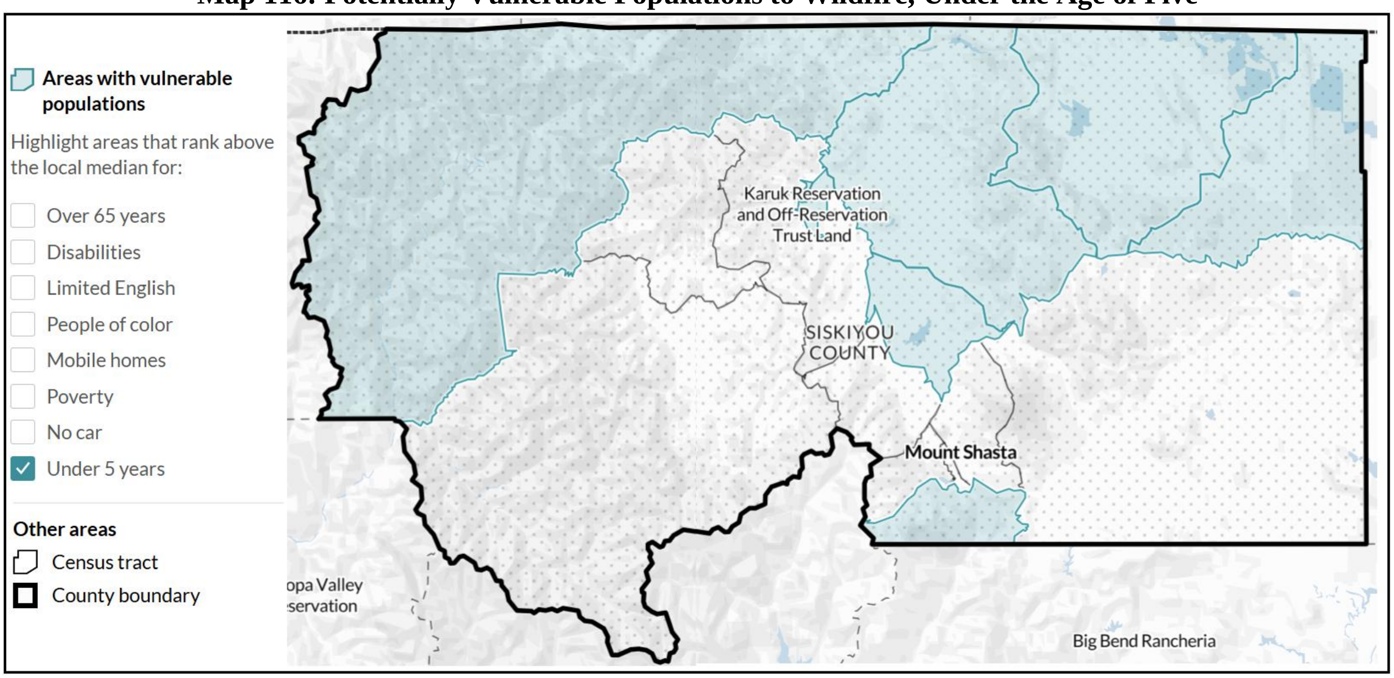
Wildfires can disproportionately affect vulnerable populations due to their limited resources, reduced mobility, and pre-existing health or socio-economic challenges. These groups often include the elderly, disabled individuals, low-income households, children, and those with chronic health conditions. Ways that wildfires may have a greater impact on these populations include:

- **Health Vulnerabilities**
    - Respiratory and cardiovascular risks: Vulnerable populations, such as the elderly, children, and those with pre-existing respiratory or heart conditions, are more susceptible to the harmful effects of wildfire smoke. The fine particulate matter from the smoke can exacerbate asthma, bronchitis, and heart disease, leading to increased hospitalizations and, in severe cases, mortality.
    - Limited healthcare access: Vulnerable groups often have less access to healthcare services, which can delay critical treatment during or after wildfire exposure. Health facilities may be overwhelmed during wildfire events, and transportation to care facilities may be hindered by road closures or evacuations.
- **Challenges with Evacuation**
    - Mobility issues: Elderly individuals, people with disabilities, and those without access to vehicles may struggle to evacuate quickly. They may depend on public transportation, community aid, or emergency services, which can be delayed or overburdened during a wildfire emergency.
    - Language barriers: Immigrant communities or non-English speakers may not fully understand emergency alerts or evacuation instructions, making it harder for them to react swiftly. This can increase the risk of delayed evacuation, which is particularly dangerous in fast-moving wildfires.

- Poverty and housing instability: Low-income families are less likely to have the means to evacuate, such as access to a car or money for temporary shelter. They may also live in less resilient housing, which is more vulnerable to wildfire damage.
- **Economic Disparities**
  - Loss of homes and belongings: Vulnerable populations are often more likely to live in fire-prone or poorly constructed homes that are less resistant to wildfires. They may lack adequate insurance coverage to rebuild or replace what is lost, which can lead to long-term displacement and financial hardship.
  - Job loss and economic disruption: After a wildfire, vulnerable populations are more likely to experience prolonged economic disruption. Many people in low-wage jobs or agriculture may face unemployment if the local economy is disrupted, or if their place of work is destroyed. Recovery can take months or years, leaving them with few financial safety nets.
- **Increased Long-Term Vulnerability**
  - Difficulty in recovery: Vulnerable populations often face more significant challenges during the recovery phase of wildfires. They may lack insurance, savings, or government support to rebuild homes, replace belongings, or relocate. This can lead to prolonged displacement or homelessness, further exacerbating their vulnerabilities.
  - Disruption of social networks: Vulnerable groups rely heavily on community networks for support during and after disasters. Wildfires may displace communities, breaking apart these networks and leaving people isolated during their recovery process.
- **Disparities in Resource Allocation**
  - Limited access to relief aid: Vulnerable populations may struggle to access emergency relief services due to logistical, language, or bureaucratic barriers. They may not be prioritized for resource distribution, further exacerbating their difficulties in recovering from wildfire impacts.

The following maps show the location of vulnerable populations compared to wildfire risk. Census tracts are highlighted that have values equal to or greater than the community median:

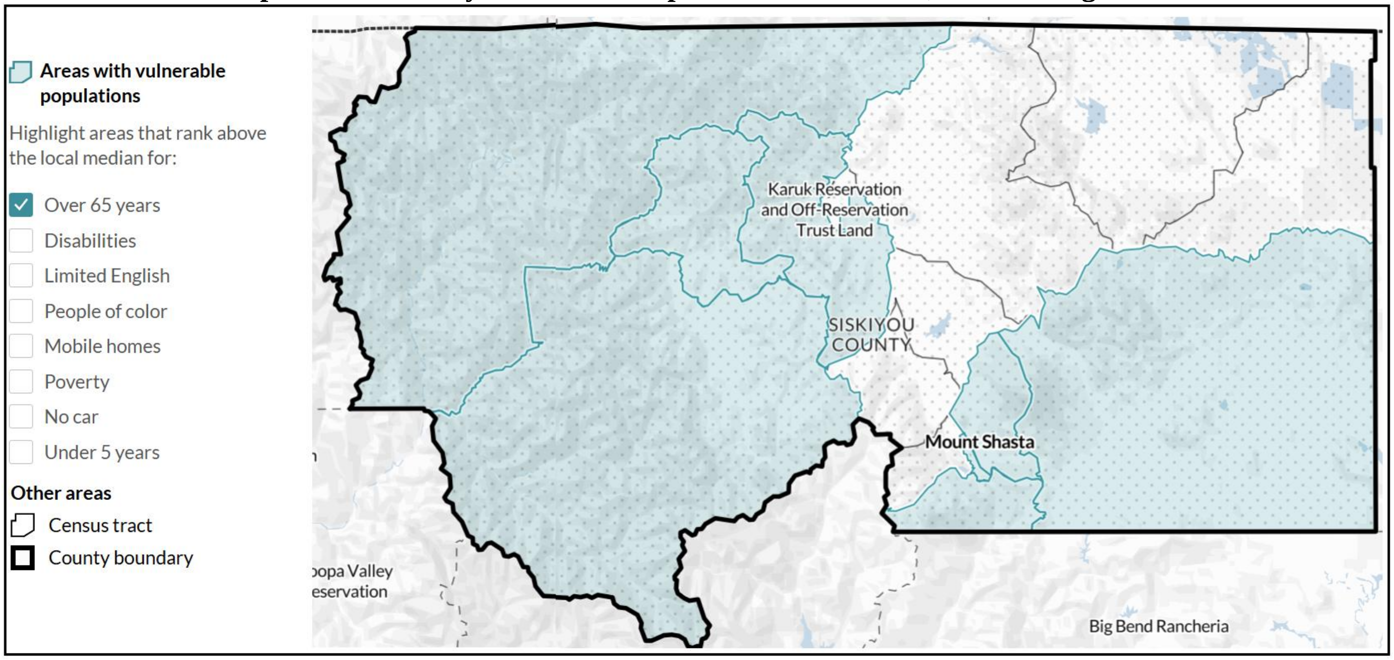
Map 116: Potentially Vulnerable Populations to Wildfire, Under the Age of Five



Source: NOAA's Wildfire Risk to Communities

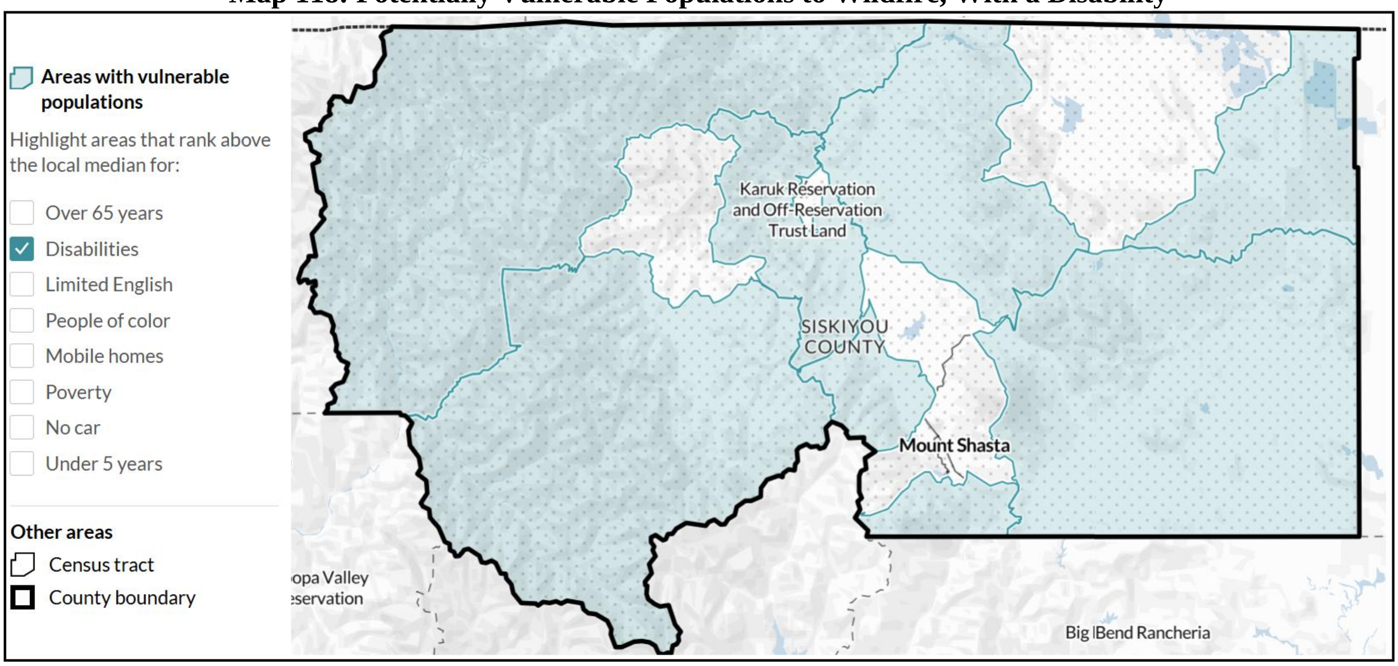
EXHIBIT C

Map 117: Potentially Vulnerable Populations to Wildfire, Over the Age of 65



Source: NOAA's Wildfire Risk to Communities

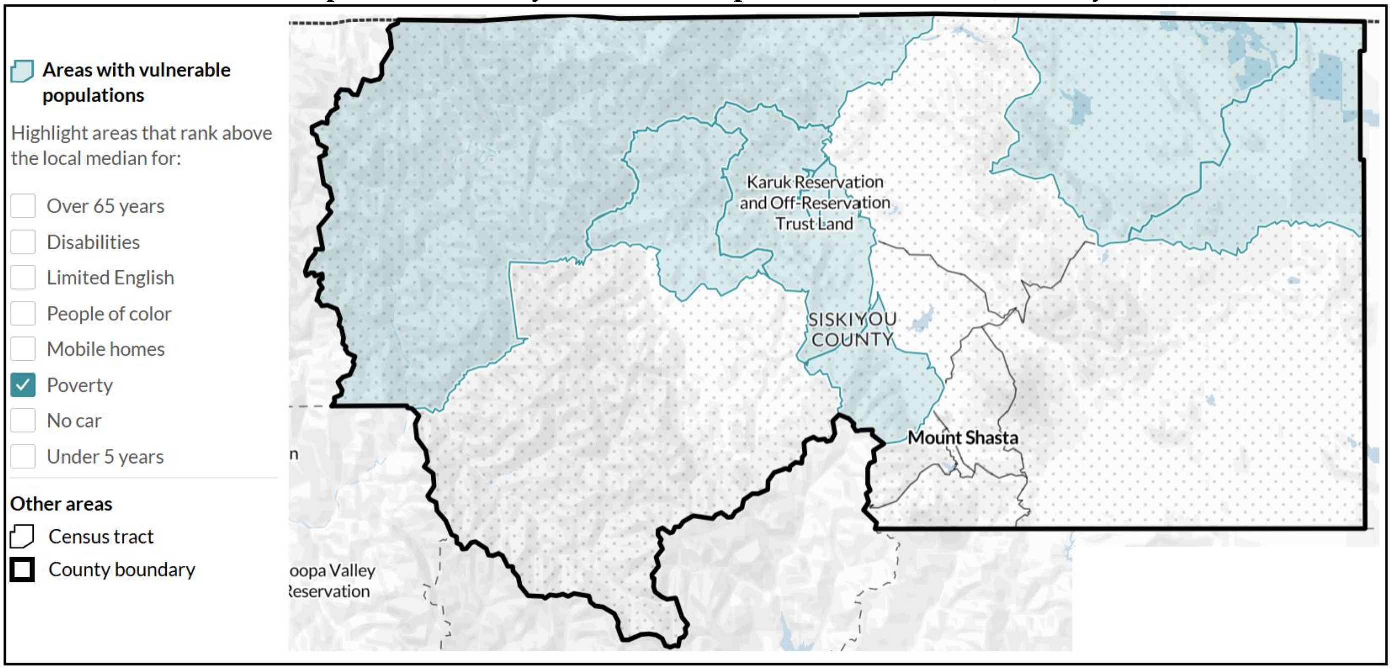
Map 118: Potentially Vulnerable Populations to Wildfire, With a Disability



Source: NOAA's Wildfire Risk to Communities

EXHIBIT C

Map 119: Potentially Vulnerable Populations to Wildfire, Poverty



Source: NOAA's Wildfire Risk to Communities

All Siskiyou County and participating jurisdiction populations are vulnerable to the impacts of wildfires. Please see Section 3.3: Population Data and Section 3.4: Socially Vulnerable and At-Risk Populations for data concerning jurisdictional populations.

Buildings and Structures

All jurisdictional buildings and structures are vulnerable to wildfires due to their location, materials, and surrounding environment. These factors determine how easily a structure may ignite, sustain damage, or be destroyed by fire. Here's how these vulnerabilities manifest:

- **Proximity to Vegetation:** Homes located in the WUI are particularly vulnerable as they are closer to dense vegetation that serves as fuel for wildfires. If the vegetation (trees, shrubs, dry grasses) is not properly managed around the property, fire can easily spread to homes.
- **Flammable roofing materials:** Roofs made from materials like wood shingles are highly flammable and can easily ignite from embers. Non-flammable materials like metal, tile, or asphalt are more resistant to fire.
- **Siding and exterior walls:** Homes with wood siding or other combustible materials are more vulnerable to fire than homes built with fire-resistant materials like stucco, brick, or concrete.
- **Windows:** Single-pane windows are more likely to break during a wildfire due to heat exposure, allowing embers and flames to enter the building. Double-pane or tempered glass windows offer more protection.
- **Eaves and vents:** Eaves and vents can allow embers to enter the attic or other vulnerable spaces in the home. If they are not properly screened or fireproofed, they become entry points for embers to ignite the structure.
- **Decks and porches:** Wooden decks and porches are highly susceptible to wildfire if they are not made from fire-resistant materials or if they have combustible items stored underneath them.
- **Lack of defensible space:** Defensible space is the buffer zone between a building and surrounding vegetation. If this space is not cleared of flammable materials (like dry leaves, dead trees, or fire-prone plants), a wildfire can spread rapidly to a home. Homes without sufficient defensible space are much more likely to ignite during a fire.
- **Combustible materials near the home:** Storing firewood, propane tanks, or other flammable items near the structure increases vulnerability, as these materials can easily catch fire and ignite the building.

EXHIBIT C

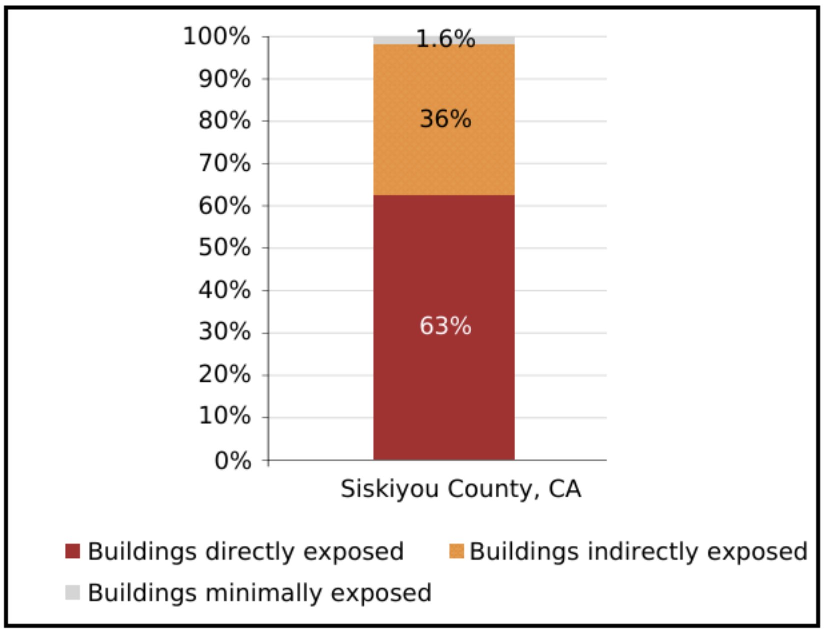
- **Distance from fire services:** Homes located far from fire stations or without adequate road access may experience delayed emergency response times, leaving them more vulnerable to destruction.
- **Neglected maintenance**: Homes that are not well-maintained, such as those with clogged gutters full of leaves or overgrown vegetation, are more likely to catch fire. Regular maintenance, such as clearing gutters and removing dead vegetation, is essential to reducing wildfire vulnerability.

When homes and buildings ignite in a wildfire, the damage can be severe. Wildfire impacts on structures typically include:

- **Complete destruction:** Buildings can be completely consumed by flames, leaving nothing but the foundation.
- Partial damage: Fire can damage parts of the building, such as roofs, walls, or outdoor structures, necessitating costly repairs.
- **Smoke damage:** Even if a structure does not burn down, smoke can infiltrate the building, causing significant damage to the interior, furniture, and electronics.
- **Water damage:** In the process of firefighting, water can cause additional damage to structures, particularly if fire suppression efforts are extensive.

According to NOAA's Wildfire Risk to Communities 99% of Siskiyou County's buildings are exposed to wildfires:

Graph : Percentage of Buildings Exposed to Wildfire



Source: NOAA's Wildfire Risk to Communities

To provide an estimate of the number of residential structures at risk to wildfires, GIS data concerning the residential structures and the median value was utilized. An estimate of the value of residential structures was determined using the Siskiyou County median household value of $231,100 from the U.S. Census Bureau. The following table provides an estimated structures exposed to wildfires for all participating jurisdictions:

Table 148: Participating Jurisdiction Estimated Residential Structures Exposure to Wildfire Hazard

Jurisdiction	Estimated Residential Structures Vulnerable to Wildfires	Valuation
Siskiyou County	22,929	$5,298,891,900

EXHIBIT C

Table 148: Participating Jurisdiction Estimated Residential Structures Exposure to Wildfire Hazard

Jurisdiction	Estimated Residential Structures Vulnerable to Wildfires	Valuation
Dorris	365	$84,351,500
Dunsmuir	1,091	$252,130,100
Etna	355	$82,040,500
Fort Jones	330	$76,263,000
Lake Shastina CSD	1,134	$262,067,400
Montague	569	$131,495,900
Mt. Shasta	1,906	$440,476,600
Tulelake	361	$83,427,100
Weed	1,281	$296,039,100
Yreka	3,668	$847,674,800

Source: Siskiyou County and U.S. Census Bureau

Governmental Operations

Wildfires can pose various risks to government operations. These risks can have significant economic and operational consequences, and can include:

- **Power Outages:** Severe weather can lead to power outages by damaging electrical infrastructure such as power lines and substations. Government buildings may lose power, affecting critical operations and services.
- **Flooding:** Heavy rainfall after a wildfire can lead to flooding, which can damage government buildings and disrupt operations. Flood damage may require extensive repairs and cleanup.
- **Communication Disruptions:** Wildfires can damage communication equipment, including telephone lines and computer systems. This can hinder communication between government agencies and the public.
- **Transportation Disruptions:** Wildfires can make roads impassable due to debris, smoke, heat, and potentially after event flooding or landslides. This can impact the ability of government employees to commute to work.
- **Budgetary Impact:** The costs associated with repairing and restoring government buildings and infrastructure after a wildfire can strain budgets.

Transportation and Electrical Infrastructure

In general, wildfires do not have a large impact on transportation infrastructure, with the exception of power loss disrupting signaling, road closures due to events, and poor conditions impacting driving conditions.

Wildfires can have severe and widespread impacts on electric infrastructure, disrupting power distribution and causing long-term damage. Here are some key ways wildfires affect electric infrastructure:

- **Damage to Transmission Lines and Power Poles**
  - Direct fire damage: Wildfires can burn through wooden power poles and even damage steel or aluminum transmission towers due to extreme heat. Transmission lines are especially vulnerable in heavily forested or remote areas where wildfires tend to occur.
  - Melting of cables and equipment: High temperatures can cause transmission lines and electrical equipment to melt or warp, leading to failures or shutdowns.
  - Power outages: Wildfires can lead to widespread power outages by directly damaging transmission lines or transformers. In some cases, utilities may also proactively shut off power (public safety power shutoffs, or PSPS) to prevent the ignition of fires by downed or sparking power lines.
- **Smoke and Soot Contamination**
  - Conductivity of smoke: Smoke and ash from wildfires can increase the conductivity of the air, leading to short circuits or arcing in power lines, especially in high-voltage systems.
  - Soot buildup: Wildfire soot can accumulate on insulators and electrical equipment, reducing efficiency and causing potential equipment failures if not cleaned.

EXHIBIT C

- **Substation and Equipment Vulnerability**
  - Heat and embers: Substations, transformers, and electrical panels can be damaged by heat or flying embers. Damage to substations can have a particularly large impact since they are key distribution points for electricity.
  - Component failures: Equipment such as switches, transformers, and circuit breakers may suffer from thermal stress or fire-related damage, leading to breakdowns and costly repairs.
- **Challenges for Utility Workers**
  - Delayed repairs: Repair crews face significant challenges during and after wildfires. Access to damaged areas can be restricted due to ongoing fires, road closures, or unsafe conditions, delaying repairs.
  - Safety hazards: Workers may be exposed to unsafe conditions, including the risk of encountering smoldering areas or downed power lines.
- **Disruptions to Power Generation Facilities**
  - Hydroelectric plants: Wildfires in watersheds that supply hydroelectric plants can disrupt water flow, reducing power generation capacity.
  - Thermal power plants: Plants using coal, natural gas, or other fuel sources may also face interruptions if transportation of fuel is hindered due to wildfires or if nearby infrastructure is damaged.

In 2012 (and revised in 2021), the California Public Utilities Commission ruled that the California Public Utility Code gives electric utilities the authority to shut off electric power to protect public safety, since power supply systems have the potential to ignite wildfires (a public safety power shutoff). In general terms, these shutoffs are instituted to lower the potential of a downed electrical line sparked wildfire. Conditions that may trigger a shutoff include:

- Red flag warning from the National Weather Service
- Low humidity
- High winds
- Situational determination by on the ground crews

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities

In general, severe weather and severe winter weather components do not have a large impact on water and wastewater infrastructure and operations. However, the cascading impacts from an event such as power loss disrupting pumping and treatment capabilities, localized flooding from heavy overwhelming drainage systems, or frozen pipes in water distribution systems, causing water outages and expensive repairs when pipes burst.

Medical, Education, and Response Facilities

Severe weather and severe winter weather can significantly impact emergency response infrastructure, creating challenges for first responders and organizations involved in managing and mitigating the effects of severe weather events. Winter storms can impact emergency response through:

- **Transportation Disruptions:** Debris on roads and road closures can hinder the ability of emergency vehicles to navigate and reach affected areas promptly. Hazardous road conditions may result in delays in response times.
- **School Closures:** Wildfires can lead to the closure of schools due to hazardous conditions. This can strain caregivers and result in lower work attendance.
- **Communication Disruptions:** Wildfires can disrupt communication networks, affecting the ability of emergency responders to coordinate and communicate effectively. Downed power lines and damage to communication infrastructure contribute to these disruptions.

EXHIBIT C

- **Power Outages:** Wildfires can lead to power outages. Emergency response facilities, such as command centers and fire stations, may lose power, affecting their operational capabilities.
- **Exposure:** Emergency responders face increased health and safety risks during wildfire events. Exposure to fire, ash, particulate matter, and high temperatures can impact the well-being of responders and affect their ability to provide effective assistance.
- **Resource Allocation Challenges:** Wildfires often requires the allocation of additional resources, including personnel, equipment, and supplies, to address immediate needs. This can strain emergency response organizations and impact their ability to respond to other concurrent incidents.
- **Increased Demand for Services:** Wildfires can result in an increased demand for emergency services, including medical assistance, and search and rescue operations. Emergency response organizations may need to manage a higher volume of incidents simultaneously. Wildfires can also increase the demand for emergency shelters, particularly in cases of widespread evacuations.

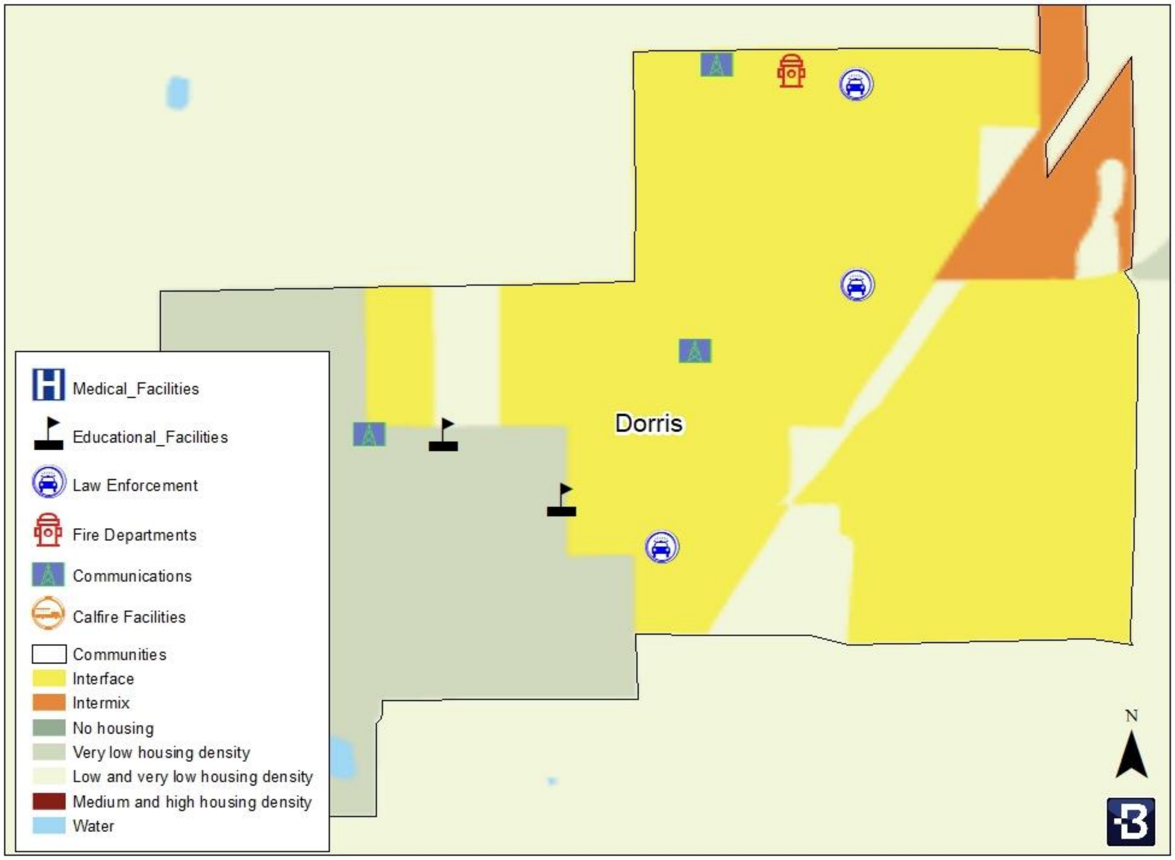
The following detail fire departments and districts throughout Siskiyou County:

- **CAL FIRE Siskiyou Unit:** Covering 1,400,000 acres of ecologically diverse State Responsibility Area wildlands, the Siskiyou Unit staffs approximately 70 career personnel and 120 seasonal personnel. The Siskiyou Unit is geographically divided into four fire battalions, which combined include seven fire stations, one conservation camp, and a headquarters facility. CAL FIRE has seven fire stations within Siskiyou County.
- **Dunsmuir-Castella Volunteer Fire District:** Comprised of three different governmental agencies, including the City of Dunsmuir, the Dunsmuir Fire Protection District, and the Castella Fire Protection District (in adjacent Shasta County).
- **Etna Fire Department:** Served by two stations, the Department has three full-time paid employees, including one fire chief, an assistant fire chief, and a secretary, as well as nine volunteer firefighters.
- **Fort Jones Volunteer Fire District:** Served by one station, the District is staffed by a full-time paid chief and two lieutenants and a team of 12 volunteer firefighters.
- **Gazelle Fire District:** Served by one station, the District is staffed by an assistant fire chief and five volunteer firefighters.
- **The Grenada Fire Protection District:** Served by one station, the District is staffed by eight volunteer firefighters, including one fire chief.
- **Hammond Ranch Fire Zone:** Served by one station, the District is staffed by a fire chief, para-career firefighters, some of whom live at the station, and eight citizen volunteer firefighters.
- **Lake Shastina Fire District:** Served by one station, the District is staffed by 15 trained volunteers.
- **Mayten Fire Protection District:** Served by one station in Montague, the District is staffed by volunteers, including a fire chief and four firefighters.
- **McCloud Community Services District and Fire Department:** Served by one station in Montague, the District is staffed by a part-time paid Fire Chief and a group of dedicated volunteers, including one assistant chief, one EMS chief, one training chief, two battalion chiefs, 22 firefighters, four of which are also EMTs, and five auxiliary/drivers.
- **Mount Shasta Fire:** Made up by a collaboration of two fire departments, Mount Shasta City Fire Department and Mount Shasta Fire Protection District, they operate out of four stations staffed by two full time chiefs, one of which works for the City and one for the District. They additionally employ five paid staff members and approximately 15 volunteers.
- **Mount Shasta Vista Fire Zone:** Served by two stations, the District is staffed by five volunteer firefighters.
- **Salmon River Fire and Rescue** Company: Served by one station, the Company is staffed by a fire chief, assistant fire chief, and four firefighters. \\
- **Scott Valley Fire Protection District:** Served by four stations, the District is staffed by one paid fire chief, two assistant chiefs, and 20 volunteer firefighters.

- **Weed Volunteer Fire District:** Served by one station, the District is staffed by a full-time fire chief, a full-time assistant fire chief, twelve volunteer company officers and firefighters, and supplemented by temporary firefighters participating in the College of the Siskiyous Emergency Response Technology Program.
- **Yreka Fire Department:** The Department, served by one station, is authorized to have 50 volunteers, however, the active roster consists of about 30 members.

The following maps detail critical facility locations mapped to the FEMA mapped WUI areas:

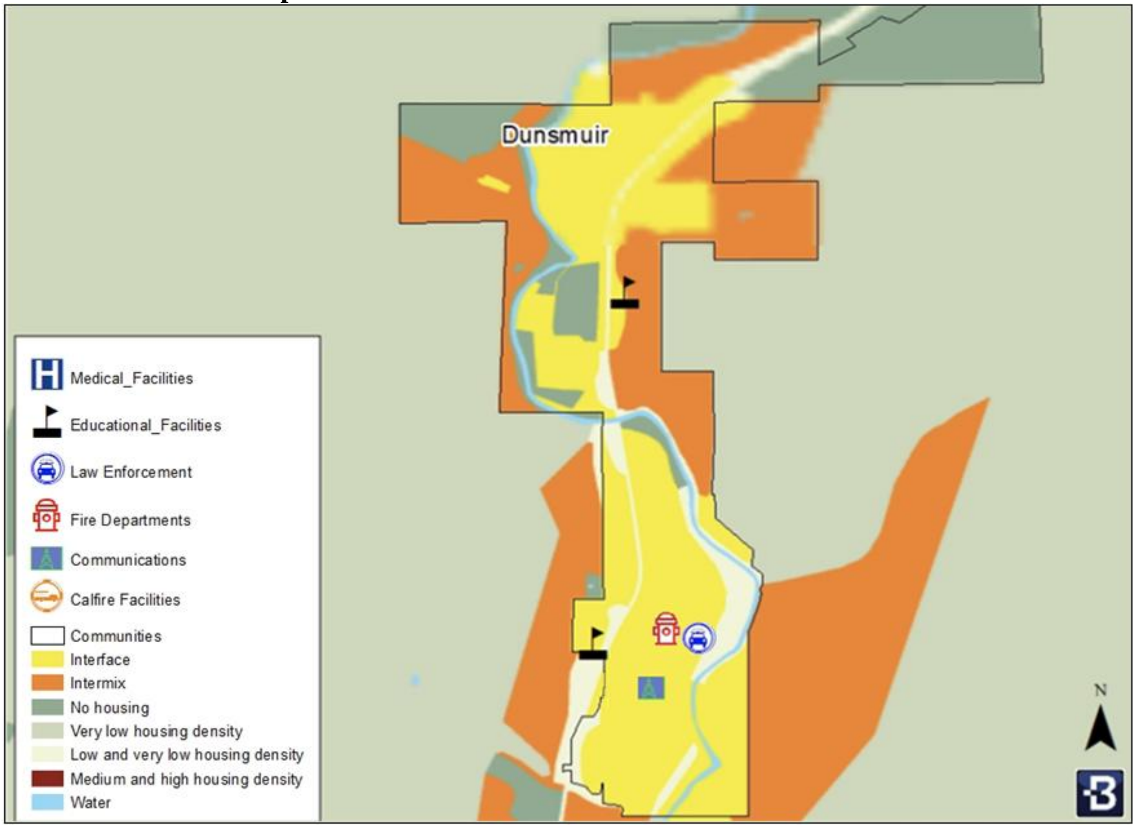
Map 120: Dorris Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

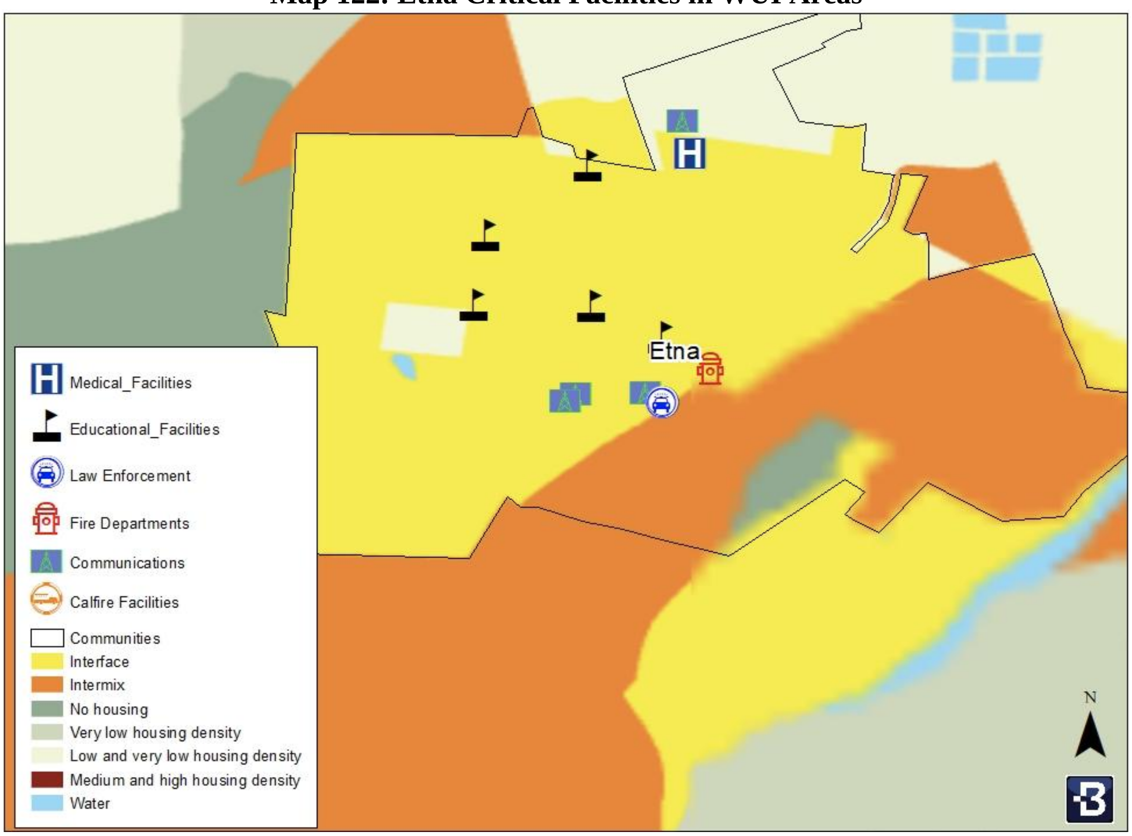
EXHIBIT C

Map 121: Dunsmuir Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

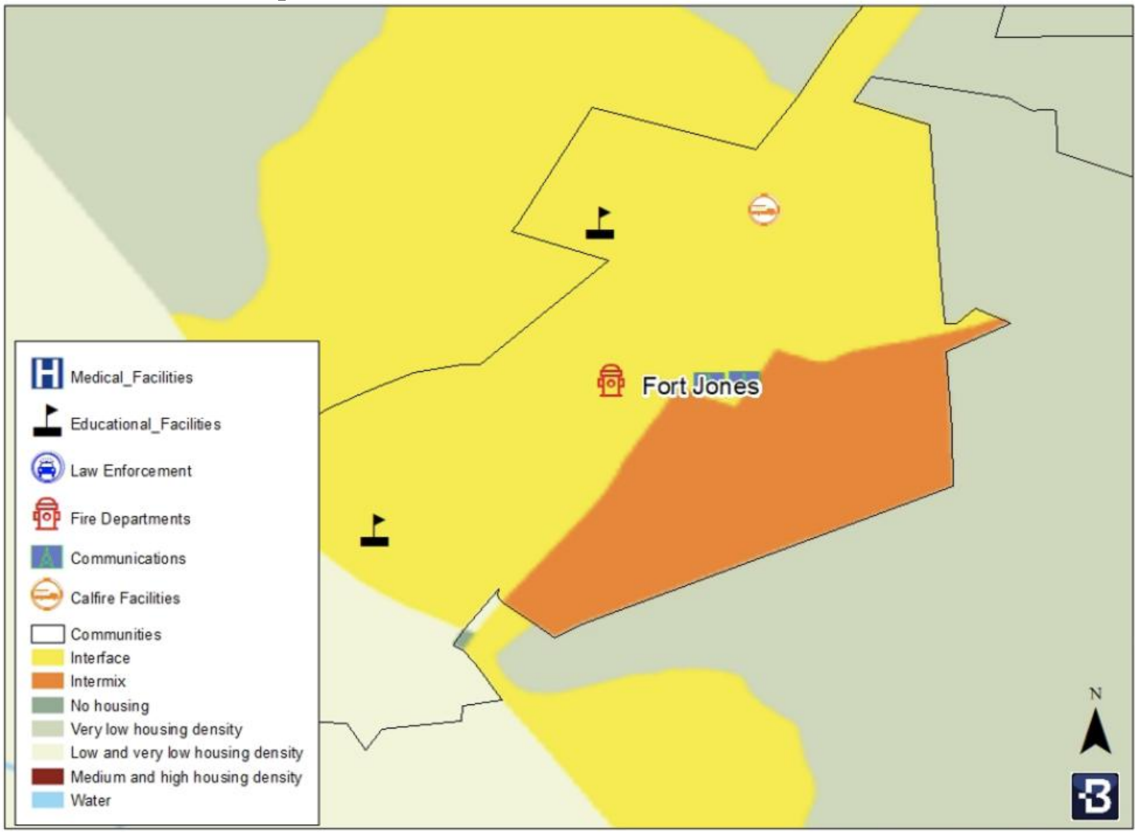
Map 122: Etna Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

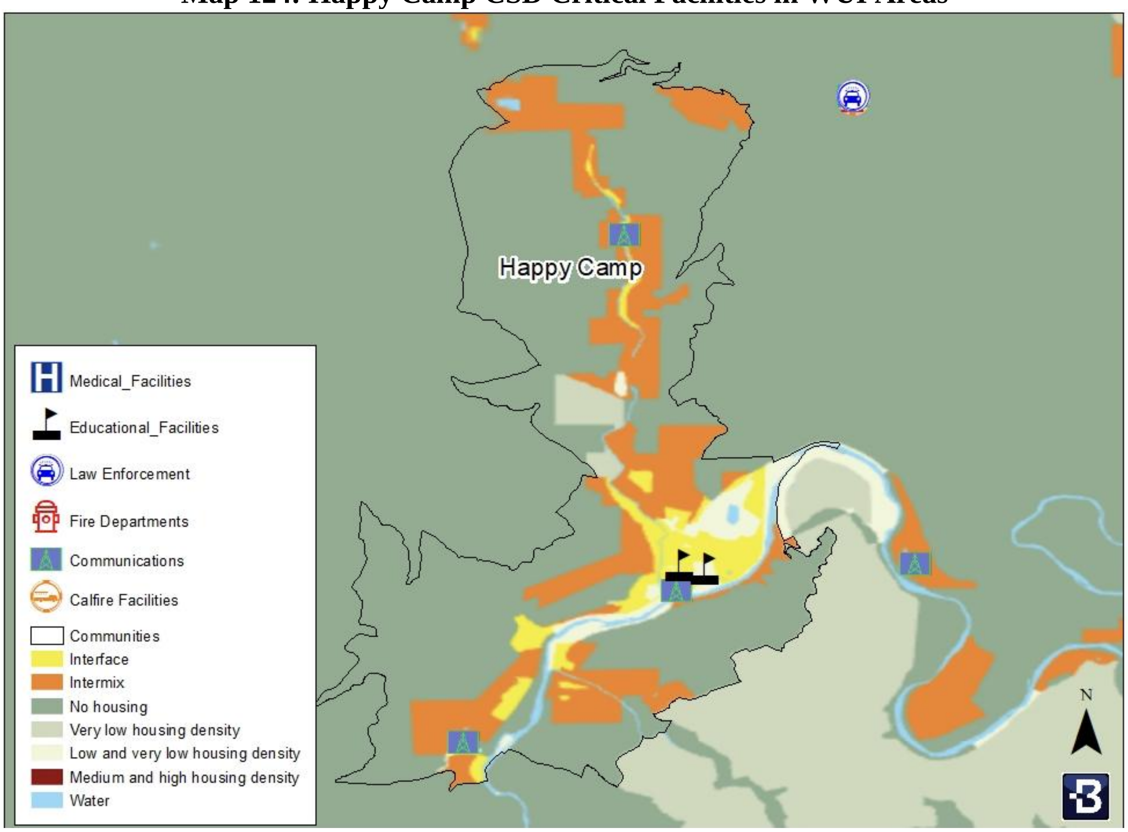
EXHIBIT C

Map 123: Fort Jones Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

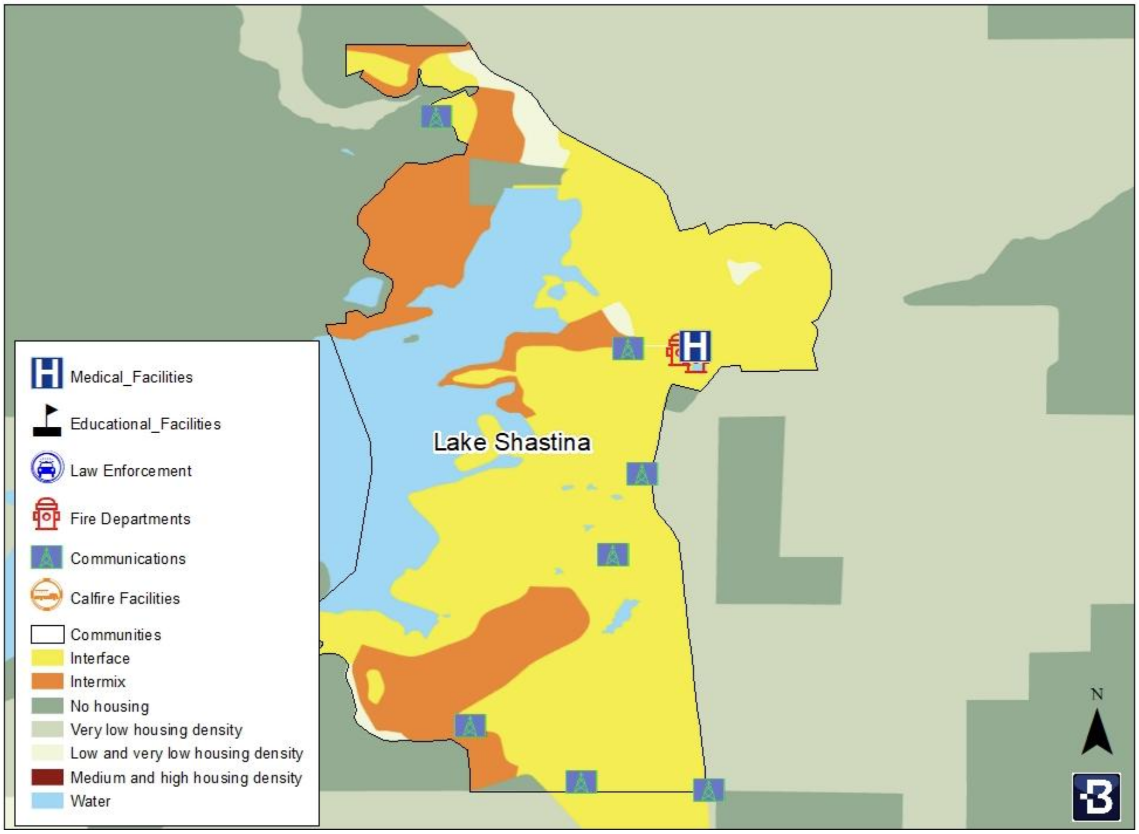
Map 124: Happy Camp CSD Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

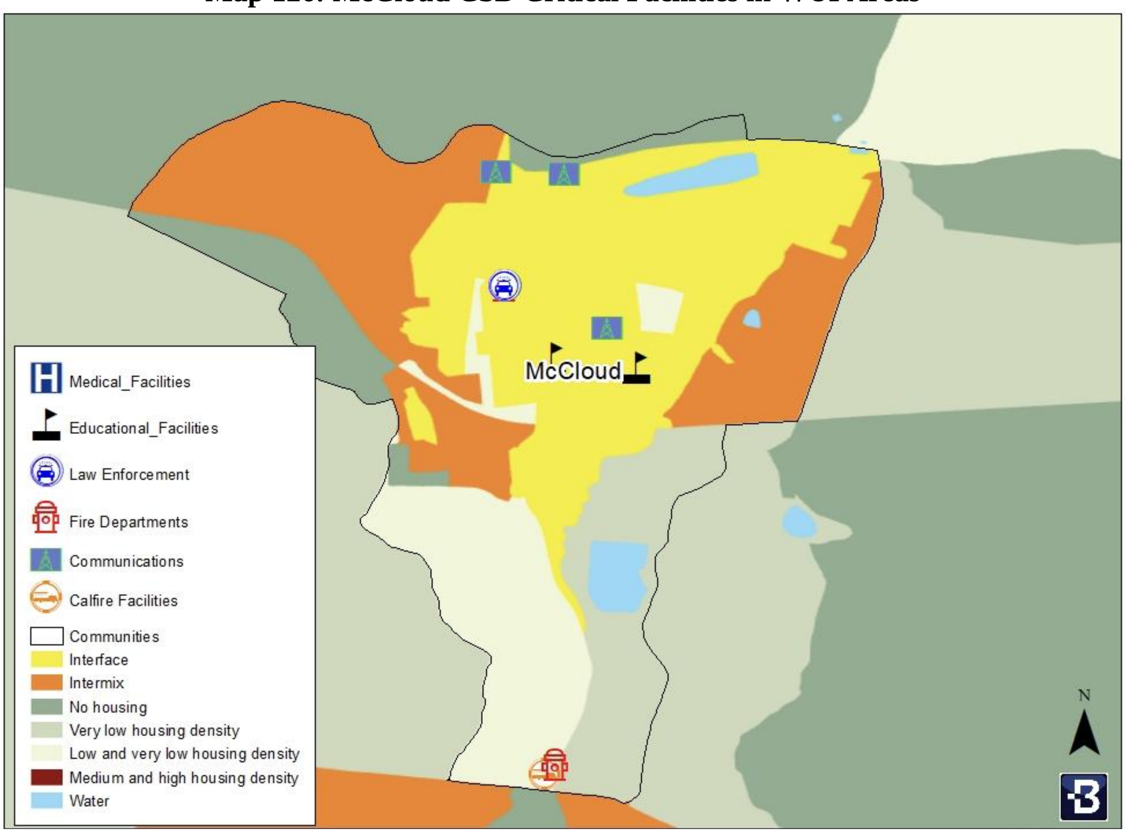
EXHIBIT C

Map 125: Lake Shastina CSD Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

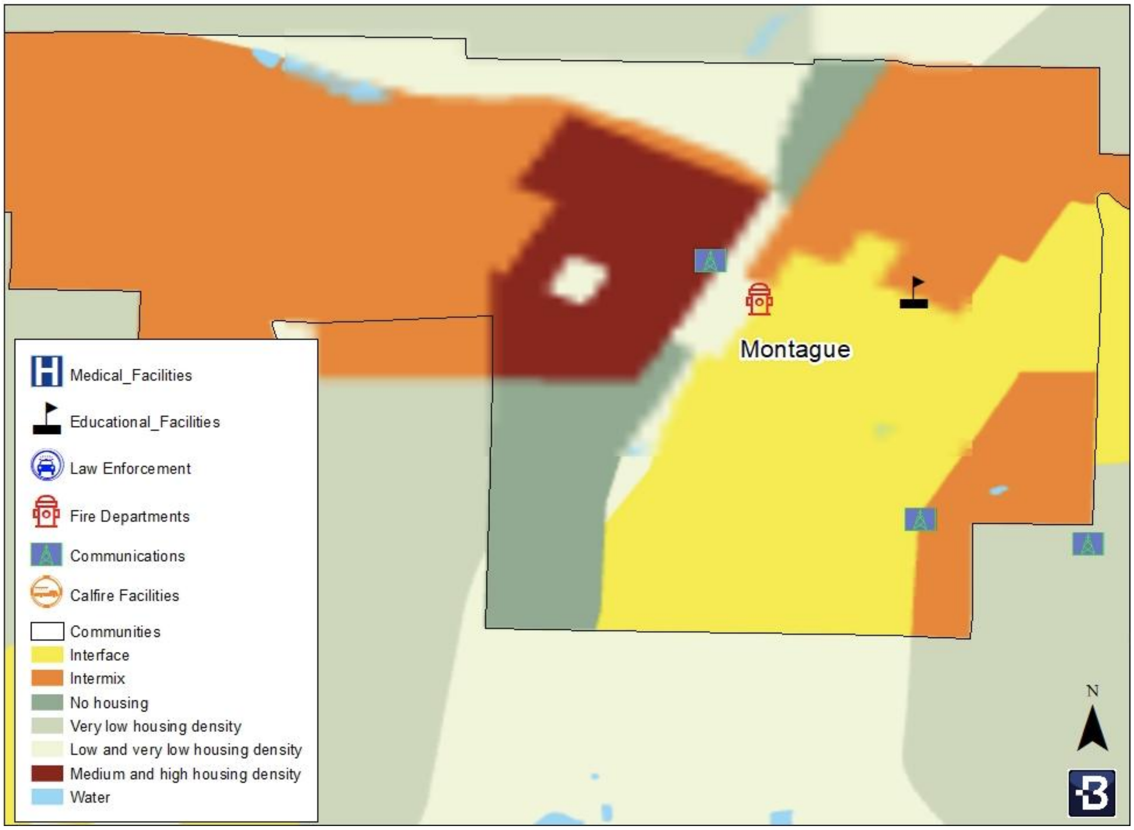
Map 126: McCloud CSD Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

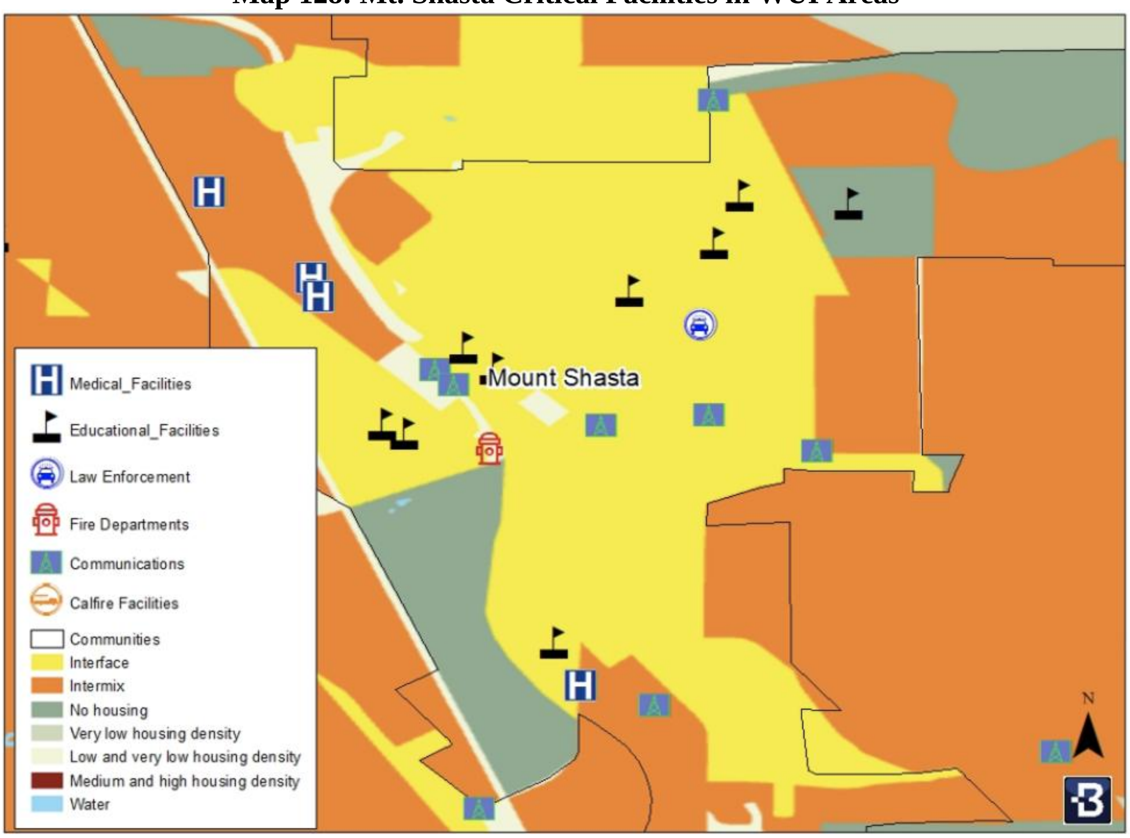
EXHIBIT C

Map 127: Montague Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

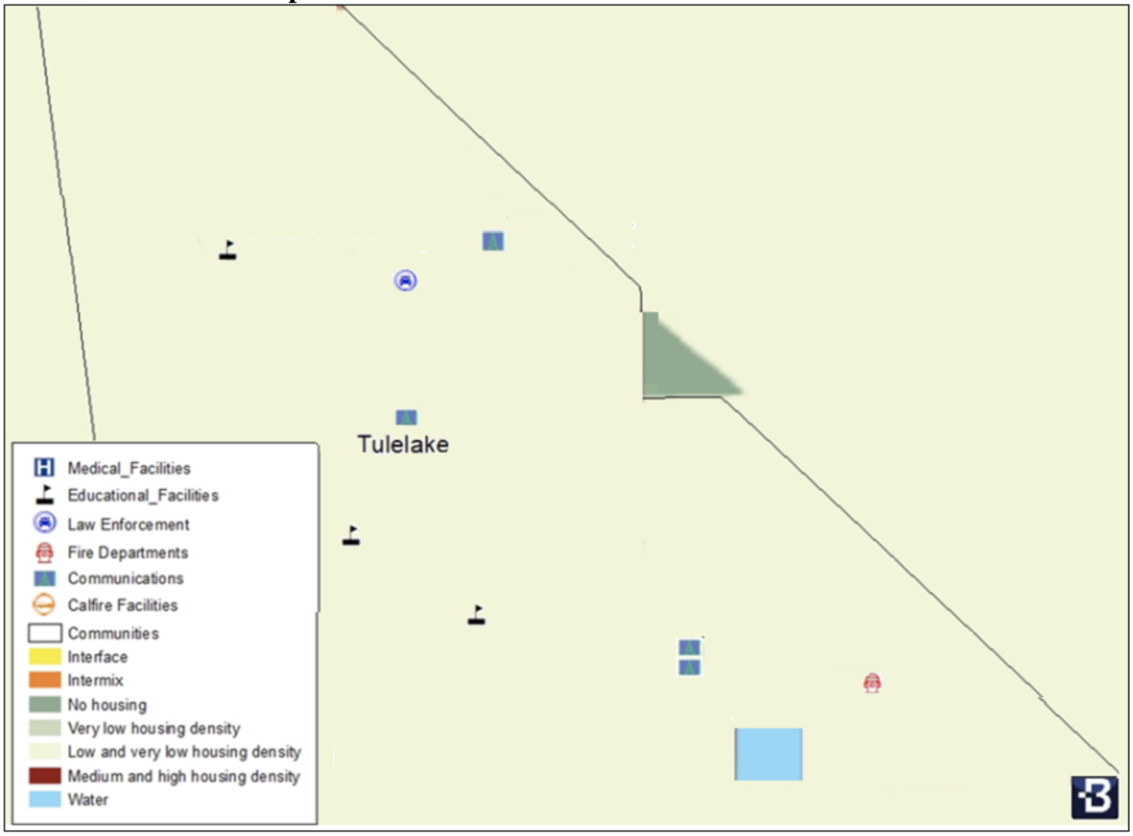
Map 128: Mt. Shasta Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

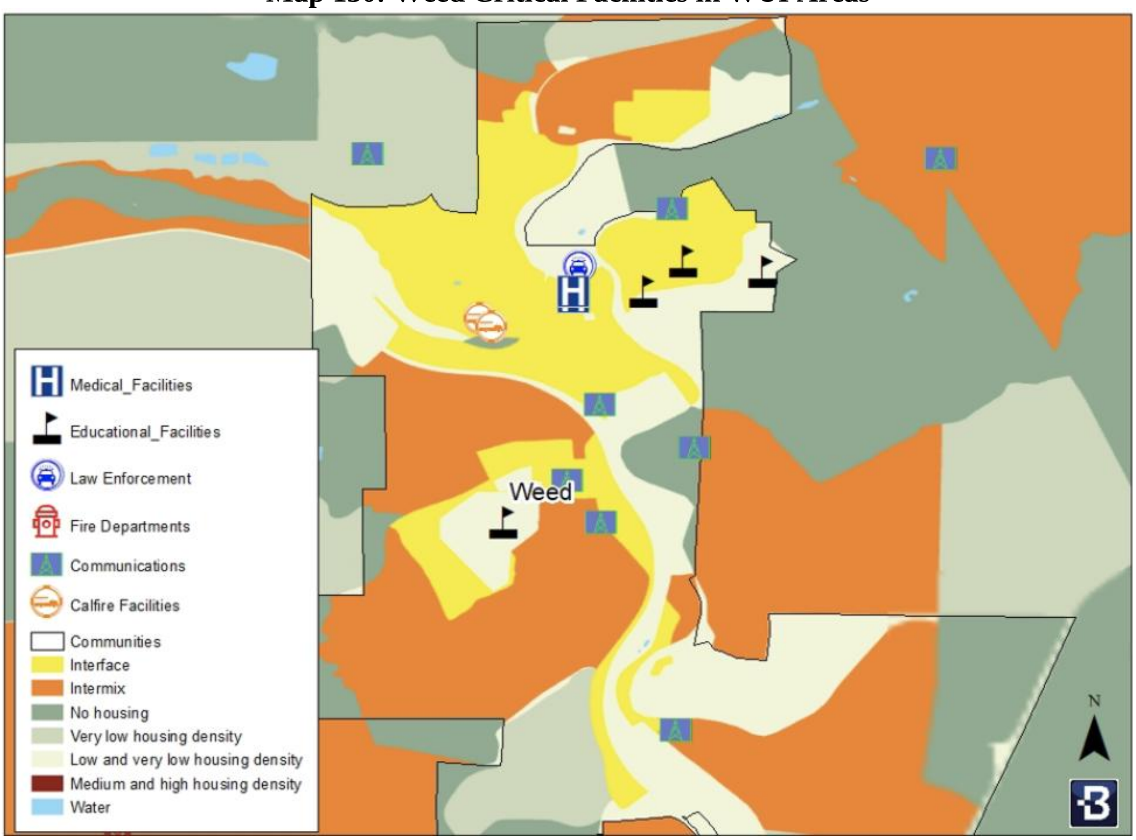
EXHIBIT C

Map 129: Tulelake Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

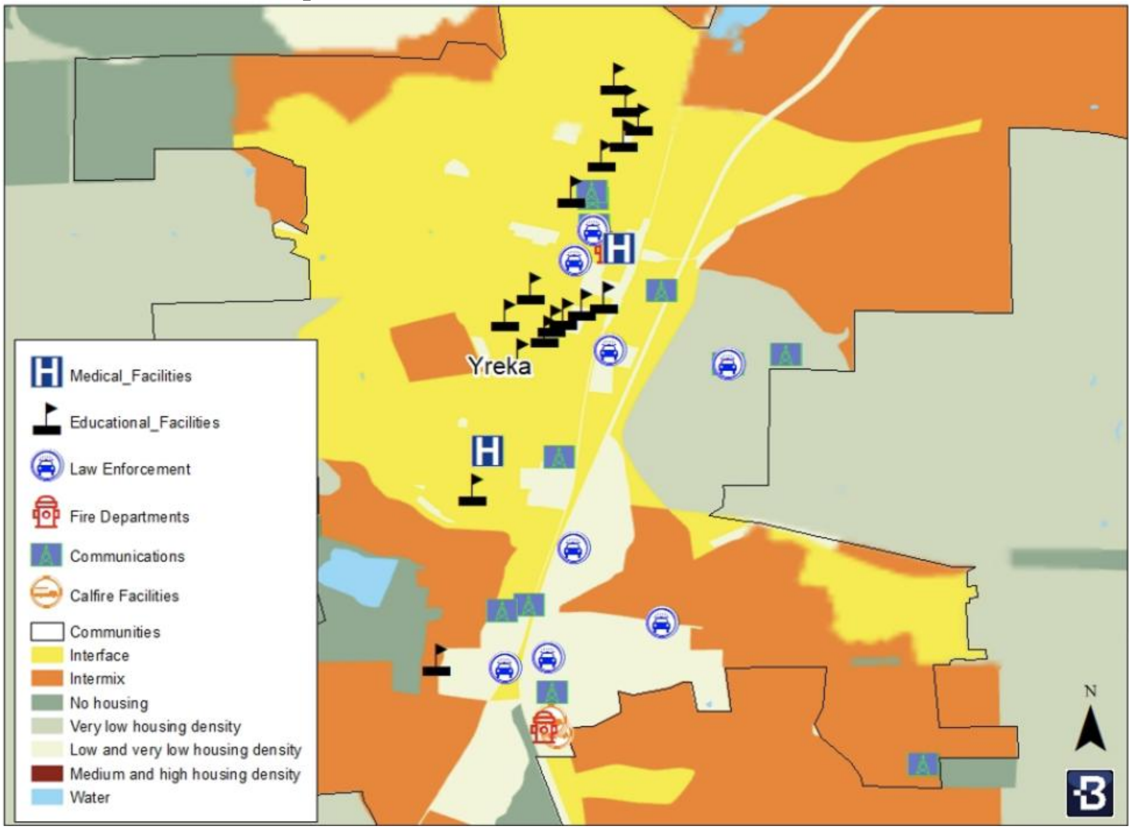
Map 130: Weed Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

EXHIBIT C

Map 131: Yreka Critical Facilities in WUI Areas



Source: Siskiyou County and BOLDplanning

Communication Systems
All communication systems within Siskiyou County are at risk to wildfire events. Wildfires can disrupt vital communications system affecting reliability and functionality. Some of the key vulnerabilities include:

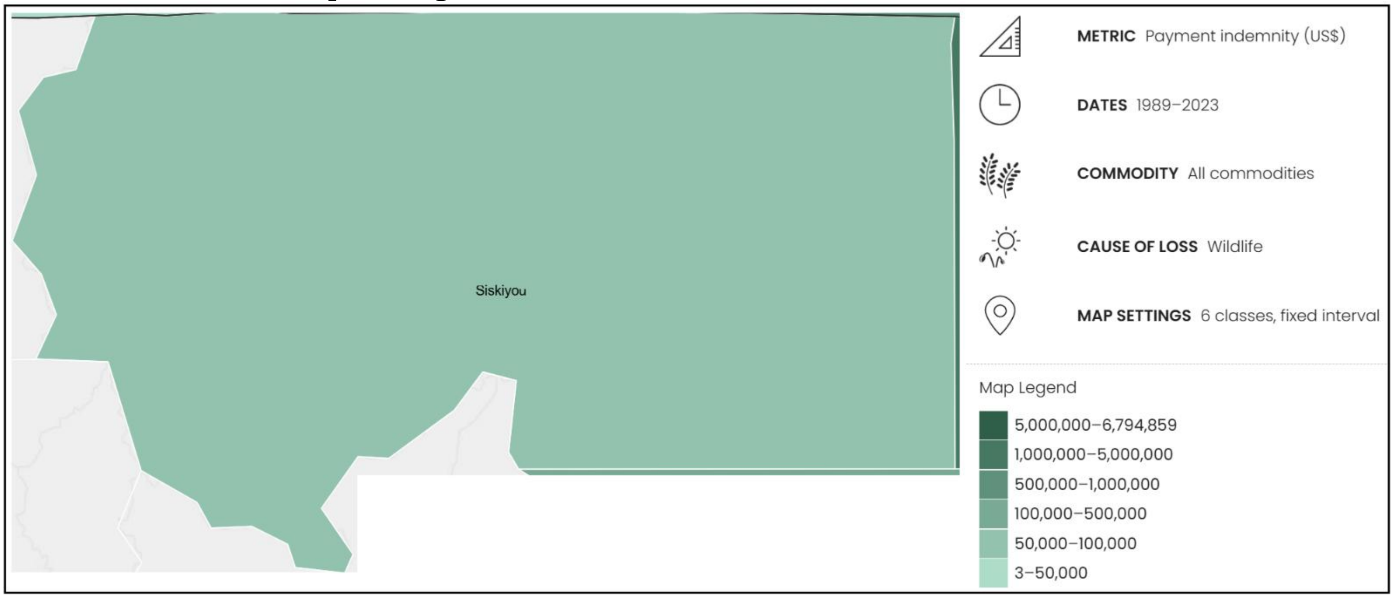
- **Physical Infrastructure Damage:** Wildfires can cause physical damage to communication infrastructure such as cell towers, antennas, cables, mountain top antennas, and data centers. This damage can result in network outages and disruptions.
- **Power Outages:** Wildfires often lead to power outages, which can affect the operation of communication networks. Without a stable power supply, cell towers, data centers, and other critical components may become non-functional, leading to service interruptions.
- **Communication Tower Instability:** Wildfires can compromise the stability of communication towers. If towers are not designed to withstand severe weather, they may collapse, leading to network outages.
- **Network Congestion:** In the event of a disaster, communication networks may experience a surge in usage as people attempt to contact emergency services, friends, and family. This increased demand can lead to network congestion, making it difficult for users to connect.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.8.6.

Environmental and Agricultural Impacts
Wildfire events can cause significant agricultural impacts The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to wildfire events from 1989 - 2023:

EXHIBIT C

Map 132: Agricultural Losses Due to Wildfire Events, 1989 - 2023



Source: USDA

Wildfires have significant and often devastating effects on the environment. These impacts can be both immediate and long-lasting, affecting air quality, ecosystems, water resources, soil stability, and wildlife. Wildfires release large quantities of smoke, which contains fine particulate matter, carbon monoxide, and other harmful pollutants. These particles can travel long distances, reducing air quality far from the fire itself, and can cause respiratory issues, especially for vulnerable populations. Wildfires contribute to climate change by releasing significant amounts of carbon dioxide (CO_2), methane (CH_4), and other greenhouse gases stored in vegetation and trees, intensifying global warming.
Fires can decimate forests, grasslands, and other plant ecosystems. The loss of vegetation can result in habitat destruction for countless species, reducing biodiversity and altering the structure of the ecosystem. Recovery can take decades, depending on the severity of the fire and the resilience of the vegetation. Wildfires can degrade soil by burning away organic matter, making it less fertile. Intense heat can also cause soil to become hydrophobic (water-repellent), increasing the risk of erosion and reducing water infiltration, which impacts plant regrowth.

After a wildfire, ash, debris, and eroded soil can be washed into rivers and streams during rainstorms, contaminating water supplies. This can affect both aquatic ecosystems and human water sources, requiring extensive treatment. The destruction of vegetation disrupts the local hydrological cycle by reducing transpiration (the release of water vapor from plants). This can result in lower humidity levels, reduced rainfall, and potentially, longer drought periods.

Animals are often killed directly by fire, especially those that are less mobile (like reptiles, amphibians, and small mammals) or those caught in fast-moving fires. Wildfires destroy habitats, which can lead to displacement, loss of food sources, and increased competition for remaining resources. This can cause population declines in already vulnerable species. Wildfires can disrupt key ecosystem services such as pollination, seed dispersal, and predator-prey relationships, affecting the balance of the ecosystem.

With the loss of vegetation, the soil becomes more susceptible to erosion. Without plants to stabilize the soil, rain and wind can easily carry away topsoil, which is crucial for plant regrowth and nutrient cycling. In steep areas, the loss of vegetation can lead to landslides during subsequent rain events. These slides can cause further destruction to the landscape, waterways, and infrastructure.

Wildfires can create opportunities for invasive species to take hold. Invasive plants, often better adapted to disturbed environments, may outcompete native species in the post-fire landscape, leading to long-term changes in ecosystem composition and reducing biodiversity. Some ecosystems, like certain forests and grasslands, are adapted to periodic fire and even rely on it for regeneration. However, the increasing intensity and frequency of wildfires, driven by climate change, can overwhelm these ecosystems, preventing recovery and pushing them beyond their adaptive capacity.

EXHIBIT C

Jurisdictional Concerns:
As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **Dorris:** All populations would be at risk to a wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **Dunsmuir:** All populations would be at risk to a wildfire event. Due to smaller capacity road systems, an evacuation of citizens would be problematic, especially if the fire blocked main arterials including the interstate. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **Etna:** All populations would be at risk to a wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities and jurisdictional remoteness, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **Fort Jones:** All populations would be at risk to a wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities and jurisdictional remoteness, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **Happy Camp CSD:** All populations would be at risk to a wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities and jurisdictional remoteness, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **Lake Shastina CSD:** All populations would be at risk to a wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **McCloud CSD:** All populations would be at risk to a wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.

- **Montague:** All populations would be at risk to a wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **Mt. Shasta:** All populations would be at risk to a wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **Tulelake:** There are no identified WUI areas within jurisdictional limits, however recent events have illustrated the potential of nearby fires to impact all surrounding areas. As such, all populations would be at risk to a proximate wildfire event. Due to limited road systems, an evacuation of citizens would be problematic. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities and jurisdictional remoteness, would make the timely attack of an identified fire difficult.
- **Weed:** All populations would be at risk to a wildfire event. Due to smaller capacity road systems, an evacuation of citizens would be problematic, especially if the fire blocked main arterials including the interstate. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.
- **Yreka:** All populations would be at risk to a wildfire event. Due to smaller capacity road systems, an evacuation of citizens would be problematic, especially if the fire blocked main arterials including the interstate. The presence of vulnerable populations, including the elderly, the very young, citizens with a disability, and citizens in poverty would further exacerbate timely evacuation. Compounding the issues, these limited road systems, along with limited local capabilities, would make the timely attack of an identified fire difficult. As the majority of the jurisdiction is in areas identified as either WUI interface or WUI intermix, all structures and identified critical facilities are at risk.

Cascading Impacts

Cascading impacts often result when one a hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with wildfires may include:

- Direct physical damage to buildings and structures:
- After event flooding, landslides, and mudslides
- Transportation infrastructure disruption
- Power outages and electrical grid disruption
- Communication system disruption
- Transportation and supply chain disruptions
- Environmental and ecological damage
- Economic impacts and business closures
- Emergency services overload

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Siskiyou County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 149: Wildfire Consequence Analysis

Subject	Potential Impacts
Impact on the Public	People located in the immediate area of the fire face the risk injury or death if not evacuated in time. Once evacuated, they may face a lengthy period of relocation. Fires can release toxic components which can cause adverse health effects including respiratory and cardiovascular system impacts. Psychological and psychiatric concerns may arise due to exposure to the traumatic event. Young children and the elderly are especially vulnerable to health issues stemming from fire and smoke exposure.
Impact on Responders	Fire, police, and emergency responders may be called to evacuate people from the fire area, close roads, create fire breaks, attend to the injured, and direct traffic. Firefighters are at a higher risk of smoke inhalation, burns, and health problems due to working in close proximity to fires and the subsequent smoke.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Wildfires may impact an agency's ability to maintain continuity of operations due to impacts on critical infrastructure.
Delivery of Services	Fires can cause disruption of services, including the ability to deliver goods and services. Impacts on operations could lead to a reduction or cessation of services. Goods and facilities may be damaged or destroyed by fire, smoke, or extremely high temperatures.
Property, Facilities, and Infrastructure	Fire can damage or completely destroy property and critical facilities, as well as lead to interruption of the power supply system. A fire of significant strength can cause major damage to buildings or farmland. Large fires may also interrupt transportation systems such as train and bus lines, creating a challenge for public transit and evacuation.
Impact on Environment	Fires can have significant impact to the environment by spreading pollution, damaging agricultural crops, and disturbing the wildlife and natural areas. Water and soil pollution caused by fire can cause longer term threats to ecosystem health. Fire damage may also affect soil formation, nutrient cycling, and carbon sequestration and storage.
Economic Conditions	Fires can cause a fiscal impact on the local government, even if costs can be recouped by federal grants. Agriculture is a major component of the local, county and local economy, and major fires could cause significant impact. Costs may be associated with loss of income, damage to property, and firefighting can be significant.
Public Confidence in Governance	Governmental response, on all levels, state and local, would require direct action that must be immediate and effective to maintain public confidence.

5.17.7 Future Development

Siskiyou County and participating jurisdictions are experiencing consistent population decline or a static population as people increasingly migrate from rural areas to urban centers. The rural-to-urban population movement has significant implications for all participating jurisdictions, including school closures and reduced economic activity. Based on projections from the State of California Department of Finance Population Projects publication, this decreasing or static population trend is expected to continue in Siskiyou County through 2060. While unlikely, any additional growth would place additional populations at risk. Should any population increase occur, potentially vulnerable populations could face disproportionate effects.

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Siskiyou County and all participating jurisdictions have generally seen static to decreasing housing growth over the previous 20-year period. As the population continues to decline, it is expected that housing development will also initially slow and then decrease. Projections from Siskiyou County indicate that from 2022 to

EXHIBIT C

2027, an average of 60 new homes per year are expected to be constructed (largely single-family). However, the majority of these will be homes rebuilt due to wildfires.

In Siskiyou County, various forest management projects are being implemented to help mitigate the future risk and severity of wildfires. These projects combine techniques such as prescribed burns, thinning of dense forests, and the development of defensible space around communities.

5.17.8 Mitigation Opportunities

Public Comment: *County is not investing enough into proper wildfire mitigation practices.*

The following table presents examples of potential actions that can be instituted for mitigating the wildfire hazard.

Table 150: Example Wildfire Mitigation Actions

Category	Example Action
Planning and Regulation	Use GIS mapping of wildfire hazard areas to facilitate analysis and planning decisions through comparison with zoning, development, infrastructure, etc.
	Use zoning and/or a special wildfire overlay district to designate high-risk areas and specify the conditions for the use and development of specific areas.
	Promote conservation of open space or wildland-urban boundary zones to separate developed areas from high-hazard areas.
	Set guidelines for annexation and service extensions in high-risk areas
	Address fire mitigation through access, signage, fire hydrants, water availability, vegetation management, and special building construction standards.
	Establish wildfire mitigation planning requirements for large scale developments or planned unit developments.
	Enclose the foundations of homes and other buildings in wildfire-prone areas, rather than leaving them open and potentially exposing undersides to blown embers or other materials.
	Encourage the use of functional shutters on windows
	Use fire resistant roofing and building materials in remodels, upgrades, and new construction.
Infrastructure	Install roof coverings, sheathing, flashing, skylights, roof and attic vents, eaves, and gutters that conform to ignition-resistant construction standards.
	Protect propane tanks or other external fuel sources.
	Create buffers around residential and non-residential structures through the removal or reduction of flammable vegetation, including vertical clearance of tree branches.
	Perform arson prevention cleanup activities in areas of abandoned or collapsed structures, accumulated trash or debris, and with a history of storing flammable materials where spills or dumping may have occurred.
	Prevent or alleviate wildfires by proper maintenance and separation of power lines as well as efficient response to fallen power lines.
	Require and maintain safe access for fire apparatus to wildland-urban interface neighborhoods and properties.
Natural Systems	Perform maintenance including fuel management techniques such as pruning and clearing dead vegetation, selective logging, cutting high grass, planting fire-resistant vegetation, and creating fuel/fire breaks (i.e., areas where the spread of wildfires will be slowed or stopped by the removal of fuels).
	Use prescribed burning to reduce fuel loads that threaten public safety and property.
	Cut firebreaks into public wooded areas in the wildland-urban interface.
	Develop a vegetation management plan

Table 150: Example Wildfire Mitigation Actions

Category	Example Action
Education	Join the "Firewise Communities/USA" recognition program sponsored by the National Wildlife Coordinating Group
	Offer GIS hazard mapping online for residents and design professionals.
	Sponsor awareness workshops for local officials, developers, civic groups, and neighborhood/homeowners' associations.
	Organize a local fire department tour to show local elected officials and planners the most vulnerable areas of the community's wildland-urban interface and increase their understanding of risks.
	Work with insurance companies, utility providers, and others to include wildfire safety information in materials provided to area residents.
	Develop partnerships with neighborhood groups, homeowners' associations, and others to conduct outreach activities.
	Create a defensible space or buffer zone cleared of combustible materials around property.
	Remove dead or dry leaves, needles, twigs, and combustibles from roofs, decks, eaves, porches, and yards.

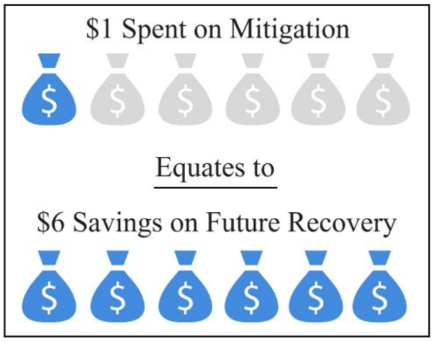
EXHIBIT C

Section 6 – Mitigation Strategy

6.1 Introduction

As part of this planning effort, Siskiyou County worked to minimize the risk of future impacts from identified hazards to all citizens of the region. In an attempt to shape future regulations, ordinances and policy decisions the MPC reviewed, revised, and developed a comprehensive hazard mitigation strategy. This comprehensive strategy includes:

- Goals to guide the selection of activities to mitigate and reduce potential loss.
- A discussion of funding capabilities for hazard mitigation projects.
- Identification, evaluation, and prioritization of mitigation actions along with potential funding sources.



Siskiyou County's mitigation strategy promotes long-term hazard resilience that will have a positive impact on quality-of-life issues. By minimizing both the exposure to, and potential impacts from, identified hazards jurisdictions can expect to minimize injuries and loss of life, reduce property damage, and minimize the day-to-day social and economic disruptions that follow hazard events.

According to an analysis by the National Institute of Building Sciences, natural hazard mitigation saves $6 on average for every $1 spent on federal mitigation grants, Additional findings indicate that:

6.2 Goals and Objectives

Siskiyou County, participating jurisdictions, and all stakeholders reviewed the previous LHMP's goals and objectives to determine if they remained viable and valid. In general terms, the relationship between goals and objectives is as follows:

- **Hierarchy:** Goals provide the overarching direction and desired outcomes, while objectives break down those goals into specific, actionable steps.
- **Alignment:** Objectives should align with and support the achievement of goals. Each objective should be directly related to one or more goals.
- **Measurement:** Goals set the vision, and objectives provide the means to measure progress toward that vision. Objectives are often used to track and evaluate the success of achieving broader goals.

During this process, and after a thorough review and discussion with all stakeholders, it was determined that the priorities of the Siskiyou County in relation to hazard mitigation planning have not changed during the five years of the previous planning cycle. Additionally, and based on discussion with all stakeholders, it was determined that the goals and objectives identified in the previous LHMP remained viable and valid. However, a need was determined to include a goal addressing the relationship between climate change and hazard mitigation. As such, Goal 6 was added to address the impacts of climate change on the landscape of mitigation planning. The following represent the identified goals for the 2025 LHMP:

- **Goal 1:** Protect life, health, property and the environment by planning and implementing whole-community risk reduction and resilience strategies.
  - Objective: Eliminate or minimize disruption of local government operations caused by natural hazards.
  - Objective: Increase resilience of (or protect and maintain) infrastructure and critical facilities.
  - Objective: Improve understanding of the location, causes and potential impacts of natural hazards.
  - Objective: Develop or improve early warning emergency response systems, communications and evacuation procedures.

EXHIBIT C

- **Goal 2:** Increase public awareness of vulnerability and enable the public to mitigate, prepare for, respond to and recover from the impacts of hazards and disasters by building capacity and capabilities among historically underserved populations.
    - Objective: Educate the public on the risk from natural hazards and increase awareness, preparation, mitigation, response, and recovery activities.
    - Objective (new): Improve community engagement and outreach by organizations and agencies that provide services to underserved communities and vulnerable populations.
    - Objective (new): Improve and advertise public access to hazard information, data, and maps to enhance understanding of hazards and potential risks.
- **Goal 3:** Reduce the adverse impacts of disasters on the economy.
    - Objective (new): Strengthen disaster resistance and resiliency of major employers
    - Objective: Consider the impacts of natural hazards on future land uses within the planning area.
    - Objective (new): Partner with private sector to leverage resources.
- **Goal 4:** Improve cooperative emergency management capabilities among all entities
    - Objective: Sustain reliable local emergency operations and facilities during and after a disaster.
    - Objective: Encourage coordination among all jurisdictions, adjoining communities and stakeholders by establishing and maintaining mutual agreements or MOUs to enhance collaboration in hazard mitigation, preparedness, response, and recovery efforts.
    - Objective (new): Establish and secure sustainable funding sources for hazard mitigation and adaptation projects to ensure long-term resilience and the ability to implement ongoing and future initiatives effectively.
- **Goal 5:** Facilitate the development and implementation of long-term, cost-effective and environmentally sound mitigation projects and programs.
    - Objective (new): Implement mitigation programs that promote reliability of community lifelines to minimize impacts from hazards and expedite recovery.
    - Objective: Retrofit, relocate, or elevate structures in high hazard areas including those known to be repetitively damaged.
    - Objective (new): Incorporate effective mitigation strategies into capital improvement projects.
- **Goal 6 (new):** Continue to adopt and enact climate adaptation measures to help reduce the long-term risk and impacts of climate change.
    - Objective (new): Advance understanding about the relationship between climate change and natural hazards.
    - Objective (new): Develop hazard mitigation and climate change adaptation policies that prevent long-term negative effects on the environment.

Participants in the LHMP will continuously evaluate these identified goals and objectives against current capabilities and conditions. As part of this process, and where possible, data and feedback from plan stakeholders will be collected and analyzed to help identify gaps, roadblocks, and achievements. Using this information, strategies will be developed to bridge identified gaps, remove identified roadblocks, and celebrate identified successes in achieving the goals of this LHMP. Additionally, when necessary, goals and objectives will be modified, updated, or expanded based on the review process. In addition, SCOES will work with all local, county, regional, and state agencies and policy makers to help integrate the goals delineated in the LHMP and goals and plans for combating climate change.

6.3 Review and Creation of Hazard Mitigation Actions

Hazard mitigation actions are proactive measures taken to reduce or eliminate the long-term risk and impact of natural and human-made hazards. These actions are designed to minimize the damage caused by disasters and contribute to the overall resilience of communities and infrastructure.

For this plan update, members of the MPC were provided with a complete list of previously identified mitigation actions and asked to review them to determine their status. Previously identified mitigation action status was reported using the following definitions:

- **Completed:** The action has been fully completed.
- **Not Completed:** The action was not started or has been started and is not completed.
- **Revised:** Action has been revised to reflect current planning environment or identified changes.
- **Deleted:** The action has been removed from consideration due to either a lack of resources or changing mitigation priorities.
- **On-going:** The action is completed and has become an ongoing activity or capability.
- **Continuous:** Actions that are on-going or repetitive in nature.

Additionally, MPC members and participating community stakeholders were provided with opportunities to identify and incorporate newly identified actions based on the changing hazard environment or previously unidentified needs. When considering new mitigation actions, participating jurisdictions were provided with two sources of guidance. Each risk assessment chapter of this LHMP provides a listing of potential mitigation actions for the specific hazard addressed. Additionally, jurisdictions were guided to the January 2013 FEMA publication Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards. This document offers a comprehensive collection of strategies and best practices for reducing risks associated with natural hazards. It covers various types of natural hazards, and provides practical ideas for communities, local governments, and individuals to implement.

In preparing a mitigation strategy all reasonable and obtainable mitigation actions were considered to help achieve the general goals. Priorities were developed based on past damage, existing exposure to risk, and weaknesses identified by the capability assessment. In identifying mitigation actions, the following activities were considered:

- The use of applicable building construction standards.
- Hazard avoidance through appropriate land-use practices.
- Relocation, retrofitting, or removal of structures at risk.
- Removal or elimination of the hazard.
- Reduction or limitation of the amount or size of the hazard.
- Segregation of the hazard from that which is to be protected.
- Modification of the basic characteristics of the hazard.
- Control of the rate of release of the hazard.
- Provision of protective systems or equipment for both cyber and physical risks.
- Establishment of hazard warning and communication procedures.
- Redundancy or duplication of essential personnel, critical systems, equipment, and information materials.

In general, all identified mitigation actions were classified under one of the following broad categories:

- **Local plans and regulations:** Actions that create or update plans to reflect situational changes and/or actions that aid in the creation, revision, or adoption of regulations related to hazard mitigation and management.
- **Infrastructure:** Actions that the modification of existing buildings or structures or involve the construction of structures to reduce the impact of hazard.
- **Natural system protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- **Public education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

Current climate adaptation strategies highlights using natural system solutions, when possible, to promote community resilience. Natural system solutions utilize natural features or processes to build more resilient communities, which in turn can contribute to climate change mitigation, climate adaptation, hazard mitigation, and environmental justice. These

EXHIBIT C

natural system solutions, often referred to as “green infrastructure” provide many additional community benefits including improving community health and wellness, protecting the environment, creating wildfire habitats, reducing greenhouse gas emissions, and providing recreational opportunities As an additional benefit, the FEMA Building Resilient Infrastructure and Communities grant program provides additional scoring criteria to promote and encourage the utilization of natural system solutions.

6.4 Prioritization of Mitigation Actions

The MPC and subject matter experts worked together to prioritize both previously identified and newly identified hazard mitigation actions. The methodology used to determine mitigation action priorities was based upon the following:

- Review of the updated risk assessments.
- Review of revised goals and objectives.
- Review of capabilities.

A multi-pronged and flexible analysis method was used for determining and prioritizing mitigation actions. An initial review of previously identified, but not completed, actions was conducted to ensure that, based on current condition and capabilities, the actions were still viable. Actions that were considered viable were retained in this plan update, with minor revisions completed as necessary.

For identified actions that were retained, and for newly identified actions, the FEMA recommended Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria were used to assist with prioritization. The following table details the STAPLEE criteria:

Table 151: STAPLEE Review Criteria

Criteria	Discussion	Example Considerations
Social	There should be community acceptance and support for the mitigation action.	Does the action have community acceptance? Will the proposed action adversely affect one segment of the population?
Technical	The proposed mitigation action should be technically feasible and should provide a long-term reduction in losses.	How effective is the action in avoiding or reducing future losses? Does it solve a problem or only a symptom? Does the action create additional problems?
Administrative	Personnel and administrative capabilities should be available to administer all phases of the project.	Are the staffing and administrative capabilities to implement the action in place? Is there someone to coordinate and lead the effort?
Political	Political support for the mitigation action needs to be present.	Is the action politically acceptable? Have political leaders been involved in the planning process? Is there a political champion to help see the project to completion?
Legal	The legal authority to implement the actions need to be in place or possible with the passing of laws or regulations.	Does the legal authority to implement the proposed action exist? Are there potential legal repercussions?
Economic	The current budget (and/or general obligation bonds or other instruments) need to be in place to fully fund the mitigation action.	Do the potential benefits of this action exceed the potential costs? Has funding been secured for the proposed action? What are the potential funding sources (public, non-profit, and private)? How will this action affect the fiscal capability of the community(s)? Does the action contribute to other community goals, such as capital improvements or economic development?

EXHIBIT C

Table 151: STAPLEE Review Criteria

Criteria	Discussion	Example Considerations
Environmental	Actions should interface with the need for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act need to be considered for federal funds.	How will the action affect the environment? Will the action need environmental regulatory approvals? Will it meet federal, state, and local state regulatory requirements? Are endangered or threatened species likely to be affected?

Based on the prioritization review, each mitigation action was assigned one of the following rankings:

- **High Priority:** Actions that provide substantial progress towards improving resiliency and are determined as potentially urgent in nature by the MPC. This would include actions that strongly support the reduction of high hazard risks and meet mitigation goals. Additionally, actions in this ranking may have imminent funding availability or strong community support.
- **Medium Priority:** Actions that provide reasonable progress towards improving resiliency and are determined as moderately urgent in nature by the MPC. This would include actions that would lessen impact hazard events, but not eliminate the impact completely.
- **Low Priority:** Actions that provide incremental progress towards improving resiliency and are determined as slightly urgent in nature by the MPC. This would include actions that are generally the responsibility of the local community, actions outside the normal authority of the State, or actions whose cost/benefit analysis returns a low yield.

6.5 Mitigation Action Funding Sources

It is generally recognized that mitigation actions help realize long term savings by preventing future losses due to hazard events. However, many mitigation actions are beyond the budgetary capabilities of a single jurisdiction. This section provides a general description of some of the avenues available to defray the cost of implementing mitigation actions.

FEMA provides financial assistance to state, local, tribal, and territorial governments, as well as certain private non-profit organizations, to implement projects that help reduce the risk and impact of future disasters. These grant programs are designed to support initiatives aimed at mitigating hazards and improving resilience. The main grant program offered by FEMA for hazard mitigation is the Hazard Mitigation Assistance (HMA) program. The HMA program includes four subprograms, the Hazard Mitigation Grant Program (HMGP), the HMGP Post-Fire, Building Resilient Infrastructure and Communities (BRIC), and the Flood Mitigation Assistance (FMA) grant program. Applicants to these grant programs are required to submit project proposals that demonstrate the effectiveness of their proposed mitigation projects. The eligibility criteria, application process, and specific requirements for each program are outlined by FEMA in their guidelines and announcements, which are typically published on FEMA's website.

The following provides a general overview of major grant funding streams:

- **HMGP and HMGP Post Fire:** The HMGP grants assist in implementing long-term hazard mitigation measures following Presidential disaster declarations, including fire declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities.
- **BRIC:** BRIC supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. Working in coordination with BRIC, the National Mitigation Investment Strategy is intended to provide a national, whole-community approach to investments in mitigation activities and risk management.
- **FMA Grant Program:** FMA is a competitive grant program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of

EXHIBIT C

repetitive flood damage to buildings insured by the NFIP. FEMA chooses recipients based on the applicant's ranking of the project and the eligibility and cost-effectiveness of the project. FEMA requires state, local, tribal and territorial governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for hazard mitigation assistance projects.

The following figure summarizes HMA grants programs:

Figure 15: HMA Grant Program Summary

HMA Program Comparison	HMGP	HMGP Post Fire	BRIC	FMA
Program Type	Post-disaster	Post-disaster	Pre-disaster	Pre-disaster
Funding Availability	Presidentially declared disaster	FMAG-declared disaster	6% set aside from federal post-disaster grant funding	Annual appropriations
Competitive?	No	No	Yes	Yes
Eligible Applicants	States, federally recognized tribes, territories and the District of Columbia (DC)	States, federally recognized tribes, territories and DC	States, federally recognized tribes, territories and DC	States, federally recognized tribes, territories and DC
Eligible Subapplicants	State agencies, local governments, tribes and private nonprofit organizations	State agencies, local governments, tribes and private nonprofit organizations	State agencies, local governments and tribes	State agencies, local governments and tribes
Hazard Mitigation Plan Requirement	Yes	Yes	Yes	Yes
NFIP Participation	Communities with projects in Special Flood Hazard Areas (SFHAs)	Communities with projects in SFHAs	Communities with projects in SFHAs	Subapplicants and properties

Additionally, the following provide available grant funding avenues for hazard mitigation projects:

- **Rehabilitation Of High Hazard Potential Dam Grant Program:** This program awards provide technical, planning, design and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. A state or territory with an enacted dam safety program, the State Administrative Agency, or an equivalent state agency, is eligible for the grant.
- **Emergency Management Performance Grant:** Program provides state, local, tribal and territorial emergency management agencies with the resources required for implementation of the National Preparedness System and works toward the National Preparedness Goal of a secure and resilient nation. Allowable costs support efforts

to build and sustain core capabilities across the prevention, protection, mitigation, response and recovery mission areas.

- **State Homeland Security Program:** Program includes a suite of risk-based grants to assist state, local, tribal and territorial efforts in preventing, protecting against, mitigating, responding to and recovering from acts of terrorism and other threats. This grant provides grantees with the resources required for implementation of the National Preparedness System and working toward the National Preparedness Goal of a resilient nation.
- **Nonprofit Security Grant Program:** Program is one of three grant programs that support DHS/FEMA's focus on enhancing the ability of state, local, tribal, and territorial governments, as well as nonprofits, to prevent, protect against, prepare for, and respond to terrorist or other extremist attacks. These grant programs are part of a comprehensive set of measures authorized by Congress and implemented by DHS to help strengthen the nation's communities against potential terrorist or other extremist attacks. Among the five basic homeland security missions noted in the DHS Strategic Plan for Fiscal Years 2020-2024.
- **Public Assistance Program:** The mission of FEMA's Public Assistance program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. Through the Public Assistance program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain private non-profit organizations. The Public Assistance Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process. The Federal share of assistance is not less than 75% of the eligible cost for emergency measures and permanent restoration. The grantee determines how the non-Federal share (up to 25%) is split with the eligible applicants.
- **Individual Assistance Program:** After a disaster, the federal government determines if any county in the state meets the criteria for individual disaster assistance. The decision is based on damage related to the severity and magnitude of the event. When a county receives an Individual Assistance declaration from the President of the United States, anyone who lives in that county can apply for assistance.
- **Small Business Administration Disaster Loans:** The Small Business Administration provides low-interest disaster loans to homeowners, renters, businesses of all sizes, and most private nonprofit organizations. Small Business Administration disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.
- **The Housing and Urban Development Agency**: Provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.
- **Community Development Block Grant Program**: This is a flexible program that provides communities with resources to address a wide range of unique community development needs. The program provides annual grants on a formula basis to general units of local government and States.
- **Individual and Households, Other Needs Assistance Program:** This program provides financial assistance to individuals or households who sustain damage or develop serious needs because of a natural or man-made disaster. The funding share is 75% federal funds and 25% state funds. The program provides grants for necessary expenses and serious needs that cannot be provided for by insurance, another federal program, or other source of assistance. The current maximum allowable amount for any one disaster to individuals or families is $25,000. The program gives funds for disaster-related necessary expenses and serious needs, including personal property, transportation, medical and dental, funeral, essential tools, flood insurance, and moving and storage.
- **WUI Grants:** The 10-Year Comprehensive Strategy focuses on assisting people and communities in the WUI to moderate the threat of catastrophic fire through the four broad goals of improving prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance. The WUI Grant may be used to apply for financial assistance towards hazardous fuels and educational projects within the four goals of: improved prevention, reduction of hazardous fuels, restoration of fire-adapted ecosystems and promotion of community assistance.
- **Forest Health Grant Program:** Awards funding to landscape-scaled land management programs that restore forest health and bolster disaster resilience on forest lands, protect the State's upper watersheds, promote long-

term storage of carbon in forest trees and soil, minimize the loss of forest carbon from unnaturally high severity wildfires, and further the goals of various State climate and land management plans.

- **Wildfire Prevention Grants Program:** Provides funding for wildfire prevention projects and activities in and near fire-threatened communities that focus on increasing the protection of people, structures, and communities. Funded activities include hazardous fuels reduction, wildfire prevention planning, and wildfire prevention education, with an emphasis on improving public health and safety while reducing greenhouse gas emissions.
- **Urban and Community Forestry Grant Program:** These grants are designed to help communities to create or implement projects with a focus on reducing greenhouse gas emissions, increasing climate resilience, and providing optimal co-benefits, with a particular focus on disadvantaged communities.
- **California Forest Improvement Program:** The State's primary assistance program for nonindustrial private forest owners, the program provides eligible landowners with technical and financial assistance for planning, reforestation, and resource management investments to improve the health and resilience of California's forestland.
- **CAL FIRE Wildfire Resilience Block Grants:** Funds technical and financial assistance for smaller, private forestland owners. The purpose of the grant is to allow prospective grantees the ability to assist nonindustrial forest landowners.
- **Small Business Loans:** These loans provide fixed rate low-interest loans to disaster victims, enabling them to repair or replace property damaged or destroyed in declared disasters. These loans are also available to affected small businesses to help them recover from economic injury caused by such disasters.
- **Increased Cost of Compliance :** This coverage provides a resource for flood insurance policyholders who need additional help rebuilding after a flood, offering up to $30,000 to help cover the cost of mitigation measures that will reduce future flood risk. This coverage is a part of most policies available under NFIP.

Small and impoverished communities that receive grants may receive a federal cost share of up to 90% of the total amount approved under the grant award. As defined in 44 CFR 201.2, a small and impoverished community is:

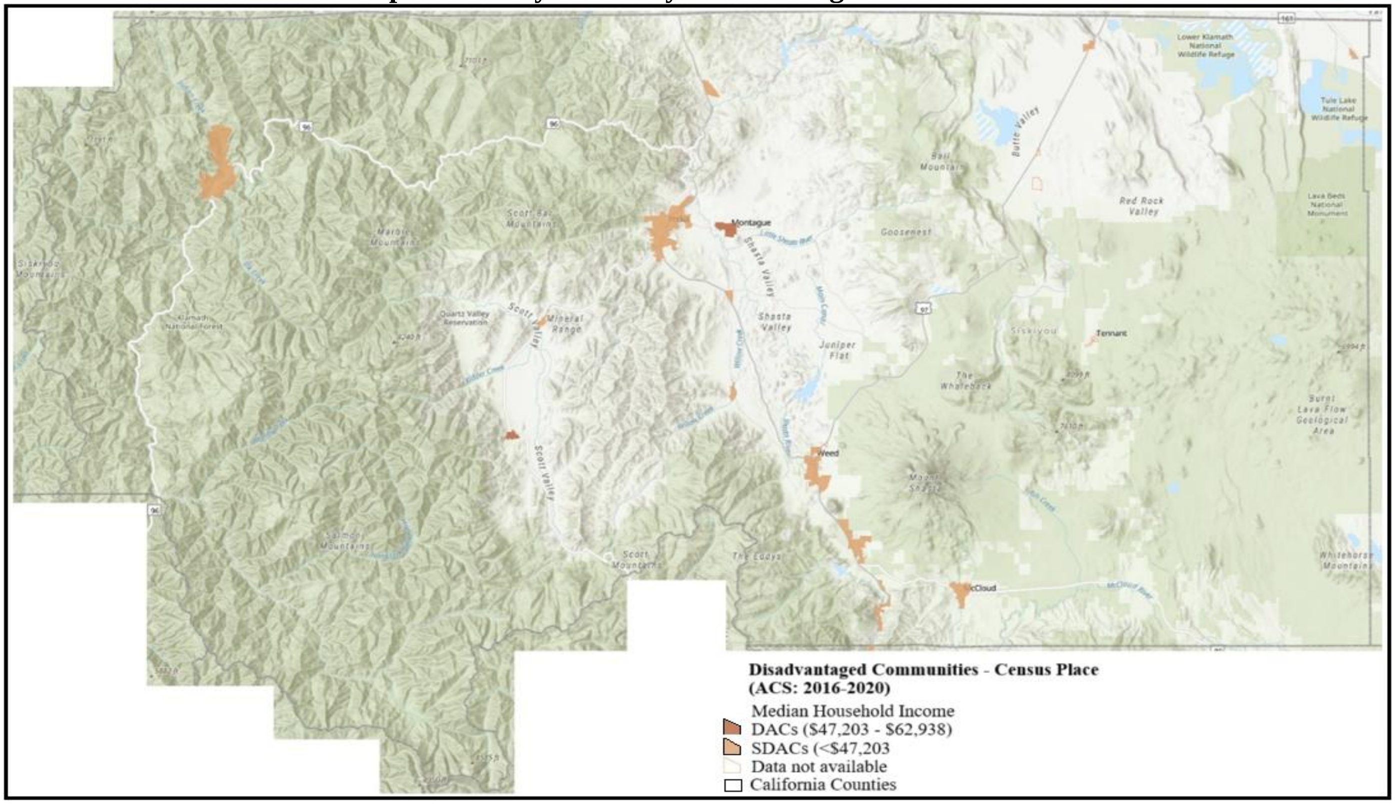
- A community of 3,000 or fewer individuals that is identified by the State as a rural community.
- Is not a remote area within the corporate boundaries of a larger city.
- Is economically disadvantaged, by having an average per capita annual income of residents not exceeding 80% of national, per capita income.
- The local unemployment rate exceeds by one percentage point or more, the most recently reported, average yearly national unemployment rate.
- Any other factors identified in the State Plan in which the community is located.

Disadvantaged Communities and Small Disadvantaged Communities are defined by income levels and eligibility for targeted resources to address infrastructure and environmental challenges. Disadvantaged Communities are defined as communities where the median household income is less than 80% of the statewide median income. Small Disadvantaged Communities are defined similarly to Disadvantaged Communities, but specifically refer to communities with a population of fewer than 10,000 people. These communities may struggle with limited access to clean water, wastewater infrastructure, healthcare, and other critical services and may be more vulnerable to natural hazards due to infrastructure deficiencies and limited adaptive capacity. State programs prioritize these communities for funding and support to address disparities in resilience and preparedness.

Disadvantaged Unincorporated Communities are defined as unincorporated areas with a median household income below 80% of the statewide median household income. These communities often lack basic infrastructure and services, and may also face challenges like limited access to public and emergency services which may make them more vulnerable to natural hazards. California Senate Bill 244 (2011) requires local governments to identify the communities in their planning efforts and prioritize addressing infrastructure and service deficiencies to reduce risks and improve equity.

The following map details disadvantaged communities within Siskiyou County:

Map 133: Siskiyou County Disadvantaged Communities



Source: State of California DAC Mapping Tool

6.6 Previously Identified Jurisdictional Mitigation Actions

Previously identified hazard mitigation actions were reviewed by the relevant jurisdiction to determine the status of each action. The status of these previously identified hazard mitigation actions indicates if the action has been completed, is carried over to this version of the plan, has been revised, or is no longer being considered. Additionally, each action was assigned a new number to conform with the numbering system in this LHMP. Completed actions may be found in the following section. Carried over, revised, and deleted actions may be found in Appendix D.

6.7 Completed Hazard Mitigation Actions

Siskiyou County and all participating jurisdictions remain committed to investigating and obtaining all available grant funding for the completion of hazard mitigation projects. Since the completion of the previous LHMP in 2019 the following previously identified mitigation actions have been completed:

Table 152: Completed Hazard Mitigation Actions

Previous LHMP Action Number	Description	Status
Dunsmuir -3	Inventory and assess condition of primary and secondary evacuation routes in the City and improve and maintain these routes as needed to ensure safe and efficient vehicle and pedestrian movement during emergency conditions.	Completed
Dunsmuir -4	Develop a post-disaster action plan that includes grant funding and debris removal components. The grant funding component should include a list of private, nonprofit, and government funding sources as well as the funding requirements for same.	Completed
Dunsmuir -7	Increase reliability, capacity, and fire safety through the addition of a new 0.9 MG water storage tank in the Downtown Pressure Zone, strengthening of the main distribution system, and replacement of pipelines that are at or beyond their serviceable life.	Completed
Tulelake-1	Demolition of Clyde Hotel, a two-story structure that is collapsing in on itself.	Complete
Tulelake -9	Reinforce, repair and/or replace above ground water storage tower and below ground tanks.	Complete

EXHIBIT C

Table 152: Completed Hazard Mitigation Actions

Previous LHMP Action Number	Description	Status
Tulelake -10	Repair or replace Well House #1 and #3 and Booster Station	Complete

Additionally, the following hazard mitigation projects, funded through a variety of programs, are currently being conducted in Siskiyou County:

- **Siskiyou County Wildfire Mitigation and Preparedness:** As part of a statewide initiative by the USDA Forest Service, the Community Organized Relief Effort is partnering with the Fire Safe Council of Siskiyou County to support wildfire mitigation and preparedness throughout Siskiyou County. This five-year, multi-phase program engages community members through public outreach and fuel reduction initiatives. Numerous events will be hosted to share information and resources and distribute go-bags and other tailored materials. The program also offers free home assessments to low-income households in the county, with the goal of creating defensible spaces or buffer zones.
- **Dunsmuir Fuels Mitigation Project:** This project will reduce hazardous fuels in the City of Dunsmuir WUI. The project will seek environmental compliance on approximately 690 acres in the community with a subset of that area, approximately 183 acres, receiving on-the-ground fuel reduction treatments.
- **Lake Shastina Fuels Reduction Project:** This project is currently conducting a Vegetation Treatment Plan, allowing for a more diverse use of the land in the future. Project specific analysis will include over 6,000 acres and will be conducted under the lead of the Shasta Valley Resource Conservation District.
- **Climate Resiliency Grant:** The California Strategic Growth Council awarded $1,500,000 to the Siskiyou Economic Development Council and the Siskiyou Climate Collaborative Program as part of a three-year grant that will focus on planning for fire and climate resiliency in the communities of Dorris, Dunsmuir, Etna, Fort Jones, Montague, Mount Shasta, Tulelake, Weed, and Yreka.
- **Siskiyou County Hazardous Fuel Reduction Project:** The McConnell Foundation has been awarded grants to mitigate wildfire impacts around Mt. Shasta and Dunsmuir. The goal of the project is to reduce the risk of wildfire within high-priority WUI areas by reducing hazardous fuels. The first phase of the project is expected to start in late early 2025 with a more robust site-assessment process. Landowners will meet with a professional experienced in hazard fuel reduction to develop a site-specific work plan for their property. The second phase of the Project will be removal of hazardous fuels and is expected to begin sometime in 2026 and last 24 months.
- **Shasta Valley Resource Conservation District Siskiyou County Fuels Reduction and Forest Restoration Planning Tool:** This project will engage diverse stakeholders to establish an innovative spatial data platform covering Siskiyou County and facilitate landscape-scale collaborative planning, empowering local entities with information to optimize resources and strategically target areas for fuels reduction and forest resiliency work in the WUI and surrounding wildlands.

6.8 Jurisdictional Hazard Mitigation Actions

__Public Comment:__ Strengthen infrastructure and public education.

To support the mitigation goals identified in this LHMP, Siskiyou County and all participating jurisdictions identified a comprehensive range mitigation projects and activities. The selected set of hazard mitigation actions carefully takes a holistic approach to mitigation while simultaneously addressing each of the plan's profiled hazards. The list of mitigation actions is based upon the potential to reduce risk to life and property with an emphasis on ease of implementation, community and agency support, consistency with local jurisdictions' plans and capabilities, available funding, and jurisdictional vulnerability. It is important to note that since the previous LHMP, requirements for plan approval have changed. In the previous plan, Siskiyou County and many participating jurisdictions identified only a few mitigation actions, with none that are specific to an identified hazard. As such, numerous additional actions have been identified to ensure there is at least one action per identified hazard.

EXHIBIT C

To ensure that all hazard that could potentially impact a participating jurisdiction have been assigned a mitigation action, the following table provides a cross check of action and identified hazards. Please see Appendix D: Jurisdictional Mitigation Actions for a full list of jurisdictional mitigation actions.

Table 153: Jurisdictional Mitigation Action Cross Check

Jurisdiction	All Hazards	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Landslide	Severe Weather	Subsidence	Volcanic Activity	Wildfire
Siskiyou County	1-12	1-12, 13, 14	1-12, 15, 16	1-12, 17, 18,19	1-12, 20, 21	1-12, 22-30	1-12, 31, 32	1-12, 33, 34, 35	1-12, 36, 37	1-12, 38, 39	1-12, 40-44
Dorris	-	N/A	1	2, 3, 4	N/A	1, 3, 4, 5	N/A	3, 4	4	N/A	1, 3, 6
Dunsmuir	1-13	1-13, 14	1-13	1-13	1-13, 15, 16	1-13, 14, 17, 18, 19, 26	1-13, 26	1-13, 14	N/A	1-13	1-13, 14, 20-27
Etna	1-5	N/A	1-5, 6, 7	1-5	1-5	1-5, 6, 8, 9, 10, 11	N/A	1-5	N/A	N/A	1-5, 6, 7, 11, 13, 14
Fort Jones	1, 2, 3	N/A	1, 2, 3, 9	1, 2, 3	1, 2, 3, 9	1, 2, 3, 4, ,5 ,6	N/A	1, 2, 3	N/A	N/A	1, 2, ,3, 7, 8, 9
Happy Camp CSD	-	N/A	1	2	3	4, 5	6, 7	8	9	10	11, 12, 13
Lake Shastina CSD	1-3	4	1-3, 5	1-3, 6	1-3, 7	1-3, 8, 9	10	1-3, 11	12	1-3, 13	1-3, 14, 15, 16
McCloud CSD	1-4	5	1-4, 6	1-4, 7	1-4, 8	1-4, 9, 10	1-4, 11	1-4, 13	13	1-4, 14	1-4, 15, 16, 17
Montague	-	1, 2	3, 4	5, 6, 7	8, 9	10-15	16, 17	18, 19	20	21, 22	23, 24, 25
Mt. Shasta	1-41	N/A	1-41	1-41	N/A	1-41	N/A	1-41	1-41	1-41	1-41
Tulelake	1-6	N/A	1-6, 7, 8	1-6, 9-13	N/A	1-6, 9	N/A	1-6, 9-13	1-6, 9-12	N/A	1-6, 10-13
Weed	1-3	N/A	1-3	1-3	1-3	1-3, 4-7	N/A	1-3	1-3	1-3	1-3, 8, 9
Yreka	1-8	1-8	1-8	1-8	1-8	1-8, 9	N/A	1-8	1-8	1-8	1-8, 10

N/A: Jurisdiction has identified the hazard as a minor community concern, and has elected to prioritize resources on other mitigation actions.

Prior to the implementation of any action further feasibility analysis will be performed. Additionally, a Benefit-Cost Analysis that determines the future risk reduction benefits of a hazard mitigation project and compares those benefits to its costs will be conducted as required. Applicants and sub-applicants will use FEMA approved methodologies and tools, such as the Benefit-Cost Analysis Toolkit, to demonstrate the cost-effectiveness of their projects. The result of the analysis is a Benefit-Cost Ratio, and a project is considered cost-effective when the Benefit-Cost Ratio is 1.0 or greater. Depending on the project, either a full Benefit-Cost Analysis will be completed by entering documented values into the FEMA Benefit-Cost Analysis Toolkit, which calculates a benefit-cost ratio or, if the project meets specified criteria, a streamlined Benefit-Cost Analysis may be completed (FEMA's cost-effectiveness requirement is never waived).

Siskiyou County and all participating jurisdictions acknowledge that the adoption and approval of this plan does not obligate the completion of each identified action. Rather, it is understood that progress should be shown in mitigation efforts which may include the completion of mitigation actions or other actions or progress in achieving the goals of this LHMP.

6.9 Mitigation Action Implementation and Monitoring

Siskiyou County and each participating jurisdiction is responsible for implementing and managing their own identified mitigation actions. To foster accountability and increase the likelihood that actions will be implemented, every proposed action is assigned to a specific position as a champion. In general:

EXHIBIT C

- The identified champion will be responsible for tracking and reporting on action status.
- The identified champion should provide input on whether the action as implemented is successful in reducing vulnerability, if applicable.
- If the action is unsuccessful in reducing vulnerability, the identified champion will be tasked with identifying deficiencies and additional required actions.

Additionally, each action has been assigned a proposed completion timeframe to determine if the action is being implemented according to plan.

SCOES is responsible for monitoring the progress of mitigation activities and projects throughout the county in conjunction with the participating jurisdictions. To facilitate the tracking of any awarded hazard mitigation grants, the SCOES will compile a list of projects funded throughout the calendar year, if any, and add it to an electronic database. Additionally, SCOES will monitor information on any other mitigation projects that were not funded through hazard mitigation grants. SCOES will utilize the Cal OES Grants Central System, an automated system that provides a streamlined and efficient way to apply for and manage grant funding. The Grants Central System:

- Automates the grant application process
- Provides the applicant notifications and status updates
- Simplifies the payment process

Providing grant oversight, Cal OES will continuously monitor the grant process to ensure compliance with federal and state regulations and requirements. Monitoring focuses on providing technical assistance and guidance to validate or improve administrative and fiscal efficiencies in managing award funds. Required by federal and state mandates, Cal OES Grants Management Monitoring Division assesses Grant Subaward programs to verify that expenditures submitted for reimbursement are allowable, reasonable, benefit the Grant Subaward, and have been appropriately charged to the correct cost category. Cal OES will also verify adequate policies, procedures, and systems are in place to manage Grant Subawards effectively. As part of the monitoring process, Cal OES will provide:

- Desk Compliance Assessment: A review of all related transactions and processes to verify that Grant Subaward funds were expended in compliance with federal and state regulations and the terms and conditions of the Subaward.
- Onsite Compliance Assessment: An assessment of the capability, performance, and compliance of subrecipients against applicable administrative and fiscal grant regulations and requirements.
- Schedule (Questionnaire) Review: A periodic self-certification that focuses on a particular topic or topics related to policies, procedures and/or payments.
- Independent Auditor’s Assessment: For projects over $750,000, an independent auditor’s assessment of a Subrecipient’s fiscal processes and compliance with federal grant guidelines. If the auditor suggests there are areas for improvement or noncompliance with grant requirements, the monitoring staff will follow up with the Subrecipient to ensure that corrective actions are being taken.

During the monitoring process, Cal OES may determine that the process is not in compliance with federal and state regulation and requirements. The following are common areas of non-compliance:

- Internal Controls
    - Lack of segregation of duties for smaller nonprofit organizations
    - Inadequate policies for victim petty cash/financial assistance
    - Single audit findings, audit reports submitted late, lack of required audits
    - Inadequate monitoring of second tier subrecipients
- Financial Management
    - Improper/inadequate tracking and recording of Subaward costs

  - Costs not allocated properly and/or Inadequate cost allocation plan
  - Overcharging of office facility rent or indirect costs
  - Inadequate/unsupported/unallowable required match
  - Match not recorded or not identified in accounting records as match
  - Match not claimed on reimbursement request as occurred
  - Reimbursement requests not submitted timely
- Personnel
  - Functional timesheets not used for Subaward Personnel costs
  - Fringe benefit costs claimed in incorrect cost category
  - Unsupported/unallowable Personnel costs
  - Unsupported volunteer in-kind match claimed on reimbursement request
- Operating
  - Unsupported/unallowable operating cost items
  - Lack of proof of payment of cost item(s)
  - Cost claimed on reimbursement request prior to expending money
- Equipment
  - Equipment inventory records missing required information
  - Disposal data and information missing from records
  - Physical equipment inventory/record reconciliation not performed
  - Missing or unidentifiable equipment (onsite equipment inspections)
- Procurements/Contracts
  - Lack of written procurement procedures
  - Lack of written code of conduct covering conflicts of interest in procurements
  - Improper procurement
  - Non-competitive procurement not justified/approved
  - Procurement documentation not maintained
  - Suspension/debarment not checked prior to awarding contract
  - Competition requirements not met (quotes, bids, proposals)
  - No cost/price analysis
  - Lack of negotiating profit/discount when required
  - Contracts/purchase orders do not contain all required provisions

Should any areas be determined as non-complaint, a Corrective Action Plan may be required to address any identified issues, with the plan needing to be completed and implemented in a specific time frame.

Upon completion of a project, a member of the awarded jurisdiction, a member of the Siskiyou County MPC, and a Cal OES representative will conduct a closeout site visit to:

- Review all files and documents
- Review all procurement files and contracts to third parties
- Take photos of the completed project

Project closeout packages will generally be submitted 90 days after a project has been completed, and will include the following:

- Summary of documentation
- Pictures of completed project
- Materials, labor, and equipment forms, if required
- Close-out certification

Section 7 – Plan Maintenance

7.1 Introduction

The LHMP is a living document that will be updated and submitted to FEMA for approval every five years as required by 44 CRF 201.6. During the five-year cycle, the plan will undergo continuous monitoring and evaluation to ensure that the policies, procedures, priorities, and state environment established in the plan reflect current conditions. Siskiyou County and all participating jurisdictions will utilize the MPC to provide plan updates, revisions, and data collection for future LHMP planning purposes.

7.2 Plan Maintenance Responsibilities

SCOES serves as the lead coordinating agency for plan maintenance. Additional assistance in the plan maintenance process is provided by members of the MPC, subject matter experts, and representatives of local jurisdictions.

SCOES will facilitate the review and revision of the LHMP every five years, with each participating jurisdiction managing the revision of their specific jurisdictional annex. The review and revision will be an ongoing process. This process will incorporate all of the revisions made during the life of the plan, especially newly obtained data on hazard occurrence or identified vulnerability.

7.3 Plan Review Meetings

The MPC will meet annually for the first two years after plan approval. MPC members will determine the meeting dates and locations and will ensure that the meetings are open to all interested parties. The Siskiyou County Emergency Manager will be the main point of contact for these meetings and will maintain attendance and meeting minutes.

The purpose of these meetings is to discuss capability changes, the status of proposed projects, and any new studies or mapping that may inform the LHMP. Should a specific plan element or section require revision or amendment due to a state or federal legislation or policy change, the MPC will work with Cal OES to complete a plan addendum and submit it to FEMA as quickly as is practicable.

During these meetings, and in order to monitor LHMP progress, the following information will be tracked:

- How the actions from the mitigation strategy are being pursued and completed
    - Are actions being prioritized
- How the plan goals and objectives are being carried out
- How mitigation funding mechanisms are being utilized
- How is technical assistance being received

Additionally, the MPC will monitor the following elements to ensure the LHMP is current and correct:

- Reviewing the hazards and determining if any of them have changed
- Determining if there are new hazards that pose a risk to the state
- Ensuring goals and objectives are still relevant
- Determining if any actions have been completed or are deemed irrelevant
- Determining if new actions should be added
- Determining if capabilities have changed

After each meeting, the MPC will compile a meeting report for usage in future plan revisions.

In addition to these meetings, MPC members will monitor and evaluate the progress of mitigation projects via quarterly reports, site visits, correspondence, and reimbursements. Completed projects will be evaluated for loss avoidance and alignment with local development plans.

EXHIBIT C

Cal OES may request a non-scheduled report on the monitoring, evaluation, or updating of any portion of the LHMP due to irregular progress on mitigation actions and or projects, in the aftermath of a hazard event, or for any reason deemed appropriate.

7.4 Plan Monitoring and Situational Change

Plan monitoring can be defined as the ongoing process by which stakeholders obtain regular feedback on the progress being made towards achieving their goals and objectives. In the more limited approach, monitoring may focus on tracking projects and the use of the agency's resources. In the broader approach, monitoring also involves tracking strategies and actions being taken by partners and non-partners, and figuring out what new strategies and actions need to be taken to ensure progress towards the most important results.

The MPC will track and record all substantial situational changes and will address, as appropriate, the following questions:

- Is the mitigation project under, over, or on budget?
- Is the mitigation project behind, ahead of, or on schedule?
- Are there any changes in jurisdictional capabilities which impact the plan?
- Are there any changes in jurisdictional hazard risk?
- Has the mitigation action been initiated, or its initiation planned?
- Is the current process of prioritizing mitigation actions and projects appropriate and accurate?
- Has the current method of incorporating mitigation actions and projects yielded a comprehensive action and project strategy to address seen and unforeseen hazards?
- Has there been regular collaboration among stakeholders?
- Was a negative result caused directly or indirectly by insufficient levels of public outreach?
- If any, what plan updates occurred, why they occurred, and what is their impact?

7.5 Post-Disaster Review

After each Presidential disaster declaration, and in coordination with FEMA and the Cal OES, the MPC will convene to document impacts on Siskiyou County and to determine if any mitigation actions should be considered to reduce future risk. This will allow for the development of hazard mitigation recommendations to FEMA during the disaster operation as well as to update the mitigation strategy as needed. The post-disaster review may coincide with established meetings or may be convened as separate events.

7.6 Plan Evaluation

A plan evaluation is a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated goals and contributing to decision making.

A plan evaluation report, conducted by the MPC, will be completed when the situation dictates. The following situations are typical examples of when an evaluation will be necessary.

- Post hazard event
- Post training exercise
- Post tabletop or drill exercise
- Significant change or completion of a mitigation project
- Significant change or completion of a mitigation action

An evaluation report will ask the following questions in response to the previously listed events.

- Do the mitigation objectives and goals continue to address the current hazards?
- Are there new or previously unforeseen hazards?

EXHIBIT C

- Does a change in hazard vulnerability demand a change of or addition of mitigation actions or projects?
- Does a change in the mitigation strategy demand a change of or addition of mitigation actions or projects?
- Are current resources appropriate for implementing a mitigation project?
- Was the outcome of a mitigation action/project expected?
- Are there implementation problems?
- Was the public engaged to the point where they were satisfied with current engagement strategies?
- Did the public participate in a number that produced a positive yield on the plan, action, or project?
- Are there coordination problems?

7.7 Plan Updates

Typically, the updating of a LHMP is initiated upon the completion of a plan evaluation when the evaluation determines an update is appropriate. A plan update also occurs every five years per FEMA guidelines or at any time it is deemed necessary by MPC.

According to FEMA DMA 2000 guidelines for mitigation planning, Siskiyou County will begin the update process three years from this plan's adoption. An increase in meeting tempo to twice a year will allow MPC to gather relevant information needed for the next plan update. The following meeting schedule indicates the tasks to be performed during this plan update period:

- **2027 Spring Meeting:** The MPC will begin updating the risk assessment portion of the plan. Hazards will be analyzed to determine if they are still relevant, if location should be updated, and if new hazards should be added. Previous occurrences will be reviewed to help determine the probability of future events.
- **2027 Fall Meeting:** The MPC will begin updating the vulnerability assessment. The MPC will update the vulnerability assessment portion of the plan. Data will need to be gathered for assets, critical facilities, building stock values, jurisdictional damages, etc.
- **2028 Spring Meeting:** The MPC will review information received and determine if the goals and objectives are still relevant and if new ones should be added. Actions will be reviewed to determine if they should remain in the plan, have been completed, or are no longer relevant. The MPC will review the potential funding sources for each action.
- **2028 Fall Meeting:** As appropriate, a new MPC for Siskiyou County will be formed to take over the planning process. The new MPC will evaluate the policies, programs, capabilities, and funding sources from the previous plan to determine if they are still accurate and if any new items should be added.
- **2029 Spring Meeting:** The new MPC will review the draft copy of the mitigation plan and make comments and updates if necessary. Formal submittal to FEMA for re-approval will follow.

In general, the following steps will be taken to complete the next LHMP revision:

Table 154: Siskiyou County LHMP Update Task List

Task	Action
1	Evaluate and update the planning process.
2	Review the stakeholder contact list and identify new stakeholders.
3	Initiate plan outreach and discussion, including a stakeholder meeting.
4	Consider the addition, removal, or modification of hazards identified in the plan.
5	Update and revise membership of the MPC.
6	Evaluate risk assessment methodologies and data sources.
7	Evaluate and update critical facility inventory information.
8	Evaluate and update the hazard profiles.
9	Evaluate and update the risk assessment summary.
10	Evaluate and update the mitigation strategy, including proposed mitigation actions.
11	Evaluate and update the mitigation implementation system.
12	Integrate new and updated local plans.

EXHIBIT C

Table 154: Siskiyou County LHMP Update Task List

Task	Action
13	Evaluate and update other plans sections.
14	Identify and add any additional sections or information needed.
15	Review updated plan in its entirety.
16	Conduct updated plan outreach, including public information, comment period, and meetings.
17	Integrate additional comments received.
18	Finalize plan document.
19	Complete crosswalk and submit final plan to FEMA for review and approval.
20	Make additional modifications as required.
21	Obtain jurisdictional adoption resolutions.

7.8 Continued Public Involvement

Siskiyou County and all participating jurisdictions are dedicated to involving the public in the continual shaping of the LHMP and in the development of its mitigation projects and activities. Continued public involvement provides valuable feedback on plan implementation, including mitigated conditions and ideas for continued mitigation projects. Additionally, all participating jurisdictions will celebrate with the public the implementation of successful mitigation projects.

As part of this process, the public will be notified and invited to attend all plan update meetings scheduled to begin in the Spring of 2027. The public will be notified by jurisdictional websites and public announcements specifying the date and time for meetings.

The Siskiyou County MPC will also continue to keep the public informed about hazard mitigation projects and activities through jurisdictional websites. Additionally, participating jurisdictions will present to public officials in a public forum concerning the progress of mitigation actions identified in this plan as progress is made.

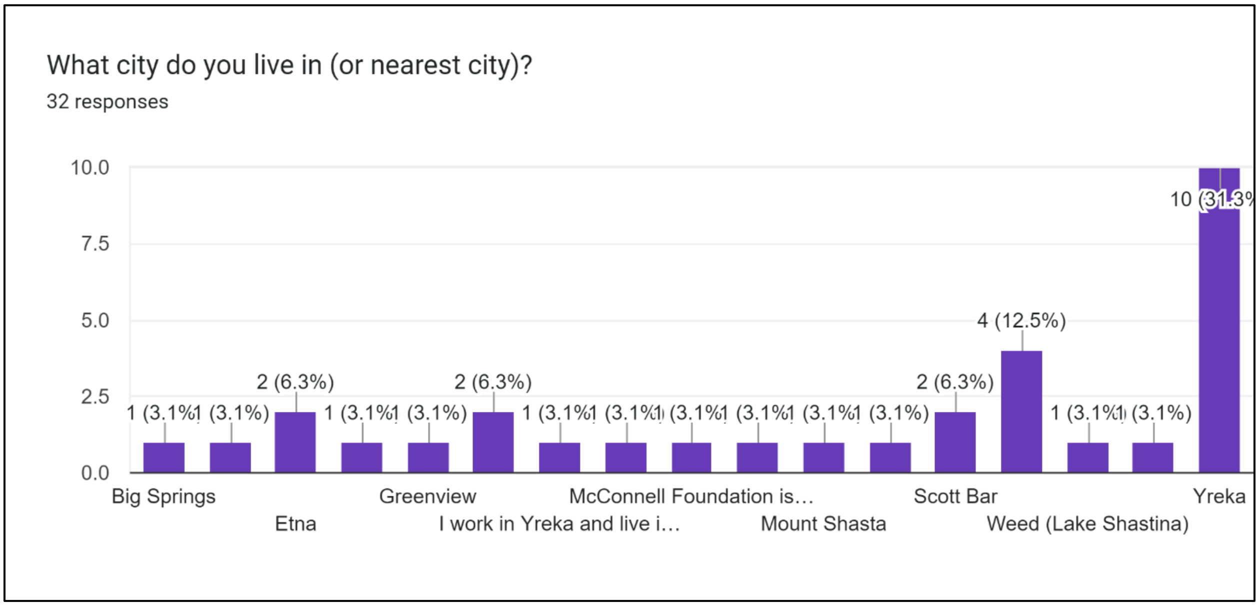
Copies of the Siskiyou County LHMP will be made available to the public and will be posted on the dedicated Siskiyou County hazard mitigation website along with a hard copy kept at SCOES and participating jurisdiction offices.

Appendix A – Siskiyou County Adoption Documentation and FEMA Region IX Approval Documentation

EXHIBIT C

Appendix B – Community Feedback

Survey One



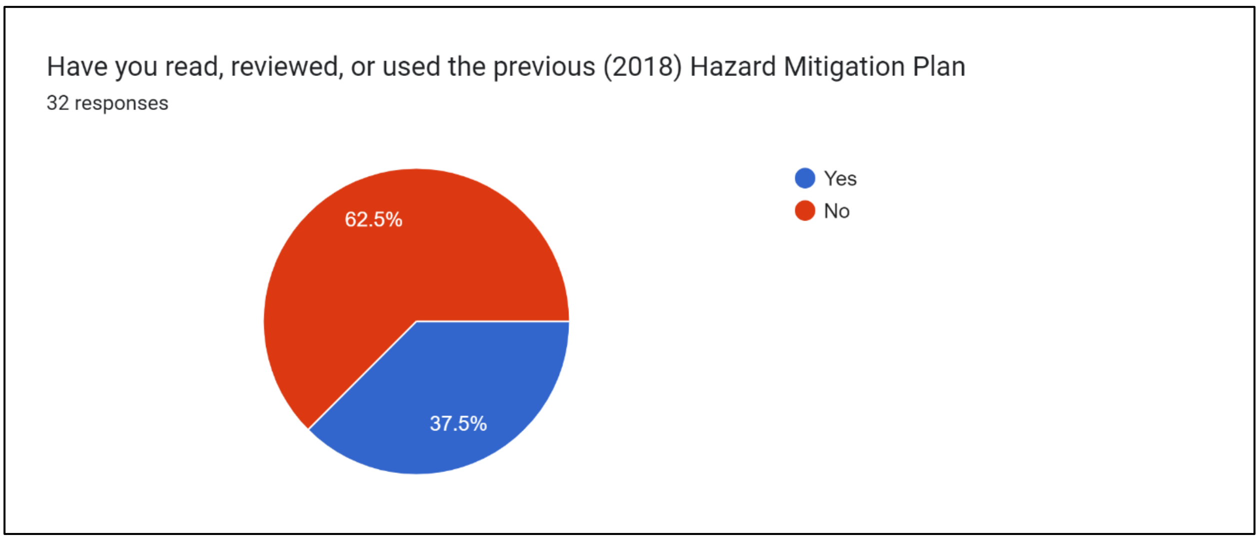
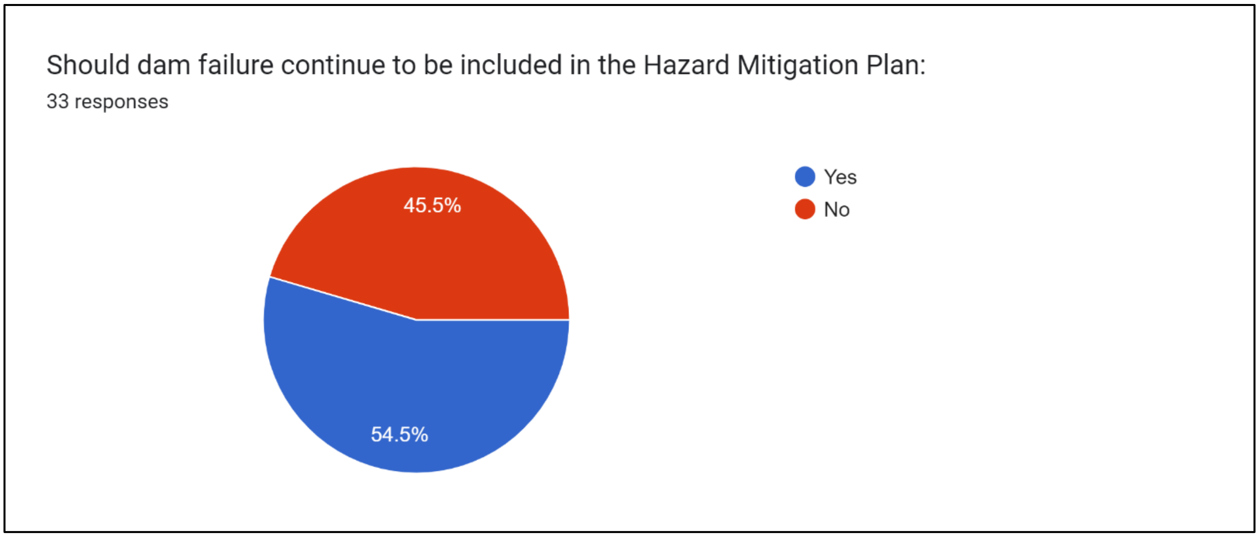
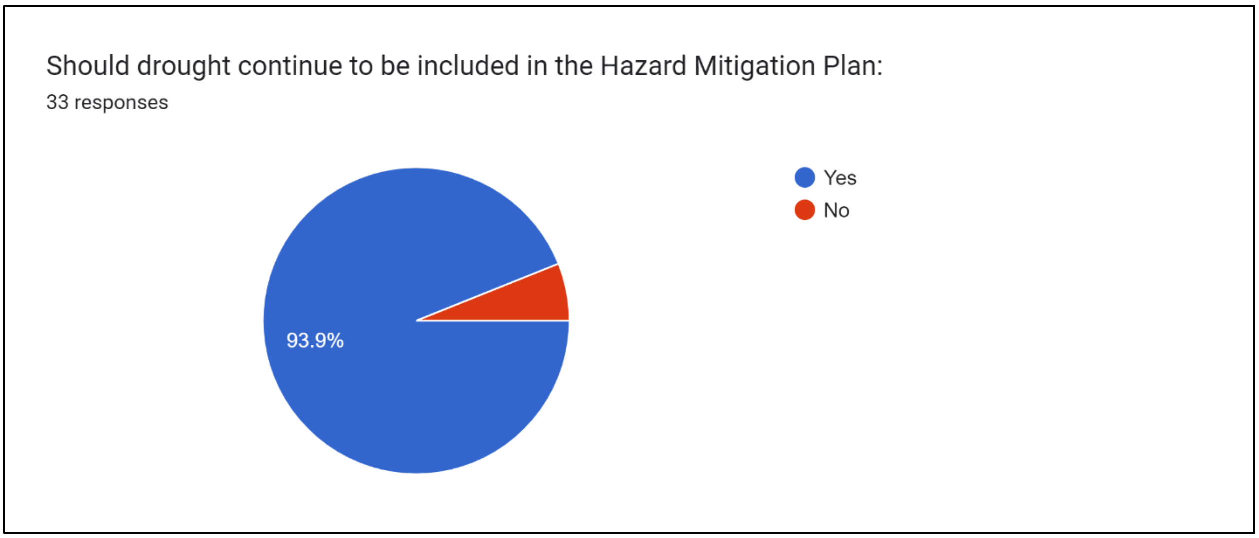


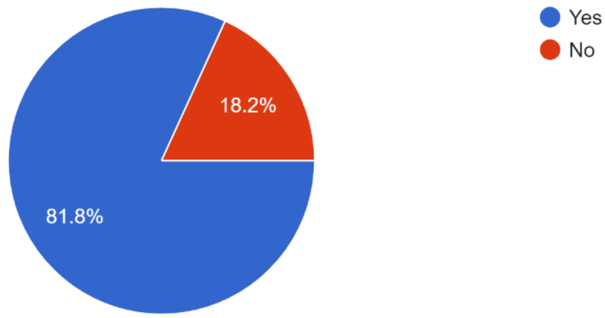
EXHIBIT C


Should dam failure continue to be included in the Hazard Mitigation Plan:
33 responses
Yes
No
45.5%
54.5%


Should drought continue to be included in the Hazard Mitigation Plan:
33 responses
Yes
No
93.9%

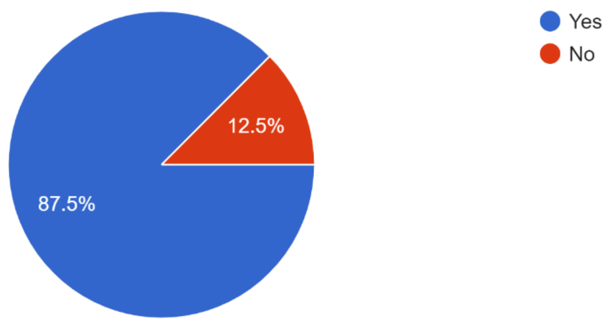
Should earthquake continue to be included in the Hazard Mitigation Plan:

33 responses



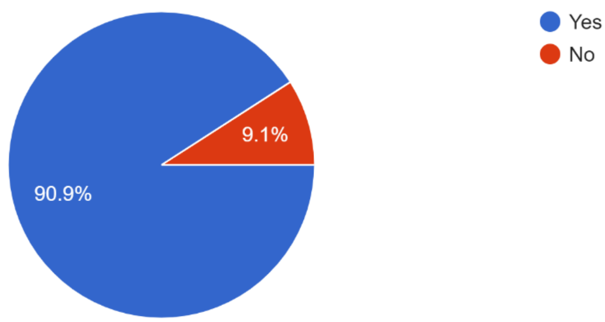
Should flood continue to be included in the Hazard Mitigation Plan:

32 responses



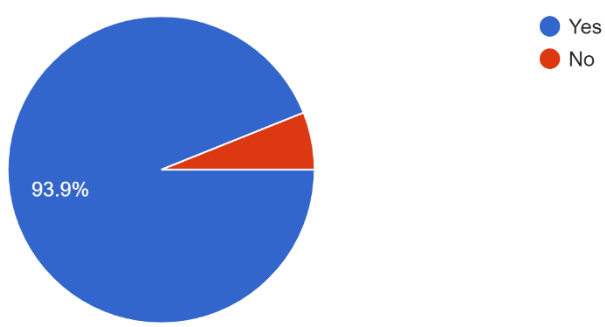
Should landslide continue to be included in the Hazard Mitigation Plan:

33 responses



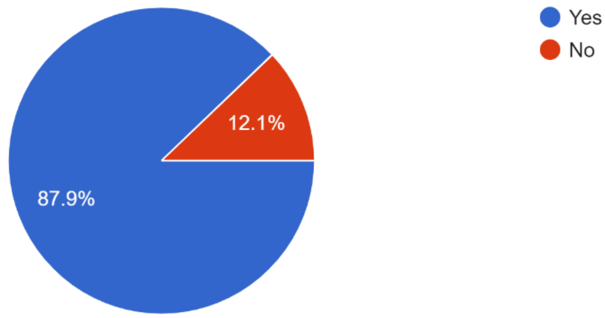
Should severe weather (high winds, lightning, thunderstorms) continue to be included in the Hazard Mitigation Plan:

33 responses



Should volcano continue to be included in the Hazard Mitigation Plan:

33 responses



Should wildfire continue to be included in the Hazard Mitigation Plan:

33 responses

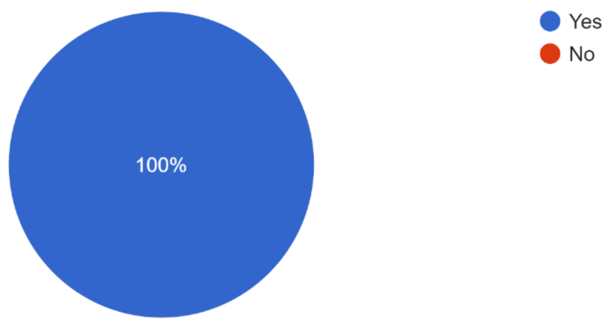
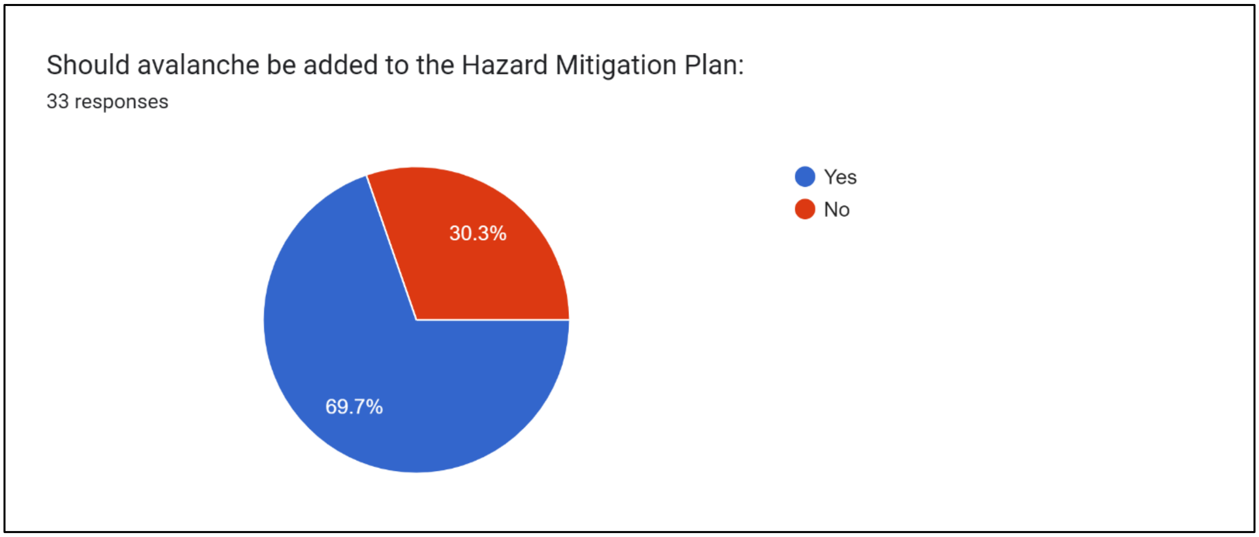


EXHIBIT C


Should avalanche be added to the Hazard Mitigation Plan:
33 responses
Yes
No
30.3%
69.7%

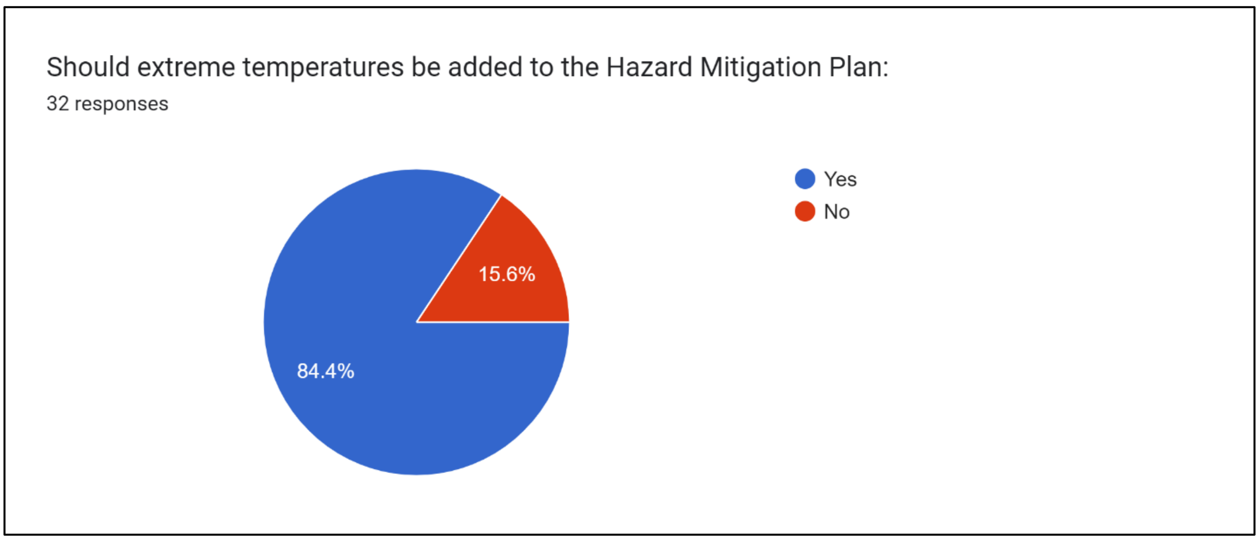
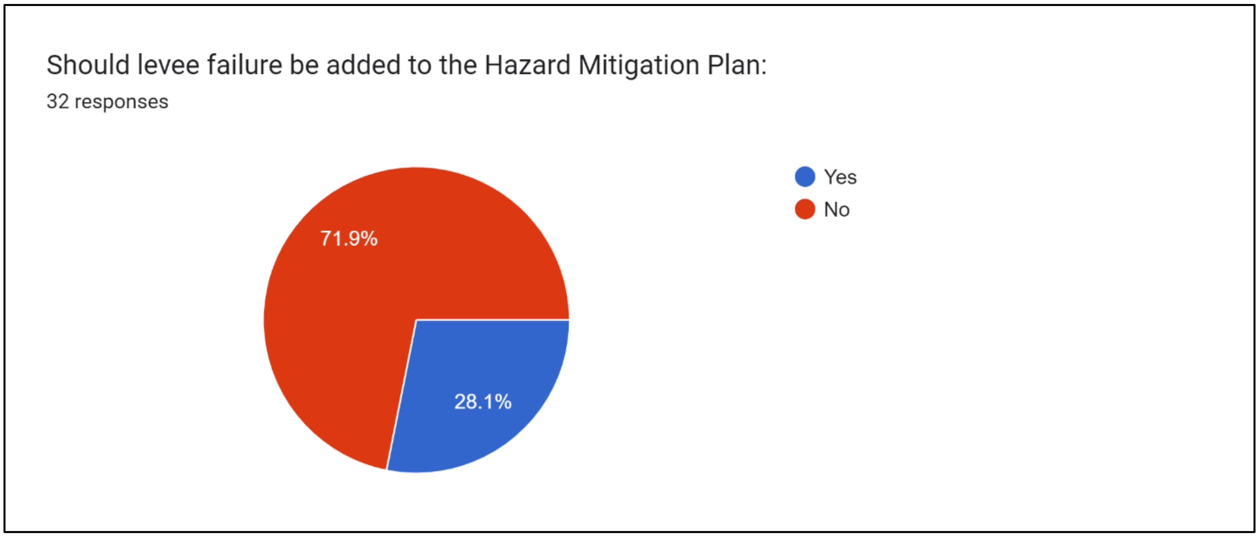

Should extreme temperatures be added to the Hazard Mitigation Plan:
32 responses
Yes
No
15.6%
84.4%

EXHIBIT C


Should levee failure be added to the Hazard Mitigation Plan:
32 responses
71.9%
28.1%
Yes
No

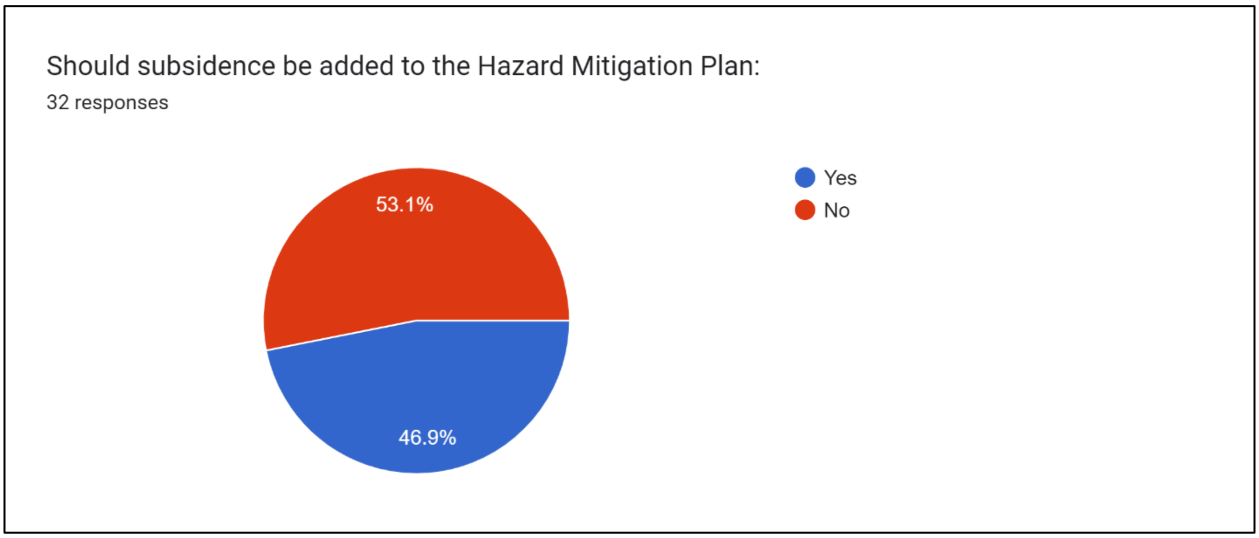
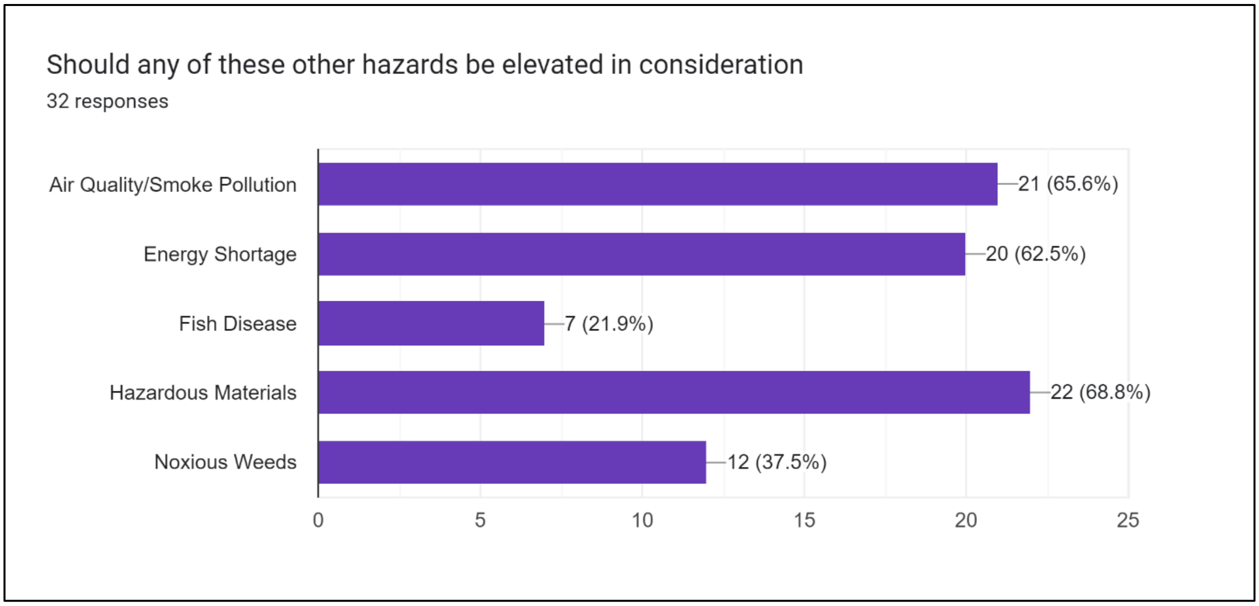

Should subsidence be added to the Hazard Mitigation Plan:
32 responses
53.1%
46.9%
Yes
No

EXHIBIT C



Do you have any specific concerns about any of these hazards?

- No
- None
- Tulelake has major subsidence occurring in the community currently that has caused several buildings to collapse. Extreme temperatures are getting more frequent, and Dunsmuir is often one of the hottest places in the County due to the lower elevation.
- Avalanches - the president's day avalanche was a near-record breaking event that fortunately occurred at a time when most people were not recreating on the mountain. However, it serves as a reminder that the Avalanche gulch path continues to be a highly active avalanche area and remains the most popular approach to the mountain for climbers, snowshoers, and backcountry skiers. Second, the presence and long-term consequences of illegal pesticides, illegal dumping, improper wastewater management, and other HAZMAT concerns should be included on future Hazard Mitigation Plans.
- McConnell has a HMGP grant under review at FEMA for Mt. Shasta and Dunsmuir area. Important to have a current LHMP to keep that funding in place. $10 million for wildfire mitigation. Important to list stages and mitigation actions for high hazards (example: wildfire) including pre, during, and post event mitigation actions since all can be funded through the Stafford Act.
- Smoke has become quite problematic and far more likely. Citizens need a means to aid them in securing fresh, safe air especially if smoke is forecasted for an extended period of time.
- Wildfires
- I have concerns around evacuation planning, protecting vulnerable populations during hazardous events, protecting critical infrastructure, implementing backup infrastructure in case of emergency, ensuring adequate communication resources for emergency response workers, building resiliency against climate change. ensuring adequate supply of emergency resources.
- No. Most jurisdictions have already easily identified their hazards.
- General concerns about most of them
- Fires that are started in illegal cannabis grows

EXHIBIT C

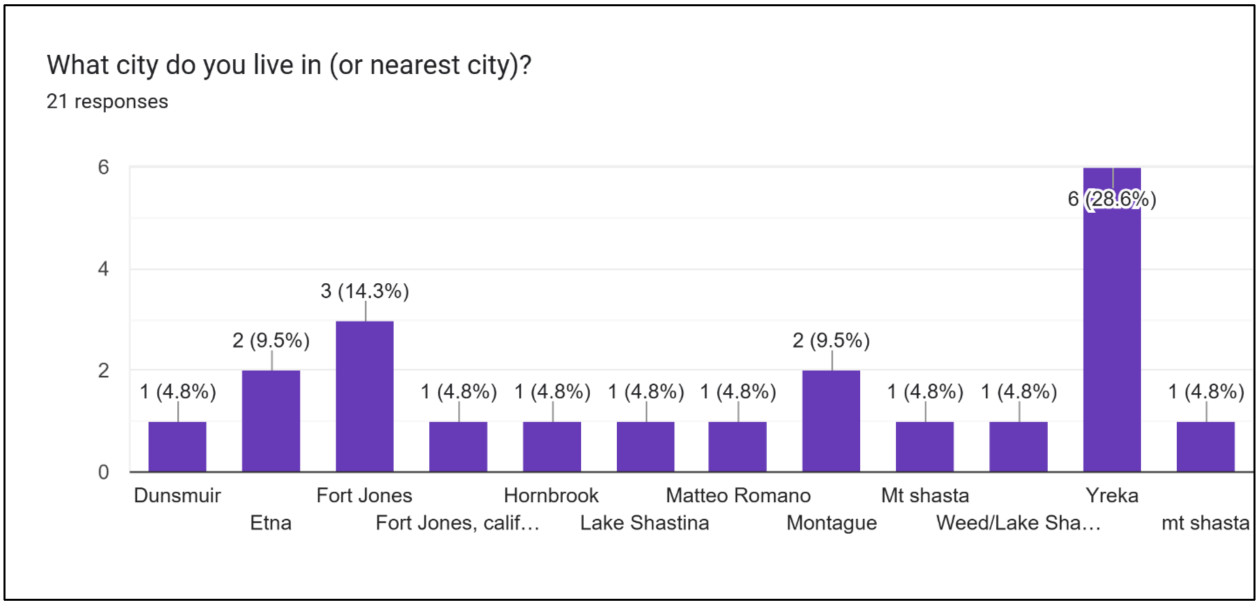
- Not enough power because of the dam removal. Not enough water to fight fires because of dam removal and the toxic smoke from the fires.
- Wildfire and no water because of dam removal
- Fire in our community.
- Knowing where to take hazardous waste or materials
- Wildfire
- Lack of water since the dams were removed
- wildfire is a priority due to the past and probably future issues with drought and water availability. Earthquake mitigation should be considered due to the numerous bridges that tie our communities together for access and exits. Storm severity is always an ongoing issue and education of citizens is relevant. imho.
- I am concerned about the use of fertilizers and pesticides, etc. for the cultivation of marijuana. I am also concerned about the lack of proper sewage (poop and pee) disposal at the marijuana grow sites and at the homeless sites. I am also concerned that our city workers are cleaning up sewage and needles at the homeless sites. Also, needles at our parks.
- no
- Of course I am concerned about wildfire…ongoing threat…

Is there anything else concerning hazard mitigation that you would like us to know?

- No
- Post-fire debris Flow is a major concern. Dunsmuir applied for a grant to conduct a risk assessment specifically designed to address the risk of slope failure if the area burned.
- Cascading or cumulative impacts. FEMA likes to compartmentalize hazards and mitigation actions to a single event with quantifiable impacts to life and structures but some of the hazards can be cumulative. The severe drought prior to 2023 is an example of this. Forest densification due to a century of fire suppression coupled with severe drought caused high tree mortality, drying of dense vegetation, a longer fire season and more intense fire behavior. The initial drought might not have a large quantifiable impact to life and property, but the cascading / downstream hazards do: Dead / drying fuels cause wildfires that destroy structures and loss of life, wildfires cause post fire hazards and increased potential for area to reburn in subsequent high-severity wildfires, smoke pollution, debris flows, fish kills, water quality issues, loss of forest carbon, etc. A well planned forest restoration project can reduce future drought caused tree mortality and cascading impacts, including wildfire impacts.
- Reference Nature Based Solutions (NBS) and Traditional Ecological Knowledge (TEK). Referencing NBS and TEK can broaden the mitigation actions to potentially reduce multiple hazards and cascading impacts as well as provide co-benefits. NBS and TEK may broaden the solutions set to protect life, property and other values. The other values can be important to Tribal and rural communities in Siskiyou County where population and structure densities are limited and there are other values at risk in addition to life and property (habitat, recreation, etc.).
- Some hazards may be subsequent to the primary hazard. Wildfire impacts air quality / smoke pollution, reduction in water quality, and impacts to aquatic life (fish), and can trigger debris flow / landslides. It might be redundant to list subsequent hazards (for example air quality/smoke pollution) as a separate, or primary hazard, if included under a primary hazard (wildfire).
- Climate Change

- We need to be able to show we are mitigating against wildfire, especially during a time where most of the County homeowners are being non-renewed and unable to obtain home insurance due to increased wildfire.
- not at this time
- I'm not sure what the purpose of this survey is. It seems that most of the communities in the County have identified the hazards that threaten them.
- Siskiyou County is very unique. Capacity is low, there are many disadvantaged communities, socio-economic status is low, education is low. It is important to take these factors into consideration when speaking with and working with this community. This survey does not address any of the needs, resources, education level, or preparedness of the community. These are essential factors when creating a LHMP that can actually be applied. Please take more time to reconsider your questions so that you can thoroughly assess the community you are working with.
- Fish decline is causing an emergency for Tribal members
- Cigarettes being thrown on roadsides by nationals invading our area
- Information on this effort has been very poorly shared. I go to meetings that should be talking about this and they have, but now all of a sudden this has become active. Do better.
- Anything that is a hazard because of the dam removals.
- Power cuts
- Answers depends on where you live.
- Not that I'm aware of!
- It's difficult to just answer yes or no. Some items are of critical importance right now and others "just in case."
- Yes, the cost of homeowners insurance… and the lack of it's availability…
- Mitigate the issue with Klamath River water quality due to dam takedown and silt issues. IE. inability of river community fire response to draft out of the river due to sedimentation.
- Ground water contamination from fire debris should be planned for and addressed.
- I hope that the people living on the Klamath River have the resources available to them if their wells dry up or become contaminated.
- The answers I replied "no" to, do not affect me, HOWEVER…I don't know all areas of the county, and if this is a Hansard for some, then YES it should be included.

Survey Two



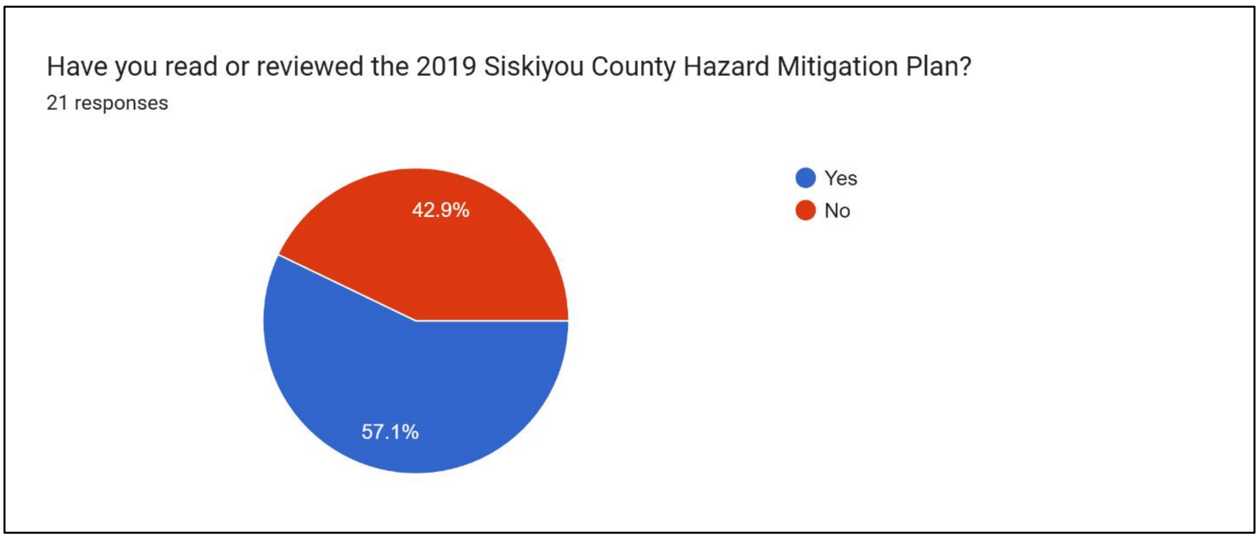
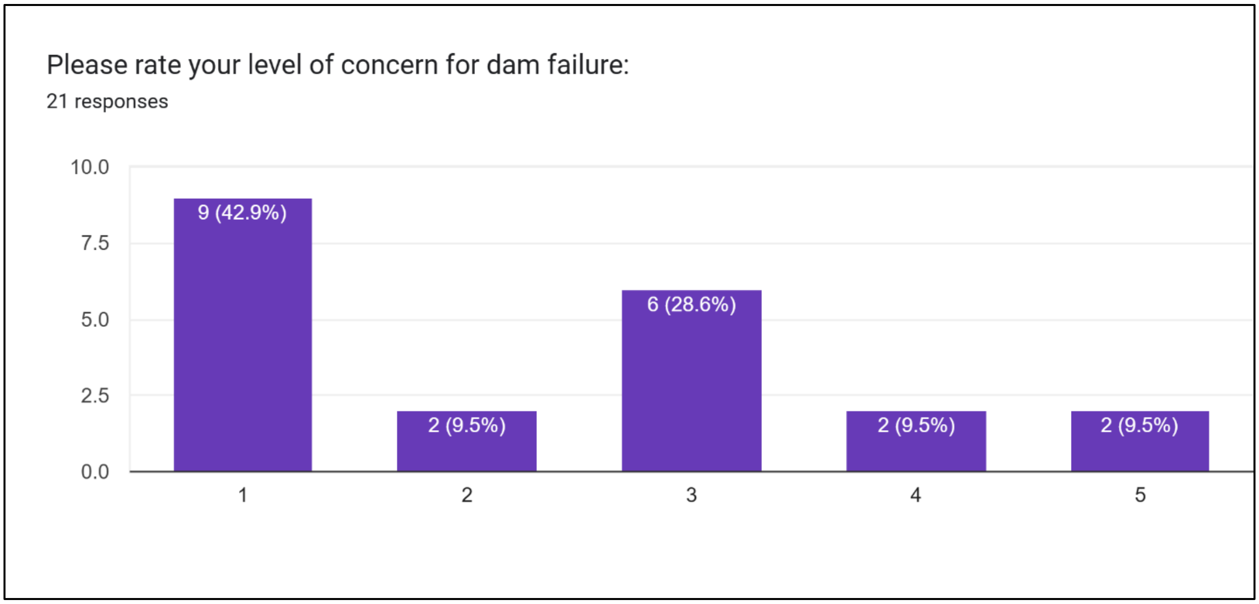


EXHIBIT C


Please rate your level of concern for dam failure:
21 responses
10.0
7.5
5.0
2.5
0.0
9 (42.9%)
2 (9.5%)
6 (28.6%)
2 (9.5%)
2 (9.5%)
1
2
3
4
5

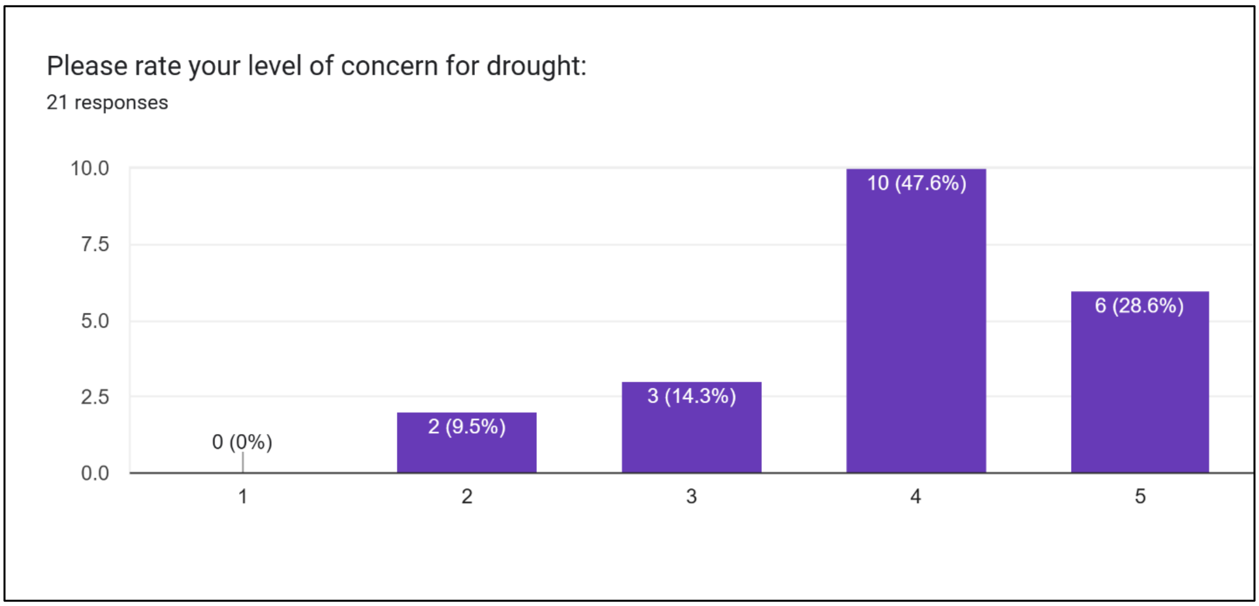
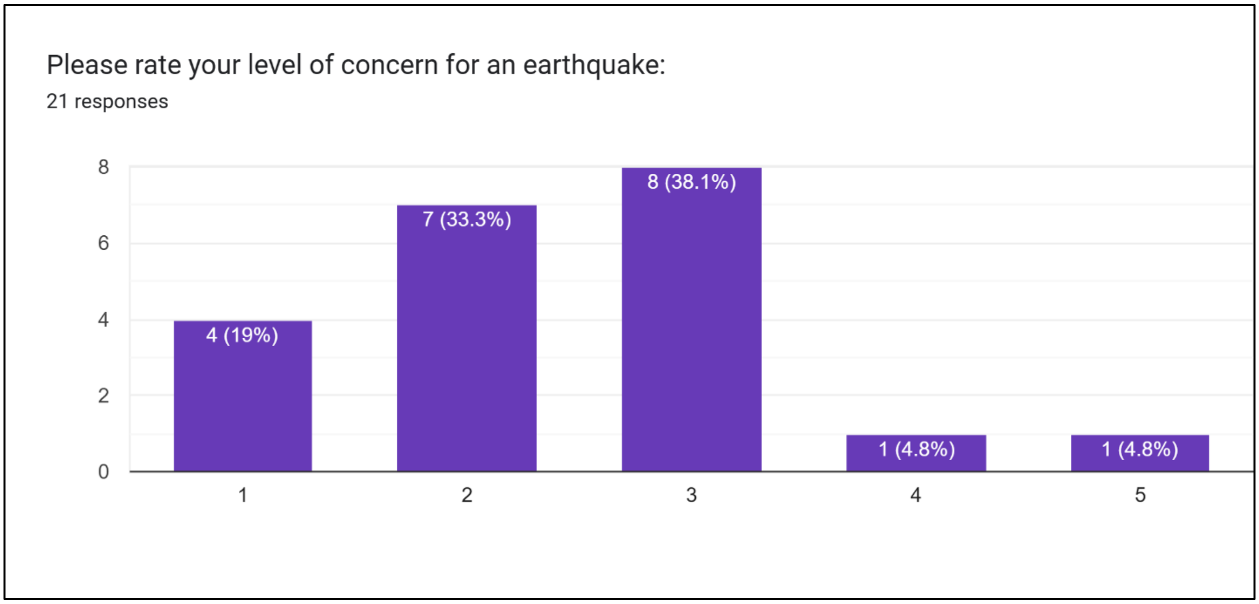
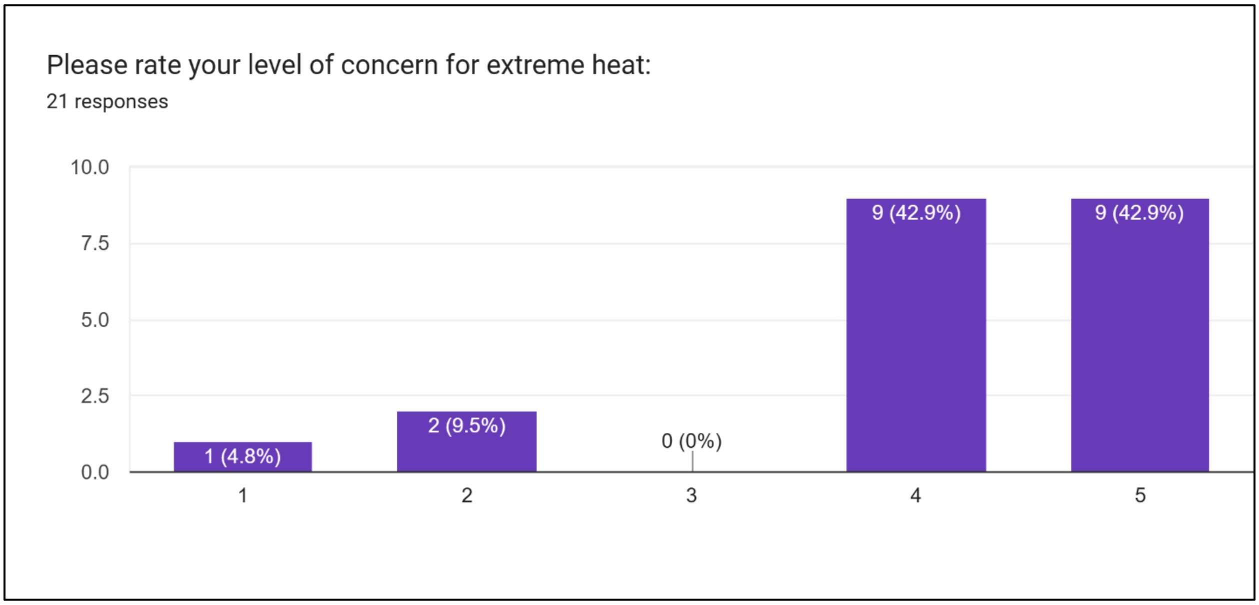

Please rate your level of concern for drought:
21 responses
10.0
7.5
5.0
2.5
0.0
0 (0%)
2 (9.5%)
3 (14.3%)
10 (47.6%)
6 (28.6%)
1
2
3
4
5

EXHIBIT C

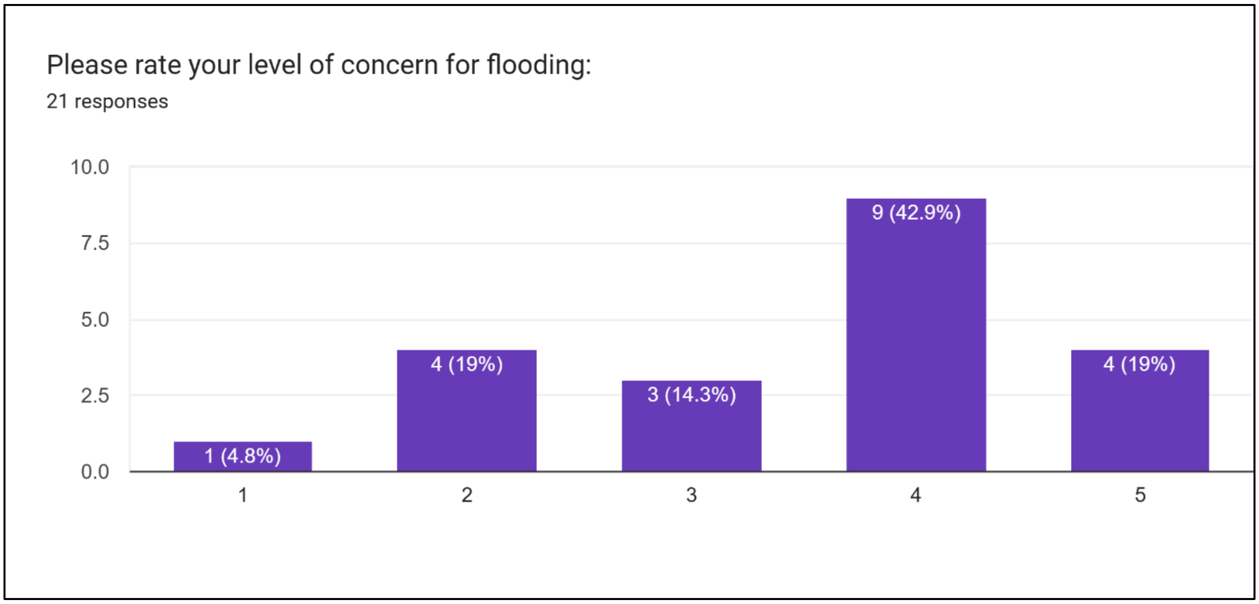


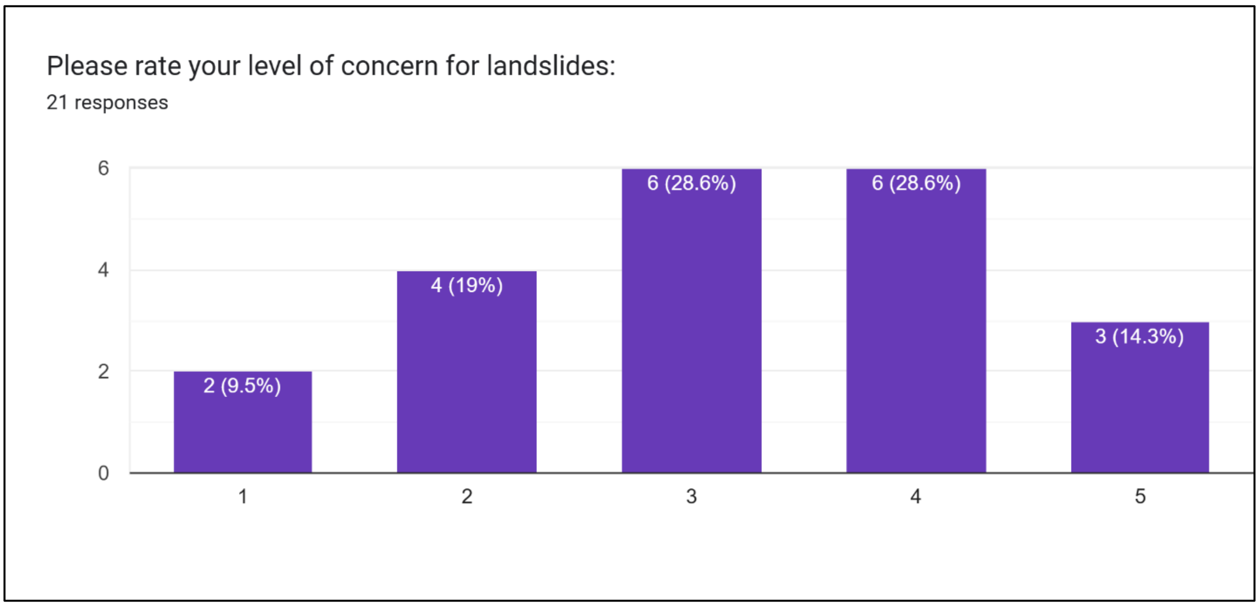
Please rate your level of concern for an earthquake:
21 responses
8
6
4
2
0
4 (19%)
7 (33.3%)
8 (38.1%)
1 (4.8%)
1 (4.8%)
1
2
3
4
5

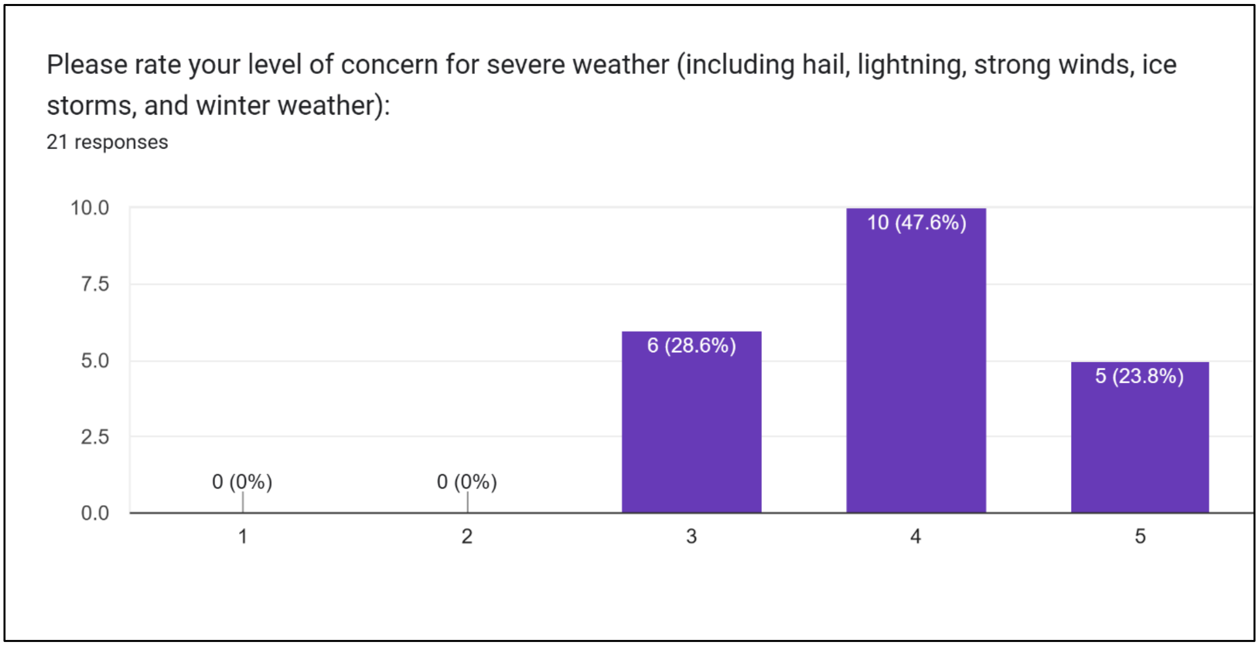


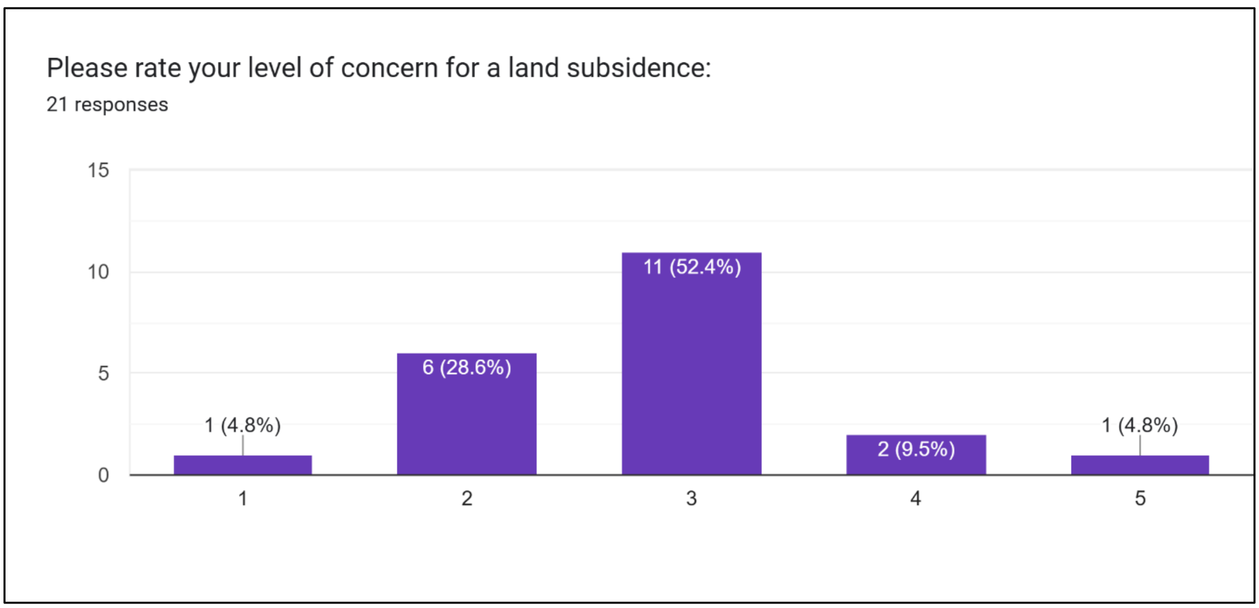
Please rate your level of concern for extreme heat:
21 responses
10.0
7.5
5.0
2.5
0.0
1 (4.8%)
2 (9.5%)
0 (0%)
9 (42.9%)
9 (42.9%)
1
2
3
4
5

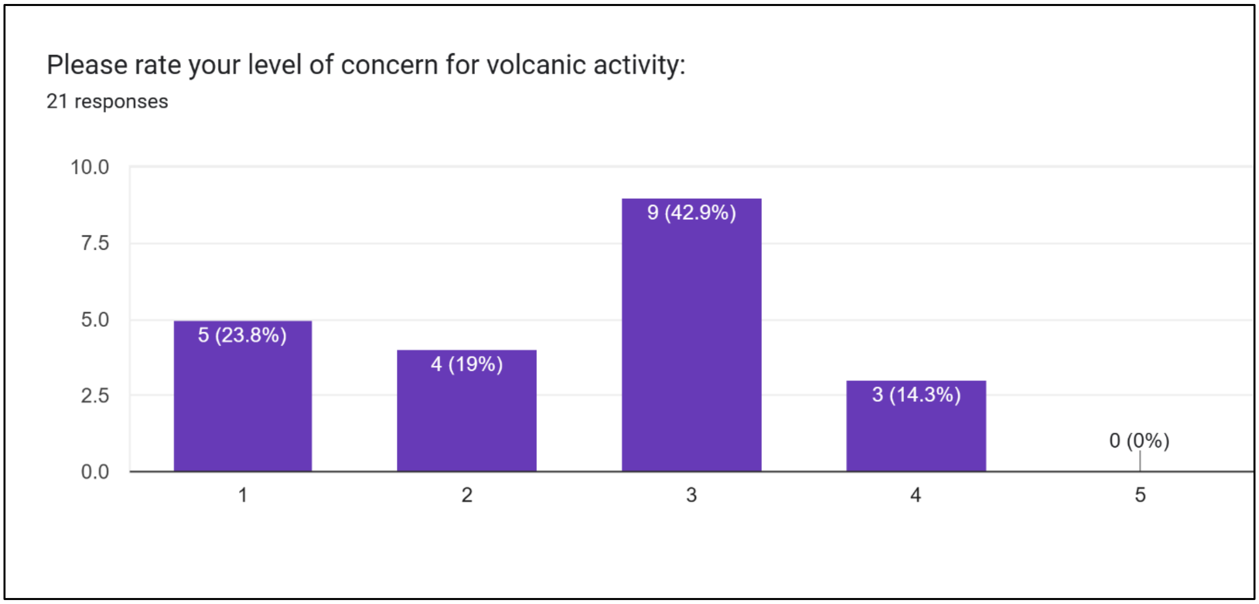
EXHIBIT C

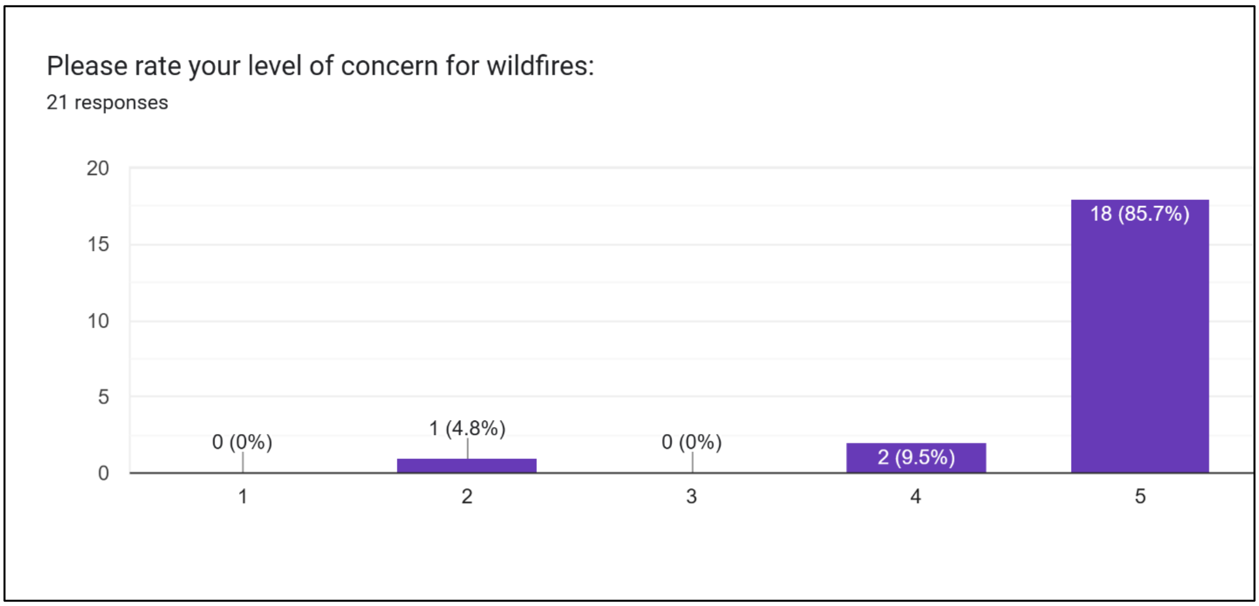

Please rate your level of concern for flooding:
21 responses
10.0
7.5
5.0
2.5
0.0
1 (4.8%)
4 (19%)
3 (14.3%)
9 (42.9%)
4 (19%)
1
2
3
4
5


Please rate your level of concern for landslides:
21 responses
6
4
2
0
2 (9.5%)
4 (19%)
6 (28.6%)
6 (28.6%)
3 (14.3%)
1
2
3
4
5


Please rate your level of concern for severe weather (including hail, lightning, strong winds, ice storms, and winter weather):
21 responses
10.0
7.5
5.0
2.5
0.0
0 (0%)
0 (0%)
6 (28.6%)
10 (47.6%)
5 (23.8%)
1
2
3
4
5


Please rate your level of concern for a land subsidence:
21 responses
15
10
5
0
1 (4.8%)
6 (28.6%)
11 (52.4%)
2 (9.5%)
1 (4.8%)
1
2
3
4
5





Do you have any specific concerns about any of these hazards?

- No
- NA
- Lightening fires
- Fire hardening
- Winter storms, extreme heat
- All greatly affect us at different times of the year
- Community protection from wildfires
- Need more public awareness
- County is not investing enough into proper wildfire mitigation practices. Places like JH ranch getting all of Cal Fire state resources to do project burns when opportunities are available for locals

EXHIBIT C

to receive equitable opportunity to have assistance on their property. I understand those are state resources, however the county could invest in similar ventures
- Evacuation notifications.
- Wildfire mitigation in our neighborhood is poor on unoccupied lots
- PCT hikers using fire in the Siskiyou county wilderness during drought years. Not enough logging or forest thinning around towns. Not enough education on how easily a fire can start to tourists who visit here.
- What dams are left to fail?
- Our lack of law enforcement in the valley

What hazard mitigation projects would you like to see completed for your community (examples include strengthening infrastructure, flood control measures, public education, etc.)?

- Fire Prevention and preparedness education
- strengthening infrastructure
- Public outreach
- siren system
- flood control, property or land clean up and clearing
- Strengthen infrastructure and public education
- Community organizations
- Wildfire mitigation defensible space education and outreach
- Flood control measures
- Wildfire: defensible space and home hardening.
- Fuels reduction to protect communities.
- Evacuation sirens for those without internet and smart phones.
- Dead material and burned/dead trees removed from empty lots, Shastina property
- More logging, thinning projects surrounding towns/valleys. More education abroad to those who hike in our forests during fire season.
- improving routes out of town, which would be jammed if there were an emergency evacuation
- Strengthen local law enforcement

Is there anything else concerning hazard mitigation that you would like us to know?

- no
- No
- grant funding availability
- AB2140
- Thank You for caring for this community.
- I believe that a hazardous materials spill should be considered. Cantara Loop spill 1991. A truck with fuel along Hwy 97 gong into the river. There are untold vast amounts of material going up and down I-5 that we should be contemplating a worse case scenario.
- Crime within the county with respect to homeless population increasing by 112% in 4 years.
- Too much environmental control.

Appendix C – Critical Facility Details

Table C1: Dunsmuir Critical Facility Information

Site Description	Address	Occupied As	Stories	Year Built	Sq Feet	Const Desc	Fire ISO Code	EQ Zone	Flood Zone	Total Values (2024)
FIREHOUSE AND OFFICES	5902-04 DUNSMUIR AVENUE	SHERIFF'S OFFICE/FIRE STATION/CITY COUNCIL CHAMBERS	3	1926	10,262	MASONRY CONST/WOOD ROOF	2	H	X	$3,120,678
FIREHOUSE	5902 DUNSMUIR AVENUE	FIRE STATION	1	1921	1,913	MASONRY CONST/WOOD ROOF	2	H	X	$352,693
CITY HALL	5915 DUNSMUIR AVENUE	CITY HALL	1	1926	3,519	MASONRY CONST/WOOD ROOF	2	H	X	$870,235
GRANDSTAND & LIGHTS AT BALLPARK	4835 DUNSMUIR AVENUE	GRANDSTAND	1	1952	1,635	ALL COMB (WOOD FRAME)	1	H	X	$275,725
LIGHTING AT BALLPARK	4835 DUNSMUIR AVENUE	LIGHTING AT BALLPARK			0	MIXED NON-COMB/COMB		H	X	$97,079
COMMUNITY CENTER	4835 DUNSMUIR AVENUE	RECREATION CENTER	1	1940	3,383	MASONRY CONST/WOOD ROOF	2	H	X	$697,214
LIBRARY	5714 DUNSMUIR AVENUE	LIBRARY - HIGH END	1	1923	4,037	MASONRY CONST/WOOD ROOF	2	H	X	$960,851
AIRPORT HANGAR/OFFICE	1000 MOTT AIRPORT ROAD	AIRCRAFT HANGAR	1	1962	3,500	ALL STEEL	3	H	X	$318,135
AIRPORT HANGAR B	MOTT ROAD	AIRCRAFT HANGAR	1	1993	1,386	ALL COMB (WOOD FRAME)	1	H	X	$100,080
AIRPORT HANGER C	6100 MOTT AIRPORT ROAD	AIRCRAFT HANGAR	1	1993	1,400	ALL COMB (WOOD FRAME)	1	H	X	$100,082
AIRPORT HANGER D	6100 MOTT AIRPORT ROAD	AIRCRAFT HANGAR	1	1993	1,400	ALL COMB (WOOD FRAME)	1	H	X	$100,082
AIRPORT HANGER E	6100 MOTT AIRPORT ROAD	AIRCRAFT HANGAR	1	1993	1,400	ALL COMB (WOOD FRAME)	1	H	X	$100,082
AIRPORT HANGER F	6100 MOTT AIRPORT ROAD	AIRCRAFT HANGAR	1	1993	1,400	ALL COMB (WOOD FRAME)	1	H	X	$100,082
AIRPORT HANGER G	6100 MOTT AIRPORT ROAD	AIRCRAFT HANGAR	1	1993	1,400	ALL COMB (WOOD FRAME)	1	H	X	$100,082
AIRPORT HANGER H	6100 MOTT AIRPORT ROAD	AIRCRAFT HANGAR	1	1993	1,400	ALL COMB (WOOD FRAME)	1	H	X	$100,082
SEWER PLANT OPERATIONS BUILDING	1100 SOUTH 1ST STREET	WASTE - CONTROL/ADMINISTRATI ON BUILDING	1	1971	874	ALL COMB (WOOD FRAME)	1	H	X	$353,461
SEWER PLANT OXIDATION DITCH	1100 SOUTH 1ST STREET	WASTE - OXIDATION DITCH	1	1976	12,610	FIRE RESISTIVE	6	H	X	$2,466,533
SEWER PLANT PARSHALL FLUME	1100 SOUTH 1ST STREET	WASTE - PARSHALL FLUME	1	1976	147	FIRE RESISTIVE	6	H	X	$109,887

EXHIBIT C

Table C1: Dunsmuir Critical Facility Information

Site Description	Address	Occupied As	Stories	Year Built	Sq Feet	Const Desc	Fire ISO Code	EQ Zone	Flood Zone	Total Values (2024)
SEWER PLANT CHEMICAL FEED	1100 SOUTH 1ST STREET	WASTE - SO2 MIXER	1	2012	70	FIRE RESISTIVE	3	H	X	$72,946
SEWER PLANT GENERATOR	1100 SOUTH 1ST STREET	SEWER PLANT GENERATOR		2015	0	NON COMB STEEL FRAME		H	X	$124,602
VEHICLE CANOPY	1100 SOUTH 1ST STREET	VEHICLE CANOPY	1	1980	432	ALL COMB (WOOD FRAME)		H	X	$15,013
SEWER PLANT AEROBIC DIGESTER	1100 SOUTH 1ST STREET	SEWER PLANT AEROBIC DIGESTER	1	1976	707	FIRE RESISTIVE		H	X	$258,308
SEWER PLANT - BLOWER BUILDING	1100 SOUTH 1ST STREET	SEWER PLANT - BLOWER BUILDING	1	2014	1,920	ALL COMB (WOOD FRAME)		H	X	$161,171
SEWER PLANT - SPLITTER BOX	1100 SOUTH 1ST STREET	SEWER PLANT - SPLITTER BOX	1	1976	46	FIRE RESISTIVE		H	X	$39,346
SEWER PLANT - EFFLUENT PUMP STATION	1100 SOUTH 1ST STREET	SEWER PLANT - EFFLUENT PUMP STATION	1	1976	105	FIRE RESISTIVE		H	X	$100,693
SEWER PLANT - SHOP/RAS BUILDING	1100 SOUTH 1ST STREET	SEWER PLANT - SHOP/RAS BUILDING	1	2014	988	MASONRY CONST/NON-COMB ROOF		H	X	$478,318
SEWER PLANT - MIXED LIQUOR RETURN PUMP STATION	1100 SOUTH 1ST STREET	SEWER PLANT - MIXED LIQUOR RETURN PUMP STATION	1	2014	30	NON COMB STEEL FRAME		H	X	$33,790
SEWER PLANT - HEADWORKS/GRIT AERATION	1100 SOUTH 1ST STREET	SEWER PLANT - HEADWORKS/GRIT AERATION	1	1976	336	FIRE RESISTIVE		H	X	$290,431
SEWER PLANT - STROAGE SHED	1100 SOUTH 1ST STREET	SEWER PLANT - STROAGE SHED	1	1976	113	UNKNOWN		H	X	$4,563
SEWER PLANT - EQUIPMENT STORAGE SHED	1100 SOUTH 1ST STREET	SEWER PLANT - EQUIPMENT STORAGE SHED	1	1976	135	MIXED NON-COMB/COMB		H	AE	$5,586
SEWER PLANT SUB SURFACE DRAIN PUMP STATION	1100 SOUTH 1ST STREET	SEWER PLANT SUB SURFACE DRAIN PUMP STATION	1	1980	13	FIRE RESISTIVE		H	AE	$65,281
DUNSMUIR - THROUGHOUT	1100 SOUTH 1ST STREET	WASTE - SLUDGE PUMP	1	1994	110	ALL COMB (WOOD FRAME)	1	H	X	$118,771
PUMP ROOM	1100 SOUTH 1ST STREET	WASTE - PUMP STATION	1	1971	192	ALL COMB (WOOD FRAME)	1	H	X	$99,248

EXHIBIT C

Table C1: Dunsmuir Critical Facility Information

Site Description	Address	Occupied As	Stories	Year Built	Sq Feet	Const Desc	Fire ISO Code	EQ Zone	Flood Zone	Total Values (2024)
CLARIFIER	1100 SOUTH 1ST STREET	WASTE - CLARIFIER	1	1976	2,827	FIRE RESISTIVE		H	X	$1,025,424
SLUDGE LAGOON #1	1100 SOUTH 1ST STREET	WASTE - SLUDGE LAGOON	1	1976	3,508	FIRE RESISTIVE		H	X	$433,168
SLUDGE LAGOON #2	1100 SOUTH 1ST STREET	WASTE - SLUDGE LAGOON	1	1976	3,468	FIRE RESISTIVE		H	X	$433,168
SLUDGE DRYING BEDS	1100 SOUTH 1ST STREET	WASTE - DRYING BEDS	1	1994	1,950	FIRE RESISTIVE		H	X	$73,988
SAND FILTER	1100 SOUTH 1ST STREET	WASTE - SAND FILTER	1	1991	990	FIRE RESISTIVE		H	X	$563,687
DOG POUND	1100 SOUTH 1ST STREET	DOG POUND/STORAGE BLOCK	1	1976	547	MASONRY CONST/WOOD ROOF	2	H	AE	$54,453
PUMP HOUSE	ELIZABETH STREET	WASTE - LIFT STATION - STICK BUILT	1	1981	210	MASONRY CONST/NON-COMB ROOF	2	H	X	$282,603
I-5 PUMP STATION	UNDER 800-FT BRIDGE	WATER - PUMPING STATION	1	1965	247	ALL COMB (WOOD FRAME)	1	H	X	$393,686
WATER EQUIPMENT STORAGE SHOP	ISGRIGG	SHOP BUILDING	1	1971	1,050	ALL COMB (WOOD FRAME)	1	H	X	$118,782
PUMP STATION	SHASTA RETREAT	WATER - PUMPING STATION	1	1965	142	ALL COMB (WOOD FRAME)	1	H	X	$198,690
BENLAP FOUNTAIN	DUNSMUIR AVENUE	PARK SHELTER - OPEN	1	1991	576	ALL COMB (WOOD FRAME)	1	H	X	$63,925
PARK HOUSE	4837 DUNSMUIR AVENUE	RESIDENCE	1	1950	1,872	ALL COMB (WOOD FRAME)	1	H	X	$247,910
LOOKOUT POINT WATER PUMP STATION	4121 DUNSMUIR AVENUE	WATER - PUMPING STATION	1	1993	129	ALL COMB (WOOD FRAME)	1	H	X	$125,249
CENTRAL DUNSMUIR WATER TANK-400,000 GALLON	WATER TANK	WATER TANK - GROUND 400,000	1	1987	3,848	MASONRY CONST/WOOD ROOF	2	H	X	$1,295,183
NORTH WATER TANK-650,000 GALLON	WATER TANK	WATER TANK - GROUND 650,000	1	2006	3,117	ALL STEEL	3	H	X	$1,268,776
DUNSMUIR - THROUGHOUT	RIVER AVENUE	WASTE - LIFT STATION	1	2007	180	MASONRY CONST/NON-COMB ROOF	2	H	X	$198,293

EXHIBIT C

Table C1: Dunsmuir Critical Facility Information

Site Description	Address	Occupied As	Stories	Year Built	Sq Feet	Const Desc	Fire ISO Code	EQ Zone	Flood Zone	Total Values (2024)
CHILDRENS PARK	SPRUCE STREET	PLAYGROUND EQUIPMENT		2008	0	NON COMB STEEL FRAME				$31,902
SPRING BOTTLING PLANT	4121 N. DUNSMUIR AVE	-	2	1991	19,800	ALL STEEL		H	X	$2,316,017
Dunsmuir Elementary School	4760 Siskiyou Ave.	-	-	-	-	-	-	-	-	-
Dunsmuir Community Pool and Community Pool Buildings	-	-	-	-	-	-	-	-	-	-
Pacific Power Substation	41.22064674724533, -122.27630027327909	-	-	-	-	-	-	-	-	-
Dunsmuir High School	5805 High School Way	-	-	-	-	-	-	-	-	-
Amtrak Station	5750 Sacramento Ave	-	-	-	-	-	-	-	-	-
Union Pacific Railyard	5750 Sacramento Ave	-	-	-	-	-	-	-	-	-
Dunsmuir-Castella Fire District Siren System	4 in Dunsmuir, North Water Tank, Ball Park, Firehouse, Cemetery	-	-	-	-	-	-	-	-	-
USPS	5530 Dunsmuir Ave	-	-	-	-	-	-	-	-	
Dunsmuir Supermarket	5529 Dunsmuir Ave	-	-	-	-	-	-	-	-	$844,804
Siskiyou Arts Museum	5824 Dunsmuir Ave	-	-	-	-	-	-	-	-	$270,401
Dunsmuir Resource Center & Community Garden	5844 Dunsmuir Ave.	-	-	-	-	-	-	-	-	$211,261

Source: City of Dunsmuir

EXHIBIT C

Table C2: Dorris Critical Facility Information

BID	DBA	Building Description	Square Footage	Total Value
25538	S. PORTLAND AVE	BASKETBALL/TENNIS COURTS	N/A	$27,987.00
25548	SINGLE FAMILY RESIDENCE	COMMERCIAL BUILDING	800	$74,538.00
25545	COMMERCIAL BUILDING	COMMERCIAL BUILDING	900	$90,073.00
25534	CONCESSION STAND	CONCESSION STAND/RESTROOM @ LITTLE LEAGUE PARK	900	$182,486.00
25544	CITY HALL	DORRIS MUNICIPAL TOWN HALL BUILDING	4,800	$1,568,365.00
25531	City of Dorris	FIRE STATION	5,102	$949,811.00
25547	FORECLOSURE HOME	FORECLOSURE HOME	1,000	$74,538.00
25535	LIBRARY	LIBRARY	3,300	$1,170,606.00
25537	LIFT STATION	LIFT STATION	28	$90,295.00
25539	PUMP HOUSE	LIFT STATION	160	$97,953.00
25532	PUBLIC WORKS GARAGE	PUBLIC WORKS GARAGE	660	$102,748.00
25541	PUMP HOUSE	PUMP HOUSE	195	$91,073.00
25543	PUMP HOUSE	PUMP HOUSE/WELL #6	342	$183,521.00
25549	Residential Home	Residential Home	N/A	$109,784.00
25533	SEWER PODS	SEWER PODS	N/A	$51,724.00
25542	PUMP HOUSE	VALVE HOUSE	100	$4,635.00
25546	DORRIS - THROUGHOUT	WATER TANK - AST 1,000,000	N/A	$1,200,000.00
25536	DORRIS - THROUGHOUT	WATER TANK-770,000 GALLON	N/A	$1,529,832.00
25540	YOUTH CLUB HOUSE	YOUTH CLUB HOUSE	1,200	$139,332.00

Source: City of Dorris

Appendix D – Jurisdictional Mitigation Actions

To support the mitigation goals identified in this LHMP, Siskiyou County and all participating jurisdictions identified a comprehensive range mitigation projects and activities. The selected set of hazard mitigation actions carefully takes a holistic approach to mitigation while simultaneously addressing each of the plan's profiled hazards. The list of mitigation actions is based upon the potential to reduce risk to life and property with an emphasis on ease of implementation, community and agency support, consistency with local jurisdictions' plans and capabilities, available funding, and jurisdictional vulnerability. To ensure that all hazard that could potentially impact a participating jurisdiction have been assigned a mitigation action, the following table provides a cross check of action and identified hazards:

Table D1: Jurisdictional Mitigation Action Cross Check

Jurisdiction	All Hazards	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Landslide	Severe Weather	Subsidence	Volcano	Wildfire
Siskiyou County	1-12	1-12, 13, 14	1-12, 15, 16	1-12, 17, 18,19	1-12, 20, 21	1-12, 22-30	1-12, 31, 32	1-12, 33, 34, 35	1-12, 36, 37	1-12, 38, 39	1-12, 40-44
Dorris	-	N/A	1	2, 3, 4	1	1, 3, 4, 5, 6	1, 3, 4	3, 4	N/A	3	1, 3, 7
Dunsmuir	1-13	1-13, 14	1-13	1-13	1-13, 15, 16	1-13, 14, 17, 18, 19, 26	1-13, 26	1-13, 14	1-13	1-13	1-13, 14, 20-27
Etna	1-5	N/A	1-5, 6, 7	1-5	1-5	1-5, 6, 8, 9, 10, 11	1-5	1-5	1-5	1-5	1-5, 6, 7, 11, 13, 14
Fort Jones	1, 2, 3	N/A	1, 2, 3, 9	1, 2, 3	1, 2, 3, 9	1, 2, 3, 4, ,5 ,6	1, 2, ,3	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, ,3, 7, 8, 9
Happy Camp CSD	-	N/A	1	2	3	4, 5	6, 7	8	9	10	11, 12, 13
Lake Shastina CSD	1-3	1-3, 4	1-3, 5	1-3, 6	1-3, 7	1-3, 8, 9	1-3, 10	1-3, 11	1-3, 12	1-3, 13	1-3, 14, 15, 16
McCloud CSD	1-4	1-4, 5	1-4, 6	1-4, 7	1-4, 8	1-4, 9, 10	1-4, 11	1-4, 13	1-4, 13	1-4, 14	1-4, 15, 16, 17
Montague	-	1, 2	3, 4	5, 6, 7	8, 9	10-15	16, 17	18, 19	20	21, 22	23, 24, 25
Mt. Shasta	1-41	1-41	1-41	1-41	1-41	1-41	1-41	1-41	1-41	1-41	1-41
Tulelake	1-6	N/A	1-6, 7, 8	1-6, 9-13	1-6, 10	1-6, 9	N/A	1-6, 9-13	1-6, 9-12	1-6	1-6, 10-13
Weed	1-3	N/A	1-3	1-3	1-3	1-3, 4-7	1-3	1-3	1-3	1-3	1-3, 8, 9
Yreka	1-8	1-8	1-8	1-8	1-8	1-8, 9	1-8	1-8	1-8	1-8	1-8, 10

Note: N/A indicates jurisdiction is not susceptible to identified hazard

The following tables identify mitigation action items for each participating jurisdictions along with the following information:

- Hazard addressed
- Responsible party
- Overall priority
- Goal(s) addressed
- Estimated cost
- Potential funding source
- Proposed completion timeframe
- Current status

EXHIBIT C

Table D2: Siskiyou County Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Siskiyou County-1	Leverage public outreach partnering capabilities to inform and educate the public about hazard mitigation and preparedness.	All	SCOES Director	High	2	Staff time	General fund	Continuous	On-going
Siskiyou County-2	Coordinate all mitigation planning and project efforts, including grant application support, to maximize all resources available to the planning partnership.	All	SCOES Director	High	2, 4, 5	Staff time	General fund	Continuous	On-going
Siskiyou County-3	Support the collection of improved data (hydrologic, geologic, topographic, volcanic, historical, etc.) to better assess risks and vulnerabilities.	All	SCOES Director	High	1, 4, 5	Staff time	General fund	Continuous	On-going
Siskiyou County-4	Provide coordination and technical assistance in grant application preparation that includes assistance in cost vs. benefit analysis for grant-eligible projects.	All	SCOES Director	High	3, 4, 5	Staff time	General fund	Continuous	On-going
Siskiyou County-5	Continue to maintain a countywide hazard mitigation plan website to house the plan and plan updates, in order to provide the public an opportunity to monitor plan implementation and progress. Each planning partner may support the initiative by including an initiative in its action plan and creating a web link to the website.	All	SCOES Director	High	2, , 4, 5	Staff time	General fund	Continuous	On-going

EXHIBIT C

Table D2: Siskiyou County Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Siskiyou County-6	Where appropriate, support retrofitting, purchase, or relocation of structures or infrastructure located in hazard-prone areas to protect structures/infrastructure from future damage, with repetitive loss and severe repetitive loss properties as priority when applicable.	All	SCOES Director	High	1, 3	Project dependent	FMA, HNGP, BRIC, General fund	5-10 years	Carried over, lack of funding
Siskiyou County-7	Relocate county-owned critical facilities out of identified high hazard risk zones.	All	SCOES Director	High	1, 3	Project dependent	FMA, HNGP, BRIC,, General fund	5-10 years	Carried over, lack of funding
Siskiyou County-8	Retrofit, rehabilitate or replace vulnerable road and bridge facilities and infrastructure throughout Siskiyou County.	All	Public Works Director	High	1, 3	Project dependent	HMGP, BRIC, General fund	5-10 years	Carried over, lack of funding
Siskiyou County-9	Seek land acquisition opportunities for open space use and preservation in areas of high vulnerability due to multiple risk exposure.	All	SCOES Director	High	1, 3	Project dependent	HMGP, BRIC, General fund	5-10 years	Carried over, lack of funding
Siskiyou County-10	Develop and maintain a county public alert and warning plan.	All	SCOES Director	High	1, 2	Staff time	General Fund	Five years	Carried over, lack of staff
Siskiyou County-11	Integrate, where appropriate, elements from the Siskiyou County Hazard Mitigation Plan into other planning mechanisms.	All	SCOES Director	High	4	Staff time	General Fund	Continuous	On-going
Siskiyou County-12	Create and maintain a Siskiyou County disaster database to better understand disaster related trends and impacts.	All	SCOES Director, Public Works Director	High	1, 3, 4	Staff time	General Fund	1-3 years	Carried over, lack of staff

EXHIBIT C

Table D2: Siskiyou County Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Siskiyou County-13	Install evacuation route and high ground signage in any high hazard dam potential inundation areas.	Dam Failure	SCOES Director	Medium	1, 2	$5,000 per location	HMGP, HHPD, General fund	Five years	New
Siskiyou County-14	Map all infrastructure and facilities within dam inundation areas.	Dam Failure	SCOES Director	Medium	1, 2, 3	$10,000 per location	HMGP, HHPD, General fund	Five years	New
Siskiyou County-15	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Siskiyou County Facilities Director	Low	1, 3, 6	$5,000 - $50,000 per location	HMGP, General fund	Five years	New
Siskiyou County-16	Conduct agricultural education program on water reduction methods.	Drought	SCOES Director	High	1, 2, 3, 6	Staff Time	General fund	Five years	New
Siskiyou County-17	Developing an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s homes and masonry buildings.	Earthquake	SCOES Director, Facilities director	High	1, 3,	Staff time	General fund	Three to five years	New
Siskiyou County-18	Educate homeowners about structural and non-structural retrofitting of vulnerable homes and encouraging retrofit.	Earthquake	SCOES Director	High	2	Staff time	General fund	Three to five years	New
Siskiyou County-19	Support financial incentives, such as low interest loans or tax breaks, for home and business owners who seismically retrofit their structures.	Earthquake	SCOES Director	High	1, 2, 3	Staff time	General fund	Three to five years	New
Siskiyou County-20	Modernization of HVAC systems in jurisdictional facilities.	Extreme Heat	Siskiyou County Facilities Director	Low	1, 3, 6	$25,000 per facility	HMGP, BRIC, General fund	-	New

EXHIBIT C

Table D2: Siskiyou County Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Siskiyou County-21	Identify and prepare county buildings for usage as heat shelters.	Extreme Heat	SCOES Director, Siskiyou County Facilities Director	Low	1, 3, 6	$2,000 per facility	General fund	-	New
Siskiyou County-22	Support the retrofitting, purchase, or demolition of repetitive loss and severe repetitive loss properties.	Flood	SCOES Director		1, 3, 6	Project dependent	FMA, HMGP, General fund	5-10 years	Carried over, lack of funding
Siskiyou County-23	Conduct a flood insurance awareness program.	Flood	NFIP Administrator	High	2	Staff Time	General fund	Five years	New
Siskiyou County-24	Retrofit, rehabilitate, or replace vulnerable water system, storm water, and sewer facilities and infrastructure throughout the District.	Flood	McCloud Community Services Director	High	1, 3, 6	Project dependent	FMA, HMGP, General fund	5-10 years	Carried over, lack of funding
Siskiyou County-25	Design and construct drainage improvements along Panther Creek through the McCloud to address repetitive damage from flooding on the adjacent roads and property.	Flood	Public Works Director	High	1, 3, 6	Project dependent	General Fund, HMGP,	5-10 years	Carried over, lack of funding
Siskiyou County-26	Replace undersized culverts at County maintained roads (particularly those in the Klamath and Scott River watersheds).	Flood	Public Works Director	High	1, 3, 6	Project dependent	FMA, HMGP, General fund	5-10 years	Carried over, lack of funding
Siskiyou County-27	Continue to maintain compliance with the National Flood Insurance Program.	Flood	NFIP Coordinator	High	3	Staff Time	General fund	Continuous	On-going
Siskiyou County-28	Update the Siskiyou County Drainage Manual (1974) incorporating the last 37 years of data, statistics and improvements	Flood	McCloud Public Works Director	Medium	1, 3	$7,000	General Fund	5-10 years	Carried over, lack of funding

EXHIBIT C

Table D2: Siskiyou County Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	in the field of hydrology to better estimate expected flood flows.								
Siskiyou County-29	Participate in the Community Rating System (CRS) program.	Flood	Planning Department Director	Medium	3	Staff Time	General Fund	1-3 years	Carried over, lack of staff
Siskiyou County-30	Construct rainwater retention/detention ponds at strategic locations.	Flood	NFIP Administrator, Public Works Director	Medium	1, 3, 6	Project dependent	General Fund, FMA, HMGP	Ten years	New
Siskiyou County-31	Stabilize cliffs with terracing or plantings of grasses or other plants to hold soil together.	Landslide	Public Works Director	Low	1, 3	Location dependent	General Fund, HMGP	5-10 years	New
Siskiyou County-32	Notify property owners located in high-risk areas.	Landslide	SCOES Director	Low	1, 2, 3	Staff time	General Fund	1-3 years	New
Siskiyou County-33	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather	Siskiyou County Facilities Director	Medium	1, 3, 6	Project dependent	General Fund, HMGP, BRIC	Five years	New
Siskiyou County-34	Construct snow fences along major transportation routes.	Severe Weather	Public Works Director	Low	1, 3	Project dependent	General Fund, BRIC, HMGP	Ten years	New
Siskiyou County-35	Installing and maintaining surge protection on critical electronic equipment.	Severe Weather	Siskiyou County Facilities Director	Low	1, 3	$10,000 per location	General Fund, HMGP	Five years	New
Siskiyou County-36	Use GIS to map areas that are susceptible to subsidence.	Subsidence	SCOES Director	Low	1, 2, 3, 4	Staff time	General fund	Five years	New
Siskiyou County-37	Promote community awareness of subsidence risks and impacts.	Subsidence	SCOES Director	Low	2	Staff time	General fund	Five years	New
Siskiyou County-38	Develop an inventory of all buildings that in potential volcanic flow areas.	Volcanic Activity	SCOES Director	Low	2	Staff time	General fund	Five years	New
Siskiyou County-39	Develop an outreach program about volcanic activity risk and	Volcanic Activity	SCOES Director	Low	2	Staff time	General fund	Five years	New

EXHIBIT C

Table D2: Siskiyou County Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	mitigation activities in homes, schools, and businesses.								
Siskiyou County-40	Increase public training on wildland-urban interface fire prevention.	Wildfire	SCOES Director	High	2	Staff time	General fund	Three to five years	Not started, lack of funding
Siskiyou County-41	In areas of the County with urban/wildland fire interface exposure, continue to promote access for ingress and egress as part of a defensible space initiative.	Wildfire	Fire Safe Council Director	High	1, 2, 3, 4	Staff time	General Fund, HMGP Post Fire	Continuous	On-going
Siskiyou County-42	Promote landscape approach to fuel reduction as part of defensible space initiative in areas with high wildfire exposure.	Wildfire	Fire Safe Council Director	High	1, 2, 3, 4	Staff time	General fund	Continuous	On-going
Siskiyou County-43	Support defensible space for wildfire through projects that create perimeters around homes, structures, and critical facilities through the removal or reduction of flammable vegetation.	Wildfire	SCOES Director, Fire Chiefs	High	1, 2, 3, 4	Staff time	General fund	Continuous	On-going
Siskiyou County-44	Support hazardous fuels reduction projects that remove vegetative fuels proximate to at-risk structures that, if ignited, pose significant threat to human life, property, and critical facilities.	Wildfire	SCOES Director, Fire Chiefs	High	1, 2, 3, 4	Staff time	General fund	Continuous	On-going
-	Collect improved data (hydrologic, geologic, topographic, volcanic, historic.) to assess risks and vulnerabilities.	-	-	-	-	-	-	-	Deleted, duplicative

EXHIBIT C

Table D2: Siskiyou County Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
-	Create a County Hazard Identification and Vulnerability Analysis utilizing enhanced technologies.	-	-	-	-	-	-	-	Deleted, duplicative
-	Develop departmental continuity of operations plans and a continuity of government plan.	-	-	-	-	-	-	-	Deleted, not mitigation
-	Develop District continuity of operations plan and continuity of government plan.	-	-	-	-	-	-	-	Deleted, not mitigation

EXHIBIT C

Table D3: Dorris Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Dorris-1	Development an initial implementation of vegetative management programs	Drought, Flood, Landslide, Wildfire	City Manager	High	1, 3	Staff time and project dependent	CDBG, HMGP, BRIC, General funds	5-10 years	Carried over, lack of funding
Dorris-2	Undertake earthquake study for all critical infrastructure	Earthquake	Planning Department Director, City Manager	Low	1, 3	$15,000	FEMA mitigation grant, General fund	Continuous	Carried over, lack of funding
Dorris-3	Structural and non-structural retrofitting of existing facilities (elevation, floodproofing, storm doors, tie-downs, etc.) for wildfire, seismic, wind or flood hazards (including designs and feasibility studies when included as part of the construction project)	Earthquake, Flood, Landslide, Severe Weather, Wildfire	Fire Chief	High	1, 3	Project dependent	HMGP, BRIC, General fund	5-10 years	Carried over, lack of funding
Dorris-4	Minor structural hazard control or protection projects that may include stormwater management (e.g., culverts, floodgates, retention basins), or landslide stabilization	Earthquake, Flood, Landslide, Severe Weather	Public Works Director, City Manager	High	1, 3	Project dependent	Fire department budget	Continuous	Carried over, lack of funding
Dorris-5	Consider participation in the National Flood Insurance Program (NFIP)	Flood	City Manager	Medium	2, 3	Staff time	General fund	1- 3 years	Carried over, lack of staff
Dorris -6	Enhance/improve City code language and	Wildfire	City Manager	High	1, 2, 3, 5	Staff time	USDA, HMGP,	1-3 years	Carried over, lack of staff

EXHIBIT C

Table D3: Dorris Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	enforcement, including City Building and Fire Codes, to increase compliance with SB 1369 (Defensible Space) and other fire safe requirements in the City, and integrate mitigation plan into the Safety Element of the City's General Plan						BRIC, General fund		
-	Continue to participate not only in general mutual-aid agreements, but also in agreements with adjoining jurisdictions for cooperative response to all hazards and disasters	-	-	-	-	-	-	-	Deleted, not mitigation
-	The Fire Department to conduct a mass care and shelter drill, which involves city and county employees, non-government agencies and the public	-	-	-	-	-	-	-	Deleted, not mitigation

EXHIBIT C

Table D4: Dunsmuir Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Dunsmuir-1	Develop new Safety and Environmental Justice Elements for the General Plan, including an evacuation plan, climate action, and adaptation planning elements.	All	City Manager, Resilience Specialist, Siskiyou County Sheriff, Siskiyou Climate Collaborative Director	High	All	Staff Time	General Fund	1 year	Revised
Dunsmuir-2	Develop educational materials to support active hazard mitigation projects, including hosting meetings, creating campaigns, and identifying community champions to spread the word about mitigation projects and increase participation.	All	City Manager, Resilience Specialist, Fire Safe Council Coordinator, McConnell Foundation Coordinator, Shasta Valley RCD Coordinator	High	2,5	Staff Time	General Fund	Project Dependent, Ongoing	Revised
Dunsmuir-3	Upgrading the city's audible emergency warning system (currently at end of life) to provide better coverage across the community and allow for audible messages and virtual activation.	All	City Manager, Resilience Specialist, Dunsmuir-Castella Fire Chief	High	1,2,3	$1,000,000	HMGP, BRIC, General Fund	1- 3 years	Revised
Dunsmuir-4	Develop a Climate Action Implementation Guide with a robust prioritization tool for hazard mitigation and climate adaptation	All	City Manager, Resilience Specialist	High	4,5	$150,000	HMGP, BRIC, EPA Grants, Other federal programs,	1- 3 years	Revised

EXHIBIT C

Table D4: Dunsmuir Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	actions that incorporate the best available hazard assessment and cost-benefit data.						General Fund		
Dunsmuir-5	Develop Post-Disaster Municipal Code and Building Code waivers that can be quickly implemented if and when a disaster occurs to make it easier for people to rebuild after a Disaster.	All	City Manager, Resilience Specialist, Deputy City Clerk, Building Official	High	3,4	Staff Time	General Fund	1-3 years	NEW
Dunsmuir-6	Develop Post-Disaster pre-approved Building Plans to fast-track rebuilding efforts if and when a disaster occurs	All	City Manager, Resilience Specialist, Building Official	High	3,4	Staff Time	General Fund	1-3 years	NEW
Dunsmuir-7	Become a National Weather Service StormReady Community	All	City Manager, Resilience Specialist	Low	2,4	Staff Time	General Fund	1 year	NEW
Dunsmuir-8	Relocate, retrofit, and/or mitigate the risk to existing critical facilities to protect them against identified hazards.	All	City Manager, Resilience Specialist, Public Works Director, Finance Director	High	1,3,4,5,6	Varies	HMGP, BRIC, USFS Grants, Infrastruct. Grants, General fund	1 - 10 years	Revised
Dunsmuir -9	Implement redundancy in all communication systems and critical infrastructure, including through the provision of emergency backup power.	All	City Manager, Resilience Specialist, Public Works Director	High	1,3,4	Varies	HMGP, BRIC, CalFire Grants, General Fund	5 - 10 years	Revised

EXHIBIT C

Table D4: Dunsmuir Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Dunsmuir-10	Establish a local Hazard Mitigation Fund to provide grant matches for large-scale hazard mitigation projects.	All	City Manager, Resilience Specialist, Finance Director	Med	4,5,6	Staff Time	General Fund, Tax Measure	3-5 years	NEW
Dunsmuir-11	Develop a Post-Disaster Damage Assessment and Debris Management Annex to add to the Emergency Operations Plan	All	City Manager, Resilience Specialist, Public Works	Med	1,3,4	Staff Time	General Fund	1-3 years	NEW
Dunsmuir-12	Establish a Community-Based Small Grant Program to Promote Mitigation Work and Community Resilience	All	City Manager, Resilience Specialist	Med	1,2,3	$50,000/year	General Fund	1-3 years	NEW
Dunsmuir-13	Build and maintain a GIS Database of local hazards and critical infrastructure layers	All	City Manager, Resilience Specialist	Low	4,5,6	$2,500/year and Staff Time	General Fund	1-3 years	NEW
Dunsmuir-14	Where feasible and appropriate underground existing utilities and require that new utility infrastructure be located underground.	Dam Failure, Flood, Severe Weather, Wildfire	City Manager, Resilience Specialist, Public Works Director, Pacific Power Regional Manager	Med	1,3	>$1,850,000/ mile	HMGP, BRIC, General Fund, Pacific Power Grants	1- 10 years	Revised
Dunsmuir-15	Upgrade the Community Center with Air Conditioning so that it can function as a Cooling Center as needed.	Extreme Heat	City Manager, Resilience Specialist, Public Works Director, Recreation and	High	1,2	$50,000	Hometown Grant Program, General Fund	1-3 years	NEW

EXHIBIT C

Table D4: Dunsmuir Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
			Parks District Director						
Dunsmuir-16	Develop a Cooling Center Activation Plan with partners and increase cooling center hours to ensure coverage from Noon-6 PM during the hottest time of day	Extreme Heat	City Manager, Resilience Specialist, Dunsmuir Library Manager, Dunsmuir Resource Center Director	High	1,2	Staff Time - $50,000/year	General Fund, Small Grant Programs	1 year	NEW
Dunsmuir-17	Maintain compliance and good standing in the National Flood Insurance Program (NFIP).	Flood	City Manager, Resilience Specialist	High	1,2,3	Staff Time	General Fund	Ongoing Mitigation Program	Revised
Dunsmuir-18	Become the First Siskiyou County Community in the Community Rating System (CRS) program.	Flood	City Manager, Resilience Specialist	Medium	1,2,3	Staff Time	General Fund	1 year	Revised
Dunsmuir-19	Install a River Gauge and Develop flood level triggers for increased warnings for flood-related evacuations and other emergency protection measures.	Flood	City Manager, Resilience Specialist, Public Works Director	Med	1,2	$150,000	General Fund, USGS, CalSIP Grant	1-3 years	NEW
Dunsmuir-20	Reduce fuel loads and harden homes in highest fire severity zones within and adjacent to the city through pursuit of grant funding, interagency coordination, and collaboration with	Wildfire	City Manager, Resilience Specialist, Public Works Director, Fire Safe Council Coordinator	High	All	500,000+/year	HMGP, BRIC, CWDG, CalFire Grants, General Fund	1- 3 years	On-going

EXHIBIT C

Table D4: Dunsmuir Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	property owners, volunteer groups and non-profit organizations (e.g., fire safe councils and resource conservation districts).								
Dunsmuir-21	Maintain Community Firewise designation through Wildfire public outreach events and the facilitation and support of communitywide fuels reduction efforts like community Wildfire Mitigation Days, free Green Waste Days and enforcement of vegetation ordinance.	Wildfire	City Manager, Resilience Specialist, Fire Safe Council Coordinator	High	1,2,3,5,6	$25,000/year	General Fund	Yearly Ongoing Mitigation Programming	Revised
Dunsmuir-22	Develop a maintenance and monitoring program for Wildfire treatments	Wildfire	City Manager, Resilience Specialist, Dunsmuir-Castella Fire Chief	Low	4,5,6	Staff Time	General Fund	1-3 years	NEW
Dunsmuir-23	Create a Biomass Feasibility Study to identify the best Biomass Facility	Wildfire	City Manager, Resilience Specialist, Finance Director	High	4,5,6	$200,000	HMGP, BRIC, USFS Grants, General Fund	1-3 years	NEW
Dunsmuir-24	Build a Biomass Facility to accelerate Dunsmuir's Wildfire Mitigation Work	Wildfire	City Manager, Resilience Specialist, Siskiyou Climate	High	4,5,6	$5,000,000 - $20,000,000	HMGP, BRIC, USFS Grants, Infrastruct	5-10 years	NEW

EXHIBIT C

Table D4: Dunsmuir Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
			Collaborative Director				Grants, CalFire Grants, Public-Private Partnerships		
Dunsmuir-25	Update and maintain the Dunsmuir CWPP to ensure a coordinated Wildfire Mitigation approach	Wildfire	City Manager, Resilience Specialist, Fire Safe Council Coordinator	High	4,5,6	Staff Time - $100,000	CWDG Grant, General Fund	1-2 years, must be updated by the end of 2026 to maintain CWDG Grant eligibility	NEW
Dunsmuir-26	Develop Pre-Event Post-Fire Debris Flow Modeling and Risk Assessment	Wildfire, Landslide, Flood	City Manager, Resilience Specialist	Med	1,2,3,5	$150,000	HMGP, BRIC, General Fund	1-3 years	NEW
Dunsmuir-27	Become a Board of Forestry Fire Risk Reduction Community List member through additional Wildfire mitigation measures.	Wildfire	City Manager, Resilience Specialist	Med	3,5,6	Staff Time	General Fund	1-3 years	NEW
Deleted	Encourage, support, and maintain ongoing coordination with the California Department of Transportation, highway contractor, emergency response agencies, and public whenever construction will occur on Interstate 5 that has the potential to significantly delay	All	City Manager				General fund	On-going	Cancelled – Not a Mitigation Action

EXHIBIT C

Table D4: Dunsmuir Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	emergency response efforts and/or impact evacuation.								
Deleted	Continue to improve upon the city's assessment of its hazard vulnerabilities, including through detailed assessments of risks to critical structures and infrastructure, to better inform and prioritize actions needed to safeguard the community.	All	City Manager				FEMA grant, General fund	5 - 10 years	Cancelled, too vague
Deleted	Stockpile crucial supplies and replacement parts that may be difficult to obtain during emergency conditions, such as sewer and water line, snowmelt, sandbags, face masks, batteries, fuel filters, air filters, sand, etc.	All	City Manager				General fund	1 - 3 years	Cancelled – Not a Mitigation Action
Deleted	Establish a dam failure early warning alert for the city's audible emergency warning system, along with signs alerting the public to the hazard and directing them to higher ground when and where appropriate.	Dam Failure	City Manager				General fund	5 - 10 years	Cancelled

EXHIBIT C

Table D4: Dunsmuir Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Deleted	Support County-wide initiatives identified in Volume 1 of this Plan.	-	-	-	-	-	-	-	Delete, no longer applicable
Deleted	Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1.	-	-	-	-	-	-	-	Delete, no longer applicable

EXHIBIT C

Table D5: Etna Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Etna-1	Integrate risk assessment information from Siskiyou County Hazard Mitigation Plan into available City planning documents	All	City Manager	Medium	2, 5	$10,000	General fund	1- 3 years	Carried over, lack of funding
Etna -2	Integrate the Hazard Mitigation Plan into the Safety Element of the General Plan.	All	City Manager	Medium	5, 5	$10,000	General fund	1- 3 years	Carried over, waiting on update
Etna -3	Update Etna Municipal code language and enforcement re: Building and Fire Codes	All	City Manager	High	1, 3, 5, 6	$5,000	General fund	1- 3 years	Carried over, lack of funding
Etna -4	Develop educational materials re: disaster planning, natural hazard risk, etc.; work with local schools, civic/social entities, Chamber of Commerce, Family Resource Center to educate community in hazard mitigation/disaster preparedness	All	City Manager	Medium	2	$5,000	General fund, Public/ private partnership	1- 3 years	Carried over, lack of funding
Etna -5	Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority	All	City Manager	High	1, 3, 6	Per location cost	HMGP, BRIC, General fund	5 - 10 years	Carried over, lack of funding

EXHIBIT C

Table D5: Etna Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Etna -6	Complete or update mutual aid agreements with adjoining entities (City of Fort Jones, Scott Valley Fire Dist., CDF)	Drought, Flood, Wildfire	City Manager	Medium	4	Staff time	General fund	1- 3 years	
Etna -7	Add a third reservoir (300,000 gallons) at the water plant for fire protection/drought management	Drought, Wildfire	City Manager	High	1, 3, 6	$300,000	USDA Rural, HMGP, BRIC, DWR/State prop grant	1- 3 years	Carried over, lack of funding
Etna -8	Feasibility study for complete upgrade of stormwater drain system	Flood	City Manager	High	1, 3, 6	$35,000	HMGP, BRIC, General fund	1-3 years	Carried over, lack of funding
Etna -9	Update/construct/retrofit storm drain system in ensure maximum efficiency	Flood	City Manager	High	1, 3, 6	$500,000	Rural USDA, DWR, HNGP, BRIC, General fund	1-3 years	Carried over, lack of funding
Etna -10	Continue to maintain compliance and good standing in the National Flood Insurance Program (NFIP)	Flood	City Manager	High	1, 2	Staff time	General fund	Continuous	On-going
Etna -11	Retrofit sewer mains in floodplain area and extend water main for fire hydrant	Flood, Wildfire	City Manager	High	1, 3, 6	$100,000	HMGP, BRIC, General fund	1-3 years	Carried over, lack of funding
Etna -12	Continue participation and improve class rating in ISO programs (Building Code Effectiveness Grading, Public Protection)	Flood, Wildfire	City Manager	High	1, 3, 6	Staff time	HMGP, BRIC, General fund	Continuous	

EXHIBIT C

Table D5: Etna Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Etna -13	Clear fuels to provide defensible open space: complete/maintain fuel break close to city boundaries; establish Etna Fire Safe Council	Wildfire	City Manager	High	1, 3, 6	$20,000	HMGP, BRIC, General fund	1- 3 years	Carried over, lack of funding
Etna -14	Require private property owners in city limits to maintain defensible space	Wildfire	City Manager	High	1, 2, 3, 6	Staff time	General fund	Continuous	
-	Support County-wide initiatives identified in Volume 1 of this Plan	-	-	-	-	-	-	-	Delete, no longer applicable
-	Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1	-	-	-	-	-	-	-	Delete, no longer applicable
-	Update Emergency Operations Plan	-	-	-	-	-	-	-	Delete, not mitigation

EXHIBIT C

Table D6: Fort Jones Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Fort Jones-1	Purchase and place into operation backup generators for critical operations, and to provide backups for the town's infrastructure.	All Hazards	Town Administrator	High	1,3,4	$200,000	HMGP, BRIC, General fund	1-5 Years	New
Fort Jones -2	Identify, secure, and develop primary/secondary evacuation routes	All Hazards	Town Administrator, Fire Chief, Police Chief	High	1,2	$20,000	FSC Grants, General fund	1-3 Years	New
Fort Jones -3	Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority.	All Hazards	Town Manager	High	1, 3, 6	Facility dependent	HMGP, BRIC, General fund	5–10 years	Carried over, lack of funding
Fort Jones -4	Increase channel capacity of Moffett Creek by removing utility line dams, vegetation and accumulated sediment.	Flood	Town Manager	Medium	1, 3	$260,000	HMGP, BRIC, General fund	1-3 years	Carried over, lack of funding
Fort Jones -5	Consider participation in the Community Rating System (CRS) program.	Flood	Town Manager	Medium	1, 2, 3	Staff time	General fund	1- 3 years	Carried over, lack of staff
Fort Jones -6	Continue to maintain compliance and good standing in the National Flood Insurance Program.	Flood	Town Manager	Medium	1, 2, 3	Staff time	General fund	Continuous	Carried over, lack of staff
Fort Jones -7	Clear 100 feet of defensible space for 30 vulnerable homes.	Wildfire	Town Manager	High	1, 3	$75,000	HMGP, BRIC, General fund	1-3 years	Carried over, lack of funding

EXHIBIT C

Table D6: Fort Jones Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Fort Jones -8	Provide 150 acres of shaded fuel break, restore emergency fire road.	Wildfire	Town Manager	High	1, 3	$225,000	HMGP, BRIC, General fund	1-3 years	Carried over, lack of funding
Fort Jones -9	Water supply. Identify and develop site for secondary well. Add additional water holding tank on the north end of town.	Wildfire, Drought, Extreme Heat	Town Administrator, Public works, Fire Chief	High	1,3,6	$750,000	HMGP, BRIC, Local budgets	1-5 Years	New
-	Support County-wide initiatives identified in Volume 1 of this Plan.	-	-	-	-	-	-	-	Delete
-	Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1.	-	-	-	-	-	-	-	Delete

EXHIBIT C

Table D7: Happy Camp Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Happy Camp-1	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	President, Board of Directors	Low	1, 3, 6	$5,000 - $50,000 per location	HMGP, BRIC, General fund	Five years	New
Happy Camp-2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes and encouraging retrofit.	Earthquake	President, Board of Directors	High	2	Staff time	General fund	Three to five years	New
Happy Camp-3	Identify and prepare district buildings for usage as heat shelters.	Extreme Heat	President, Board of Directors	Low	1, 3, 6	$2,000 per facility	General fund	5-10 years	New
Happy Camp-4	Conduct a public information program on actions to take when flooding is expected.	Flood	President, Board of Directors	High	2	Staff Time	General fund	Five years	New
Happy Camp-5	Construct rainwater retention/detention ponds at strategic locations.	Flood	President, Board of Directors	Medium	1, 3, 6	Project dependent	General Fund, FMA, HMGP	Ten years	New
Happy Camp-6	Stabilize cliffs with terracing or plantings of grasses or other plants to hold soil together.	Landslide	President, Board of Directors	Low	1, 3	Project size dependent	General Fund	5-10 years	New
Happy Camp-7	Notify property owners located in high-risk areas.	Landslide	President, Board of Directors	Low	1, 2, 3	Staff time	General Fund	1-3 years	New
Happy Camp-8	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather	President, Board of Directors	Medium	1, 3, 6	Project dependent	General Fund, BRIC, HMGP	Five years	New
Happy Camp-9	Use GIS to map areas that are susceptible to subsidence.	Subsidence	President, Board of Directors	Low	1, 2, 3, 4	Staff time	General fund	Five years	New

EXHIBIT C

Table D7: Happy Camp Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Happy Camp-10	Develop an outreach program about volcanic activity risk and mitigation activities in homes, schools, and businesses.	Volcanic Activity	President, Board of Directors	Low	2	Staff time	General fund	Five years	New
Happy Camp-11	Increase public training on wildland-urban interface fire prevention.	Wildfire	President, Board of Directors	High	2	Staff time	General fund	Three to five years	New
Happy Camp-12	Promote landscape approach to fuel reduction as part of defensible space initiative in areas with high wildfire exposure.	Wildfire	President, Board of Directors	High	1, 2, 3, 4	Staff time	General fund	Continuous	New
Happy Camp-13	Support defensible space for wildfire through projects that create perimeters around homes, structures, and critical facilities through the removal or reduction of flammable vegetation.	Wildfire	President, Board of Directors	High	1, 2, 3, 4	Staff time	General fund	Continuous	New

EXHIBIT C

Table D8: Lake Shastina CSD Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Lake Shastina CSD-1	Add generators to all district water well to ensure continued provision of service.	All hazards	President, Board of Directors	High	1, 2, 3	$350,000	HMGP, BRIC, General fund	Five years	Carried over, lack of funding
Lake Shastina CSD-2	Construct an Emergency Operations Center for the district to ensure the continued provision of emergency services.	All hazards	President, Board of Directors	High	1, 2, 3	$1,000,000	HMGP, BRIC, General fund	Five years	Carried over, lack of funding
Lake Shastina CSD-3	Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage	All hazards	President, Board of Directors	High	1, 3	Project and location dependent	HMGP, BRIC, CDBG, General fund	Ten years	Carried over, lack of funding
Lake Shastina CSD-4	Map all infrastructure and facilities within dam inundation areas.	Dam Failure	President, Board of Directors	Medium	1, 2, 3	Staff time	HMGP, BRIC, General fund	Five years	New
Lake Shastina CSD-5	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	President, Board of Directors	Low	1, 3, 6	$5,000 - $50,000 per location	HMGP, BRIC, General fund	Five years	New
Lake Shastina CSD-6	Conduct seismic improvements to district fire and police facilities.	Earthquake	President, Board of Directors	High	1, 3,	$300,000	HMGP, BRIC, General fund	Three to five years	Carried over, lack of funding
Lake Shastina CSD-7	Identify and prepare district buildings for usage as heat shelters.	Extreme Heat	President, Board of Directors	Low	1, 3, 6	$2,000 per facility	General fund	5-10 years	New
Lake Shastina CSD-8	Conduct a public information program on actions to take when flooding is expected.	Flood	President, Board of Directors	High	2	Staff Time	General fund	Five years	New

EXHIBIT C

Table D8: Lake Shastina CSD Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Lake Shastina CSD-9	Construct rainwater retention/detention ponds at strategic locations.	Flood	President, Board of Directors	Medium	1, 3, 6	Project dependent	General Fund, FMA, HMGP	Ten years	New
Lake Shastina CSD-10	Notify property owners located in high-risk areas.	Landslide	President, Board of Directors	Low	1, 2, 3	Staff time	General Fund	1-3 years	New
Lake Shastina CSD-11	Install high wind, hail, and fire-resistant roofing on all district facilities.	Severe Weather	President, Board of Directors	Medium	1, 3, 6	Project dependent	General Fund, BRIC, HMGP	Five years	New
Lake Shastina CSD-12	Use GIS to map areas that are susceptible to subsidence.	Subsidence	President, Board of Directors	Low	1, 2, 3, 4	Staff time	General fund	Five years	New
Lake Shastina CSD-13	Develop an outreach program about volcanic activity risk and mitigation activities in homes, schools, and businesses.	Volcanic Activity	President, Board of Directors	Low	2	Staff time	General fund	Five years	New
Lake Shastina CSD-14	Upgrade district fire engine fleet to allow for a more comprehensive prevention and management of wildfires.	Wildfire	District Fire Chief	High	1, 3, 6	$550,000	General fund, HMGP Post Fire	Five years	Carried over, lack of funding
Lake Shastina CSD-15	Conduct fuel abatement projects throughout the district.	Wildfire	District Fire Chief	High	1, 3, 6	$30,000 per year	General fund	Continuous	On-going
Lake Shastina CSD-16	Protect Lake Shastina as a fire suppression resource	Wildfire	District Fire Chief	Medium	1, 3, 6	$5,000 per year	General fund, Homeowner funds	Continuous	On-going
-	Support County-wide initiatives identified in Volume 1 of this Plan	-	-	-	-	-	-	-	Delete, no longer applicable

EXHIBIT C

Table D8: Lake Shastina CSD Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
-	Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1	-	-	-	-	-	-	-	Delete, no longer applicable

EXHIBIT C

Table D9: McCloud CSD Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
McCloud CSD-1	Relocate District owned critical facilities out of identified high hazard risk zones.	All hazards	President, Board of Directors	High	1, 3, 6	Project dependent	HMGP, BRIC, General fund	Ten years	Carried over, lack of funding
McCloud CSD-2	Collect improved data (hydrologic, topographic, geologic, volcanic, historic, etc.) to assess risks and vulnerabilities.	All hazards	President, Board of Directors	High	1, 2, 3	$50,000	HMGP, BRIC, General fund	Five years	Carried over, lack of funding
McCloud CSD-3	Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage	All hazards	President, Board of Directors	High	1, 3	Project and location dependent	HMGP, BRIC, CDBG, General fund	Ten years	Carried over, lack of funding
McCloud CSD-4	Integrate goals, objectives, and initiatives of the Siskiyou County Hazard Mitigation Plan into existing district regulations and programs where appropriate.	All hazards	President, Board of Directors	Medium	1, 2, 3	Staff time	General fund	Five years	New
McCloud CSD-5	Map all infrastructure and facilities within dam inundation areas.	Dam Failure	President, Board of Directors	Medium	1, 2, 3	Staff time	General fund	Five years	New
McCloud CSD-6	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	President, Board of Directors	Low	1, 3, 6	$5,000 - $50,000 per location	HMGP, BRIC, General fund	Five years	New
McCloud CSD-7	Conduct seismic improvements to district fire and police facilities.	Earthquake	President, Board of Directors	High	1, 3,	$300,000	HMGP, BRIC, General fund	Three to five years	Carried over, lack of funding

EXHIBIT C

Table D9: McCloud CSD Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
McCloud CSD-8	Identify and prepare district buildings for usage as heat shelters.	Extreme Heat	President, Board of Directors	Low	1, 3, 6	$2,000 per facility	General fund	5-10 years	New
McCloud CSD-9	Retrofit, rehabilitate, or replace vulnerable water system, storm water, and sewer facilities and infrastructure throughout the District.	Flood	President, Board of Directors	High	2	Project dependent	General Fund, FMA, HMGP	Five years	New
McCloud CSD-10	Design and construct drainage improvements along Panther Creek through the District to address repetitive damage from flooding on the adjacent roads and property.	Flood	President, Board of Directors	High	1, 3, 6	$35,000	General Fund, FMA, HMGP	Ten years	New
McCloud CSD-11	Notify property owners located in high-risk areas.	Landslide	President, Board of Directors	Low	1, 2, 3	Staff time	General Fund	1-3 years	New
McCloud CSD-12	Install high wind, hail, and fire-resistant roofing on all district facilities.	Severe Weather	President, Board of Directors	Medium	1, 3, 6	Project dependent	General Fund, BRIC, HMGP	Five years	New
McCloud CSD-13	Use GIS to map areas that are susceptible to subsidence.	Subsidence	President, Board of Directors	Low	1, 2, 3, 4	Staff time	General fund	Five years	New
McCloud CSD-14	Develop an outreach program about volcanic activity risk and mitigation activities in homes, schools, and businesses.	Volcanic Activity	President, Board of Directors	Low	2	Staff time	General fund	Five years	New
McCloud CSD-15	Increase public training on wildland-urban interface fire prevention.	Wildfire	District Fire Chief	High	2	Staff time	General fund	Three to five years	New

EXHIBIT C

Table D9: McCloud CSD Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
McCloud CSD-16	Promote landscape approach to fuel reduction as part of defensible space initiative in areas with high wildfire exposure.	Wildfire	District Fire Chief	High	1, 2, 3, 4	Staff time	General fund	Continuous	New
McCloud CSD-17	Conduct fuel abatement projects throughout the district.	Wildfire	District Fire Chief	High	1, 3, 6	$30,000 per year	General fund	Continuous	On-going
-	Support County-wide initiatives identified in Volume 1 of this Plan	-	-	-	-	-	-	-	Delete, no longer applicable
-	Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1	-	-	-	-	-	-	-	Delete, no longer applicable
-	Develop District continuity of operations plan and continuity of government plan.	Severe Weather	City Manager	Low	1, 3	$10,000 per location	General Fund, HMGP	Five years	Delete, not mitigation

EXHIBIT C

Table D10: Montague Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Montague-1	Work with neighboring Yreka to install evacuation route signage.	Dam Failure	City Manager	Medium	1, 2	Staff time	HMGP, BRIC, General fund	Five years	New
Montague-2	Map all infrastructure and facilities within dam inundation areas.	Dam Failure	City Manager	Medium	1, 2, 3	$10,000 per location	HMGP, BRIC, General fund	Five years	New
Montague-3	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	City Manager	Low	1, 3, 6	$5,000 - $50,000 per location	HMGP, BRIC, General fund	Five years	New
Montague-4	Conduct agricultural education program on water reduction methods.	Drought	City Manager	High	1, 2, 3, 6	Staff Time	General fund	Five years	New
Montague-5	Develop an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s homes and masonry buildings.	Earthquake	City Manager	High	1, 3,	Staff time	General fund	Three to five years	New
Montague-6	Educate homeowners about structural and non-structural retrofitting of vulnerable homes and encouraging retrofit.	Earthquake	City Manager	High	2	Staff time	General fund	Three to five years	New
Montague-7	Support financial incentives, such as low interest loans or tax breaks, for home and business owners who seismically retrofit their structures.	Earthquake	City Manager	High	1, 2, 3	Staff time	General fund	Three to five years	New

EXHIBIT C

Table D10: Montague Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Montague-8	Modernization of HVAC systems in jurisdictional facilities.	Extreme Heat	City Manager	Low	1, 3, 6	$25,000 per facility	HMGP, BRIC, General fund	5-10 years	New
Montague-9	Identify and prepare city buildings for usage as heat shelters.	Extreme Heat	City Manager	Low	1, 3, 6	$2,000 per facility	General fund	5-10 years	New
Montague-10	Support the retrofitting, purchase, or demolition of flood prone properties.	Flood	City Manager		1, 3, 6	Project dependent	HMGP, BRIC, General fund	5-10 years	New
Montague-11	Conduct a flood insurance awareness program.	Flood	City Manager	High	2	Staff Time	General fund	Five years	New
Montague-12	Retrofit, rehabilitate, or replace vulnerable water system, storm water, and sewer facilities and infrastructure as needed.	Flood	City Manager	High	1, 3, 6	Project dependent	HMGP, BRIC, General fund	5-10 years	New
Montague-13	Replace undersized culverts as needed.	Flood	City Manager	High	1, 3, 6	Project dependent	General Fund, FMA, HMGP	5-10 years	New
Montague-14	Consider participation in the National Flood Insurance Program.	Flood	City Manager	High	3	Staff Time	General fund	1-3 years	New
Montague-15	Construct rainwater retention/detention ponds at strategic locations.	Flood	City Manager	Medium	1, 3, 6	Project dependent	General Fund, FMA, HMGP	Ten years	New
Montague-16	Map any areas of potential sliding.	Landslide	City Manager	Low	1, 3	Staff time	General Fund	5-10 years	New
Montague-17	Notify property owners located in high-risk areas.	Landslide	City Manager	Low	1, 2, 3	Staff time	General Fund	1-3 years	New
Montague-18	Install high wind, hail, and fire-resistant roofing	Severe Weather	City Manager	Medium	1, 3, 6	Project dependent	General Fund, BRIC, HMGP	Five years	New

EXHIBIT C

Table D10: Montague Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	on all jurisdictional facilities.								
Montague-19	Install and maintain surge protection on critical electronic equipment.	Severe Weather	City Manager	Low	1, 3	$10,000 per location	General Fund, HMGP	Five years	New
Montague-20	Use GIS to map areas that are susceptible to subsidence.	Subsidence	City Manager	Low	1, 2, 3, 4	Staff time	General fund	Five years	New
Montague-21	Develop an inventory of all buildings that are in potential volcanic flow areas.	Volcanic Activity	City Manager	Low	2	Staff time	General fund	Five years	New
Montague-22	Develop an outreach program about volcanic activity risk and mitigation activities in homes, schools, and businesses.	Volcanic Activity	City Manager	Low	2	Staff time	General fund	Five years	New
Montague-23	Increase public training on wildland-urban interface fire prevention.	Wildfire	City Manager	High	2	Staff time	General fund	Three to five years	New
Montague-24	Promote landscape approach to fuel reduction as part of defensible space initiative in areas with high wildfire exposure.	Wildfire	City Manager	High	1, 2, 3, 4	Staff time	General fund	Continuous	New
Montague-25	Support defensible space for wildfire through projects that create perimeters around homes, structures, and critical facilities through	Wildfire	City Manager	High	1, 2, 3, 4	Staff time	General fund	Continuous	New

EXHIBIT C

Table D10: Montague Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	the removal or reduction of flammable vegetation.								

EXHIBIT C

Table D11: Mt. Shasta Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Mt. Shasta-1	Develop and maintain emergency preparedness guides for evacuations	All	City Manager	High	1, 2	Staff time	City General Fund	1 year	Carried over, lack of staff
Mt. Shasta -2	Create a central webpage for hazard and evacuation information and materials	All	City Manager	High	1, 2	Staff time and $5,000	City General Fund, Ford Foundation	1 year	Carried over, lack of funding
Mt. Shasta -3	Ensure all staff are properly trained in Incident Command System (ICS) communication techniques	All	City Manager	High	4	Staff time and $5,000	City General Fund, Ford Foundation	City General Fund, Ford Foundation	Carried over, lack of funding
Mt. Shasta -4	Develop multi-lingual emergency preparedness and evacuation materials that cater to residents and visitors	All	City Manager	Medium	1, 2	Staff time and $5,000	City General Fund, Ford Foundation	1 - 3 years	Carried over, lack of funding
Mt. Shasta -5	Develop hazard specific education and mitigation materials	All	City Manager	Medium	1, ,2, 3	Staff time and $5,000	City General Fund, Ford Foundation	1 - 3 years	Carried over, lack of funding
Mt. Shasta -6	Establish a process to coordinate with local, regional, state, and Federal agencies to maintain up-to-date hazard data, maps, and assessments	All	Planning Department Director	Low	1, 2, 3, 4	Staff time	City General Fund	1 - 3 years	Carried over, lack of staff
Mt. Shasta -7	Develop a "Hazard Awareness Month/Week" in coordination with media to promote hazard awareness	All	City Manager	Low	2	Staff time and $5,000	City General Fund, Ford Foundation	1 - 3 years	Carried over, lack of funding

EXHIBIT C

Table D11: Mt. Shasta Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Mt. Shasta -8	Enhance hazard awareness of the private sector, specifically in the housing sector	All	Planning Department Director	Low	2	Staff time	City General Fund	1 - 3 years	Carried over, lack of staff
Mt. Shasta -9	Develop and share information related to local hazard vulnerability with housing and business sector	All	Planning Department Director	Low	2	Staff time	City General Fund	1 - 3 years	Carried over, lack of staff
Mt. Shasta -10	Educate the public on tradeoffs associated with multi-hazard design	All	Planning Department Director	Low	2	Staff time and $5,000	City General Fund, Ford Foundation	1 - 3 years	Carried over, lack of funding
Mt. Shasta -11	Establish a technical assistance program for residents to access data or resources for mitigation purposes	All	Planning Department Director	Low	2	Staff time and $5,000	City General Fund, Ford Foundation	3 - 5 years	Carried over, lack of funding
Mt. Shasta -12	Obtain local data on parcel, building footprints, critical facility locations to improve risk analysis	All	Planning Department Director	High	1, ,2, 3	Staff time	City General Fund	1 - 3 years	Carried over, lack of staff
Mt. Shasta -13	Develop and maintain a database to track community vulnerability	All	Planning Department Director	High	1, ,2, 3, 6	Staff time and $5,000	HMGP, City General Fund	1 - 3 years	Carried over, lack of funding
Mt. Shasta -14	Develop and keep aerial photography current, especially post disaster	All	Planning Department Director	High	1, ,2, 3, 6	Staff time and $15,000	HMGP, City General Fund	1 - 3 years	Carried over, lack of funding
Mt. Shasta -15	Develop a coordinated GIS database to track permitting, land use patterns, hazard areas, etc.	All	Planning Department Director	Medium	1, ,2, 3, 6	Staff time and $15,000	HMGP, City General Fund	1 - 3 years	Carried over, lack of funding

EXHIBIT C

Table D11: Mt. Shasta Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Mt. Shasta -16	Identify strategies to increase consistent, sufficient funding for hazard mitigation and recovery projects	All	Finance Department Director	High	1, ,2, 3, 5, 6	Staff time	City General Fund	1 year	Carried over, lack of staff
Mt. Shasta -17	Develop a list of private, nonprofit, and government funding sources for hazard mitigation and recovery	All	Planning Department Director	High	5	Staff time and $15,000	City General Fund	1 year	Carried over, lack of funding
Mt. Shasta -18	Integrate hazards into Capital Improvements Plan	All	Planning Department Director	Medium	1, 2, 3, 6	Staff time	City General Fund	1 year	Carried over, lack of staff
Mt. Shasta -19	Provide tax disincentives for developing in high hazard areas	All	Planning Department Director	Medium	1, 2, 3	Staff time and $5,000	City General Fund	3 – 5 years	Carried over, lack of funding
Mt. Shasta -20	Develop tax abatement, public subsidies, and other incentives to encourage private mitigation practices	All	Finance Department Director	Medium	1, 2, 3	Staff Time	City General Fund	3 – 5years	Carried over, lack of staff
Mt. Shasta -21	Encourage infill development through tax incentives, streamlined approval process, etc.	All	Planning Department Director	Medium	1, 2, 3	Staff time	City General Fund	1 year	Carried over, lack of staff
Mt. Shasta -22	Utilize outreach programs to advise homeowners of risks to life, health, and safety, and facilitate technical assistance programs that address measures that residents can take	All	Planning Department Director	Low	2	Staff time and $5,000	City General Fund	1 – 3 years	Carried over, lack of funding

EXHIBIT C

Table D11: Mt. Shasta Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Mt. Shasta -23	Establish, maintain, and promote a library section on hazard mitigation techniques for local residents and businesses	All	Planning Department Director	Low	2	Staff time and $5,000	City General Fund	1 – 3 years	Carried over, lack of funding
Mt. Shasta -24	Develop and offer hazard susceptibility audits of local small businesses	All	City Manager	Low	1, 2, 3	Staff time and $5,000	City General Fund	1 – 3 years	Carried over, lack of funding
Mt. Shasta -25	Complete and showcase a demonstration model showing the use of mitigation techniques for public display	All	Public Works Department Director	Low	2	Staff time and $5,000	HMGP, BRIC, FEMA IHP, City General Fund	3 – 5years	Carried over, lack of funding
Mt. Shasta -26	Inventory and assess condition of transportation routes and alternative routes	All	Planning Department Director	High	1, 2, 3	$50,000	HMGP, City General Fund	1 year	Carried over, lack of funding
Mt. Shasta -27	Establish and maintain communication with transportation agencies concerning current and future road improvement projects	All	Public Works Department Director	High	4	Staff time	City General Fund	1 – 3 years	Carried over, lack of staff
Mt. Shasta -28	Identify, prioritize, and improve infrastructure improvement projects to improve transportation routes	All	Public Works Department Director	High	1, 2, 3	Staff time	City General Fund	1 -3 years	Carried over, lack of staff
Mt. Shasta -29	Identify and develop green infrastructure improvements to existing and future roadway projects	All	Public Works Department Director	High	1, 2, 3, 6	Project dependent	HMGP, BRIC, City General Fund	1 -3 years	Carried over, lack of funding

EXHIBIT C

Table D11: Mt. Shasta Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Mt. Shasta -30	Develop land use regulations and mechanisms to reduce development in wetlands, high wildfire severity zones, and areas prone to heavy winter storms.	Flood, Wildfire	Planning Department Director	Medium	1, 2, 3, 6	Staff time	City General Fund	1 year	Carried over, lack of staff
Mt. Shasta -31	Develop additional building standards for development in flooding, wildfire, and seismic prone areas	Flood	Planning Department Director	Medium	1, 2, 3	Staff time	City General Fund	1 -3 years	Carried over, lack of staff
Mt. Shasta -32	Identify and eliminate development in areas experiencing high rebuilding rates from hazards	All	Planning Department Director	Low	1, 2, 3	Staff time and $15,000	HMGP, CDA, FEMA IHP, City General Fund	1 -3 years	Carried over, lack of funding
Mt. Shasta -33	Develop internal policies and regulations to protect and restore wetland areas to absorb hazard impacts	Flood	Planning Department Director	Low	1, 2, 3, 6	Staff time	City General Fund	1 year	Carried over, lack of staff
Mt. Shasta -34	Identify infrastructure vulnerable to hazards	All	Planning Department Director	High	1, 2, 3	Staff time	City General Fund	1 year	Carried over, lack of staff
Mt. Shasta -35	Develop underground standards for utilities	All	Planning Department Director	High	1, 3	Staff time	City General Fund	1 -3 years	Carried over, lack of staff
Mt. Shasta -36	Require undergrounding of new utility infrastructure, when physically possible	All	Planning Department Director	High	1, 3	Staff time	City General Fund	1 -3 years	Carried over, lack of staff
Mt. Shasta -37	Underground existing utilities, whenever physically possible	All	Public Works Department Director	High	1, 3	Project dependent	HMGP, BRIC, City	3 - 5 years	Carried over, lack of funding

EXHIBIT C

Table D11: Mt. Shasta Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
							General Fund		
Mt. Shasta-38	Work with private utility providers to ensure system redundancy	All	City Manager	Medium	1, 3	Staff time	City General Fund	1 -3 years	Carried over, lack of staff
Mt. Shasta -39	Develop green infrastructure standards for future infrastructure projects	All	Public Works Department Director	High	1, 2, 3, 6	Staff time	City General Fund	1 - 3 years	Carried over, lack of staff
Mt. Shasta -40	Restore stream and wetland habitat	All	City Manager	Medium	1, 2, 3, 6	Project dependent	HMGP, BRIC, City General Fund	1 - 3 years	Carried over, lack of funding
Mt. Shasta -41	Develop green infrastructure standards for commercial development	All	Planning Department Director	Low	1, 2, 3, 6	Staff time	City General Fund	1 - 3 years	Carried over, lack of staff

EXHIBIT C

Table D12: Tulelake Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Tulelake-1	Create a city-wide Emergency Preparedness Plan for natural and/or manmade disasters	All	Chief Resilience Officer	High	2, 3	$40,000	CA Jumpstart Grant	2 years	Carried over, lack of funding
Tulelake -2	Create evacuation maps with “routes” and “safe zones” to direct City residents during hazard.	All	Chief Resilience Officer	High	2, 3	$40,000	CA Jumpstart Grant	2 years	Carried over, lack of funding
Tulelake -3	Create a city-wide Post Disaster Mitigation Plan.	All	Chief Resilience Officer	High	2, 3	$40,000	CA Jumpstart Grant	3 years	Carried over, lack of funding
Tulelake -4	Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority.	All	Building Inspector, City Administrator, Chief Resilience Officer, Director of Public Works	Medium	1, 3, 6	$5,000,000	Brownfields Program, CDBG, HMGP, BRIC, Local budgets. Public/ private partnership	7 years	Carried over, lack of funding, revised
Tulelake -5	Prepare and plan for backup water supplies and storage. Revised to upgrade Well #1 and Well #2 for additional backup water supply.	All	Director of Public Works and Chief Resilience Officer	High	3, 4	$950,000	Small Communities Drought Relief Grant (SCDRG), DWR, Tulelake Irrigation District, local budgets	5 years	Carried over, lack of funding, revised

EXHIBIT C

Table D12: Tulelake Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Tulelake -6	Repair or replace water and sewer lines, laterals, backflows and meters.	All	City Engineer and Director of Public Works	High	1, 3, 4	$2,500,000	SWRQCB	5 years	Carried over, lack of funding., revised
Tulelake -7	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	City Manager	Low	1, 3, 6	$5,000 - $50,000 per location	HMGP, BRIC, General fund	Five years	New
Tulelake -8	Conduct agricultural education program on water reduction methods.	Drought	City Manager	High	1, 2, 3, 6	Staff Time	General fund	Five years	New
Tulelake -9	Reinforce and/or replace liners for existing or new sewer ponds to avoid a public health risk.	Earthquake, Flood, Landslide, Severe Weather Subsidence	City Engineer, Director of Public Works	Medium	1, 6	$5,500,000	SWRQCB & DWR	5 years	Carried over, lack of funding
Tulelake -10	Renovation of City Hall to become code compliant for community meetings upstairs.	Earthquake, Severe Weather, Subsidence, Wildfire	City Administrator, City Engineer, Building Inspector,	High	1, 3, 4	$1,000,000	HMGP, BRIC, Local budgets	7 years	Carried over, lack of funding
Tulelake -11	Renovation of Public Works shop to become code compliant for employee safety - 2024 Electrical Fire destroyed Public Works Shop. Shop to be rebuilt in different location.	Earthquake, Severe Weather, Subsidence, Wildfire	Building Inspector, City Engineer, City Administrator	High	1, 3, 4	$775,000	City Insurance Company, Local budgets	2 years	Carried over, lack of funding, revised
Tulelake -12	Require engineered plan sets for retrofitting unreinforced masonry and soft story buildings. City Brownfields Program in 2021 to assist with building investigations.	Earthquake, Subsidence, Severe Weather, Wildfire	City Engineer	High	1	$775,000	EPA Brownfields Grant, HMGP, BRIC,	3-5 years	Carried over, lack of funding

EXHIBIT C

Table D12: Tulelake Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
							Local budgets		
Tulelake -13	Increase water storage with replacement of 100,000, gallon storage tank to two 125,000-gallon storage tanks	Earthquake, Severe Weather, Wildfire	City Engineer and Director of Public Works	High	Goal 1, 3 & 4	$5,000,000	SWRQCB -	5 years	New
Tulelake Delete -1	Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1.	-	-	-	-	-	-	-	Delete, no longer applicable

EXHIBIT C

Table D13: Weed Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Weed-1	Establish New Fire Station South Weed	All	City Manager	Medium	1, 3	$5,000	FSC Grant, local budget	1 – 2 year	Carried over due to lack of funding
Weed-2	Backup Generators for Utilities	All	City Manager	High	1, 3, 4	$1,000,000	HMGP, BRIC, Local budgets	1 – 5 years	Carried over due to lack of funding
Weed -3	Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority.	All	City Manager	Medium	1, 3, 6	Per project cost	HMGP, BRIC, Local budgets. Public/ private partnership	10+ years	Carried over due to lack of funding
Weed -4	Boles Creek Main Street Mitigation.	Flood	City Manager	Medium	1, 3	$600,000	Local budgets	1 year	Carried over due to lack of funding
Weed -5	Improve Highway 97 culvert.	Flood	City Manager	Medium	1, 3, 6	$800,000	HMGP, BRIC, DWR, Local budgets	20 years	Carried over due to lack of funding
Weed -6	Continue to maintain compliance and good standing in the National Flood Insurance Program (NFIP)	Flood	City Manager, NFIP Coordinator	Medium	1, 2, 3	Staff time	Local budgets	1 – 2 years	Carried over due to lack of staff
Weed -7	Consider participation in the Community Rating System (CRS) program	Flood	City Manager, NFIP Coordinator	Medium	1, 2, 3	Staff time	Local budgets	2 – 5 years	Carried over due to lack of staff
Weed -8	Substitute Spring Water Source with Well	Wildfire	City Manager	Low	1, 3, 6	Project dependent	Local budget	1 – 2 years	

EXHIBIT C

Table D13: Weed Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Weed -9	City Wide Fuel Reduction Projects	Wildfire	City Manager	Medium	1, 3, 6	$250,000	HMGP, BRIC, Local budgets	10 years	Carried over due to lack of funding
-	Support County-wide initiatives identified in Volume 1 of this Plan	-	-	-	-	-	-	-	Delete, no longer applicable
-	Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1	-	-	-	-	-	-	-	Delete, no longer applicable

EXHIBIT C

Table D14: Yreka Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Yreka 1	Integrate Local Hazard Mitigation Plan into Safety Element of General Plan.	All	Community Development Director, Resilience Planner, City Manager	High	O1: Align LHMP objectives with Safety Element policies, including SB 379 requiring climate adaptation and resilience to be included in the Safety Element. O2: Engage stakeholders and the public in integration process by distributing surveys and hosting workshops. O3: Incorporate updated hazard mapping and data. O4: Ensure consistency with State and Federal regulations to ensure compliance and eligibility for pre- and post-disaster federal funding. O5: Partner with regional planning agencies to assist with plan alignment, public outreach, and stakeholder engagement.	High	Local budgets, Prepare California Jumpstart	1-2 years	New
Yreka 2	Strengthen emergency response capabilities, ensuring the community is equipped to effectively prepare for, respond to, and recover from identified disasters and hazards.	All	City Manager, Community Development Director, Resilience Planner, Public Works Director and Staff, Yreka Fire Safe Council Director, Fire	High	O1: Maintain, update, and ensure widespread distribution and accessibility of clear evacuation plans, while promoting community-wide understanding and preparedness. O2: Review and update Yreka's Emergency Operations Plan to enhance its accessibility and clarity, ensuring all community members understand their	High	Local budgets, grant funds, Homeland Security Grant, Prepare California Jumpstart Grant	Annually	New goal with revised objectives

EXHIBIT C

Table D14: Yreka Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
			Chief, Police Chief		roles and responsibilities in emergency situations. O3: Establish a comprehensive stockpile of emergency replacement parts and supplies critical for disaster response and recovery, including provisions for shelters, food banks, and partner agency supply caches. Ensure timely availability and accessibility of these resources to maintain essential services and infrastructure during and after emergencies. Additionally, conduct regular inventory checks and updates of emergency supply stockpiles to ensure they are always ready for immediate use. O4: Expand emergency heavy equipment resources for disaster response by developing mutual aid agreements with neighboring cities, counties, and private contractors to share heavy equipment during emergencies. O5: Establish and maintain strong collaborative relationships with regional agencies to improve service delivery, resource sharing, and shared decision-making.				

EXHIBIT C

Table D14: Yreka Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Yreka 3	Build capacity and capabilities to increase disaster resilience among historically underserved populations, individuals with access and functional needs, and communities disproportionately impacted by disasters and climate change.	All	City Manager, Community Development Director, Resilience Planner, Fire Chief, Police Chief, Yreka Fire Safe Council Director, Siskiyou County Public Health Director, Siskiyou County Office of Emergency Services Director, Siskiyou Media Council Director	High	O1: Identify underserved and vulnerable community groups. O2: Improve accessibility of emergency resources and services. O3: Enhance emergency preparedness education and outreach. O4: Expand local workforce and volunteer capacity for emergency response. O5: Strengthen partnerships with local organizations serving vulnerable populations. O6: Enhance data collection and analysis for targeted disaster preparedness.	Medium	Local budgets, Prepare California Jumpstart Grant	On-going	New goal with revised objectives
Yreka 4	Incorporate equity metrics, tools, and strategies into all mitigation planning, policy, funding, outreach, and implementation efforts.	All	City Manager, Community Development Director, Resilience Planner, Public Works Director	High	O1: Conduct a community vulnerability assessment that includes demographic data and hazard exposure, highlighting disproportionately impacted groups. O2: Embed equity into mitigation policy and decision-making.		Local budgets, California Jumpstart Grant	On-going	New goal with revised objectives

EXHIBIT C

Table D14: Yreka Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
					O3: Ensure equitable access to mitigation funding and resources. O4: Build capacity for equitable mitigation planning and implementation through training for City Staff.				
Yreka 5	Enhance critical infrastructure by ensuring the continued functioning of essential services and community lifelines in the face of potential hazards/disasters.	All	City Manager, Community Development Director, Resilience Planner, Public Works Director, Siskiyou Media Council Director	High	O1: Require all city infrastructure be fortified with generators for critical operations and backup power. O2: Establish Community Resilience Hub/Center to enhance local disaster preparedness and recovery. O3: Conduct assessment of critical infrastructure and prioritize necessary mitigation measures, such as retrofitting, floodproofing, and fireproofing, to reduce potential damage from hazards. Integrate regular inspections and maintenance to ensure long-term resilience. O4: Develop additional backup water supplies and storage. O5: Establish partnerships with regional agencies to develop alternative transportation mechanisms and resource sharing to improve access to Fall Creek during impassable conditions.	High	Local budget, HMPG, BRIC, Pacific Power Foundatio n, California Jumpstart Grant	On-going	New goal with revised objectives

EXHIBIT C

Table D14: Yreka Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Yreka 6	Apply the best available science and authoritative data to design, implement, and prioritize projects that enhance resilience to natural hazards and climate change impacts.	All	City Manager, Community Development Director, Resilience Planner, Public Works Director	High	O1: Conduct comprehensive data collection and analysis and develop a centralized database to store and manage data. O2: Engage with experts in climate science and hazard mitigation by organizing workshops where best practices and latest findings are shared. O3: Integrate climate resilience strategies into the design of infrastructure projects, ensuring they are adaptable to future climate conditions and hazards.	High	Local budgets, California Jumpstart Grant	On-going	New goal with revised objectives
Yreka 7	Integrate mitigation principles into laws, regulations, policies, and guidance to support equitable outcomes to benefit the whole community.	All	City Manager, Community Development Director, Resilience Planner, Public Works Director	High	O1: Identify and prioritize high-risk, repetitive loss properties located in hazard-prone areas for home-hardening to reduce future damage. O2: Purchase and convert properties in high-risk areas into green spaces or flood retention zones, reducing the risk of future damage while benefiting the community.	High	Local budgets, HMGP, FMA	5 years	New goal with revised objectives
Yreka 8	Significantly reduce barriers to timely, efficient, and effective hazard mitigation	All	City Manager, Community Development Director, Resilience	High	O1: Review and revise local zoning, building codes, and land-use regulations to align with hazard mitigation goals, eliminating any outdated or		Local budgets, California Jumpstart Grant	On-going	New goal with revised objectives

EXHIBIT C

Table D14: Yreka Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	planning and action.		Planner, Public Works Director, Siskiyou Media Council Director, Siskiyou County Office of Emergency Services Director, Siskiyou County Public Health Director		conflicting policies that delay action. O2: Increase access to hazard mitigation funding by providing technical assistance/ training to help community members and organizations develop competitive grant applications for state and federal mitigation funding. O3: Enhance coordination between stakeholders by developing MOUs with regional partners to facilitate resource sharing, technical expertise, and collaborative efforts in mitigation planning and response. O4: Use a variety of communication channels (social media, local radio, virtual town halls, tv applications) to reach broader audiences, reduce delays, and streamline communication between local government, agencies, and community members, ensuring quick and reliable access to resources and information. O5: Create easy-to-navigate online portals for residents and stakeholders to access hazard mitigation information, submit feedback, and track project updates.				

EXHIBIT C

Table D14: Yreka Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
					O6: Regularly monitor and evaluate barriers to the mitigation process to identify challenges and areas for improvement.				
Yreka 9	Reduce flood risk and enhance community safety by minimizing exposure to flood-prone areas and purchasing natural floodplains to provide open spaces.	Flood	City Manager, Community Development Director, Resilience Planner, Public Works Director	High	O1: Identify repetitive flood loss properties and prioritize them for relocation, elevation, or reconfiguration to minimize flood exposure. O2: Acquire and preserve floodplain as open space/ greenbelt. O3: Continue to maintain compliance and good standing in the National Flood Insurance Program (NFIP). O4: Continue to implement improvements and upgrades recommended in Master Plan of Drainage. O5: Achieve eligibility for participation in the Community Rating System (CRS) by meeting all necessary program requirements.	Medium	Local budgets, California Jumpstart Grant	On-going	New goal with revised objectives
Yreka 10	Enhance the resilience of residential structures by promoting home hardening techniques to reduce the impacts	Wildfire	City Manager, Community Development Director, Resilience Planner, Public Works	High	O1: Reduce fuel loads in highest fire severity zones by encouraging property owners to establish defensible space. O2: Require annual fuel and weed reduction to minimize fire spread.	Medium	Local budgets, The Greenhouse Gas Reduction Fund, California	On-going	New goal with revised objectives

EXHIBIT C

Table D14: Yreka Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
	of potential disaster and hazards.		Director, Yreka Fire Safe Council Director				Jumpstart Grant		
Yreka Delete 1	Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1.	-	-	-	-	-	-	-	Delete, no longer applicable
Yreka Delete 2	Support County-wide initiatives identified in Volume 1 of this Plan.	-	-	-	-	-	-	-	Delete, no longer applicable

EXHIBIT C

In compliance with AB 2140 (2006), the 2025 Siskiyou County Local Hazard Mitigation Plan (LHMP) is herein incorporated and made a part of the Seismic Safety and Safety Element of the Siskiyou County General Plan.

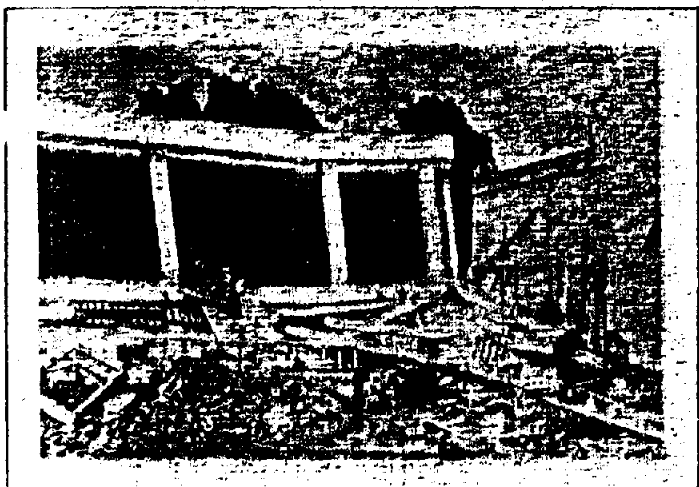
2025 LOCAL HAZARD MITIGATION PLAN

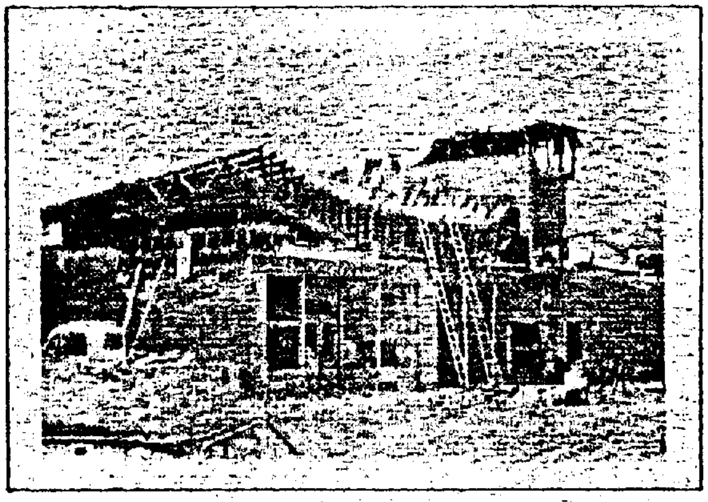
The 2025 Local Hazard Mitigation Plan (LHMP) for the Siskiyou County planning area was developed in accordance with the Disaster Mitigation Act of 2000 (DMA 2000) and followed FEMA's Local Hazard Mitigation Plan guidance. The LHMP incorporates a process where hazards are identified and profiled, the people and facilities at risk are analyzed, and mitigation actions are developed to reduce or eliminate hazard risk. The implementation of these mitigation actions, which include both short and long-term strategies, involve planning, policy changes, programs, projects, and other activities.

To view the 2025 LHMP in its entirety please visit:

https://www.siskiyoucounty.gov/emergencyservices/page/local-hazard-mitigation-plan

SEISMIC SAFETY AND SAFETY





SISKIYOU COUNTY GENERAL PLAN

Prepared by Siskiyou County Planning Department, June 1975

EXHIBIT D

RESOLUTION

RESOLUTIONS

NO. 45

BOOK 7

RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF SISKIYOU, STATE OF CALIFORNIA ADOPTING THE SEISMIC SAFETY AND SAFETY ELEMENT OF THE SISKIYOU COUNTY GENERAL PLAN FOR SAID COUNTY

WHEREAS the Siskiyou County Planning Commission by its Resolution 1976-1 did on the 21st day of January 1976 adopt the proposed Seismic Safety and Safety Element for the Siskiyou County General Plan, and

WHEREAS, a Negative Declaration was prepared, reviewed and certified as complete, and

WHEREAS, this Board of Supervisors did on the 24th day of February 1976 hold a Public Hearing thereon, notice thereof having been given as prescribed by law, and at which time all interested persons were afforded opportunity to be heard thereon, and

WHEREAS, all comments, requests and suggestions received at said hearing were given due and deliberate consideration in connection with the objectives and purposes of the proposed element, now

THEREFORE BE IT RESOLVED by the Board of Supervisors of County of Siskiyou, State of California in regular session assembled this 24 day of February, 1976 that the Seismic Safety and Safety Element of of the Siskiyou County General Plan be and is hereby adopted as part of the General Plan for Siskiyou County, and

BE IT FURTHER RESOLVED, that the Planning Director is directed and authorized to certify the Seismic Safety and Safety Element to any concerned agencies.

The foregoing Resolution was introduced by Supervisor Hayden who moved it adoption, seconded by Supervisor Porterfield and adopted by the following vote:

AYES: Supervisors Hayden, Porterfield, Wacker and Torrey.

NOES: None.

ABSENT: Supervisor Belcastro

There upon the Chairman declared the above and foregoing Resolution duly adopted and so ordered.

[signature]

Chairman, Siskiyou County Board of Supervisors

ATTEST: NORMA FRICE, CLERK BOARD OF SUPERVISORS

[signature] Deputy

Clerk, Siskiyou County Board of Supervisors

EXHIBIT D

RESOLUTION 1976-1

RESOLUTION OF THE PLANNING COMMISSION OF THE COUNTY OF SISKIYOU ADOPTING THE SEISMIC SAFETY AND SAFETY ELEMENT OF THE SISKIYOU COUNTY GENERAL PLAN FOR SISKIYOU COUNTY, STATE OF CALIFORNIA

WHEREAS, this Commission did cause to be prepared a Seismic Safety and Safety Element of the General Plan for Siskiyou County and,

WHEREAS, in accordance with the provisions of law a public hearing was held on the 21st day of January 1976, notice having been given in the time and manner specified by law in which all interested persons were afforded opportunity to be heard thereon, and

WHEREAS, a Negative Declaration was approved by the Planning Commission on January 7, 1976, certifying that the adoption of this element would not have a significant effect on the environment, and

WHEREAS, all comments received at the aforesaid hearing were duly considered, now

THEREFORE be it resolved by the Siskiyou County Planning Commission in regular session this 21st day of January 1976 this document entitled Seismic Safety and Safety Element of the Siskiyou County General Plan be and is here adopted and be it further resolved, that this Commission recommends that the Board of Supervisors of the County of Siskiyou hold a Public Hearing thereon in the manner prescribed by law and do adopt said Seismic Safety and Safety Element of the Siskiyou County General Plan.

The foregoing resolution was introduced by Commissioner Steinhaus who moved its adoption, seconded by Commissioner Radcliffe and adopted by the following roll call vote:

AYES: Lange, Nilsson, Martin, Radcliffe, Steinhaus, Cedros,

NOES:

ABSENT: Cannon, Hillery

So ordered,

[signature]

Chairman, Siskiyou County Planning Commission

ATTEST:

[signature]

Secretary, Siskiyou County Planning Commission

EXHIBIT D

SISKIYOU COUNTY

SEISMIC SAFETY AND SAFETY ELEMENT

TABLE OF CONTENTS

Page

A. Introduction. 1

B. Seismic Safety

Section I - General Information 4

Section II - Seismic Hazards. 10

Section III - Building Codes and Performance.26

Section IV - Seismic Hazard in Northeast California 41

C. Safety

Section I - Fire Protection 90

Section II - Volcanic Hazard. 92

D. Recommendations 94

EXHIBIT D

THE SISKIYOU COUNTY SAFETY AND SEISMIC SAFETY ELEMENT TO THE GENERAL PLAN

INTRODUCTION

The Safety Element and the Seismic-Safety Element to the county's General Plan are required by the Government Code, Section 65302. The purpose of these elements is to examine the particular, physical needs of a county in relation to safety and seismic-safety, and to establish procedures for the orderly development of the county relative to physical problems. Because of the similarity in the requirements of these two elements, and to avoid duplication of effort, the county has chosen to write these two elements into a single document. As with each of the other elements to the county's General Plan, one must bear in mind that these elements while individually separate all interact and form the total development program for the county.

Many of the recommendations that are listed in the seismic-safety portion of this element will not be repeated in the safety portion. The purpose of this is for simplicity only and the recommendation which apply to seismic-safety would, of course, apply to the Safety Element.

EXHIBIT D

The Seismic Safety Element is required and defined in Section 65303 (f) of the Government Code. This Element is mandated to be a part of the general plan of all cities and counties, and reads as follows:

> A seismic safety element, consisting of an identification and appraisal of seismic hazards such as susceptibility to surface ruptures from faulting, to ground shaking, to ground failures, or to the effects of seismically induced waves such as tsunamis and seiches.
>
> The seismic safety element shall also include an appraisal of mudslides, landslides, and slope stability as necessary geologic hazards that must be considered simultaneously with other hazards such as possible surface ruptures from faulting, ground shaking, ground failure, and seismically induced waves.

The effect of this section is to require cities and counties to take seismic hazards into account in their planning programs. All seismic hazards need to be considered, even though only ground and water effects are given as specific examples. The basic objective is to reduce loss of life, injuries, damage to property, and economic and social dislocations resulting from future earthquakes.

It has been the policy of the Boards of Supervisors of this county throughout its history to assure the residents of the county a life of safety and prosperity in all aspects of living coming within their ability to control. This is a county of vast wealth: timber, agriculture, and mineral. This is, also, an area of vast geographic diversity. This is a part of her wealth. However, this geographic diversity is one of our greatest problems.

Man has learned, and is continuing to learn to harvest this county's wealths without destroying its resources. We have not, however, learned to control the natural hazards of the county. Since we cannot control hazards, our prime goal must be to learn to live with these hazards and minimize their effects.

Generally, Siskiyou County is an area of low seismic activity within recent times. Obviously, our county was at one time very active seismically. Numerous faults cross the landscape. Volcanos dot the countryside, but most show insignificant recent, if any, disturbance.

We must accept the fact that an earthquake can occur at any time and any place.

To assure common understanding and a reference for discussion, Section I is a summary and analysis of the basic language and processes involved in seismic activity.

House built across fault at Wright's Station. 1906 earthquake.

EXHIBIT D

GENERAL INFORMATION AND GLOSSARY ON EARTHQUAKES AND SEISMIC HAZARDS

SECTION I

GENERAL INFORMATION ON EARTHQUAKES

Earthquakes are caused by the sudden rupturing of the earth along faults (weak portions of the earth's crust). It is believed that this rupturing relieves stress that has been building up in the earth's crust. It is also generally believed that this stress is caused by the movement of plates in the earth's crust. As these crustal plates move against or past one another, stress develops which causes the crust on the edge of each plate to become deformed. When too much deformation builds up, the rocks snap along a fault. This relieves the strain by allowing each side of the fault to move to a position of lower stress.

The mechanism of the movement of a fault is explained by the Elastic Rebound Theory. Robert J. Foster has described how this theory explains the 1906 San Francisco earthquake: "Accurate surveys, which had been made on both sides of the fault before the earthquake, show that a small amount of movement had occurred between the time of the surveys. Resurvey after the earthquake showed that about 20 feet of absolute horizontal movement occurred in the earthquake, in agreement with the 20 feet of relative movement measured by surface features. This led to the theory that earthquakes occur when the energy stored by elastic

EXHIBIT D

deformation in the rocks on both sides of the fault is enough to rupture the rocks or to overcome the friction on the existing plane. This elastic rebound theory process. . . . explains the surface deformation of most earthquakes. Friction on the fault plane may cause sticking after some movement has occurred, and so the total strain may not be relieved in a single earthquake." *(See Figure 1)

The type of stress build-up discussed above is common along the margins of moving plates in all the earth's earthquake belts. California is located in one of the belts of greatest stress development - the Circum-Pacific Seismic Belt.

The fault which separates two plates is not always perceivable on the earth's surface, but there are land forms, geologic criteria and instrumentation which can be used to map its location. The fault is not one solid, continuous line, but is composed of a system of splinter faults which appear periodically on the earth's surface. The term fault trace is used to describe a line on the surface of the earth formed by the intersection of the fault with the earth's surface.

Ground rupture and cracking are surface expressions of earthquakes which originate on subsurface faults. Earthquakes occur at various depths within the earth's crust. The point below the surface where the rupture first occurs is known as the focus and can be located with the help of seismic instruments. The news media usually use the term "epicenter" to describe the

---

*Robert J. Foster, PHYSICAL GEOLOGY, Charles E. Merrill Publishing Co., Columbus, Ohio, 1971.

point of initial rupture. Used in this context, the term is a misnomer. The epicenter of an earthquake is measured in two ways. The instrumental epicenter is that point on the earth's surface directly above the focus but may not be the area of maximum damage.

For planning purposes there are two kinds of faults: (1) active faults which have experienced displacement in recent geologic time, suggesting that future displacement can be expected on these faults; and (2) inactive faults that have shown no evidence of movement in recent geologic time, suggesting that these faults are dormant. However, some faults labeled as inactive are so termed due to lack of knowledge. Increased research and monitoring of these faults could reveal some of them as active.

California is interlaced with hundreds of active faults. The most important fault system is the San Andreas fault, which extends from south of Los Angeles to north of San Francisco. The main branch of this fault runs through Hollister and up the San Francisco peninsula. It enters the ocean at Daly City and runs through the mouth of Tomales Bay to Marin County. A branch of the San Andreas fault is the Hayward fault, which extends from Fremont, through Hayward, San Leandro, Oakland, Berkeley, Richmond and San Pablo. This fault has been responsible for at least two major earthquakes. (See Figure 2)

Earthquakes are not all the same. They can range from a minor disturbance to a catastrophic event. How then can we tell the difference between quakes and compare then to each other?

Figure 1

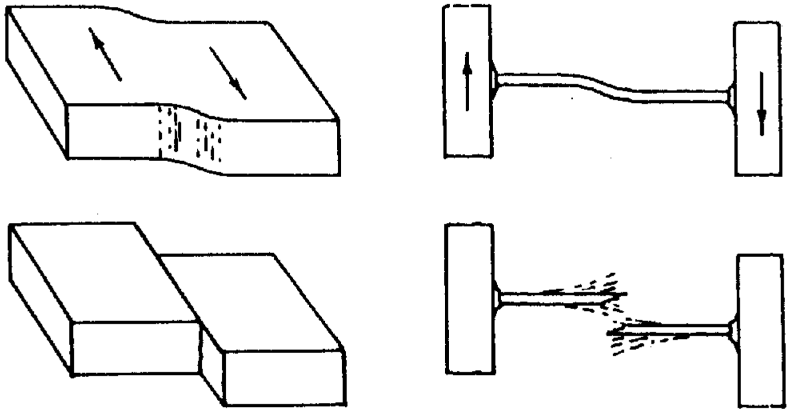
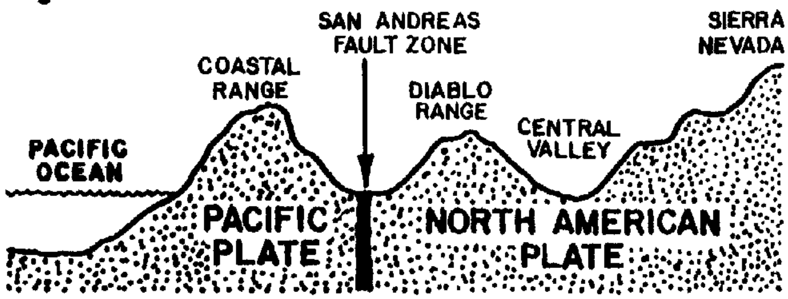


Figure 2



A Simplified Cross Section of San Andreas Fault Zone to Emphasize Location of Boundary Between Crustal Plates

Origin of earthquakes. A portion of the earth's crust is shown on the left and a limber stick on the right.

A. Slow deformation of the crust is caused by internal forces.

B. When the strength of the rocks is exceeded, they rupture or fault, producing earthquake vibrations. Earthquakes on old faults result when the friction along the plane of the old break is exceeded.

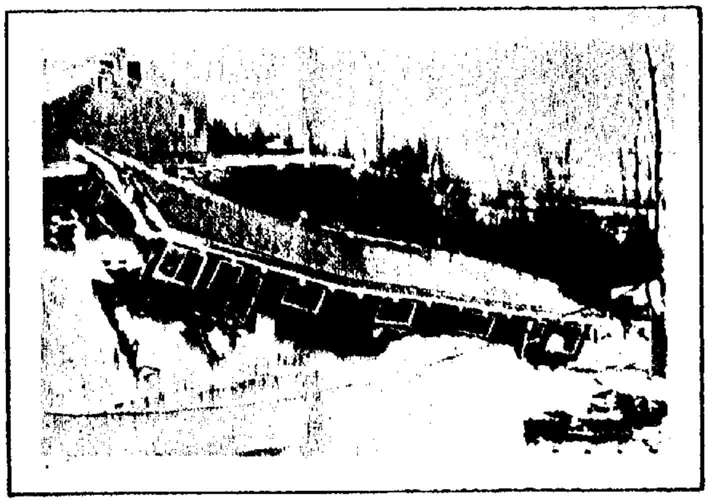
The first attempt to classify earthquakes involved a description of their intensity. The scale used to measure the intensity of a quake is the Modified Mercalli scale with intensities ranging from I to XII. (See Table I for the Modified Mercalli Scale with written descriptions of observations.)

Intensity is a description of the physical effects of earthquakes. The lowest intensity ratings are based on human reactions, such as "felt indoors by few". The highest intensities are measured by geologic effects, such as "broad fissures in wet ground, numerous and extensive landslides, and major surface faulting". The middle intensity range is based largely on the degree of damage to buildings and other man-made structures. Intensity ratings are based on visual observation and are not measured with instruments. The degree of intensity varies from place to place during an earthquake. Specific locations in an area may have an intensity rating of VIII because of soil conditions and type of building structure, while other locations affected by the same earthquake may only have an intensity of IV. Therefore, a single earthquake can have different intensity ratings based on geologic conditions, structural design, or distance from field epicenter.

In 1932, Charles Richter developed a system of tables and charts to deduce from seismological instruments a method of measuring the magnitude of an earthquake. The magnitude assigns a number to the calculated energy release of the earthquake. Because numbers are assigned to the calculated energy release, this system can rank earthquakes and compare them one to another. By this method, an earthquake is rated independently of the place of observation.

The magnitude is the logarithm (base 10) of the maximum amplitude of a seismogram referred to a distance of 62 miles from the epicenter. Under this system, an increase of one degree in magnitude is equal to 32 times the previous energy release. Thus an earthquake of magnitude 7 represents about 32 times as much energy release as one of magnitude 6; magnitude 8 represents 32 times the energy of magnitude 7 and, therefore, about 1000 times the energy of magnitude 6.

Crustal movement and faulting are evolutionary processes in the earth's geologic history. These geologic processes have a direct impact on man and his activities when they occur in an urbanized area. Therefore, an understanding of the different types of seismic expression and their effect on development is necessary for an effective program of seismic risk reduction.



House in slide area, 1964 Alaska earthquake.

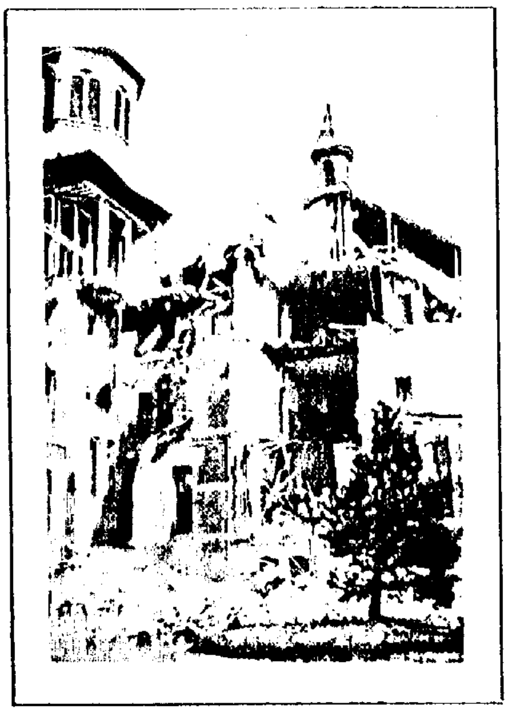
EXHIBIT D

SECTION II

SEISMIC HAZARDS*

Donald R. Nichols
U. S. Geological Survey
Menlo Park, California

Earthquakes commonly give rise to various geologic processes that may cause severe damage to structures and loss of life to people in them. These processes include surface faulting, ground shaking, associated ground failure, generation of large waves in bodies of water, and regional subsidence or downwarping.



Effects of ground shaking.

Agnew State Hospital, 1906. 112 people killed.

*Excerpts from manuscript in preparation.

These seismic hazards vary widely from area to area, and the level of hazard depends on both geologic conditions and the extent and type of land use. This section concerns itself with a description of geologic conditions that may contribute to seismic risk, how to determine their significance in a given area, and the level of data desirable for land-use decisions.

Surface Faulting. The earth is laced with faults--planes or surfaces in earth materials along which failure has occurred and materials on opposite sides have moved relative to one another in response to the accumulation of stress. Most of these faults have not moved for hundreds of thousands or even millions of years and thus can be considered inactive. Others, however, show evidence of current activity or have moved sufficiently recently to be considered active; i.e., capable of displacement in the near future. Any fault movement beneath a building in excess of an inch or two could have catastrophic effects on the structure, depending upon its design and construction, and the shaking stresses it experiences at the same time. Therefore it is important to know not only which faults may move but how they might move.

The definition of what constitutes an "active fault" may vary greatly according to the type of land use contemplated or to the importance of the structure. For example, the Atomic Energy Commission regards a fault as active or "Capable" with respect to nuclear reactor sites if it has moved "at or near the ground surface at least once in the past 35,000 years", or "more than once in the past 500,000 years" (Atomic Energy Commission, 1974). A definition for purposes of town planning in New Zealand defines as active, any fault on which "movement has taken place at least once in the last 20,000 years", originally published as 1,000 years by typographical error (Town and Country Planning Branch, 1965). Commonly, faults are regarded as active and of concern to land-use planning when there is evidence that they have moved during historic time or, through geologic evidence there may be a significant likelihood that they will move during the projected use of a particular structure or piece of land. Because geologic evidence may be lacking, obscure, or ambiguous as to specific times of past movement, geologists may be able to estimate relative degree of activity only after a regional analysis that may extend far beyond the locality under consideration. Such analysis may be based on historic evidence of fault movement, seismic activity (occurrence of small to moderate earthquakes along the fault trace even though not accompanied by obvious fault movement), displacement of recent earth layers (those deposited during the past 10,000 years), and presence of topographically young fault-produced features (scarps, sag ponds, offset stream courses and disruption of man-made features such as fences, curbs, etc.) However, movement seldom is limited to a single fault surface throughout the lifetime of a fault system such as the San Andreas. In many places tens, or even hundreds, or thousands of individual fault surfaces made up the San Andreas in a zone varying in width from a few hundreds to many thousands of feet. Any individual fault surface may have ruptured at any time during the last 40 million years or so that the fault has been active. It is speculated, however, that most of these surfaces probably have not moved in millions of years, and only infrequently may a new rupture surface develop or is fault movement transferred from one part of the fault zone to another. Faults that commonly produce significant displacement (more than several inches at a time) often have related branches that diverge from the main fault but usually have less movement along them. They may also have secondary faults that are not directly or obviously connected physically to the main fault trace. Secondary faults are usually nearby (within hundreds of feet) of the main rupture, but they may extend as much as several miles away. As with branch faults, displacement along secondary faults is usually only a fraction of that along a main fault.

The amount of displacement that can occur during a single earthquake can be related in a general way to the total length of a fault. The longer the fault, the greater the potential for a great earthquake and the greater amount of displacement likely (Albee and Smith, 1967; Bonilla, 1970). The maximum displacement ever recorded during a single earthquake is about 42 feet of vertical displacement (Bonilla, 1970). Horizontal movement of as much as 20 feet occurred along the San Andreas fault in 1960 (Bonilla and Buchanan, 1970).

In addition to the location and amount of displacement, the sense of movement is extremely important in estimating the amount and type of damage that might be produced. This was evidenced by the great damage over faults during the moderate (magnitude 6.6) San Fernando earthquake, which produced a reverse or thrust fault movement. (See Figure 3b). Movement occurs along a similar plane, but in an opposite direction on the normal Wasatch fault in Utah. (See Figure 3c). Left-lateral movement (Figure 3d) and right-lateral movement, which

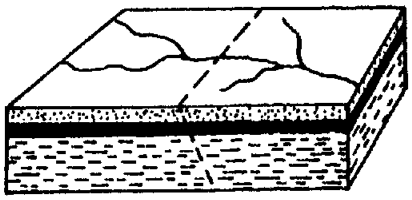
EXHIBIT D

is common to the San Andreas fault, probably are less potentially damaging to most structures than normal or thrust faulting.

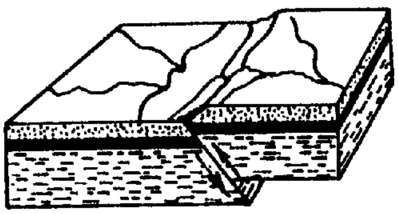
Not all surface faulting need be rapid nor need it occur during major earthquakes. Imperceptibly slow movement, called "fault creep" occurs along the Hayward, Calaveras, and some other faults, and may be accompanied by microearthquakes. Similarly, not all deformation of the earth's surface produces fault displacements. Strains in the earth deform the rocks until their strength is exceeded and they rupture, producing the earthquake. Accompanying this bending, however, is a certain amount of plastic deformation. Both rupture and plastic deformation commonly occur along active fault zones and may be sufficient to damage or destroy structures over particularly strongly deformed rocks. Earthquakes deep within the earth may result from rupture of deeply buried rocks but without fault displacement at the ground surface, although the surface rocks may be deformed (See Figure 3e). This may have been the case along a part of the Newport-Inglewood fault zone where movement along the fault during the last 10,000 years or so has merely caused a permanent flexuring or bending of the surface rocks (Castle, 1966).

Ground Shaking. Probably the most difficult task today, in terms of the predictive capability of the geologist and seismologist, is devising a reasonably reliable method of predicting "ground shaking" effects--what most people and structures react to during an earthquake. Examination of damage from numerous past earthquakes, in lieu of conclusive strong-motion seismograph records, has suggested to geologists and engineers that the greatest damage to tall structures results where they are built over thick, relatively soft, water-saturated sediments and that the least damage occurs where they are built on very firm bedrock (Wallace, 1968b, P. 67). Although engineers have shown that while great thicknesses of wet unconsolidated sediments may amplify the ground motion, perhaps a more critical measure of damage is a determination of the "predominant period" of the building and of the ground on which it rests. The predominant period of a building can be related in a very general way to its height or number of stories. Taller buildings have a longer predominant period (2 seconds or more). Therefore, they are subject to greater damage where they occur on ground with a longer predominant period (thick, saturated sediments). Conversely, one or two-story buildings with a short predominant period may be in trouble on firmer ground. Further complicating this very generalized picture are a wide variety of other factors that may contribute significantly to a damage potential: magnitude of a particular earthquake, distance and direction from the epicenter and causative fault, duration of shaking, and the structural integrity of buildings before the earthquake, and many others. The greatest damage is likely to occur where the predominant ground period is coincident with that of the greatest number of high-rise buildings. However, a prediction of ground shaking at a particular spot or point is subject to a great variety of conditions, only some of which are predictable with confidence. For example, a magnitude 5 earthquake on the San Andreas fault at Hollister may have the same damage pattern at a particular locality as a more distant 7.5 magnitude earthquake on the Hayward or Calaveras fault.

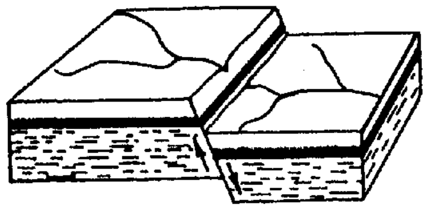
Figure 3



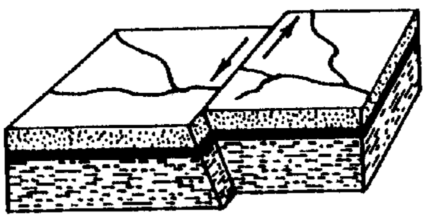
Earth block before movement
Fig. 3a



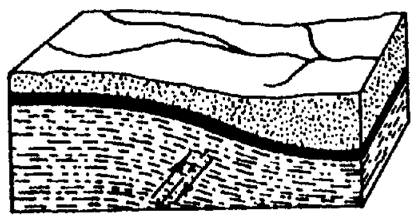
Thrust or Reverse fault
Fig. 3b



Normal fault
Fig. 3c



Left lateral fault
Fig. 3d



Monoclinal fold caused by

faulting at depth
Fig. 3e

EXAMPLES OF SOME TYPES OF FAULT DISPLACEMENT AND

EARTH FLEXURE

Ground Failure. Earth materials in a natural condition tend to reach equilibrium over a long period of time. In geologically active areas such as California and Alaska, there are many regions where earth materials have not yet reached a natural state of stability. For example, most of the valleys and bay margins are underlain by recent loose materials that have not been compacted and hardened by long-term natural processes. Landslides are common on most of the hills and mountains as loose material moves downslope. In addition, many activities of man tend to make the earth materials less stable and hence to increase the chance of ground failure. Some of the natural causes of instability are earthquakes, weak materials, stream and coastal erosion, and heavy rainfall. Human activities that contribute to instability include oversteepening of slopes by undercutting them or overloading them with artificial fill, extensive irrigation, poor drainage or even groundwater withdrawal, and removal of stabilizing vegetation. These causes of failure, which normally produce landslides and differential settlement, are augmented during earthquakes by strong ground motions that result in rapid changes in the state of earth materials. It is these changes, by means of liquefaction and loss of strength in fine-grained materials, that result in so many landslides during earthquakes as well as differential settlement, subsidence, ground cracking, ground lurching, and a variety of transient and permanent changes in the ground surface.

Mechanisms of Failure. Liquefaction is a common mechanism causing many types of ground failure. It occurs when strength of saturated, loose, granular materials (silt, sand, or gravel) is drastically reduced, such as may occur during an earthquake. The earthquake-induced deformation transforms a stable granular material into a fluidlike state in which the solid particles are virtually in suspension, similar to quicksand. The result, where the liquefied materials are in a broad buried layer, may be likened to the action of ball bearings in reducing friction in the movement of one material past another. The Juvenile Hall landslide during the 1971 San Fernando earthquake resulted from liquefaction of a shallow sand layer and involved an area almost a mile long and a failure surface that had a slope of only 2-1/2 percent (Youd, 1971, p. 107, 108). Where the liquefied granular layer is thick and occurs at the surface, structures may gradually sink downward. The tilting and sinking of building during the Niigata earthquake illustrate this phenomenon.

Loss of strength in fine-grained cohesive materials is another mechanism of ground or foundation failure, and might manifest itself in squeezing or "lateral spreading" of soft, saturated clays such as San Francisco Bay mud. It can result in rapid or gradual loss of strength in the foundation materials so that structures built upon them gradually settle or break up as foundation soils move laterally by flowage.

Other causes for loss of resistance include raising the ground water to reduce frictional resistance along a potential failure surface and removal of water or earth masses that may be serving as a buttress to prevent downslope movement.

<u>Results of Ground Failure.</u> Although the basic causes of ground instability are simple in concept, the consequences are often

complex and highly variable. They include numerous varieties of landslides, ground cracking, lurching, subsidence, and differential settlement. Moreover, these types of ground failure occur on a wide variety of ground conditions. Landslides, for example, do not require a steep slope on which to form, particularly during earthquakes. Many occur on slopes that are virtually flat, and the surface on which they fail may be very shallow (1 to 2 feet deep) or as much as hundreds of feet below the ground surface. The type of ground failure that develops in a given area is determined by the nature of the natural or man-made disturbance that occurs and partly by the topographic, geologic, hydrologic, and geotechnical characteristics of the ground.

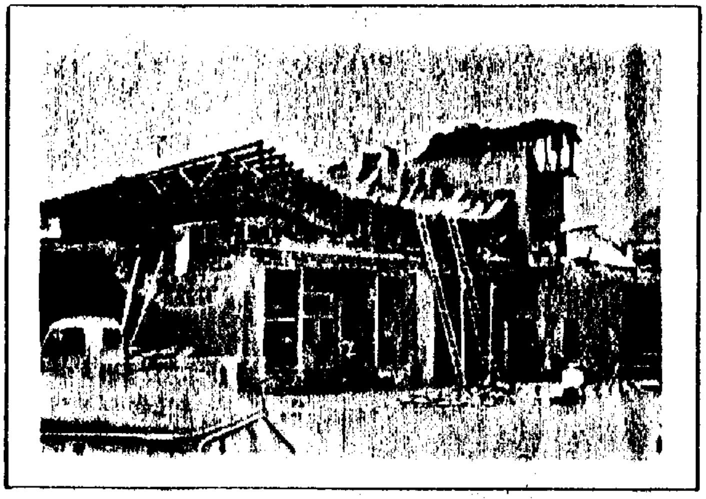
Ground cracking usually occurs in stiff surface materials and is associated with changes in surface topography or materials. For example, during the 1964 Alaskan earthquake, much of the ground cracking that occurred along river flood plains adjacent and parallel to stream channels and along road and railroad embankments resulted from differential movement owing either to liquefaction or to lateral spreading of a relatively soft, deeper layer under a stiffer surface layer. Cracks may be only hairline or several feet wide and from a few feet to hundreds of feet long.

Ground lurching may be both a transitory and permanent phenomenon. During earthquakes, soft saturated ground may be thrown into undulating waves that may or may not remain when the ground motion ceases. The same or similar ground surface appearance may also result from permanent differential settlement of the ground, which can be caused by loss of soil strength or by liquefaction. Commonly, the water freed by liquefaction of buried and confined granular layers is forced to the ground surface, moving laterally toward steep slopes or vertically along the planes of weakness in the overlying layers. As the water moves toward the surface or "free face", it often carries with it some of the sand. Thus, "sand boils," "sand volcanoes," "sand ridges," and similar anomalous features attest to the occurrence of liquefaction. As sand and water are removed from the subsurface, the ground settles, often differentially because the sand and water are seldom removed evenly over broad areas. The resulting effects on buildings can be catastrophic. Subsidence of as much as several feet may occur over a broad area underlain by a thick sequence of sedimentary deposits. For example, after the 1906 earthquake, a well casing was reported to have "risen" two feet out of the ground, when in fact, the ground around it probably liquefied or compacted as a result of the shaking. Subsidence is likely to be greatest in areas where there has been withdrawal of fluids (ground water or oil) over a long period of time. Lesser amounts of subsidence can occur even where fluid withdrawal has not taken place, as in the Homer area of Alaska in 1964. Compaction effects may be predicted with some degree of assurance over fairly broad areas (up to 1 or 2 miles) and even on a site basis, especially when the cause may be liquefaction.

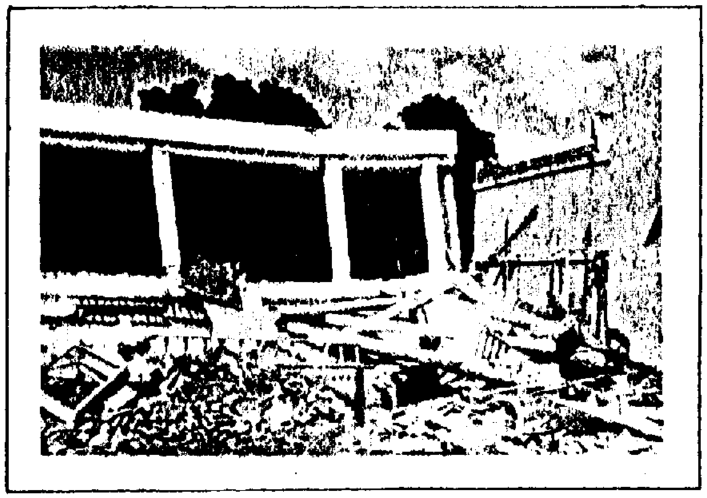
<u>Tectonic Deformation.</u> Earthquakes may produce major differential vertical and horizontal movements over broad parts of the earth's crust. For example, as a result of the 1964 Alaskan earthquake, between 70,000 and 110,000 square miles of both the

sea floor and land in Southern Alaska were warped, elevating or depressing them as much as 6 feet; elevation changes locally exceeded 50 feet (Hansen and others, 1966, p. 17). While the effect of compaction and tectonic subsidence may appear the same locally, the mechanisms differ greatly and the total area affected will be much greater where tectonic deformation occurs. Tectonic land changes result from major movements in the earth's crust, and neither their location nor their magnitude is predictable. Therefore, little can be done to minimize the effects of these changes before they occur.

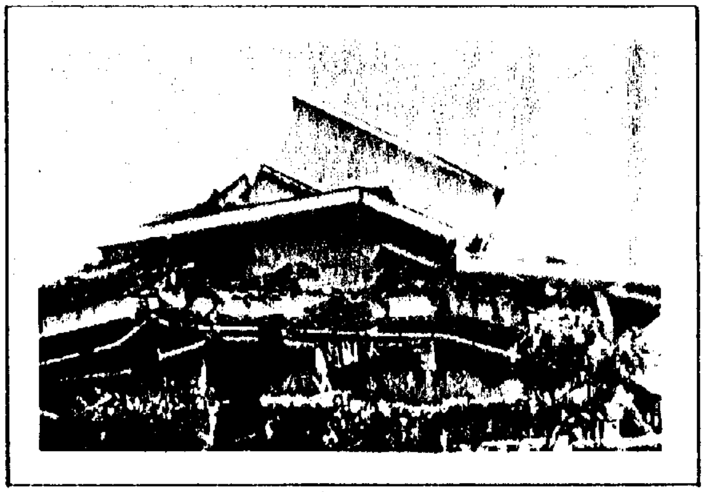
Tsunami and Seiche Effects. Tsunamis are large ocean waves generated by rapid changes in elevation of large masses of earth and ocean. They are commonly caused by vertical faulting beneath the ocean that rapidly moves a large volume of earth and water. Such rapid movement may generate huge waves of destructive force that can travel thousands of miles. During the 1964 Alaskan earthquake, for example, faulting and crustal warping created tsunamis, or sea waves, tens of feet high that spread more than 1,500 miles from the source area and caused devastation to many coastal communities within their reach. The effects of tsunamis can be greatly amplified by the configuration of the local shoreline and the sea bottom. Since a precise methodology does not exist to define these effects it becomes important, through examination of the historic record, to what elevation they have reached. It is also desirable to attempt to assess what amplifying effect a local coastal topographic configuration might have on uniquely directional incoming waves.



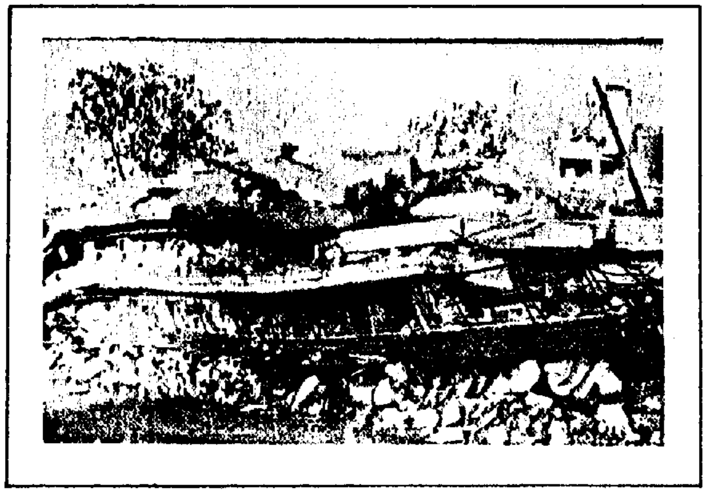
Lodge Hall in Tehachapi in 1952 earthquake. The ceiling over the 2nd floor auditorium now rests on the piano.



Three story school in Managua is now one story. 1972 earthquake - effects of groundshaking.

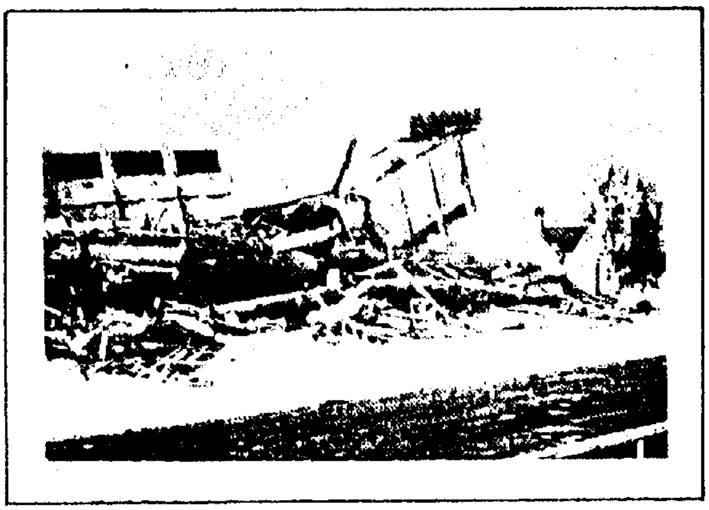


Three story office for the Custom House in Managua. Effects of groundshaking. 1972 earthquake.



Picture No. 19: Four story office in the Building Commission in Managua, 1972. Groundshaking effect.

Five story Penney Store in Anchorage, Alaska collapsed causing some deaths in 1964 earthquake.



Six story Four Seasons Apartment Building in Anchorage collapsed in 1964.

EXHIBIT 2D

Seiches are earthquake-generated waves within enclosed or restricted bodies of water (lakes, reservoirs, and bays). They can be likened to the sloshing of water in a bowl or bucket when it is shaken or jarred. The waves can be tens of feet high or more and have devastating effects on people and property within their reach. Dams and reservoirs can be overtopped and large volumes of water released to inundate downstream development.

Large water waves causing catastrophic inundation can also result during an earthquake from a dam failure or from large-scale landsliding into a reservoir or bay. The near failure of the Van Norman reservoir during the 1971 San Fernando earthquake required the evacuation of 80,000 people that lived below it (Seed, 1974, p. 14). Although not the result of an earthquake, almost 3,000 lives were lost in Italy in 1963 when a huge landslide (more than 312 million cubic yards of material) suddenly fell into Vaiont Reservoir, sending up a wall of water and rocks 850 feet above reservoir level opposite the slide area and waves of water about 330 feet above the crest of the dam (Kiersch, 1964). Waves were more than 230 feet high in the narrow valley as far as 1 mile downstream from the dam. Earthquake-generated landslides of this magnitude are possible hazards to dams or reservoirs. The 1958 Alaskan earthquake produced a massive rock fall that plunged into an inlet at the head of Lituya Bay, causing water to surge against the opposite wall of the inlet and to wash out trees up to 1,720 feet above sea level (Miller, 1960, p. 51). It is extremely fortunate that the bay was uninhabited and that no more than two fishermen died when their boat was destroyed as the wave passed out of the mouth of the bay.

Methods for Assessing Wave and Flooding Hazards. Assessing the hazards from tsunamis and seiches is very difficult and subject to varying interpretations because of very limited historical data and theoretical knowledge. Nevertheless, wave run-up elevations could be predicted for most ocean and lake shorelines from examination of historic records. An attempt should be made to assess the amplifying effect of unique topographical coastal configurations even though the methodology may be very crude. Potential areas of catastrophic inundation from dam and reservoir failure or from landslide-generated waves that overtop dam crests, on the other hand, can be mapped for all large bodies of water perched above populated areas. Recently passed legislation in California now requires the dam owners to prepare maps showing areas of potential inundation for use in disaster and land-use planning.

SECTION II REFERENCE

Albee, A. L., and Smith, J. L., 1967, Geologic Criteria for Nuclear Power Plant Location; Soc. Mining Engineers Trans., v. 238, no. 4, p. 430-434.

Atomic Energy Commission, 1971, Nuclear power plants, seismic and geologic siting criteria: Federal Register, v. 36, no. 228, p. 22601-22605.

Bonilla, M. G., 1970, Surface faulting and related effects, Chap. 3 in Wiegel, R. L., ed., Earthquake Engineering: Prentice-Hall, Englewood Cliffs, N. J., p. 47-74.

______, and Buchanan, J. M., 1970, Interim report on worldwide historic surface faulting: U. S. Geologic Survey open file rept. 32 p.

Castle, R. O., 1966, Preliminary Study of the Geology at Two Proposed Sites for a Nuclear-Powered Desalting Plant Near

Sunset Beach and Pelican Point, Orange County, California: U. S. Geol. Survey Rept. prepared on behalf of the U. S. Atomic Energy Comm., 73 p.

Hansen, W. R., Eckel, E. B., Schaem, W. E., Lyle, R. E., George, Warren, and Chance, Genie, 1966, The Alaska Earthquake March 27, 1964; Field Investigations and Reconstruction Effort: U. S. Geologic Survey Prof. Paper 541, 111 P.

Kiersch, G. A., 1964, Vaiont Reservoir Disaster: Civil Engineering, v. 34, no. 3, p. 32-39.

Longwell, C. R., Knopf, Adolph, Flint, R. F., 1949, Physical Geology: John Wiley & Sons, Inc., New York, N. Y., 602 p.

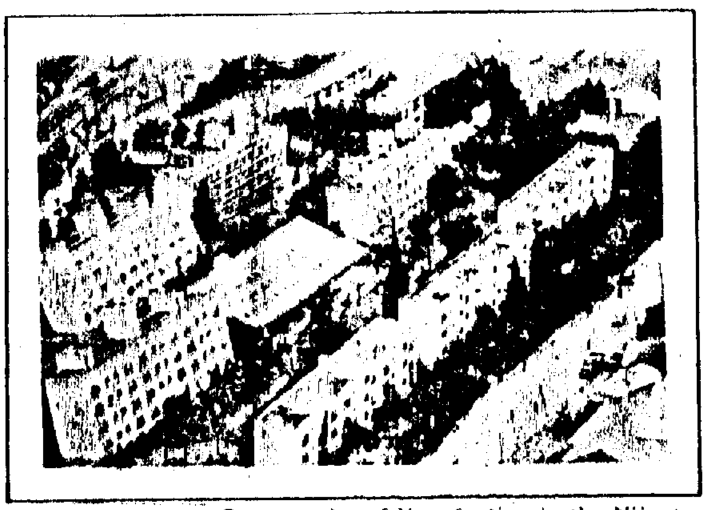
Miller, Don J., 1960, Giant Waves in Lituya Bay, Alaska: U. S. Geologic Survey Prof. Paper 354-C, p. 51-86.

Seed, H. Bolton, 1972, Dams and soils, in the San Fernando Earthquake of February 9, 1971 and Public Policy, ed., George O. Gates: Spec. Subcommittee of the Joint Committee on Seismic Safety, California Legislature, 131 p.

Town and Country Planning Branch, Ministry of Works, 1965, Town Planning and Earthquake Faults: Town and Country Planning Bull., No. 7, p. 1-6, Wellington, New Zealand.

Wallace, R. E., 1968b, Minimizing earthquake hazards: Jour. American Inst. of Architects, vol. 19, no. 1, p. 65-69.

Youd, T. L., 1971, Landsliding in the vicinity of the Van Norman Lakes, in the San Fernando, California, earthquake of February 9, 1971: U. S. Geologic Survey Prof. Paper 733, p. 105-109.



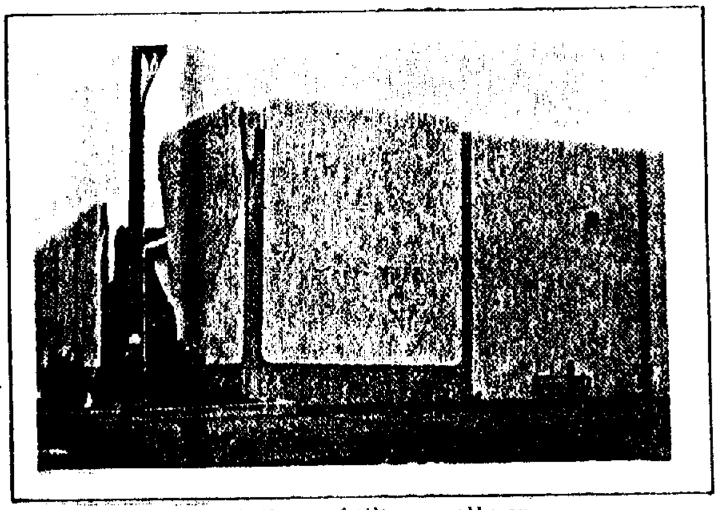
One results of liquefaction in the Niigata earthquake. These apartment houses which did not have basements overturned. The two buildings with basements were not damaged and remained vertical.

EXHIBIT D

SECTION III

BUILDING CODES AND BUILDING PERFORMANCE IN EARTHQUAKES

The forces exerted on a building and its contests by shaking are often represented as fractions of the acceleration of gravity. Thus, an earthquake force of 0.3g would indicate that the maximum ground acceleration expected would be 30% of the acceleration of gravity. Ground acceleration from earthquakes can occur in both the horizontal (lateral) and vertical directions.



Failure of tilt-up walls on industrial structure in San Fernando earthquake, 1971.

EXHIBIT D

Lateral forces are usually but not always randomly directed and a design for a lg horizontal acceleration could be very roughly compared with a design which allowed the foundation of the building to be set on edge with the building cantilevered into space. A vertical acceleration of lg would throw loose objects into the air. The design of a building for a lg vertical acceleration could be roughly compared to designing the building to support double the weight of the structure and its contents. Total vertical design load of a building is the load resulting from the weight of the building itself (called the "dead load"), plus the estimated load to result from the contents, usage, wind, ground and other variable forces (called the "live load"). This would be equivalent to more than lg acceleration in total.

HISTORY OF EARTHQUAKE CODES IN CALIFORNIA

Prior to 1933, the earthquake design standards contained in building codes in California specified only a single lateral force for both wind and earthquake resistance. For example, San Francisco was rebuilt after the 1906 earthquake and fire under a code which required strength enough for 30 pounds per square foot from either wind or earthquake forces.

Beginning with the Riley Act, adopted by the California State Legislature in 1933, earthquake codes have specified that buildings be designed for earthquake forces proportional to their masses. This initial act required all buildings except certain dwellings and farm buildings to be designed to resist a lateral force of 2% of the total vertical design load. In 1953, this requirement was revised to require 3%

for buildings less than 40 feet in height and 2% for those over 40 feet in height.

In 1948, a Joint Committee on Lateral Forces (of the San Francisco Section of the American Society of Civil Engineers and the Structural Engineers Association of Northern California) was formed, and after several years of study, it recommended a code in which the required percentages of load were related to the estimated or calculated fundamental period of the structure. This takes into consideration semi-dynamic loads. San Francisco adopted a version of this code in 1956 and the Uniform Building Code adopted it somewhat later.

Recently, some structural engineers have been working with an analytical method which takes into account the dynamic response of proposed buildings, through the use of computer analysis. This dynamic response method is likely to become part of the building codes in the future.

TYPES OF BUILDINGS AND PAST PERFORMANCE

Steel Frame Buildings. During the 1971 San Fernando earthquake, no significant structural damage was experienced by any completed earthquake resistive steel-frame buildings in the Los Angeles area. Many did suffer other kinds of damage resulting in a maximum loss, in one case, of $200,000, or about 1% of the value of the building.

Older steel frame non-earthquake resistive buildings performed much more poorly. While none sustained structural damage, many experienced non-structural losses amounting to over 5% of assessed market value and in one case over 25% of assessed market value.

Concrete Frame Buildings. The experience of the 1971 San Fernando quake showed that earthquake-resistive concrete frame buildings performed generally as well as steel frame buildings when located 15 to 25 miles from the epicenter. Of the high-rise buildings which suffered the highest amounts of damage, however, many more were to reinforced concrete than steel.

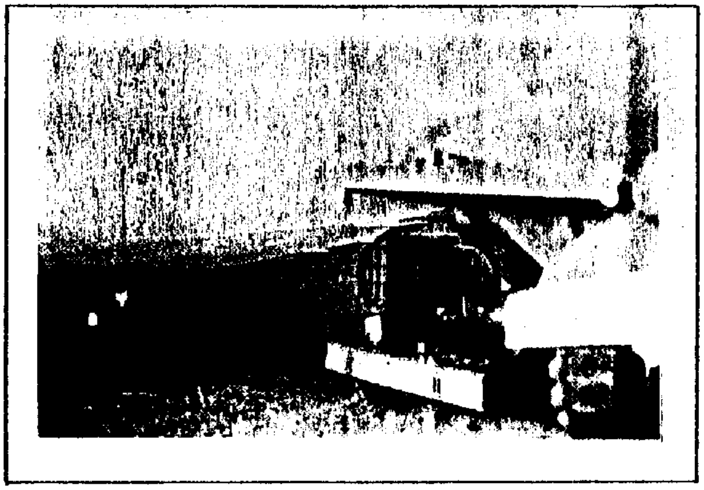
Unreinforced Concrete Block and Hollow Clay Tile Buildings. Older buildings of non-reinforced concrete block laid in sand-lime mortar are extremely vulnerable to earthquake damage. Many of this kind of building suffered slight and moderate damage in San Fernando, and a few experienced severe damage.

Brick Buildings and Reinforced Brick Buildings. Brick and reinforced brick buildings also do very poorly in earthquakes. In the San Fernando quake, pre-1940 brick structures suffered much more severe and moderate damage than any other type.

Reinforced Masonry Buildings. Most of these buildings were built under modern building codes and can be considered generally safe. Their weakness in San Fernando was joint failure, leading occasionally to detachment of roof from walls.

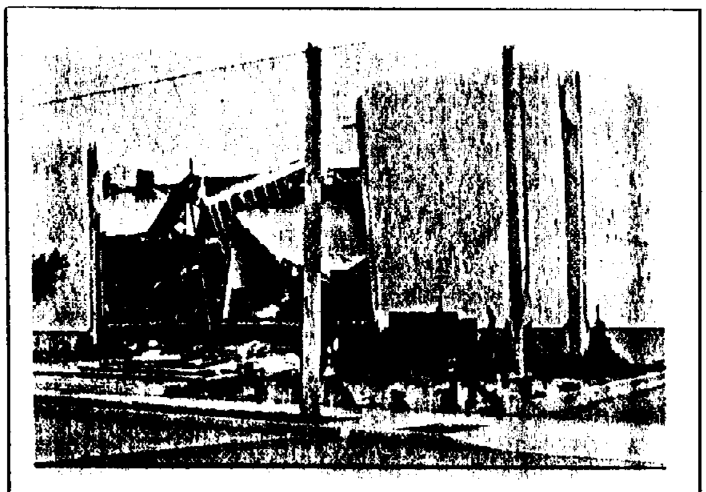
Steel and Sheet Metal Buildings. Metal-sided buildings, usually used for storage and factories, perform very well in earthquakes because of their light weight and flexibility.

Wood-Frame Buildings. Wood-frame structures have the best earthquake performance record of all older and smaller buildings. Their light mass accounts for much of their low susceptibility to damage.

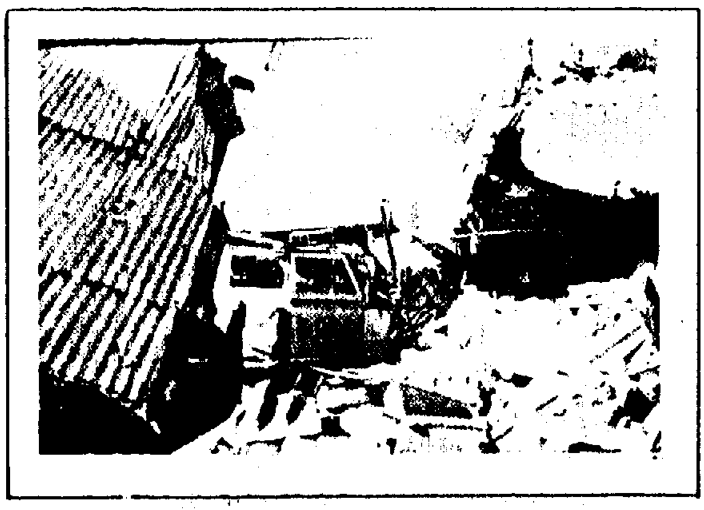


Managua, 1972. Eight modern firetrucks were of no use in fighting fires after the firehouse collapsed on them.

Even reinforced masonry failed similarly to tilt-up walls in the 1971 San Fernando earthquake in the industrial buildings.



Another view of typical failure 1971 San Fernando earthquake.



Managua, 1972 earthquake. The collapse of the Red Cross Building rendered the ambulances useless

EXHIBIT D

BUILDING COMPONENTS AND PAST PERFORMANCE

Parapets and Chimneys. Probably the greatest loss of life from earthquakes has resulted from the failure of unreinforced unit masonry, particularly unreinforced brick parapets, on commercial buildings. Persons on the streets or inside buildings are often injured by such falling masonry. Chimneys can, also, be a great hazard in houses and small apartments.

Signs and Appendages. Signs, marquees, canopies, and general ornamentation extending out from buildings pose a great potential hazard in earthquakes if not adequately anchored to the building.

Facades. Two kinds of hazards can be caused by building facades. Masonry veneer facades, inadequately anchored, can be shaken loose by an earthquake, causing danger similar to parapets. On the other hand open glass facades, as on stores, can cause amplified twisting to the building and shattering of glass on the sidewalk.

Ceilings and Hanging Items. Plaster ceilings and ceiling tiles are often shaken loose during an earthquake, as are poorly-anchored hanging fixtures, resulting in human injury.

Building Contents. Heavy furniture, appliances, bookcases, machinery, etc. often are thrown about during earthquake shaking and can cause damage and injury.

Access Routes. Stairwells and doorways are often blocked after earthquakes. Doors and elevators are often inoperative.

BUILDING PERFORMANCE IN RELATION TO FAULTS

Straddling Fault. Buildings located upon a fault inevitably suffer damage in an earthquake as well as by fault creep. Any fault displacement will cause cracking of continuous foundations or shearing and twisting of pile foundations. This may result in failure of the structural frame.

Adjacent to Fault. While damage is insured to structures located on faults, it is much more variable for structures very near faults and depends a great deal on specific ground and building conditions. Buildings on solid ground near a fault often fare much better in an earthquake then buildings on softer ground miles away.

Some Distance from the Fault. Although the force of the earthquake is diminished as it moves away from the epicenter, it can still have considerable effect for miles. Buildings over five stories high are especially susceptible to damage from the diminishing gentler oscillations of an earthquake, which may travel as far as 100 to 200 miles from the epicenter.

Reference: Section I-III, Table I, Glossary Tri-Cities Citizens Advisory Committee, The Seismic Safety Study for the General Plan. California Council on Intergovernmental Relations, Sacramento, California 1973.

TABLE I

MODIFIED MERCALLI SCALE OF EARTHQUAKE INTENSITIES

(As modified by Charles F. Richter in 1956 and rearranged)

The intensity is:	If most of these effects are observed:
1	Earthquake shaking not felt, but people may observe marginal effects of large distance earthquakes without identifying these effects as earthquake caused. Among them: trees, structures, liquids, bodies of water sway slowly, or doors swing slowly.
2	Effect on people: Shaking felt by those at rest; especially if they are indoors and by those on upper floors.
3	Effect on people: Felt by most people indoors. Some can estimate duration of shaking. But many may not recognize shaking of building as caused by an earthquake; the shaking is like that caused by the passing of light trucks.
4	Other effect: Hanging objects swing. Structural effect: Windows or doors rattle. Wooden walls and frames creak.
5	Effect on people: Felt by everyone indoors. Many estimate duration of shaking. But they still may not recognize it as caused by an earthquake. The shaking is like that caused by the passing of heavy trucks, though sometimes, instead people may feel the sensation of a jolt, as if a heavy ball had struck the walls. Other effects: Hanging objects swing. Standing autos rock. Crockery clashes, dishes rattle or glasses clink. Structural effects: Doors close, open or swing. Windows rattle.
6	Effect on people: Felt by everyone indoors and by most people outdoors. Many now estimate not only the duration of shaking but also its direction and have no doubt as to its cause. Sleepers wakened. Other effects: Hanging objects swing.

EXHIBIT D

Shutters or pictures move. Pendulum clocks stop, start or change rate. Standing autos rock. Crockery clashes, dishes rattle or glasses clink. Liquids disturbed, some spilled. Small unstable objects displaced or upset.
Structural effects: Weak plaster and Masonry D* crack. Windows break. Doors close, open or swing.

7 Effect on people: Felt by everyone. Many are frightened and run outdoors. People walk unsteadily.
Other effects: Small church or school bells ring. Pictures thrown off walls, knicknacks and books off shelves. Dishes or glasses broken. Furniture moved or overturned. Trees, bushes shaken visibly, or heard to rustle.
Structural effects: Masonry D* damaged; some cracks in Masonry C*. Weak chimneys break at roof line. Plaster, loose bricks, stones, tiles, cornices, unbraced parapets and architectural ornaments fall. Concrete irrigation ditches damaged.

8 Effect on people: Difficult to stand. Shaking noticed by auto drivers.
Other effects: Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Furniture broken. Hanging objects quiver.
Structural effects: Masonry D* heavily damaged; Masonry C* damaged, partially collapses in some cases; some damage to Masonry B*; none to Masonry A*. Stucco and some masonry walls fall. Chimneys, factory stacks, monuments, towers, elevated tanks twist or fall. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off.

9 Effect on people: General fright. People thrown to ground.
Other effects: Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes. Steering of autos affected. Branches broken from trees.
Structural effects: Masonry D* destroyed; Masonry C* heavily damaged, sometimes with complete collapse; Masonry B* is seriously damaged. General damage to foundations.

10 Effect on people: General Panic.
Other effects: Conspicuous cracks in ground. In areas of soft ground, sand is ejected through holes and piles up into a small crater, and in muddy areas, water fountains are formed.
Structural effects: Most masonry and frame structures destroyed along with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes and embankments. Railroads bent slightly.

11 Effect on people: General panic.
Other effects: Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land.
Structural effects: General destruction of buildings. Underground pipelines completely out of service. Railroads bent greatly.

12 Effect on people: General panic.
Other effects: Same as for Intensity X.
Structural effects: Damage nearly total, the ultimate catastrophe.
Other effects: Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.

*Masonry A: Good workmanship and mortar, reinforced designed to resist lateral forces.

Masonry B: Good workmanship and mortar, reinforced.

Masonry C: Good workmanship and mortar, unreinforced.

Masonry D: Poor workmanship and mortar and weak materials, like adobe.

GLOSSARY

An attempt has been made to define all technical words contained in the text. If a technical word is not defined, often the word can be found in a standard dictionary. In using the glossary, the reader will note that many technical words appear within the definitions themselves. Definitions of these words can also be found in the glossary.

Active faults. Active faults are faults which show evidence of any or all of the following:

1. Topographic or physiographic expressions suggestive of geologically young fault movements.
2. Fault creep.
3. Records of surface rupture within or adjacent to the study area in historic time.

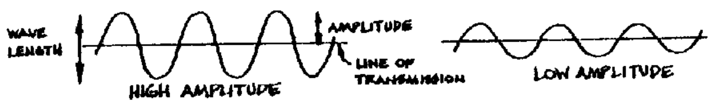
Aggregate. Materials such as sand, gravel, and crushed rock, with which cement or bituminous material is mixed to make concrete or asphalt.

Alluvial fans. Alluvial fans are built by rivers flowing from mountains onto lowlands. They are low cone-shaped heaps, steepest near the mouth of the valley, and sloping gently outward with ever decreasing slope.

Alluvium. A general term for the sediments laid down in river beds, flood plains, lakes, fans at the foot of the mountain slopes, and estuaries during relatively recent geologic times.

Amplification. The increase in earthquake ground motion that may occur to the principal components of seismic waves as they enter and pass through different earth materials.

Amplitude. One-half the elevation of the crest of a wave or ripple above the adjacent troughs:

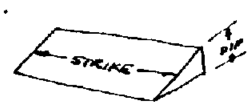


Anomaly. A deviation or inconsistency of a specific land feature from uniformity with the larger area.

Anomalous features. See "anomaly".

Anticline. An upfold or arch of rock strata formed by internal earth pressure forming a shape like the roof of a house. Erosion could alter this shape leaving only the inclined strata.

Attitude (of rock structures). A term including the terms dip and strike. The attitude of the flat surface of a sedimentary bed, whether inclined or not, is referred to the horizontal plane. Dip is its slope inclination (in degrees) from this plane, and is measured with a clinometer. Strike is the compass bearing on the line of intersection of its surface with horizontal plane. The terms may also apply to faults, veins, and dikes.



Basalt. A dark-colored, fine-grained volcanic rock, composed essentially of the mineral plagioclase feldspar and one or more dark minerals such as pyroxene.

Bed. The smallest division of a stratified series, and marked by a more or less well-defined plane from its neighbors above and below.

Bedding plane. In sedimentary or stratified rocks, the division planes which separate the individual layers, beds or strata.

Bedrock. Any solid rock underlying soil, sand, clay, etc.

Berkeley hills. The hills on the immediate east side of San Francisco Bay contained within such cities as Oakland, Berkeley, El Cerrito and Richmond.

Bore hole. A hole drilled into the earth for exploratory purposes.

Breccia. A rock composed of angular coarse fragments, commonly cemented together.

Chert. A compact sedimentary rock containing abundant quartz of organic or precipitated origin.

Clastic rock or Clast. A rock which is composed principally of detritus transported mechanically into its place of deposition.

Cohesion, rock. The capacity of a rock to stick or adhere together. In effect the cohesion of soil or rock is that part of its shear strength which does not depend upon interparticle friction.

Cohesive materials. See "cohesion, rock".

Colluvium. Soil deposited by soil creep, landslides and surface wash.

Compaction. Decrease in volume of sediments, as a result of compression of sediments deposited above them.

Competent beds. Those beds or strata which, because of massiveness or inherent strength, are able to lift not only their own weight but also overlying rock. Therefore, such rock material is especially able to withstand failure such as landsliding.

Conglomerate. A rock composed of larger fragments (such as pebbles or cobbles) set in a matrix of finer material (such as sand, silt, and/or clay).

Consolidated material. Soft or hard rock which requires some medium of loosening at the excavation site before it can be handled. The more loosening required (i.e., blasting as opposed to bulldozing) the more consolidated the material.

Continental rock. A rock unit laid down on land as opposed to one laid down in marine water.

Contra Costa Group. The type of poorly consolidated young sedimentary rock found in the Tri-Cities Area east & north of the Berkeley hills ridgeline.

Creep, fault. See "fault creep".

Cross bedding. The arrangement of narrow layers of sedimentary rock such that layers are at angles to rather than parallel to the other layers.

Damping. A resistance to vibration that causes a progressive reduction of motion with time or distance.

Deformation of rocks. A change in the original form or volume of rock masses produced by faulting, folding or other tectonic forces.

Detritus. The materials that result from the breaking up, disintegration and wearing away of minerals and rocks resulting in alluvial deposits.

Diatomite. A light friable, siliceous material chiefly produced from the remains of minute forms of algae.

Differential Settlement. Loss of strength or the loss of water and sand through liquefaction often does not occur evenly over broad areas. Thus the ground settles different amounts in adjacent spots. Can be very destructive to buildings.

Dip. See "attitude".

Dip slip. Fault displacement parallel to the dip of the fault. See "attitude" and "slip".

Displacement. The dislocation of one side of a fault relative to the other side resulting from fault movement.

Earth-flow. A slow flow of earth lubricated with water. Earth-flows may be discriminated from earth-slumps by reason of their greater mobility.

Earthquake. Perceptible trembling to violent shaking of the ground, produced by sudden displacement of rocks below and at the earth's surface.

Earthquake focus. See "focus".

Earth-slump. See "earth-flow".

Elastic limit. The maximum stress that a material can withstand without undergoing permanent deformation either by solid flow or by rupture.

Elasticity. The property or quality of being elastic, that is, an elastic body returns to its original form or condition after a displacing force is removed.

Eocene. An epoch of the lower Tertiary period. It ranges from 37 to 38 million to 53 to 54 million years before the present.

Epicenter. The geographical location of the point on the surface of the earth that is vertically above the earthquake focus.

Fan, alluvial. See "alluvial fan".

Fault. An earth fracture or zone of fracture along which the rocks on one side have been displaced in relation to those of the other.

Fault block. A body of rock bounded by one or more faults.

Fault creep. Very slow periodic or episodic movement along a fault trace unaccompanied by quakes.

Fault-scarp. The cliff formed by a fault. Most fault scarps have been modified by erosion since faulting.

Fault set. Two or more parallel faults within an area.

Fault slip or slippage. The relative displacement of formerly adjacent points on opposite sides of a fault. Also known as fault creep.

Fault system. Two or more fault sets formed at the same time.

Fault surface. The surface along which dislocation has taken place.

Fault trace. The intersection of a fault and the earth's surface as revealed by dislocation of fences, roads, by ridges and furrows in the ground, etc.

Fault zone. A fault instead of being a single clean fracture, may be a zone hundreds or thousands of feet wide; the fault zone consists of numerous interlacing small faults or a confused zone of gouge, breccia or other material.

Fault, active. See "active fault".

Fault, inactive. See "inactive fault".

Fault, normal. See "normal fault".

Fault, reverse. See "reverse fault".

Fault, right-lateral. See "right-lateral fault".

Fault, thrust. See "thrust fault".

Faulting. The movement which produces relative displacement of adjacent rock masses along a fracture.

Fissure. An extensive crack, break, or fracture in the rocks.

Flexuring. Synonymous with folding.

Focal depth. Depth of an earthquake focus below the ground surface.

Focus. The point within the earth which marks the origin of the elastic waves of an earthquake.

Fold. A bend in rock strata.

Formation. A rock body or an assemblage of rocks which have some character in common; applied to a particular sequence of rocks formed during one epoch; a rock unit used in mapping.

Fracture. Breaks in rocks due to intense faulting or folding.

Free face. A sloping surface exposed to air or water such that there is little or no resistance to lateral movement of earth materials.

Frequency. The number of seismic wave peaks which pass through a point in the ground in a unit of time. Usually measured in cycles per second.

Friable. A term applied to rocks that are easily crumbled or pulverized.

Geodetic measurements. Controls on location (vertical & horizontal) of positions on the earth's surface of a high order of accuracy, usually extended over large areas for surveying and mapping operations.

Geology. The science which treats of the earth, the rocks of which it is composed, and the changes which it has undergone or is undergoing.

Geophysical surveys. The use of one or more physical techniques to explore earth properties and processes.

Gouge material. Finely ground material occurring between the walls of a fault, the result of grinding movements.

Graywacke. A hard, dark-colored, sandstone composed primarily of highly angular quartz and feldspar in a clay matrix. Usually contains significant quantities of rock fragments.

Ground cracking. Cracks usually occurring in stiff surface materials resulting from differential ground movement.

Ground failure. A situation in which the ground does not hold together such as in landsliding, mud flows, liquefaction and the like.

Ground lurching. Undulating waves in soft saturated ground that may or may not remain after the earthquake.

Ground strength. The limiting stress that ground can withstand without failing by rupture or continuous flow.

Ground response. The reaction of the ground to earthquake shaking.

Group. A local subdivision of a series of rocks, based on lithologic features. It usually contains two or more formations.

Hayward fault. A large and active branch of the San Andreas Fault System. It has been the center of many earthquakes, including the 1868 earthquake which was one of the largest ever to hit Northern California.

Hummocky. Lumpy land, or in small uneven knolls. This condition is a sign of previous extensive landsliding.

Hypocenter That point within the earth which is the center of an earthquake and the origin of its elastic waves.

Inactive faults. Identifiable faults which do not meet any of the criteria listed under "active faults".

Incompetent beds. Opposite of competent beds.

Inelastic deformation. Permanent deformation of materials either by flow, creep, or rupture.

Intensity. (See Table 1) A nonlinear measure of earthquake size at a particular place as determined by its effect on persons, structures, and earth materials. The principal scale used in the United States today is the Modified Mercalli, 1956 version. Intensity is a measure of effects as contrasted with magnitude which is a measure of energy. They are not the same.

Interstitial water. Water contained within the minute pores or spaces between the small grains or other units of rock.

Intrusion. An igneous rock that has been injected into older rocks; it has cooled and solidified from a molten condition under the cover of the surrounding rock mass.

Inundation. Flooding caused by water topping a dam or water released by dam, reservoir, levy or other break.

Isoseismic line. An imaginary line connecting all points on the surface of the earth where an earthquake shock is of the same intensity.

Lacustrine. Formed in a lake.

Landsliding. The perceptible downward sliding or falling of a relatively dry mass of earth, rock, or mixture of the two. Often loosely used to also include sliding of wet earth masses such as mudslides and earthflows.

Left-lateral fault movement. Generally horizontal movement in which the block across the fault from an observer has moved to the left.

Lenticular. Shaped approximately like a double convex lens. When a mass of rock thins out from the center to a thin edge all around, it is said to be lenticular in form.

Liquefaction. A process by which a water saturated sand lens loses coherence when shaken. Involved is the collapse of sand grains into intergranular voids which induces an increase in pore pressure and loss of strength. This loss of strength leads to a quicksand condition in which objects can either sink or float depending on their density.

Lithology. The description of rock composition and texture from observation of hand specimens or outcrops.

Mafic pyroclastic rocks. Pyroclastic rocks containing a high proportion of dark colored (mafic) rock and mineral constituents such as basalt.

Magnitude. The rating of a given earthquake is defined as the logarithm of the maximum amplitude on a seismogram written by an instrument of specified standard type at a distance of 62 miles from the epicenter. It is a measure of the energy released in an earthquake. The zero of the scale is fixed arbitrarily to fit the smallest recorded earthquakes. The scale is open ended but the largest known earthquake magnitudes are near 8-3/4. Because the scale is logarithmic, every upward step of one magnitude unit means a 32 fold increase in energey release. Thus, a magnitude 7 earthquake releases 32 times as much energy as a magnitude 6 earthquake. Magnitude is not the same as intensity.

Melange. A mixture or complex of rocks.

Micro-earthquake. A very small earthquake having a magnitude of 2 or less on the Richter scale.

Microseismic Event. An earthquake or man-induced vibrations observable only with instruments.

Miocene. An epoch of the upper Tertiary period. It ranges from 12 million to 26 million years before the present.

Modified Mercalli. See "intensity".

Monitoring fault movement. Use of survey methods over a period of time to measure displacement caused by creep over a period of time.

Morphology, slope. See "slope morphology."

Mudflow or mudslide. A flowage of heterogeneous debris lubricated with a large amount of water.

Normal fault. Vertical movement along a sloping fault surface in which the block above the fault has moved downward relative to the block below.

Period, natural. See "natural period".

Period, predominant. See "predominant period".

Physiography. A description of existing nature as displayed in the surface arrangement of the globe, its features, atmospheric and oceanic currents, climate, etc.

Plastic deformation. Under some conditions solids may bend instead of shearing or breaking as a result of seismic and geologic forces.

Pliocene. The latest epoch in the Tertiary period. It ranges from 7 to 10 million to 2 to 3 million years before the present.

Ponding. Accumulation of alluvial and colluvial deposits behind a fault-produced barrier.

Precipitate. The material resulting from the process of separating mineral constituents from a solution by evaporation (salt, etc.) or from magma to form igneous rocks.

Predominant period. A number representing the time between seismic wave peaks to which a building on the ground is most vulnerable. Usually measured in seconds.

Pumice. An excessively cellular, glassy lava of whitish or gray color. It is very light and will float on water.

Pyroclastic. A general term for fragmental deposits of volcanic materials, including volcanic conglomerate, agglomerate, tuff and ash.

Remote sensing. The acquisition of information or measurement of some property of an object by a recording device that is not in physical or intimate contact with the object under study. The technique employs such devices as the camera, lasers, infrared and ultraviolet detectors, microwave and radio frequency receivers, radar systems, etc.

Residual soil. A soil deposit formed by the decay of rock in place.

Reverse or thrust fault. Vertical or nearly horizontal movement along a sloping fault surface in which the block above has moved upward or over the block below the fault.

Right-lateral fault movement. Generally horizontal movement in which the block across the fault from an observer has moved to the right.

Sag ponds. Ponds occupying depressions along active faults. The depressions are due to uneven settling of the ground.

Sand boils. Turgid upward flow of water and some sand to the ground surface resulting from increased ground water pressures when saturated cohesionless materials are compacted by earthquake ground vibrations.

Scarp. An escarpment, cliff, or steep slope of some extent along the margin of a plateau, terrace, bench, and at the top of a slide.

Sediment. Solid material settled from suspension in a liquid.

Sedimentary rocks. Rocks, commonly stratified, formed by the accumulation of sedimentation in water or from air.

Seismograph. An instrument that writes a permanent continuous record of earth vibrations.

Seismic. Pertaining to an earthquake or earth vibration, including those that are artificially induced.

Seismology. The science of earthquakes and related phenomena.

Seismometer. A device which detects vibrations of the earth, and whose physical constants are known sufficiently for calibration to permit calculation of actual ground motion from the seismograph.

Shear. A mode of failure whereby two adjacent parts of a solid, slide past one another parallel to the plane of contact. To subject a body to shear, similar to the displacement of the cards in a pack relative to one another.

Slip, fault. See "fault slip".

Solid flow. Flow of a solid under long-time stress.

Strata. Layers of sedimentary rocks.

Strength, ground. See "ground strength".

Strike. See "attitude".

Strike-slip. Fault displacement parallel to the strike of the fault. See "attitude" and "slip".

Strong motion. Ground motion produced by a "strong" earthquake or one capable of producing damage to structures. The magnitude of such an earthquake may vary considerably according to the character of the earthquake.

Structural feature. Features produced in the rock by movements after deposition, and commonly after consolidation, of the rock.

Subsidence. A shrinking of a large area of land, usually observed as a shrinkage.

Surface wash. A loose surface deposit of sand, gravel, boulders, etc.

Syncline. A trough-shaped fold in rocks in which the strata dip inward from both sides toward the axis. The opposite of anticline.

Tectonic. Pertaining to or designating the rock structure and external forms resulting from the deformation of the earth's crust. Pressures causing such deformations often result in earthquakes.

Trace, fault. See "fault trace".

Thrust fault. See "reverse fault".

Topography. The physical features of the land, especially its relief and contour.

Torsional forces. Forces which act to twist the object in question.

Tsunami. A sea wave produced by large areal displacements of the ocean bottom, often the result of earthquakes or volcanic activity. Also known as seismic sea waves.

Unconformity. In sedimentary rocks sometimes strata of intermediate age between younger and older rocks are absent. This is usually caused by total erosion of the middle-aged sediment before the younger sediment was deposited.

Unconsolidated material. Opposite of "consolidated material".

Undulating waves. Waves that rise and fall.

Water Table. The upper surface of a zone of water saturation within the ground.

Wash, surface. See "surface wash".

Wave height. The difference in elevation between adjoining wave crests and troughs.

Our county's experience with floods that never reached such heights before or never flooded areas before illustrates man's inability to predict nature.

It seems, therefore, that two basic approaches are available to our county to cope with our natural environment.

First, determine what areas pose the greatest hazards to life and property within the county and avoid development in these areas.

Second, maintain the most effective disaster-response program practicable to cope with emergencies and reduce loss of life, injuries, and property damage.

In an attempt to meet the requirements of the state law, Siskiyou County in conjunction with other Northern California governmental agencies contracted with the California State University at Chico to analyze and evaluate the seismic history and potential for the 13 northeastern counties of California.

Following this report is a further summary and analysis by Dr. Rolland Berger, Office of Regional Programs, California State University, Chico.

Using these two documents and relating the data to Siskiyou County forms the basis for the findings and recommendations for action to be best prepared, avert, and to react to a seismic disaster.

Seismic Hazard in Northeastern California

Section IV

Page

INTRODUCTION AND PURPOSE 1

DEFINITION OF REGION 2

SEISMIC HAZARD IN CALIFORNIA 2

PROBLEM OF IDENTIFYING SEISMIC HAZARD. 4

SEISMIC REGIONALIZATION. 6

EARTHQUAKE HISTORY: EARTHQUAKES IN THE REGION 11

NUMBER AND INTENSITY. 12
DAMAGE, INJURIES, DEATHS. 13
LOCATION IN SPACE 14
LOCATION IN TIME. 14
MAGNITUDE 15

EARTHQUAKE HISTORY: EARTHQUAKES OUTSIDE
THE REGION 15

DAMAGE, INJURIES, DEATHS. 21

FAULTS 21

ACTIVE AND INACTIVE FAULTS. 22
FAULTS OF NORTHEAST CALIFORNIA. 24

FUTURE SEISMIC ACTIVITY. 26

MAXIMUM INTENSITY 26
LOCATION. 28

EARTHQUAKE HAZARD IN PERSPECTIVE 28

SUMMARY OF CONCLUSIONS 31

REFERENCES CITED 33

APPENDIX I 34

APPENDIX II. 36

EARTHQUAKE HAZARD IN NORTHEAST CALIFORNIA

J.W. Guyton* and A.L. Scheel**

INTRODUCTION AND PURPOSE

The purpose of this study is to analyze existing seismological and geological data pertinent to earthquake hazard within a thirteen county area of Northeast California. The need for the study originates with the adoption by the California legislature in 1971 of an amendment to State Planning Law that includes a seismic safety element as a mandatory part of each city and county General Plan (Chap. 150, Section 65302 (F) of the Government Code).

The preparation of an effective seismic safety element necessitates not only detailed consideration of what has happened or might happen within a given jurisdiction, but also consideration of that jurisdiction within a larger area, a region. It is the regional aspect of seismic safety that this study addresses. We will present data and analysis that are useful to each governmental unit within the region even though the study is not oriented toward any single unit. This approach minimizes duplication of effort in some respects, even though each jurisdiction must still utilize supplementary data to construct its own seismic safety element.

---

*Dept. of Geological and Physical Sciences, California State University, Chico

**Graduate Student, Dept. of Geography, California State University, Chico

EXHIBIT D

When this study was first conceived it was our plan to restrict it to a compilation of factual data. This would be useful, but would still necessitate analysis and interpretation of the data by each city and county planner, thus relegating a critical part of the procedure to a person least familiar with the data. Discussion with Rolland Berger of the Office of Regional Programs convinced us that we should not only compile but also analyze and interpret; this we have tried to do. In addition, Dr. Berger is preparing a separate paper in which he relates results of this study directly to planning policy for Northeast California. We hope that this approach will deliver maximum useful information to those who make decisions for Counties and Cities.

DEFINITION OF REGION

We have used the thirteen county region of northeast California (Fig.1) as defined by the Office of Regional Programs of California State University, Chico. The boundaries are arbitrary and do not correspond to any geologic or seismic region, but with the user in mind, we have elected to work with the political boundaries. It is essential that definite limits be set, because we will distinguish between earthquakes orginating within the region, which we will treat comprehensively, and those originating outside the region, which we will consider selectively.

SEISMIC HAZARD IN CALIFORNIA

California has been earthquake conscious since the disastrous San Francisco earthquake of 1906, but this consciousness was markedly reinforced by the Alaska earthquake of 1964 which served to remind responsible persons that disastrous earthquakes are not restricted to history books, but can and do demolish modern American cities. Then, to underline the point, Los Angeles was victimized by a moderate-sized but highly destructive earthquake in February, 1971. In consequence of this heightened awareness governmental bodies and agencies have endeavored to plan and act toward the reduction of seismic hazards both in California and the nation.

The following list of selected reports is offered to emphasize that planning and action is underway, and to provide the reader with a convenient listing of valuable references.

1. "Proposal for a Ten-Year National Earthquake Hazards Program" by the Ad Hoc Interagency Working Group for Earthquake Research, prepared for the Office of Science and Technology, Washington D. C., 1968.

2. "Earthquake Hazard Reduction", a report of the Task Force on Earthquake Hazard Reduction, prepared for the Executive Office of the President, Office of Science and Technology, August, 1970.

3. "First Report of the Governor's Earthquake Council", a report to the Governor of California (available from the California Division of Mines and Geology) November, 1972.

4. "A Study of Earthquake Losses in the San Francisco Bay Area", a report prepared for the Office of Emergency Preparedness by the National Oceanic and Atmospheric Administration, 1972.

5. "Urban Geology, Master Plan for California" by J. T. Alfors, J. L. Burnett, and T. E. Gay, Jr., California Division of Mines and Geology Bulletin 198, 1973.

6. "Meeting the Earthquake Challenge", by the Joint Committee on Seismic Safety of the California Legislature, Sacramento, California, 223 pages, 1974.

As one reads these documents two things emerge that are of general interest.

1. There is much yet to be done and to be learned. Some things that are very important, we simply don't know how to do. Other things that are very important, we know how to do, but have not committed the resources to cause them to be done everywhere or routinely.

2. Sincere efforts are being made to answer important questions, reorganize responsibilities among research and administrative agencies, revise research and operation priorities and increase funding.

In brief, the reports admit there has been some neglect in the past, but resolve that things will be better in the future.

THE PROBLEM OF IDENTIFYING SEISMIC HAZARD

The foregoing is interesting in light of the state requirement that each city and county prepare a seismic safety element. Guidelines published in September 1973 by the California Council on Intergovernmental Relations are quite specific with respect to what the local governments must consider. To elaborate with one example, the guidelines, (page IV-25, item 3-B), specifies, among other things, "Location of all active or potentially active faults, with evaluation regarding past displacement and probability of future movement." One may recall reading:

> Maps that delineate relative kinds and degrees of geologic hazards are as yet rare, and no fully satisfactory map of earthquake geologic hazards is available for any urban area. It is realized that such maps prepared in the near

> future will be little more than crude approximations, and the continuing decisions will have to be made regarding their detail and scale.
> (Earthquake Hazard Reduction, Office of Science and Technology, 1970, page 13.)

Other similar contrasts could be made between (1) the guidelines that demand information from the city and county planner and (2) the experts who say that data does not exist and that it is going to take many years and many dollars to get it. The fact is, county and city planners have been asked, firmly, to provide answers and maps to geologic problems that have eluded the U. S. Gological Survey, the California Division of Mines and Geology, and the U. S. Coast and Geodetic Survey (formerly responsible for many seismological studies now reorganized under the Geological Survey).

To reach the conclusion just stated is not to be critical of legislation requiring planners to prepare a seismic safety element; the need is real enough; but it is important to recognize that, for most areas, sufficiently detailed and pertinent data do not exist. To ask city and county governments to produce the information on short notice is an unrealistic solution, except possibly as a means of stressing the need and providing motivation for the future; but this demanding approach runs the risk of generating cynical responses to requirements perceived to be impossible to meet.

One final example will be given to illustrate the problem. The guidelines specify, among other things, that the seismic safety element will contain "Evaluation of slope stability...", and "Maps identifying location of...(unstable slopes)". It is pertinent to ask what a local planner has available with which to address the requirement. Alfors et al. (1973, pg. 27) presents a map of the state at a scale of 1:5,000,000 showing four degrees of landslide severity. Within an area of Butte County classified as "low severity" two landslides have closed or partially closed main state highways in the last few years, and without benefit of earthquake shaking. More vividly, within an area of Shasta County, also classified as "low severity", an extensive campground-administrative-commercial area within Lassen Volcanic National Park has been abandoned because of landslide hazard. Clearly a map at this scale does not serve the planner's needs. More detailed maps exist (e.g. Saul, 1973) at scales as large as 1:12,000 where many aspects of the soil and regolith are described and delineated in detail. Maps of this sort would solve the planner's problem, but of about 1000 15-minute quadrangles in California, fewer than a dozen have been completed. What then is the planner to do? Construct his own detailed maps? Hire the work done in detail? Use the existing 1:5,000,000 map and regard that as sufficient? Write an innocuous response that satisfies the letter of the law but really doesn't help advance the cause of seismic safety?

We have dwelled upon this topic at some length for two reasons. First, the planner has been given a very difficult task, perhaps an impossible task, and it needs to be said that it is not his fault if he cannot do it as well as his professional pride would desire. Second, the approach used to assess earthquake hazard in this study seems to us to be the best that can be done with available data. It is important for the reader to realize that the ideal, as represented by the General Plan Guidelines, is not attainable in most areas at the present time.

SEISMIC REGIONALIZATION

At various times efforts have been made to prepare maps that convey the degree of seismic hazard in an area. Four of these will be discussed now.

Urrick, 1948. This map prepared for the U. S. Coast and Geodetic Survey was an early attempt to express earthquake risk, and was subsequently adopted by the Pacific Coast Building Officials Conference for inclusion in the 1952 edition of their Uniform Building Code. Since then the U. S. Coast and Geodetic Survey has withdrawn the map from circulation because it was too general and subject to misinterpretation.

Richter, 1958. Figure 2 is a reproduction of a map showing the probable maximum intensities to be expected in California (Richter, 1959). This map is quite ambitious and has received a mixed reception, being both praised, criticized, but, more often, ignored.

Algermissen, 1969. This map (Fig. 3) has been widely reproduced and is probably the best available for the U. S., although it is "an interim map and does not represent the final form of a risk map of the United States" (U. S. Earthquakes, 1968, pg. 8).

Alfors et al., 1973. This map (Fig. 4) is the most complete and detailed yet offered for California. It expresses both probable maximum intensity (on the Modified Mercalli Scale, see Appendix I) as well as probable damage. The map is carefully labelled "preliminary map--subject to revision."

Each of these maps is a testimonial to the difficulty of determining the seismic hazard in a given area. More specifically:

> The making of truly adequate seismic risk or probability maps requires a long term research effort of great sophistication and involving many disciplines. In the broad view, it is almost impossible to separate the problems of seismicity and prediction, and anyone who asks for a completely satisfactory seismic probability map is in essence asking for a type of earthquake prediction. Even very generalized seismic risks maps, such as that of Figure 1, (Algermissen, 1969) are the subject of continuing vigorous debate among scientists and engineers.
> (Earthquake Hazard Reduction, 1970, pg. 11.)

The obvious next question is, how useful are the maps in assessing seismic hazard in Northeast California? A partial answer is given by Richter (1959) who, after lengthy analysis and attempts to construct such maps, concludes:

> Small-scale regionalization maps covering large areas are satisfactory only when they represent generalization of the results of microregionalization. They should serve as general index maps, from which the engineer or planning authority should pass to microregionalization maps for the localities where construction is intended.
> (Richter, 1959, page 158)

And further, "Regionalization can now be carried out for the whole of California, but involves some very rough estimates in desert and mountainous areas" (Richter, 1959, page 158). If Richter is correct, and we believe he is, then each of the foregoing maps is unsatisfactory because they are not generalized from more detailed maps. With scattered local exceptions, detailed maps do not exist.

But the maps described previously are the best available, and the challenge in 1974 is to do the best we can with what we have. What then can be learned from the maps if they are taken as valid? Careful inspection will show the status of individual cities and counties, but for the entire region we observe:

1. Most of the region should anticipate a maximum intensity of VI or VII (Modified Mercalli scale, see Appendix I).
2. The eastern part of the region should anticipate a maximum intensity of VIII, IX, or even X.
3. The southern part of the region is ambiguous, two maps suggesting a maximum intensity of VII, the third map suggesting as high as IX will be reached occasionally.

Before attempting to judge whether these estimates should be accepted and acted upon, we wish to examine the historical and geologic records.

EARTHQUAKE HISTORY: EARTHQUAKES IN THE REGION

The history of earthquake occurrence within a region offers the most objective insight possible (at present) into the future prospects for the region. Many persons will object to this statement, and with some merit. But we emphasize its objectivity, not the correctness of its extrapolation, and contend firmly that, for planning purposes, an objective approach that may be proven wrong is superior to a subjective approach that may, just as likely, be proven wrong. Superior to both, of course, would be a comprehensive, qualitative study using boreholes to locate faults precisely, years of strain gauge readings, detailed seismogeological mapping, and similar technical studies which may, someday, be available; but for now, earthquake history remains the best single, available benchmark.

What then is the earthquake history of Northeast California? We consulted three sources:

1. "Descriptive Catalog of Earthquakes of the Pacific Coast of the United States, 1769 to 1928" by S. D. Townley and Maxwell E. Allen, published in the Bulletin of the Seismological Society of America, V. 29, January, 1939.

2. "United States Earthquakes" published periodically (annually in recent years) by the U. S. Coast and Geodetic Survey, then by the National Oceanic and Atmospheric Administration, and, at present, by the U. A. Geological Survey. This series extends from 1928 through 1971.

3. "Earthquake History of the United States", publication 41-1 of the national Oceanic and Atmospheric Administration, Revised through 1970, published in 1973. A summary of the larger earthquakes of the U. S., extending back as far as 1638.

We searched these publications for every earthquake listed with epicenter in the defined region or, in the case of early earthquakes, where reports of shaking originated in the region.

NUMBER AND INTENSITY

Table I shows the total number of earthquakes known for the region arranged by intensity.

TABLE I

Earthquakes of Northeast California, 1851-1971 (all reports prior to 1931 have been converted from Rossi-Forel to Modified Mercalli)

Intensity (Modified Mercalli)		Number of earthquakes	Percent of total earthquakes
I to III		153	52
IV		68	24
V		41	14
VI		20 Plus 2?	7
VII		9 Plus 1?	3
VIII		0 Plus 1?	less than 1
	Total	291 Plus 4?	

The four questionable events were reported during the 1800's and are, for one reason or another, of dubious location or reality; one may have been a landslide; another may have originated in Nevada and simply been felt within the region. The other two are questionable because of poor reporting and record keeping a century ago.

The maximum intensity (see Appendix I for description of the Modified Mercalli scale of intensities) for which there is evidence, is VIII, and this single report is of questionable validity. There are nine established events where intensity VII was reached and significantly more events of intensity VI or less.

Noting that in the Modified Mercalli scale, it is intensity VII where mention is first made of "considerable damage" resulting, and this only for "poorly built or badly designed structures", we point out that, in the 120 years since the first earthquake was reported from this region, there have been nine (or ten) earthquakes capable of considerable damage to poorly built structures and only one (questionable occurrence) capable of considerable damage to "ordinary substantial buildings". We note at this same time that this record is equalled or surpassed by the St. Lawrence River region, Massachussetts, Missouri, Arizona, South Carolina, Utah, Montana, and Texas, and states not commonly thought of as seismic.

For most Northeast California occurrences the extent of the description is "windows rattled", so it would serve no purpose to reproduce data for every earthquake. Instead we present in Appendix II a chronological listing of only those earthquakes originating in the region that acheived an intensity of VI or greater.

<u>DAMAGE</u>, <u>INJURIES</u>, <u>DEATHS</u>. There is no record of any death or injury resulting from earthquakes within the region, and damage to buildings has been very minor; the following notes are the worst in this regard (Appendix II includes more detail and description of lesser phenomena):

1855 Large pinnacle of rock on the Downieville Buttes thrown down.

1866 Siskiyou County. Klamath River changed course, accompanied by landslide (may not have been earthquake).

1869 Report of $5,000 damage to buildings in Oroville.

(Whether local or from earthquake in Nevada is unknown. Report may be inaccurate).

1885 Glass broken and chimneys shaken down in Lassen County.

1888 Plaster cracked at Biggs.

1889 Lassen County, chimney thrown down at Willow Creek; Eagle Lake became muddy; crockery and glassware broken in Susanville.

1903 Willows, several brick walls cracked and plaster fell from many buildings.

1908 Chimneys thrown down in Lassen County.

1909 Chimneys damaged at Downieville. Minor damage to flumes, chimneys, plaster, and dishes in Sierra and Plumas Counties.

1915 Shasta County, Twin Valley; earth cracked, rocks thrown about, barn sagged, house tipped to one side. (Puzzling account; nothing recorded at Berkeley seismograph, nothing felt at Redding).

1919 Shasta County; chimneys damaged, ground fractured near Whitmore and Fern (puzzling account, similar to 1915 above).

1928 Chimneys thrown down at Weaverville.

1936 Rock slides reported on Lassen Peak and Chaos Crags.

1940 Chimneys cracked or twisted at several places in Butte County; plaster cracked at numerous places.

1945 Water pipes broken at Paradise, Butte Co.

1948 Plaster cracked.

1950 Herlong, Lassen Co; building shifted on foundation, buildings cracked; some underground pipes damaged; many chimneys broken; trusses and rafters split. Lesser damage in Doyle.

1950 Doyle; earth fracture in Long Valley.

1956 Plaster cracked at home near Manzanita Lake.

1958 Chimneys cracked at Hallelujah Junction, Lassen County.

1959 Loyalton; several chimneys fell, walls cracked, considerable glassware and merchandise fell.

1966 Plaster cracked at Forest Ranch (Butte Co.), rocks heard rolling downhill east of Oroville; some telephone service interrupted at Forest Ranch.

1966 Loyalton; lumber shed nearly collapsed, chimneys fell, walls cracked, fireplace collapsed; hairline cracks in cement block building.

1968 Chico; glass door broke in High School, several burglar alarms activated. Willows; plaster cracked.

This is a record that, while extensive, is not serious. Without denying the loss to some individuals, and possible fright to many, it can be stated confidently that this is not the sort of record that commands great concern.

LOCATION IN SPACE. Figure 5 shows the location in the region of all the known earthquakes; many locations are known only approximately and these are distinguished from those of better known location.

LOCATION IN TIME. The region experienced 291 known earthquakes in 120 years, yielding an average of 2.4 felt events per year. The region experienced 29 definite, significant events (intensity VI or greater) in 120 years of recorded history. This yields an average of one significant event every 4.1 years.

There is no obvious pattern to the recurrence of significant earthquakes. Some are separated by time intervals of less than a month, and there is one gap of 15 years with no significant events reported.

MAGNITUDE. Few Northeastern California earthquakes have magnitudes available because magnitudes are routinely calculated only for events well-recorded at several seismograph stations, and most of the events we are concerned with were too small or occurred prior to the installation of sensitive seismographs.

We found magnitudes available for 15 events, ranging from 3.3 to 6 1/4 - 6 1/2.

Table II presents these data.

TABLE II

Available Magnitudes of Northeast California Earthquakes

Magnitude	Number of Events
0-2.9	none reported
3.0-3.9	4
4.0-4.9	7
5.0-5.9	1
6.0-6.5	3

Of the three magnitude six earthquakes, one resulted in an intensity of VII and the other two were of intensity VI. Considering the more complete record of intensities, and making an admittedly tenuous correlation between intensity and magnitude, it seems safe to conclude that there is no reason to believe any earthquake of magnitude greater than 6.5 has originated within the region within the span of recorded history of the region.

EARTHQUAKE HISTORY: EARTHQUAKES OUTSIDE THE REGION

Earthquakes need not originate nearby to be hazardous. In the great Alaska earthquake of 1964, the city of Anchorage suffered very extensive damage from ground shaking (i.e., not tsunami) at a distance of 90 miles from the epicenter. As we extend our consideration beyond the borders of the defined region for the first time we encounter "great" earthquakes, the major events for which California and, to a lesser degree, Western Nevada, are famous. These are the earthquakes that have had the potential or the accomplishment of inflicting dollar losses measured in the millions, casualties in the thousands, and of seriously disrupting the economic, physical, and social milieu of cities and counties.

We consulted "Earthquake History of the United States", N.O.A.A. Publication 41-1, 1973, for their listing of earthquakes for California (including "off the coast"), Nevada, and Oregon. We considered all of the "great" earthquakes on this list, as well as those of intensity VII or greater that occurred within 100 miles of the borders of the defined region. In Southern Oregon we accepted intensities as low as V to obtain a sufficient number of events to display the seismic areas of that relatively tranquil state. All of these events are located on Fig. 6. Information concerning effects in Northeast California were sought in Townley and Allen (1939) and "United States Earthquakes."

Of primary concern in this phase of the study is the question, "What is the range of intensity to which the defined region has been subjected owing to large earthquakes which have originated outside the region?" The answer to this question is provided by isoseismal maps (see Fig. 7 for an example) and descriptions of the earthquakes. Unfortunately isoseismal maps are not constructed for every earthquake.

The following earthquakes produced the effects in the defined region as noted (Tables III and IV).

TABLE III

Great earthquakes of California, Nevada, and Oregon

Date, Location, Magnitude	Remarks
1812, Dec. 21 Southern California Mag. Unknown	Disastrous in southern California no mention of northeast California
1838, June San Francisco Mag. Unknown	"Very severe" in San Francisco region to Monterey. No mention of northeast California.
1856, Jan. 9 Southern California Mag. about 8.3	Possibly the potentially most destructive earthquake in coastal Calif. ever. No mention of northeast Calif.
1872, March 26 Owens Valley Mag. Possibly 8.3+	Probably the greatest earthquake ever recorded in Calif. and Nev. Very destructive of property and lives. Int. VI in Chico, Marysville; IV-V Red Bluff; V in Downieville.
1906, April 18 San Francisco Mag. 8.3	The great Calif. earthquake of popular knowledge. Great destruction in San Francisco Bay Area. Maximum intensity of V in southeast part of northeast California.
1915, Oct. 2 Nevada Mag. 7 3/4	Felt over 500,000 sq. miles from Oregon to so. Calif. Intensities from II to V reported throughout northeast California.
1932, Dec. 20 Western Nevada Mag. 7.3	Extensive faulting, some damage in epicentral area. Felt over 500,000 mi. square. Maximum intensity V from northeast California.
1952, July 21 Kern County Mag. 7.7	Felt over 160,000 mi. sq., 12 killed, $50 million damage. Intensity I-IV as far north as Red Bluff, imperceptible north of there.
1954, Aug. 23 Western Nevada Mag. 6.8	Extensive damage in Nevada. Maximum intensity of V in eastern part of northeast Calif.

1954, Dec. 16 Dixie Valley, Nevada Mag. 7.1	Faulting 55 miles long. Damage in Nevada. Int. V in east from Modoc Co. to Sierra Co.; IV or less elsewhere.

TABLE IV

Selected Moderate Earthquakes of
California, Nevada, and Oregon

Date, Location, Intensity		Damage - NE California
1836	San Francisco X	None
1860	Humboldt Bay VIII	None
1861	Contra Costa Co. VIII	None
1865	Sonoma Co. VII	None
1865	Eureka VIII-IX	None
1869	Virginia City, Nev. IX	Some Damage in Downieville. Oroville suffered $5,000 damage (but may have been another event).
1871	Mendocino Co. VII	None
1873	Del Norte Co. VII	Strong in Trinity Co. Felt in Red Bluff and Redding.
1876	Sonoma Co. VII	None
1881	Stanislaus Co. VII	Felt in Greenville.
1887	Carson City, Nev. VII	None
1888	Sonoma Co. VII	None
1888	Oakland VII	None
1889	San Francisco	None
1891	Napa Co. VII-VIII	None
1892	Vacaville, Solano Co., IX	None
1892	Winters, Yolo Co. IX	Minor damage in Butte and Yuba Co. Felt in Red Bluff.

Date, Location, Size		Damage - NE California
1893	Sonoma Co. VII	None
1898	Mendocino Co. VIII - IX	None
1908	Humboldt Co. VII	None
1909	Humboldt Co. VIII	Severe throughout Shasta Co., but damage was trivial. Felt widely in other places.
1914	Reno, Nev. VII	Int. IV at Susanville, no damage.
1920	Crater Lake, Oregon V	None
1923	So. Oregon V	Plaster fell at Alturas; Int. III at Susanville.
1927	Humboldt Bay VIII	Felt in Trinity Co., no damage.
1931	Talent, Oregon V	None
1932	Humboldt Co. VIII	Felt in Bieber, Shasta, and Shasta Springs; no damage. Int. IV at Anderson, Chico, Paradise, McCloud; no damage.
1933	Wabuska, Nevada VII	IV at Chico, Willows, Williams; no damage.
1948	Verdi, Nevada VII	VI at Loyalton, Sierraville; very minor damage; V at Butte City, Colusa, Downieville, Gridley, Marysville, Quincy, Susanville, Willows; no damage.
1951	Cape Mendocino VII	V at Red Bluff and Willows; no damage.
1954	Eureka VII	VI broke 10" wooden water main in McCloud; VI slight damage in Castella; chimney twisted in Red Bluff; two windows cracked in Redding; Int. I-III in Alturas and Chico; slight damage in Orland; two windows cracked at City Hall in Redding.
1962	Lake Co. VII	None

Date, Location, Size		Damage - NE California
1968	Santa Rosa VII	None
1968	Adel, Oregon V	None
1968	Calif.-Oregon Border V	V at Modoc County
1968	Calif.-Oregon Border VI	VI at Fort Bidwell, Modoc County; house sustained cracking of foundation, some shifting of frames and walls.
1969	Santa Rosa, VII-VIII	III in Sutter County
1971	San Fernando, Calif. XI	Not Felt.

DAMAGE, INJURIES, DEATHS. The "great" earthquakes of California history have not resulted in a single death or injury in Northeast California insofar as official records reveal. The damage they have done has been quite minor, less than that done by smaller earthquakes within the region or just outside the region. There is great ambiguity regarding $5,000 damage to Oroville in 1869, whether it was an effect of a Nevada earthquake or a coincidental local earthquake, or whether it was an earthquake at all. The two most significant reports are (1) 1954, when an earthquake near Eureka broke a wooden water main in McCloud, and (2) 1968, when an Oregon event cracked the foundation of a house in Modoc County. Other effects are similar to these produced by the stronger earthquakes that have occurred within the region, and can only be classified as minor.

The historic record indicates that great earthquakes occurring outside the region are not cause for concern to the cities and counties of Northeast California.

FAULTS

Although not all authorities are willing to attribute all earthquakes to consequences of movement on faults, the relation of earthquakes to active faults is well established in California. If we can identify active faults and learn their histories, we might be able to anticipate their future movements and, hence, future seismic hazard. This is why the planner is asked to consider the location and activity of faults.

The location of faults is available from several sources, including the Geologic Map of California (scale 1:250,000, California Division of Mines and Geology) and a special fault map prepared by the California Department of Water Resources (1964). Alfors et al. (1973, pg. 37) presents a summary map, reproduced here as Figure 8.

But the map of greatest current value is that of Jennings (1973) which distinguishes among faults in such a way as to permit interpretation as to whether the faults are active, possibly active, or probably inactive.

ACTIVE AND INACTIVE FAULTS. The guidelines for preparing a Seismic Safety Element include determination of "location of all active or potentially active faults, with evaluation regarding past displacement and probability of future movement." This is a fine goal, but one that will only be realized many years from now if the efforts of the U. S. Geological Survey and the California Division of Mines and Geology are greatly expanded.

At the present time there is no agreement among authorities as to working definition of "active" and "inactive". Some faults in California are "active" by everyone's definition, and some of these are receiving intensive study. There are many other faults that everyone would agree may be justifiably classified as "inactive" (even though authorities are still prone to point out that this doesn't mean the fault is "safe"). The real problem lies with a large number of faults that show geologically recent evidence of movement, but which have no historical record of displacement. Evaluating the past displacement of these faults is very difficult, and it may be impossible to date the time of last movement in years. Anticipating future behavior is more difficult yet.

Thus Jennings (1973) does not present a map entitled "Active Faults" or "Dangerous Faults" or "Potentially Active Faults"; he presents a "Preliminary Fault Map" which presents valuable information, but which still requires that the critical interpretation of "active" or "inactive" be made by the user. What Jennings does do is distinguish the following:

A. Faults having moved in historic time.

B. Faults that have displaced Quaternary rock-units, or show geomorphic evidence of having moved during Quaternary time. (Quaternary refers to the last 2 or 3 million years of geologic time).

C. Faults that show no evidence of having moved during the Quaternary.

The natural inclination is to regard A. as active, B. as potentially active, and C. as inactive. This procedure may be justifiable, but there is no assurance that it is correct.

FAULTS OF NORTHEAST CALIFORNIA. Jennings (1973) shows three small faults of northeast California as having moved in historic time:

<u>FAULTS OF NORTHEAST CALIFORNIA</u>. Jennings (1973) shows three small faults of Northeast California as having moved in historic time:

<u>Sierra County</u> - A zone about 12 miles long in Eastern Sierra County where ground displacement accompanied the September 12, 1966 Truckee earthquake. This breakage was extensive, but minor, appearing almost entirely in unconsolidated natural fill. This breakage may not even be associated with a fault, but may be attributable solely to the passage of gravitational waves (Kachadoorian et al, 1967, pag. 4).

<u>Plumas County</u> - Three lines of breakage each about two miles long in Mohawk Valley, labelled as occurring in 1875, hence probably the January 24 earthquake described by Townley and Allen (1939) as "heavy shock", intensity VI (Rossi-Forel). No other details are given.

<u>Lassen County</u> - Two lines of breakage, each two miles long, southeast of Honey Lake, accompanied the December 14, 1950 earthquake of intensity VI. The breakage is very close to the epicenter and may mark disruption of the surface above an active fault.

Another occurrence, not indicated on Jennings' map, was the occurrence near Fort Bidwell in Modoc County of ground breakage accompanying the June 3, 1968 Oregon earthquake. "U. S. Earthquakes" describes a fissure at least 550 feet long with vertical offset as much as 18 inches. This may reflect movement above a buried fault, but was probably caused by the earthquake rather than being the cause of the earthquake.

Jennings' map shows a much more extensive network of quaternary faults within the region, especially within the mountainous, volcanic northeast part (see also Fig. 8). These faults are usually conspicuous in topography, and although little detailed study has been made of them, are familiar parts of the landscape in this area. These are faults with a few tens or a few hundred feet of displacement that probably resulted from readjustment of surface rocks made necessary by the withdrawal of lava from underneath during times of volcanic eruptions. These are not, with two exceptions, the major zones of deformation that accompany mountain building episodes. The two exceptions are the Honey Lake fault separating the Diamond Mountains from the Honey Lake basin in Lassen County, and the Surprise Valley fault, separating the Warner Mountains from Surprise Valley of Modoc County. These two faults are of large displacement (thousands of feet), and movement on these faults has resulted in the creation of large block mountains, or mountain ranges.

These quaternary faults are significant in that most of them (perhaps all, if the truth were known) have prominent vertical displacement. They are, as a generalization, normal faults, in contrast to the famous faults of Coastal and Southern California, which are mostly of horizontal (strike-slip) displacement. The significance of this is that the faults create prominent steep-faced scarps that are not conducive to building. While it is true that there are roads across these faults, and buildings are located near them, the relief across the fault discourages construction directly on the fault itself. Thus there is less danger than would be the case if strike-slip faults were abundant, for it is these faults that one must make special efforts to avoid.

Jennings' map shows many pre-quaternary faults in the mountainous parts of the region, but these we can ignore. If there _is_ such a thing as an inactive fault, it would be these, and although Jennings especially warned that these are not necessarily "dead", they will be so regarded here.

What then can we infer about earthquake hazard from the foregoing? First, that "active" faults are very rare in the region. The few that do exist are quite small, and it is equally possible that they are consequences of earthquakes rather than causes. We think it would be prudent to initiate an investigation of those localized areas in Sierra, Plumas, Lassen, and Modoc Counties with known ground rupture, but we do not regard them as especially hazardous. Certainly there should not be anything constructed directly across the break, but there would seem to be little hazard nearby. Second, though there are many potentially active faults within the region, they are small in length and displacement, and carry their own "stay off" sign in the form of a topographic scarp. Third, the two biggest faults, Honey Lake (Lassen County) and Surprise Valley (Modoc County) would be presumed to hold the greatest threat of large, destructive earthquakes. The distribution of earthquakes during the last 120 years does not point to these faults as being especially hazardous, but one should not overlook the possibility that earthquakes do occur on these faults with recurrence intervals of more than 120 years. Although there is no evidence that these faults are especially dangerous, it would seem prudent to conduct field observations along these two faults to see if the absence of evidence is because there is none, or because it simply has not been discovered.

Finally, mention should be made of faults that may exist under the surface of the Sacramento Valley. Jennings (1973)

Having mentioned this possibility, we can dismiss the possible faults from consideration as being not in evidence, and inaccessible to study. But we should not forget that they may be there despite the clean, unblemished appearance of the Sacramento Valley on the fault map.

FUTURE SEISMIC ACTIVITY

MAXIMUM INTENSITY. Although earthquake prediction is currently the subject of much research, it is not yet possible to predict future seismic activity with reliability. We can only extrapolate from past experience and hope that nature does not have too many surprises for us.

Earthquakes are caused by natural processes within the earth that proceed at very slow rates compared to human perception; timespans of many thousands or several millions of years are typical. Recognizing this we are justified in inferring that the next thousand years will be like the last thousand years. The problem is that we rarely know what the last thousand years has been like in sufficient detail. The earthquake record in Northeast California extends only slightly more than one century into the past, and only the most recent 50 years of this span are completely satisfactory.

In brief, we would probably be correct in anticipating the next thousand years if reliable records extended for a thousand years into the past. To anticipate the next 100 years from the last 100 years is less justifiable owing to the brevity of experience in comparison with the tempo of the natural process.

At this junction there are three alternative ways to proceed:

1. Assume the best: The best possibility is that our brief earthquake history is an adequate sample, and that for the foreseeable future, the events of the known past will not be exceeded. We note that an extensive study of possible earthquake effects in the San Francisco Bay region (Nat'l Oceanic and Atm. Adm., 1972) assumed as their largest, most disastrous model earthquake, one equal to the 1906 earthquake. There is justification for this reasoning, but it is risky. There is absolutely no reason to believe that the future will be <u>less</u> active than the past. For it to be exactly equal to the past would seem too fortuitous to be readily accepted. Thus it is prudent to anticipate that the future will hold something greater than recorded history reveals.

2. Assume the worst: A touchstone of seismologic thought is that if you wait long enough any given location will be subject to shaking of great intensity. The New Madrid, Missouri earthquakes of 1811 and 1912, and 1912, and the Charleston, South Carolina earthquake of 1886 remind us that you do not have to be in a notorious seismic area to be subject to extremely severe earthquake shaking. Indeed, one of the great problems of regional seismic risk maps has to do with these two earthquakes forcing inclusion of these two areas in a high-risk category. This being so, should not all geologically similar regions of the U. S. be so classified? The person who would make a seismic-risk map for the U. S. thus faces a cruel dilemma...he must either ignore major events, or include virtually all of the U. S. as high risk, an action that minimizes the utility of his map. This approach is safe, for if with the passage of time, that which is anticipated does not occur, it is simply because not enough time has passed. Thus the day of judgment is postponed into the future to a time when being proven wrong would no longer be an embarrassment.

   City and county planners need not take the distant future into account, and perhaps should not try. Castles of Europe and England remind us that while it is possible to build to last for hundreds of years, it is not necessarily wise to do so.

Thus we reject this approach as begging the question, which should be "What is to be expected in the near future?" rather than, "What is possible in the indefinite future?"

3. Compromise: One might be at ease assuming that the near future will bring what the known past has delivered plus a little more. From the known distribution of intensities (Table I) we note that while VI has been relatively common, VII has been sparse, and VIII has been very rare, if it has been reached at all. Thus we might be justified as predicting VIII as the highest intensity that should be planned for. The other obvious choice would be to plan for IX, but, as we review damage reports we feel (albeit intuitively) that reported intensities have been overestimated often and not underestimated at all; hence the VI and VII reports suggest, to us, that an "honest" VIII is more likely than an "honest" IX is.

LOCATION. What part of the region is most likely to be subjected to the maximum intensity? Reviewing data from previous sections, we note that the highest intensities from the past have originated from earthquakes within the region, and that the larger of these are distributed throughout the region without any obvious pattern. (There are distinct clusters of low-intensity events, but these we will ignore.) Thus we believe that the maximum intensity can be reached anywhere in the region. Over a very long period of time it is likely that this maximum might be repeated more often in some parts of the area than in others (and here the clusters of low-intensity events should be considered), but we do not believe that frequency of repetition is particularly pertinent to the immediate study, nor would it be determinable if it were pertinent.

EARTHQUAKE HAZARD IN PERSPECTIVE

This study has taken a thorough look at earthquake history in Northeast California. Based on past occurrences we have been able to make some intelligent projections for future planning; but it is necessary to back up and take a broader view of earthquake hazard for the region. Earthquake hazard must be seen in the proper perspective. Two hundred ninety one earthquakes are known within the study area since 1769, but does that mean that Northeast California is earthquake prone, or earthquake safe overall? Brief comparison with other regions benefits us here.

In the San Francisco Bay Area alone, for example, a few major earthquakes of high intensities have caused alarmingly serious losses in dollars and lives. The following table enumerates those quakes:

TABLE V

Some San Francisco Earthquakes

Year	Location	$ loss at time of quake	Lives lost
1865	San Francisco	500,000	0
1868	Hayward	350,000	30
1898	Mare Island	1,400,000	0
1906	San Francisco	500,000,000	700
1955	Oakland Walnut	1,000,000	1
1957	San Francisco	1,000,000	0
	Total	504,250,000	731

Source: Alfors, 1973.

A total of only six earthquakes accounted for over

$500,000,000 in damage, and a total of only three quakes accounted for the deaths of 731 persons. This in an area much smaller than the present study area. In Northeast California, the greatest known earthquake intensity is VII, with the possibility of an intensity VIII quake in Oroville in 1869. Damage has been negligible. No lives have been lost. Since 1769, there has been no record of any death nor even any injury received as a consequence of earthquakes in this region. Some of the most serious disturbances reported were cracked walls, fallen chimneys, broken pipes, and split rafters; but in the main, Northeast California earthquakes have caused only "rattling dishes, cracked plaster, and creaking walls."

On the other hand, there are regions within the U. S. with less active seismic histories. In the entire state of Kansas, only nineteen earthquakes have been reported since 1867. Three of those quakes were Intensity VI or VII; the others were between I and V. Three of the quakes had their epicenters outside Kansas, but were felt within the state. In all of Kansas' earthquake history damage has been slight, and no lives have been lost.

Although Kansas has been considerably less active than Northeast California, the difference is not significant to planners because the consequences of each region's earthquakes have been virtually the same, little or no damage, and no loss of life. The difference between Northeast California and the Bay Area is, of course, significant to the planner.

Earthquake hazard must, also, be viewed with respect to other natural hazards within the region. In Northern California,

EXHIBIT D

particularly in the Sacramento Valley, flooding is feared more than any other natural hazard. While flood prediction in the area is imperfect, there is no doubt that even with extensive flood control measures, the waters of the various rivers and streams will periodically overflow their banks and flood the surrounding land. Agriculturalists who have lost orchards and crops know this. Riverside dwellers who have seen their homes torn away by a torrent know this.

In one flood alone, that of December 1955 which flooded Yuba City, 55 people died and losses were in the millions of dollars (Hartman, 1964, pg. 26). In Siskiyou County, damage to county roads alone was estimated at $4,000,000. In Butte County damage to public property was estimated at $750,000 (Jackson, 1955, pg. 91).

All this is not to say that concern for seismic safety is unnecessary, but the planner would do well to keep the hazard of earthquakes in the proper perspective so that he may judiciously direct his energies.

SUMMARY OF CONCLUSIONS

1. Existing seismic risk maps of California and the United States are unreliable because they are not based upon more detailed study of smaller areas. Also, existing maps are contradictory in some county-sized areas, and there is no objective way to choose which is correct.

2. Earthquake history is the most objective guide to the future that is presently available to us.

3. There is written record of 295 earthquakes having occurred in Northeast California since 1851; 22 of these achieved an intensity of VI (M.M.), 10 an intensity of VII, and one questionable occurrence of intensity VIII.

4. Of known earthquakes in the region, 90% were of intensity V or less, capable only of very minor damage or no damage at all.

5. There have not been any injuries or deaths caused by earthquakes in the region.

6. Property damage caused by earthquakes in the region has been very small.

7. There is no evidence of an earthquake greater than magnitude 6.5 having occurred in the region.

8. Earthquakes occurring outside the region in California, Nevada, and Oregon have not had any greater effects in the region than much smaller earthquakes originating within the boundaries of the region.

9. There are four small areas within the region that should be treated as active faults. Each of these should be investigated more, but do not appear to be of major concern. Building should not be permitted in these areas.

10. There are many faults that must be regarded as potentially active, but they do not pose a serious threat.

11. There are two large faults, the Honey Lake fault and the Surprise Valley fault, that should become the subjects of additional study. While there is no evidence that they are dangerous, evidence is not yet complete.

12. There are many faults in the region that can be classified as inactive.

13. Planning within the region should be based upon a maximum intensity earthquake of VIII (M.M.). Such earthquakes will not occur frequently.

14. The hypothetical intensity VIII earthquake might occur anywhere in the region.

15. Earthquake hazard in Northeast California is not great compared to the rest of California.

16. Earthquake hazard in Northeast California is not great when compared with other natural hazards in the same region.

REFERENCES CITED

Alfors, J. T., Burnett, J. L., and Gay, T. E., Jr., 1973. Urban Geology; Bull. 198, California Division of Mines and Geology, 112 p.

Algermissen, S. T., 1969. Seismic Risk Studies in the United States; Fourth World Conference on Earthquake Engineering, v. I, p. 26.

California Department of Water Resources, 1964. Faults and Earthquake Epicenters in California; Bull. 116-2, 96 p. plus maps.

Hartman, David N., 1964. California and Man; Wm. C. Brown Co. Inc., Dubuque, Iowa, 423 p.

Jackson, Samuel B., 1955. The Big Flood, California Disaster Office, Sacramento, 126 p.

Jennings, C. W., 1973. Preliminary Fault and Geologic Map of California; Preliminary Report 13, California Division of Mines and Geology, 2 sheets.

Kachadoorian, Reuben, Yerkes, R. F. and Waananen, A. O., 1967. Effects of the Truckee Earthquake of September 12, 1966; U. S. Geological Survey Circular 537, 14 p.

National Atmospheric and Oceanic Administration, 1972. A study of Earthquake Losses in the San Francisco Bay Area; a report prepared for the Office of Emergency Preparedness, 220 p.

Richter, C. F., 1959. Seismic Regionalization, Bull. Seis. Soc. Amer., v. 49, p. 123-162.

Saul, R. B., 1973. Geology and Slope Stability of the S. W. 1/4 Walnut Creek Quadrangle, Contra Costa County, California; Map Sheet 16, California Division of Mines and Geology.

Townley, S. D., and Allen, M. W., 1939. Descriptive Catalog of Earthquakes of the Pacific Coast of the United States, 1769 to 1928; Bull. Seis. Soc. Amer., v. 29, p. 1-297.

EXHIBIT D

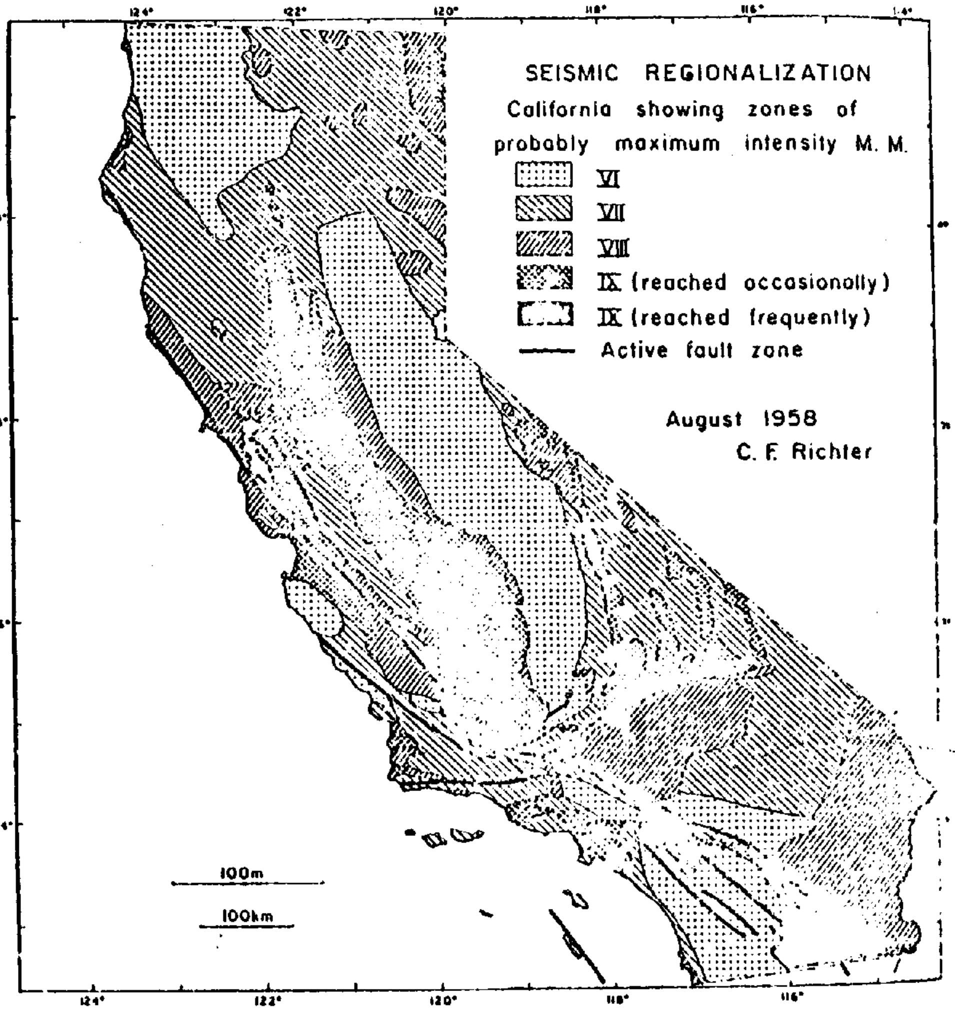


Fig. 2. Seismic Risk Map, Richter, 1959

EXHIBIT D

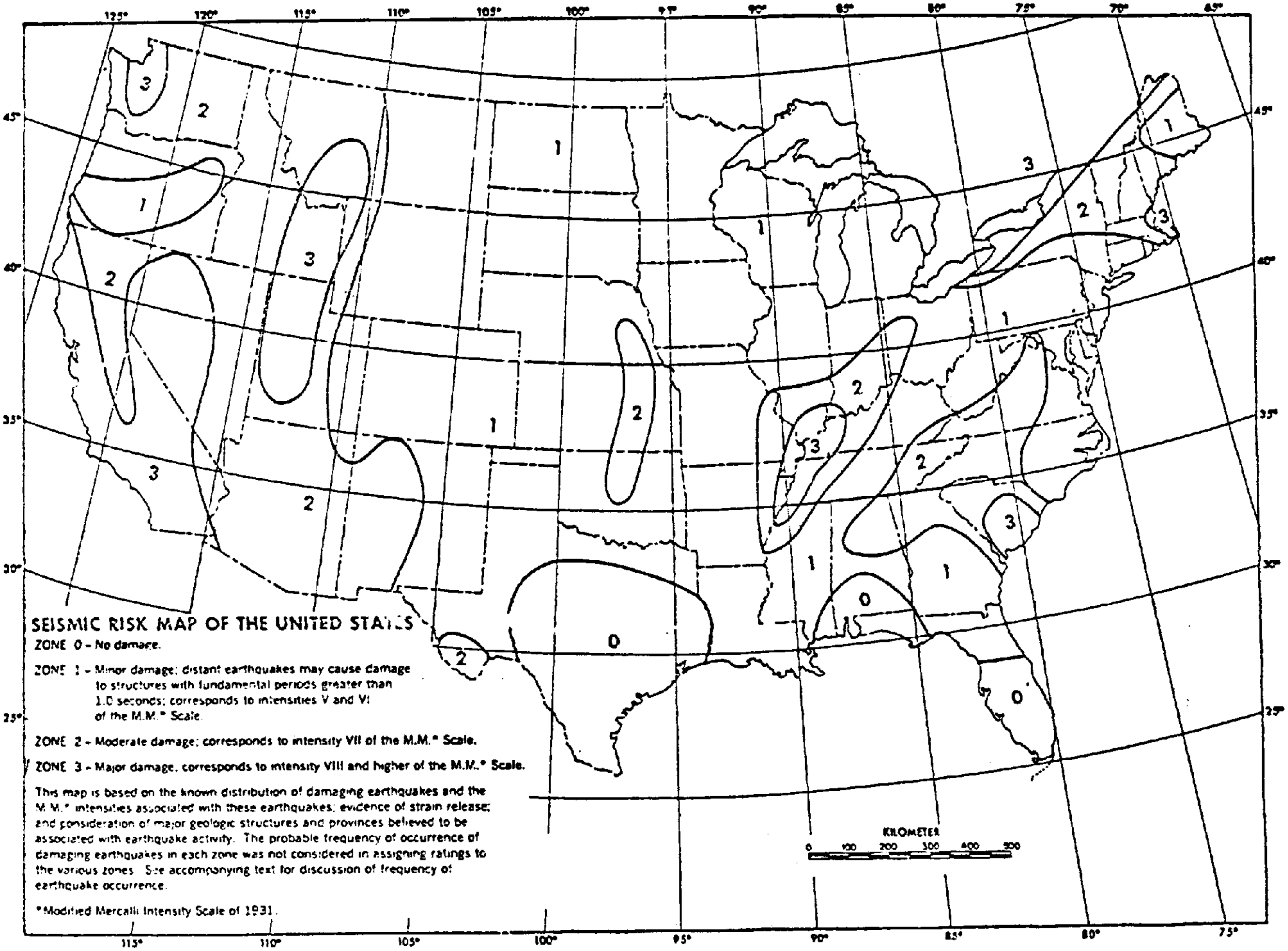


Fig. 3. Seismic Risk Map, Algermissen, 1969

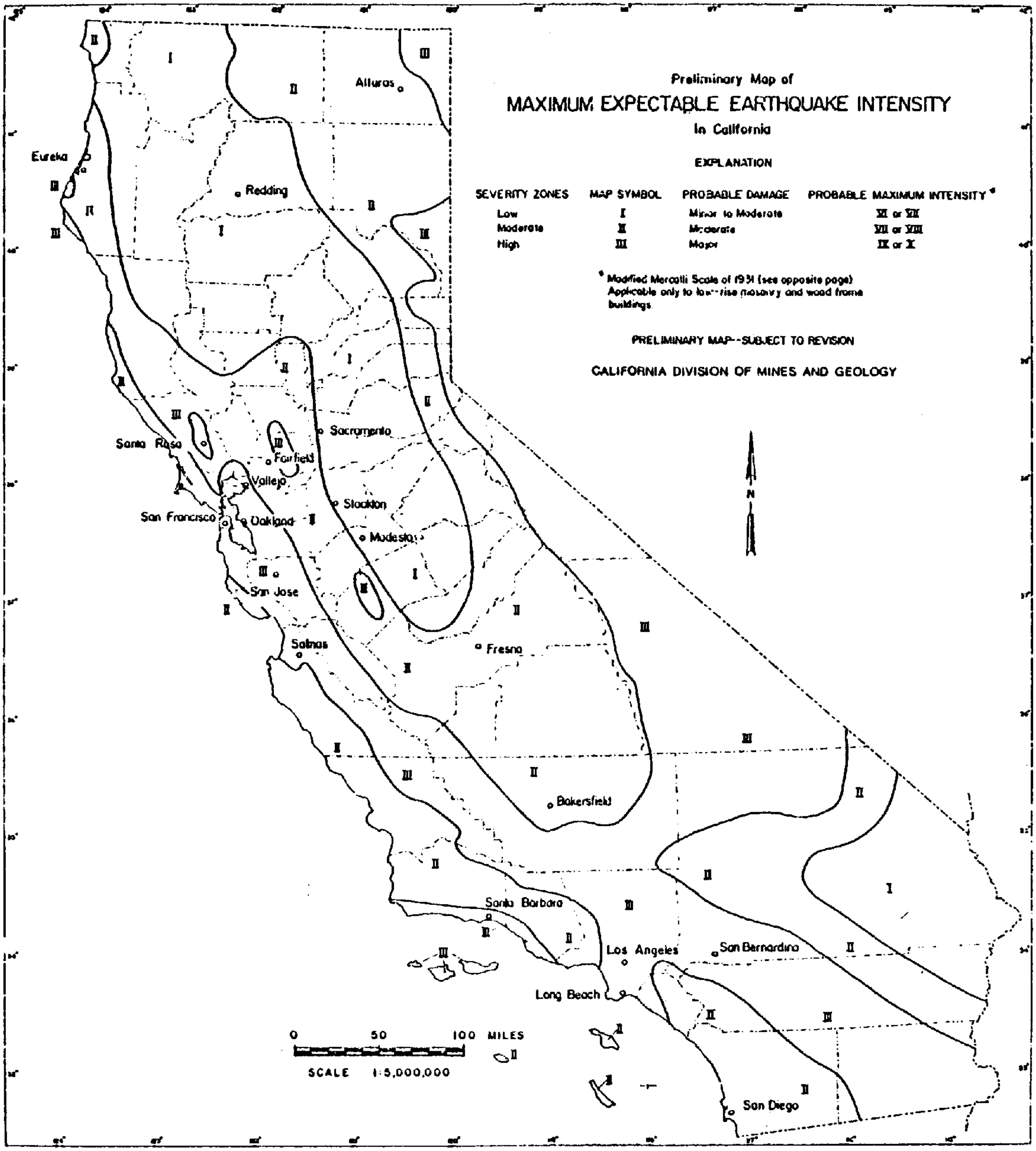


Fig. 4. Seismic Risk Map, Alfors et. al., 1973

APPENDIX I

INTENSITY SCALES

Intensity scales measure the strength of an earthquake by observing the effects it had on people, buildings, and objects. When one speaks of the intensity of an earthquake, he refers to the greatest intensity usually observed near the epicenter. But one may also speak of intensity at a particular location; thus an intensity VIII earthquake in Butte County might have an intensity of V at Redding. Roman numerals are used for intensity to keep them distinct from magnitude, another measure of strength, but one that is decidedly different in meaning.

Rossi-Forel Scale. This scale was widely used between 1883 and 1931, but changes in building construction gradually rendered it obsolete.

Modified Mercalli Scale of 1931. This scale replaced the Rossi-Forel scale in 1931 in publications of "United States Earthquakes." Originally established in 1902, it was significantly modified in 1931, hence the name. In 1956, Richter reworded the scale without changing the intent. Today one finds two versions in circulation, the 1931 version and the 1956 rewording; either is acceptable, and they are interchangeable.

The 1931 version is given below because it is used in "United States Earthquakes" from which much of the data for this study were taken. Alfors et al. (1973, p. 21) gives the rewording proposed in 1956 by Richter (note: this version is not "the Richter scale", which is a magnitude scale). Rossi-Forel equivalents are given at the end of the descriptions which follow.

I. Not felt except by a very few under specially favorable circumstances. (I)

II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (I to II)

III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibration like passing of truck. Duration estimated. (III)

IV. During the day, felt indoors by many, outdoors by a few. At night, some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably. (IV to V)

V. Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI)

VI. Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight. (VI to VII)

VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motorcars. (VIII-)

VIII. Damage slight in specially designed structures; considerable in ordinary, substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motorcars disturbed. (VIII+ to IX)

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken (IX+)

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with their foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. (X)

XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into air.

EXHIBIT D

APPENDIX II

CHRONOLOGICAL LIST OF EARTHQUAKES OF INTENSITY VI OR GREATER ORIGINATING IN NORTHEAST CALIFORNIA

Due to the length and detail of this chronology dating from 1855, it has been omitted from the report, but is on file in the office of the Planning Commission and is available for public inspection.

California State University, Chico
Chico, California 95926

Regional Programs
(916) 345-6296

SIGNIFICANCE OF SEISMIC HAZARDS IN NORTHEASTERN CALIFORNIA FOR PUBLIC POLICY

By Rolland D. Berger
Office of Regional Programs
California State University, Chico

Guyton and Scheel prepared a history of all reported earthquakes in REGIONAL PROGRAMS MONOGRAPH #1 entitled "Earthquake Hazard in Northeast California." They summarize by saying that the maximum intensity reliably reported in historic times was VII on the Modified Mercalli Intensity Scale of 1931. Intensity VII is described, "Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motorcars." They further report that there are no known deaths or injuries due to earthquakes. Property damage has been minimal to both private and public improvements. Earth displacement has been minimal. The largest earthquakes originating outside of the region have not produced shock intensities in Northeast California as great as the quakes originating within the region.

During the first 120 years of recorded history in Northeast California earthquakes have not been an important enough hazard to justify any significant recognition in public policy. However, we realize that earthquakes occur very infrequently. The fact that Northeast California has not suffered a serious earthquake during the past 120 years does not mean that we will not have one in the next 120 years. Guyton and Scheel suggest that prudent planning for the future take into consideration the possibility of earthquake intensity of VIII(MM). This intensity would produce, "Damage slight in specially designed structures; considerable in ordinary, substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls, heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motorcars disturbed." We suggest that some attention be given to the following matters which may be earthquake related.

Landslides. Steep slopes, loss of vegetation, soil type, saturation, and earthquakes are all contributing factors to landslides. All of these factors may exist simultaneously in selected locations. Particular attention should be given to slope stability in Environmental Impact Reports. It is well to bear in mind that landslides can take place on level ground if the subsurface slide face is at an angle. Careful studies should be done to examine the possibility of land-slides into reservoirs which may place overload stresses on dams.

Infiltration of Groundwater in Sewage Mains and Interceptors. The infiltration of groundwater in a sewage collection system can overload the treatment plant and render it ineffective. Most of the cracks which open in mains and interceptors are probably due to differential settling within a short period after construction. Small cracks grow to large cracks. We have no direct evidence to establish that ground-shaking due to earthquakes has caused small cracks in our sewage collection systems. However, it would seem that extra care in design, construction, and repair of the collection system should be exercised to minimize the possibility of fractures due to ground shaking.

Structural Failures in Buildings. The principle structural damages sustained during the last 120 years have been due to weakened chimneys. Building inspections and building codes should pay attention to the sturdiness of chimneys and other roof structures exposed to the weather such as parapets. Construction of new schools, hospitals, apartments, commercial and industrial buildings should be to high standards to withstanding MM intensity VIII shocks. Care should be exercised in drawing building code changes to specify standards to be met, rather than to specify materials and crafts. A building code can become a means for greatly increasing the cost of construction without adding to quality. Many materials suppliers and building trades are not above perpetuation of their self interests through adoption and enforcement of unnecessary restrictions in a building code.

Disaster Response. Every unit of government should be prepared to marshall and manage forces within their jurisdiction to meet disasters due to fire, flood, earthquake, civil disorder, accidents, and war. While we believe that the possibility of disaster from an earthquake has a very low probability, the possibility cannot be ruled out. With regard to earthquake hazard the greatest likelihood in disaster response is that resources from Northeastern California will be called upon to provide assistance to emergency forces dealing with an earthquake disaster in the San Francisco Bay area. Thought should be given to the minimum complement of forces necessary to continuation of services in this part of the state; this will provide a clear picture of the emergency vehicles and trained personnel which can be dispatched to the aid of other communities.

<u>Reservoir Failure</u>. Communities lying in the inundation path below a major reservoir have a special interest in knowing the consequences of structural failure. These reservoirs were designed with large safety margins which are believed to be adequate. However, we must recognize that the intensity, magnitude and epicenters of earthquakes cannot be predicted accurately. Under these circumstances it behooves us to examine even the <u>most</u> unlikely possibilities and consider the appropriate contingency plan for even unlikely possibilities. These contingency studies are the responsibility of those units of government directly affected.

<u>Scaling the Response to the Size of the Problem.</u> Earthquakes in other parts of the country and other parts of the world have been known to cause severe damage. Northeast California has a history of quakes. It would be easy to conclude that it is only a matter of time before we experience a major quake. Further, that public policy should provide for this contingency. The evidence does not seem to support this line of reasoning. However, it would appear that earthquake hazard in Northeast California does justify some attention to the issues set forth in this report.

Consideration of Existing Structural Hazards

1. Dams, Public Utilities, and Services

The problem of failure of dams is indeed a massive concern. Water is considered to be the most powerful, naturally occurring force affecting man. The destruction and power resulting from the failure or overtopping of a dam (seiche) is beyond the comprehension of most people. Inundation maps are currently being prepared by the Office of Emergency Services and are currently not yet available.

In reviewing this potential for damage, one must consider at least two major factors: Volume of water released and proximity to large population concentrations.

It would be unwise to speculate about damage to civilian populations without accurate data, however, it appears that most population centers are not in direct danger from flooding of any greater potential than exist from other natural causes.

2. All emergency service facilities should develop the capability to function when public utility services are interupted. Hospitals should have independent and adequate emergency generators and water supply systems. Radio communication systems should be developed to enable the rapid dispersion of medical aid where and when needed.

Police and sheriff offices should also have back-up systems to assure the maintenance of county wide, as well as statewide, communication.

Fire stations should have available independent syphon pumps to provide water from streams, lakes, or wells should water mains be out of service. Fires are probably the second most damaging affect of earthquakes, and often due to the inability to adequately contain them. may cause more actual damage than the earthquake.

All gas lines as well as water lines should be equipped with emergency valves to close the major lines when a rupture occurs. This is to prevent the escape of gas with resulting fires, and to preserve water supplies for later emergency use.

3. Substandard Public Buildings

Public buildings pose one of the more troublesome risk problems due to the nature of the services provided, the public is more or less captive and since they have no choice of whether to use the public facility or not, it is vital that all public buildings be as earthquake proof as reasonable. This is vital for numerous reasons:

a. To protect the lives and safety of the public and employees required to use the facilities.

b. To insure that the functions of government and provisions of public services continue to function efficiently.

c. To provide operations bases to aid in the restoration of all functions of civilian life to normal as rapidly as possible.

A comprehensive earthquake analysis of all public buildings should be initiated. Special evaluation will be necessary in older buildings; especially unreinforced-brick structures which, while of historic value, may pose great hazards to life.

Unreinforced-brick or concrete structures appear to be the major structural hazard within this area.

The problems of building over active or potentially active faults presents the greatest danger. This is due to the predominance of most fault activity being of a normal or thrust configuration rather than lateral, which in most cases means that even minor movement can destroy buildings even where shaking or intensity is low.

Other geologic features such as relative depth to bedrock, the nature of subsurface geology, and potential for liquidfaction should be considered when designing buildings. This, of course, does not relate to single-family or duplex-type buildings, but should be a consideration in public or multi-story buildings.

SAFETY AND SEISMIC-SAFETY ELEMENTS

A. Safety (Fire and Geologic Hazards)

Section 1. Summary and Objectives

Government Code Section 65302.1 requires a Safety Element of all County General Plans, as follows:

> "A Safety Element for the protection of the community from fires and geologic hazards including features necessary for such protection as evacuation route, peak-load water supply requirements, minimum road widths, clearances around structures, and geologic hazard mapping in areas of known geologic hazards."

The objective of this element is to introduce safety considerations into the planning process in order to reduce loss of life, injuries, damage to property, and economic and social dislocation resulting from fire and dangerous geologic occurrences.

EXHIBIT D

FIRE PROTECTION REQUIREMENTS OF THE CITIZENS OF SISKIYOU COUNTY

The Board of Supervisors has established fire protection districts. Since Siskiyou County is not basicly an urban county with unincorporated urban populations, these districts are formed at the request of residents of a particular area. To date, Siskiyou County has established 12 fire protection districts. These include: Happy Camp District, Copco Lake District, Hornbrook District, South Yreka District, Scott Valley District, Callahan District, Montague District, Gazelle District, Butte Valley District, Tulelake District, Mount Shasta District, and the Dunsmuir District. These districts have varying capacities, which vary directly with equipment, manpower, and relative response time. In addition, during the fire season the fire fighting capability of the California Division of Forestry, Shasta-Trinity, Klamath, Modoc, and Six Rivers National Forests, and on occasion the state of Oregon's forest fire fighting units, are available to assist in the fire control. The state and federal agencies will not respond to a structure fire unless there is an endangering of state or federal lands through spreading of the fire.

The Public Resources Code defines hazardous fire areas, restrictions on use, and minimum protection requirements, administration of which is carried out by the State Division of Forestry.

The Public Resources Codes setforth provisions for the reduction of fire hazards around buildings located on land which is covered with flamable material. A firebreak of at least thirty (30) feet is required to be maintained around buildings by removing all flamable vegetation or other combustible growth. Additional widths of firebreak may be required under extrahazardous conditions. Firebreak clearance is, also, required around electrical transmission poles and towers.

Burning is regulated by permits issued by the State Forester. Provisions must be made to control erosion in areas where vegetation has been removed for firebreaks.

Siskiyou County is in the process of amending its Subdivision Ordinance. In conjuction with the evaluation of this ordinance, the county's Improvement Standards are also being revised. This revision will evaluate and establish the mimimum road widths required for development, the minimum water supply requirements in those developments which have public water systems, and controls to some extent the design of subdivisions and road extensions to avoid hazardous design which can result in the inability to move emergency equipment down roads or the severing of single-entrance roads by fires or other occurrences, which would result in the trapping of citizens in a dangerous area.

VOLCANIC HAZARDS

With a quick look around the county, it is apparent that Siskiyou County has been subject to volcanic activity in the past. Although there is no record of active volcanism within time, the possibility of eruption or related volcanism must not be overlooked. However, it would be premature to establish numerous procedures and special plans to meet the needs of the volcanic disaster. The plans that are evolved to meet any disaster in the county can obviously be implemented to meet a volcanic disaster. Further, it is normal that prior to any direct volcanic eruption the activities are preceded by numerous seismic occurrences of varying magnitude. It is, therefore, critical that any seismic activity which can be placed as occurring either within the county's boundaries or in the very near vicnity should be carefully observed and thoroughly examined.

One of the most important problems of safety is knowning not only that a safety hazard exists, but where the hazard is located. The Siskiyou County Planning Department in its county-wide zoning investigations has contracted with the Soil Conservation Service for generalized soils maps of Siskiyou County. Included in these soils maps are delinations of areas subject to landsliding. These delinations are general and specific recommendations must be based upon on-site inspection in relation to any proposed development of the property. The principal advantage of the mapping is that it allows the establishment of areas of concern so that hazards are not overlooked. The Soil Conservation Service has in the past established flood-plain zoning in the Scott Valley's watershed area, and the county is in the process of having the balance of the flood-zones within the county established by the federal government. Specific seismic hazard areas are discussed in the seismic-safety portion of this element.

EXHIBIT D

Recommendations:

The following policies should be established to protect the public health and safety.

1. Dissemination of Seismic Safety Information.

   Geologic and structural hazard information relating to private development should be readily available.

2. Dissemination of Seismic Emergency Information.

   Emergency information available at the Office of Emergency Services should be more widely distributed.

3. Radio Communication Facilities

   The radio communication capabilities should be evaluated both for the ability to withstand seismic damage and as to effectiveness as an area-wide communications network.

4. Public Buildings

   All public buildings should be reviewed for structural adequacy and the ability to survive a major earthquake. This is imperative for structures housing safety and rescue equipment and communications center buildings. Occupation of high risk buildings should be minimized whenever possible.

5. Geologic Hazard Management Areas.

   The County should initiate a "GH", Geologic Hazard Zone in which all uses would require a use permit to assure acceptable development in a known hazard area. Hazard areas will be established by agencies capable of making geologic evaluations.

EXHIBIT D