2025 Multi-Jurisdiction Hazard Mitigation Plan: Clearlake Annex

CHAPTER ONE: INTRODUCTION

1.1 About the Plan

Lake County OES led the 2025 Lake County Multi-Jurisdictional Hazard Mitigation Plan development in close coordination with the City of Clearlake, the City of Lakeport and a team of consultants retained to author the annexes for each city, together called the Project Team. This new, multi-jurisdiction plan geographically encompasses the unincorporated areas within Lake County's boundaries and both cities (hereinafter referred to as the Planning Area). It is acknowledged that the local tribal governments also maintain a separate multi-jurisdictional tribal mitigation plan and may decide to join the Lake County plan in the future.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." A three-year, congressionally-mandated independent study to assess potential cost savings from mitigation activities provided evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation prevents $6 in future losses, in addition to saving lives and preventing injuries (National Institute of Building Science Natural Hazard Mitigation Saves 2017 Interim Report).

This 2025 Plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and regulations set forth by the Interim Final Rule published in the Federal Register February 26, 2002, (44 CFR §201.6) and finalized October 31, 2007 (hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act, DMA, or DMA 2000). The Act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts. Regulations set forth establish requirements that local hazard mitigation plans must meet for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288).

This planning effort also follows FEMA's 2023 Plan Preparation Guidance. Planning efforts result in a Multi-Jurisdictional HMP that details potential hazards, risks and mitigation goals/objectives. It will be used to guide County and City efforts to protect life and property and enhance resiliency to disaster through local land use policy, mitigation activities and efforts.

1.2 What's New or Updated

The biggest change between the previous 2019 City of Clearlake Local Hazard Mitigation Plan and the current plan is the decision to move to a *Lake County Multi-Jurisdiction Hazard Mitigation Plan* (MJHMP). This MJHMP combines the previous Local Hazard Mitigation Plans of Lake County, the City of Clearlake, and the City of Lakeport. This decision was based on several considerations:

- The Cities of Clearlake and Lakeport are relatively geographically small sections within Lake County.
- The Cities of Clearlake and Lakeport both border unincorporated Lake County land.
- Hazard profiles are fairly standard across the three jurisdictions, with limited differences.
- Creating a MJHMP allows the three jurisdictions to combine resources and encourages further cooperation and coordination between them.

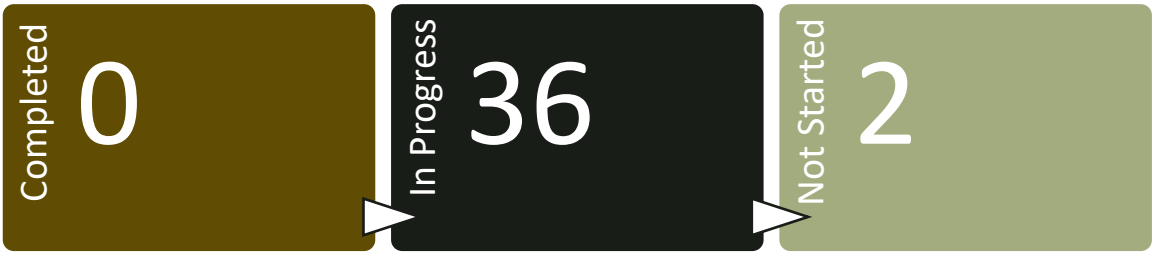
The structure of the MJHMP has changed to include a Base Plan (also referred to in this document as the *Lake County Base Plan*) which focuses on Lake County, with each city having its own Annex. These Annexes will highlight any differences between the County's hazard profiles in the Base Plan and the Cities' hazard profiles. Additionally, profiled hazards were changed to match those listed in the Base Plan. These changes are identified in Chapter Two, Section 2.1.

The planning process, such as organizing resources, engaging the public, and hazard profiling, was combined due to the proximity of each jurisdiction, the similarity of the hazards, and the crossover in stakeholders.

1.2.1 Mitigation Action Review

The 2019 HMP included 38 mitigation activities, summarized below. The impacts of hazard mitigation planning and new mitigation actions (refer to CHAPTER SIXTEEN: *Mitigation Strategy*) will continue to build the City's resilience in the face of disaster.

Figure 1: Clearlake's Mitigation Action Overview



1.3 Organizing Resources

Clearlake was represented on the Hazard Mitigation Planning Committee (HMPC) through the following representative. On November 1, 2022, the BOS approved the HMPC. Throughout the planning process, Clearlake representation worked closely with Lake County OES representation to select, review, and approve selected city and county stakeholders.

Name	Title	Representing
Adeline Leyba	Public Works Director	City of Clearlake

In addition to the organization of resources outlined in the Base Plan, the City of Clearlake completed a Clearlake Department Leaders Meeting, MJHMP Briefing, and Annex review with the following representatives. These stakeholders reviewed the Plan, including reviewing and updating their associated hazard mitigation actions.

Name	Title	Representing
Bo Wymer	Dept of Public Works	City of Clearlake
Adeline Leyba	Dept of Public Works	City of Clearlake
Dave Swartz	City Engineer	City of Clearlake
Mark Roberts	Senior Planner	City of Clearlake
Alan Flora	City Manager	City of Clearlake

Name	Title	Representing
Chief Timothy Hobbs	Chief of Police	City of Clearlake
Ryan Peterson	Assistant Chief	City of Clearlake
Willie Sapeta	Lake County Fire Protection District Chief	City of Clearlake

The City facilitated stakeholder outreach by reviewing and approving the invited stakeholders. Additionally, they forwarded all relevant messaging to City contacts. These stakeholders (identified in Base Plan Section 1.4.1) reviewed relevant sections for the Base Plan and the annexes. For more information regarding the creation, facilitation, and participation of the HMPC, refer to the Base Plan Section 1.4.1.

1.4 Assess Community Support

In addition to the assessment of community support outlined in the Base Plan, the City of Clearlake completed the following outreach activities:

- Engagement with City Council
- Engagement with City Staff

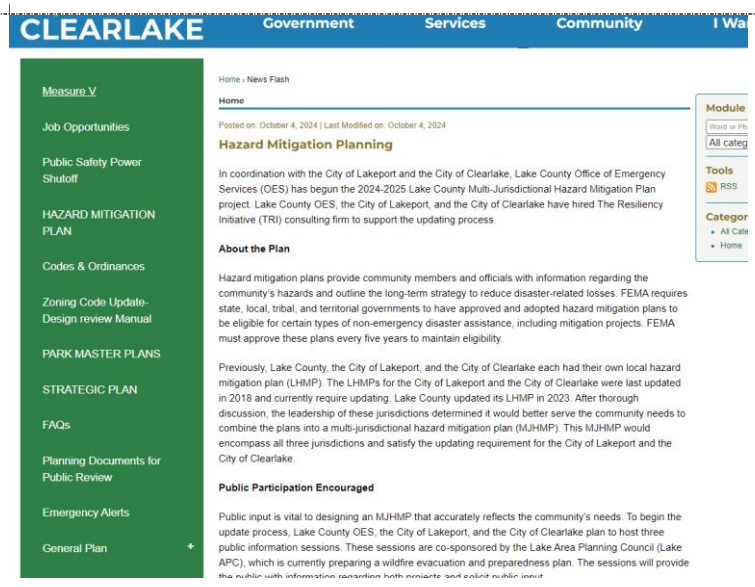
1.5 Engage the Public

In addition to the public engagement outlined in the Base Plan, the City of Clearlake completed the following activities.

Clearlake promoted the overall mitigation project, public information sessions, the public input survey, and opportunities for engagement through:

- City Website
- City Department Email
- Social Media
- Public Engagement Flyers

Figure 2: Screenshot of the City's Website



The 2025 MJHMP final draft was provided for a public review and comment period from February 3 to February 28, 2025.

Edits, additions, and other considerations provided by the public, stakeholders, and City staff were incorporated into the final submission draft. The core public comments received include:

- Concerns about the maintenance needs of the levee system in Upper Lake.
- Evacuation concerns with wildfires and the need for wider transportation routes, defensible space and fuel breaks.
- Mediterranean Oak Boar as a cause of tree mortality and the need to find solutions to protect local forests.
- The need for greater understanding of H2S gasses in relation to volcanic vents around the County.

1.6 Integration and Coordination with Other Planning Efforts

In addition to the documents listed in the Base Plan, the following were consulted, reviewed, referenced and evaluated:

- Clearlake General Plan
    - The Clearlake General Plan is the official document used by decision makers and citizens to guide and interpret the City's long-range plans for development of land and conservation of resources
        - Referenced to ensure compliance
- City Municipal Code
    - Referenced regarding authority, compliance guidelines, and procedural standards for managing and reducing local disaster risks.

1.6.1 Previous HMP

The 2019 Clearlake HMP was integrated into city planning with the Emergency Operations Plan, the Clearlake General Plan's Safety Element, utilizing the hazard profiles and ratings to evaluate the city's response procedures, instituted ordinances/regulations with regard to floodplain management and building regulations, enforcement of the Lake County Stormwater Management Plan under NPDES regulations, and capital improvement projects that align with mitigation priorities such as the recent drainage master plan completed in 2025.

1.6.2 Ongoing Integration

The 2025 MJHMP will be referenced and integrated with the Clearlake Departments into other planning mechanisms as appropriate, such as community planning, EOP revisions, city training and exercises. As the HMP is updated and reviewed annually, the information will be provided to these departments.

Additionally, as Clearlake reviews the 2040 General Plan, the MJHMP will be incorporated into the safety element via an addendum.

1.7 Integrating Climate Change

To match the Base Plan structure, this Annex fully integrates climate change into the annex, rather than treating it as a standalone hazard. Climate change concerns, projections, and expectations factor into all phases of development and each hazard profile. The annual report from the American Meteorological Society (AMS) released in early 2023, which compiles the leading science about the role of climate change in extreme weather, acknowledges that climate change drove unprecedented heat waves, floods, and droughts in 2021 and 2022.

Those heat waves, floods, and droughts will continue to increase in frequency and intensity, as well as impact other ecological systems within the entirety of Lake County.

CHAPTER TWO: HAZARDS OF CONCERN

2.1 Hazard Identification

The 2019 City of Clearlake HMP Hazards List, the 2023 Lake County HMP, and public survey results were reviewed with the working group, at public sessions, and with the HMPC. Our intent was to:

- Identify hazards not previously included
- Remove hazards no longer relevant
- Agree on a complete list of hazards that could affect Lake County

Results from this process, ranked by perceived importance, are included in Table 1.

Table 1: Hazards for 2025 Inclusion Ranking

Hazard	Included in 2019 Plan?	Included in 2023 County Plan?	Included in 2025 MJHMP?
Agricultural Hazards (e.g. insect pests/smoke taint)	Yes	Yes*	Yes*
Air Pollution	No	No	No
Aquatic Biologic Hazards: Cyanobacterial Bloom	Yes	Yes±	Yes±
Aquatic Biologic Hazards: Quagga Mussel	Yes	Yes±	Yes±
Avalanche	No	No	No
Climate Change	Yes	Yes±	Yes±
Coastal Flooding/Erosion, Sea Level Rise	No	No	No
Dam Failure	Yes	Yes	Yes
Drought & Water Shortage	Yes	Yes	Yes
Earthquake	Yes	Yes	Yes
Epidemic/Pandemic/Vector-Borne Disease Hazards	No	No	No
Flood: 1%/0.2% Annual Chance	Yes	Yes±	Yes±
Flood: Localized/Stormwater	Yes	Yes±	Yes±
Hazardous Materials Transportation	Yes	No	No
Landslide & Debris Flows	Yes	Yes*	Yes*
Levee Failure	Yes	Yes	Yes
Oil Spills	No	No	No
Radiological Accidents	No	No	No
Seiche	Yes	Yes*	Yes*
Severe Weather: Extreme Heat	Yes	Yes	Yes
Severe Weather: High Winds	Yes	Yes±	Yes±
Severe Weather: Storms (Heavy Rain, Wind, Snow, Freeze)	Yes	Yes±	Yes±
Subsidence	Yes	Yes*	Yes*

Hazard	Included in 2019 Plan?	Included in 2023 County Plan?	Included in 2025 MJHMP?
Terrorism	No	No	No
Tree Mortality	No	Yes	Yes
Tsunami	No	No	No
Volcano and Geothermal Gas Release	Yes	Yes	Yes
Wildfire	Yes	Yes	Yes

**Hazards are included as secondary hazards.*
±Profiles combined, see below.

The HMPC reviewed the 2019 City of Clearlake LHMP, reviewed the 2023 Lake County LHMP, and considered input from public sessions, working group meetings and the community survey to identify hazards of concern. While the hazards are generally the same as the 2019 Plan, some changes were made:

- **Severe Weather**
  Previously, these were three separate and specific hazards: Extreme Heat; Heavy Rains, Snow, and Storms; and High Winds. To match the Base Plan, these were condensed into two categories: Extreme Heat and Heavy Rains, Snow, Storms. Extreme heat is its own category, as it differs greatly in its effects and appropriate mitigation actions, and all others (rain, snow, freezing, and wind) could be covered by "Storms".
- **Tree Mortality as a standalone hazard**
  Tree Mortality was not included in the previous plan as its own hazard but has since been declared a local emergency. Contributors weighed leaving it as its own category, versus discussing it in relation to other topics, such as drought. Ultimately, it was maintained as a standalone hazard. Measures to address the issue of the multi-species bark beetle infestation could not be satisfyingly combined with other disaster-types.
- **Aquatic Biologic Hazards – one hazard**

Previously, two separate and specific hazards: quagga mussel and cyanobacterial bloom. Recognizing the evolving research and impacts, the HMPC combined the separate hazards into a single category.

- **Landslide and Debris Flows**
  In the previous HMP, Landslide and Debris Flows were a profiled hazard. For this MJHMP, the risk of this natural hazard is reduced and does not constitute a full profile because the land susceptible to this hazard is in remote and undeveloped locales. Landslide and Debris Flow are covered as a secondary hazard in Earthquakes and Wildfires.
- **Climate Change**
- Climate change is integrated throughout the plan rather than being a standalone hazard. This does not mean less information is included in the Plan Update, but rather that climate change is detailed in Section 1.8 and referenced within each hazard profile.
- **Floods – one hazard**
  Previously, two separate and specific hazards: Flood (1% and 0.2% Annual Chance) and Flood (Localized/Stormwater). Based on the overarching similarities between these profiles, these separate hazards were combined into a single category. Additionally, Lake County does not have major rivers or other terrain that would suggest a vast difference between these flood categories.
- **Seiches**
  In the previous HMP, Seiches were a profiled hazard. For this MJHMP, Seiche is covered as a secondary hazard in Earthquakes.
- **Non-Natural Hazards**
  After much discussion, the HMPC elected not to include non-natural hazards within the Base Plan. To match the Base Plan structure, this Annex also does not include non-natural hazards. The following were either removed or not considered: Hazardous Materials Transportation, Energy Shortage, and Industrial Accidents/Activities. It is reasonable to consider further exploration of these in future updates.

2.1.1 Priority

Hazards for the City of Clearlake were prioritized using the same rubric as the County's Base Plan. (Refer to 2.2.1 *Priority* of the Base Plan for more information.)

Table 2 summarizes results from this process and whether the hazard is considered a priority for the Planning Area.

Table 2: Hazard Identification Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence	Priority Hazard
Aquatic Biological Hazards: Invasive Species	Extensive	Highly Likely	Catastrophic	High	High	Yes
Dam Failure	Limited	Unlikely	Limited	Medium	Medium	Yes
Drought and Water Shortage	Extensive	Likely	Critical	High	High	Yes
Earthquake	Extensive	Occasional	Catastrophic	Medium	Low	Yes
Flood	Extensive	Occasional| Occasional| Highly Likely	Critical	High	Medium	Yes
Landslide and Debris Flows	Significant	Highly Likely	Critical	Medium	Medium	No
Levee Failure	Limited	Occasional	Negligible	Low	Low	Yes
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Medium	High	Yes

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence	Priority Hazard
Severe Weather: Heavy Rains, Snow, Storms, and High Winds	Extensive	Highly Likely	Limited	Medium	Medium	Yes
Tree Mortality	Significant	Highly Likely	Critical	Medium	High	Yes
Volcano Geothermal Gases	Significant	Unlikely | Highly Likely	Critical	High	Low	Yes
Wildfire	Extensive	Highly Likely	Catastrophic	High	High	Yes

Hazards determined to be a "priority" to the County are profiled. Hazards not determined to be a "priority" to the County are included as secondary hazards to relevant profiled hazards.

CHAPTER THREE: Profiling Clearlake

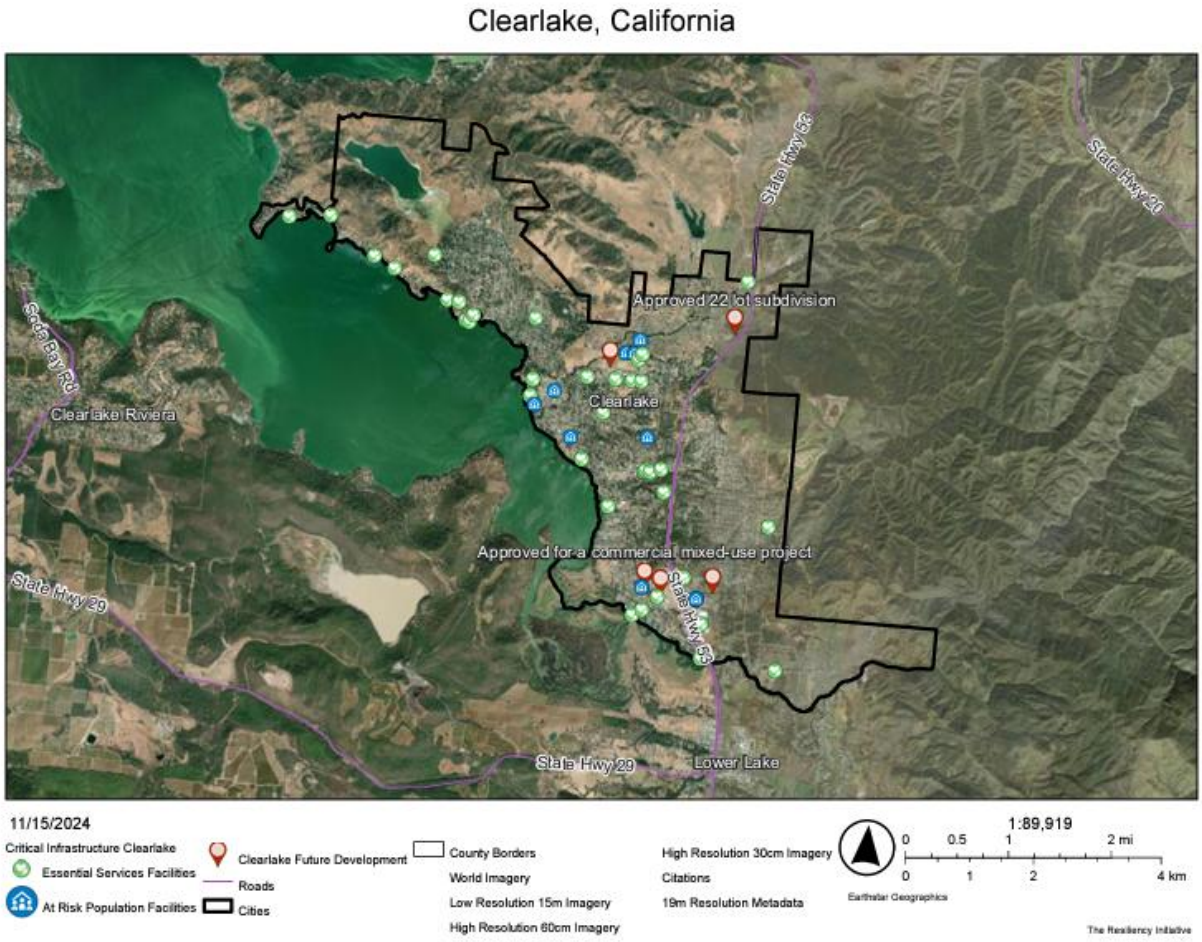
3.1 Clearlake at a Glance

One can easily consider Clearlake a rural, small town. Residents and visitors value the slow pace of life and laid-back atmosphere of the community. Most land within City boundaries is as open space or vacant. The building stock is mostly residential housing. Commercial areas are concentrated along Lakeshore Drive and around the Safeway and Clearlake Shopping centers.

Clear Lake is a major life force for the City of Clearlake. The lake is renowned for its abundant fish stock, rare and migratory birds, and a host of other wildlife living in Clearlake's surrounding wetlands, grasslands and oak woodlands. Residents and visitors are attracted to the area for its natural beauty and recreational activities like boating, fishing, camping, and bird watching.

In 1980, Clearlake was incorporated as an independent city within Lake County with a total population of less than 10,000 people. Over the last thirty years, Clearlake has experienced slow but steady growth. With over 16,000 residents, Clearlake still encompasses a rural character and small-town atmosphere.

Figure 3: Satellite Image of Clearlake, California



3.2 Planning Area Communities

The City Council is the policy-making body of the City of Clearlake and, in that capacity, approves and adopts ordinances and resolutions and acts on other policy matters to provide community leadership. The City Council is comprised of five directly elected members whose terms of office are staggered. The Mayor's position is rotated annually and selected by the City Council.

3.3 Geography and Climate

The City of Clearlake is in Northern California, approximately 80 miles north of San Francisco. It is situated in rural Lake County, which is bordered by Mendocino,

Sonoma, Napa, Yolo, Colusa and Glenn Counties. The City is 10.8 square miles and sits on the southeastern shore of Clear Lake, the largest natural freshwater lake entirely within the State. Clearlake is bisected by Highway 53, a major connector between Highways 20 and 29.

Clearlake is located on the eastern shore of the lower arm of Clear Lake in central Lake County between the unincorporated communities of Lower Lake to the south and Clearlake Oaks to the north. Originally inhabited by Pomo Native Americans, Clearlake was settled in the early 20th century and became known as a resort destination along with other lakeside communities.

The City sits at an elevation of 1,417 feet. The topography of the City is flat close to Clear Lake but rises quickly on the sides of the City that do not border the Lake.

The City of Clearlake enjoys a moderate, Mediterranean-like climate. Summers are typically dry and warm, while winters are wet. Winter temperatures average between 30° F and 50° F. Summer temperatures can exceed 90° F but can also drop below 50° F at night. Year-round winds blow generally from the west and the northwest. Average yearly rainfall varies annually around 25 to 30 inches.

3.4 History

The dramatic landscape surrounding the City of Clearlake was formed by the collision of the Pacific and North American plates over one million years ago. This tectonic activity formed Mount Konocti, a now-dormant volcano rising 4,300 feet above sea level. Situated to the west, across the lake from the City of Clearlake, Konocti dominates scenic viewpoints from various locations in the City. Clear Lake is estimated to have formed approximately 2.5 million years ago, making it possibly the oldest lake in North America.

The area that would become the City of Clearlake was home to one of the largest groups of people in prehistoric California, the Southeastern Pomo Indians. Anderson Marsh State Historic Park, located just southeast of the City, protects 10,000-year old archeological sites and rich habitats that supported the Pomo people.

In the 19th century, American pioneers and European families began to settle in the area and take over the land for agricultural and mining purposes. Towards the end of the 19th century, luxury resorts and hot springs around the Lake became a destination

for wealthy vacationers. The City of Clearlake grew slowly outward from the first resorts established on the shores of Clear Lake during this era.

In 1980, Clearlake was incorporated as an independent city within Lake County with a total population of less than 10,000 people. Over the last thirty years, Clearlake has experienced slow but steady growth. With just over 16,000 residents, Clearlake still encompasses a rural character and small-town atmosphere.

3.5 Population and Demographics

According to 2020 Decennial Census, the population of the City is 16,685. This represents an increase in population from the 2000 US Census, which estimated the City population at 13,147. Select social and economic information for the City is shown in Table 3.

Table 3: Clearlake– Select Social and Economic Statistics

Statistic	Clearlake	Lake County
Populations		
Population under 5	5.2%	5.6%
Population under 18	26.4%	21.3%
Population over 65	17.6%	23.2%
Median Age	38.6	43.2
Racial Makeup		
White	85.4%	68.7%
Black or African American	3.4%	1.6%
American Indian or Alaska Native	2.7%	3.5%
Asian	1%	1.5%
Native Hawaiian or Pacific Islander	0.2%	.2%
Other Races	18.8%	11.3%
Two or more races	14.6%	13.1%
Income and Employment		
Median Income	$41,047	$59,444
Poverty Rate: All people	24.7%	17%
Employment Rate	40.2%	48.8%
Home Ownership		
Home value of $299,999 or less	82.5%	40.4%

Statistic	Clearlake	Lake County
Home Ownership Rate	59.4%	76.3%
Education		
Bachelor's Degree or higher	7.8%	16.8%
Disabilities		
One or More Disabilities	21%	22.2%
Hearing Difficulty	6.9%	6.8%
Vision Difficulty	3.9%	6.2%
Cognitive Difficulty	11.2%	8.6%
Ambulatory Difficulty	10.4%	11.7%
Self-Care Difficulty	6.5%	5.8%
Independent Living Difficulty	11.2%	12.7%
Language		
Only English is spoken at home	77.9%	81%
Spanish is spoken at home	20.7%	16.6%
Other Indo-European languages spoken at home	0.9%	1.8%
Asian and Pacific Islander languages spoken at home	0.4%	.5%

CHAPTER FOUR: HAZARD PROFILES AND RISK ASSESSMENTS

4.1 What's at Risk

4.1.1 Methodology

The City of Clearlake Annex follows the same methodology outlined in the *Lake County Base Plan.*

4.1.2 Vulnerability

The City of Clearlake Annex uses the same vulnerability rubric as the *Lake County Base Plan*. (Refer to *Section* 4.1.2 *Vulnerability* of the Base plan for more information.)

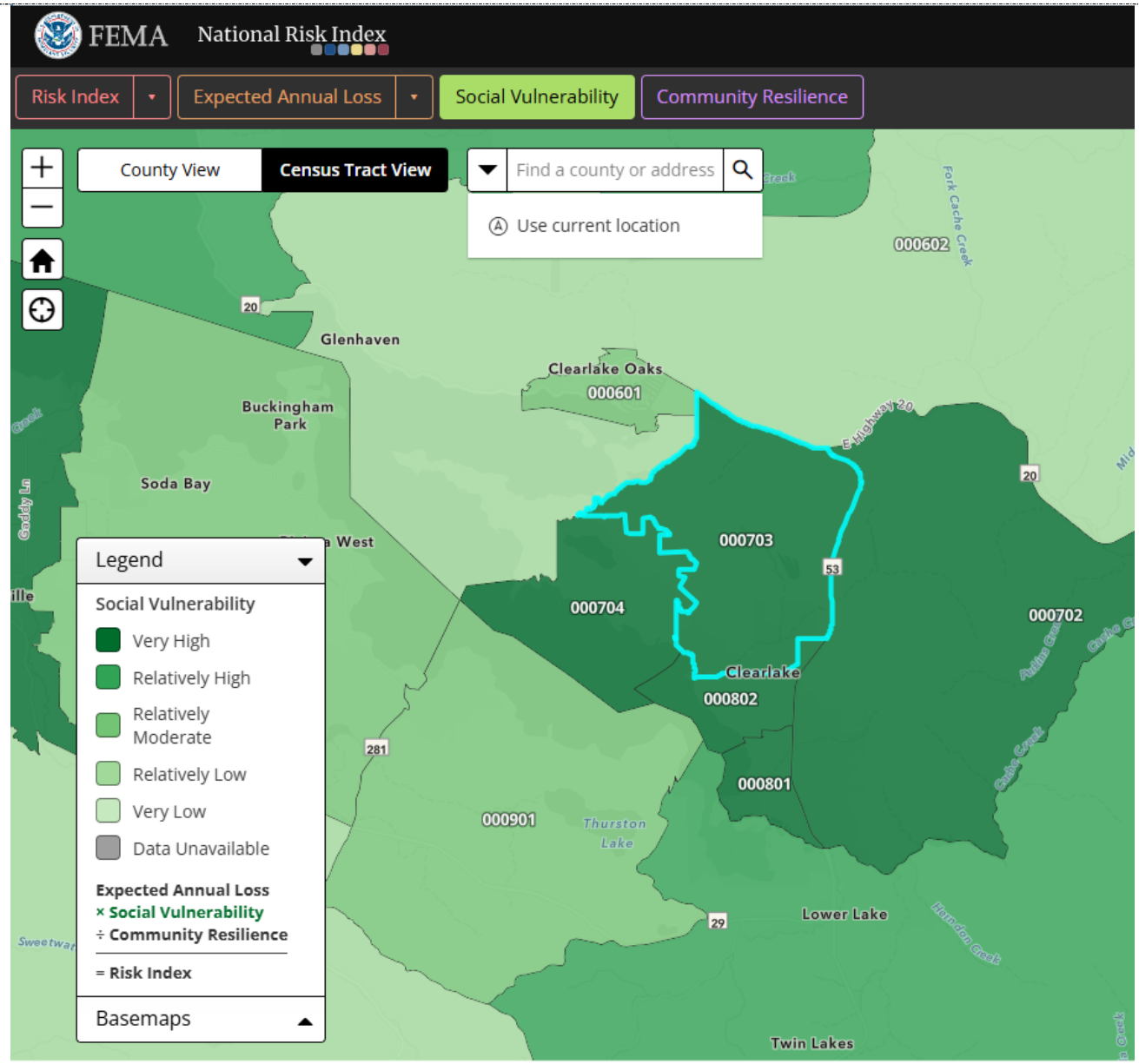
4.2 Underserved Populations/Communities

General population statistics are included in Chapter 3.

4.2.1 Socioeconomically Disadvantaged

Similar to Lake County's rating, Clearlake also has a social vulnerability rating of **VERY HIGH** according to FEMA's National Risk Index.

Figure 4: FEMA's National Risk Index Map of Clearlake



4.2.2 Access and Functional Needs

According to the 2022 American Community Survey 5-Year Estimates, 21% of Clearlake residents live with a disability.

4.2.3 Tourists

No additional information specific to Clearlake.

4.3 Built Environment

4.3.1 City-Owned or Leased Facilities

These facilities are critical to the continuity of operations post-disaster. The list included herein is also managed by its location within the Planning Area and will be compared with potential exposure to each hazard in the profiles. The source for this information is Clearlake Public Works.

4.3.2 Critical Facilities

Table 4: Critical Facilities Identified in Clearlake

Facility Category	Critical Facility Types	Clearlake
Hazardous Materials Facilities	Hazardous Material	0
At Risk Population Facilities	Assisted Living	2
	Child Care	4
	School	9
	Senior Apt Complex	4
Essential Services Facilities	Animal	2
	Commerce	8
	Communications	1
	Construction - Engineering	2
	Fire - Rescue	4
	Government	5
	Medical - Clinic	5
	Medical - Hospital	1
	Pump Stations	13
	Shelter Site	1
	Transportation	1
	Utilities	12
Total Critical Infrastructure		74

4.3.3 Other

According to the California State Hazard Mitigation Plan, Lake County has 82,544 acres of buildable land (currently vacant lots that have land use or zoning designations permitting future development).

Table 5: Values - Clearlake Parcels, Land and Improved Structures

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Total Value
Clearlake	14,259	7,261	$360,197,137	$861,158,556	$1,221,355,693

4.3.4 Future Development

Clearlake supports additional growth and development and incorporates measures to address hazard mitigation. Current proposed development projects include:

- 2890 Old Highway 53 – 22-lot subdivision
- J&L 6673 Old Hwy 53, Clearlake, CA 95422 – Commercial mixed-use project
- 14775 Burns Valley Rd, Clearlake, CA 95422 – Sports complex
- 15837 18th Avenue – Affordable Housing Development of up to 80 units
- Airport Redevelopment Project – commercial mix use and residential development

4.3.5 Outside County Access

There are three major ingress/egress routes for the County: State Roads 20, 29, and 175. These can be blocked by snow, slides, debris, wildfires, etc. In addition, the HMPC clearly pointed out the National Weather Service Radio coverage in Lake County is deficient according to the propagation maps. The NOAA/NWS radios given to residents in the burn scars of the Valley Fire, Clayton Fire and others might never hear an alert since they do not live in a coverage area.

It is also known that NOAA/NWS would like to help increase coverage, but currently do not have any funds available now, nor are they expected in the future to improve the coverage for Lake County.

4.4 Natural Environment

4.4.1 Tribal Cultural and Natural Resources

Lake County lies within and near the ancestral lands of the various local Native American Tribes, including the Pomo, Wintun, Wappo, and Lake Miwok Indians, that have and continue to live within the Lake County Planning Areas.

4.4.2 Natural Resources

Natural resources are important to include in cost/benefit analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources.

Clearlake sits on the edge of Clear Lake, the largest natural freshwater lake entirely within the geographic boundaries of California. Clear Lake, which has more than 100 miles of shoreline, sits at an elevation of 1,326 feet above sea level.

4.5 Agricultural Resources

Agriculture is an integral part of Lake County and has continually adapted along with the County. The Base Plan outlines the agricultural commodities in Lake County.

CHAPTER FIVE: WILDFIRE

5.1 Clearlake and Lake County Hazard Profile Comparison

Table 6: Clearlake and Lake County Wildfire Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Extensive	Extensive	N/A
Likelihood	Highly Likely	Highly Likely	N/A
Magnitude| Severity	**Catastrophic**	**Critical**	**Maintain at Catastrophic**
Significance	High	High	N/A
Climate Change Influence	**Medium**	**High**	**Upgrade to High**
Vulnerability	Extremely High	Extremely High	N/A

5.1.1 Profile Updates:

The City's Wildfire Hazards profile has been updated from its 2019 assessment in the following ways:

- The City's climate change influence assessment has been raised to High to match the County's.

5.1.2 Differences between County and City assessments:

- The city's assessment of the magnitude/severity rating of wildfires is higher than that of the county due to the city's population density and critical infrastructure within the jurisdictional planning area.

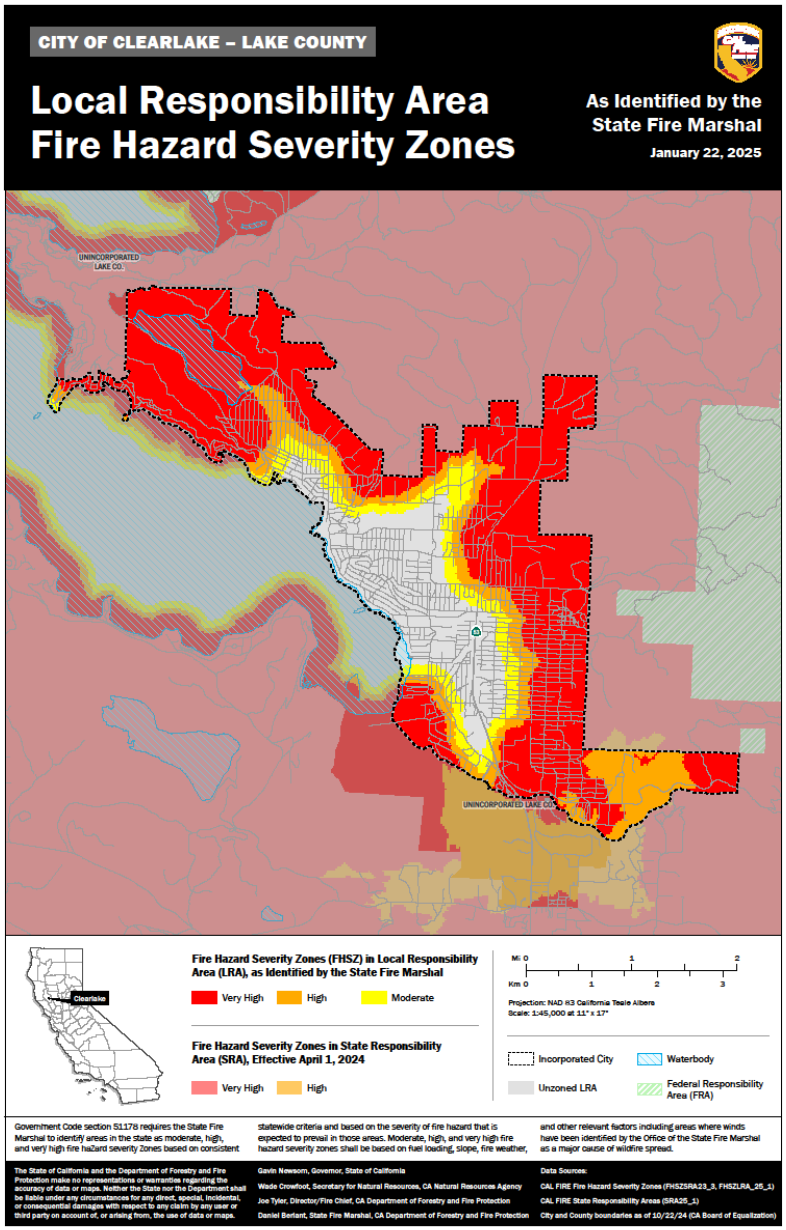
5.2 Location and Extent

CAL FIRE has identified areas at risk of fires in the eastern hills surrounding the region and has designated most of the land within Clearlake city limits east of SR 53 as a **Very High** Fire Hazard Zone, which is the highest fire hazard designation.

The outskirts of Clearlake form a wildland-urban interface (WUI), where structures face significant fire exposure risks. Challenges such as poor road conditions and insufficient water suppression infrastructure can hinder fire crews' ability to effectively combat fires. Additionally, dead vegetation on properties, and buildings

made with non-fire-resistant materials can further elevate the risk of structural losses during fires. CAL FIRE released an updated Fire Hazard Severity Zones in January 2025.

Figure 5: Clearlake LRA FHSZ



5.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan* for previous occurrences. The most recent previous occurrence was in September 2024:

the Boyles Fire occurred within the city limits of Clearlake, impacting 30 structures and 40 vehicles, and burning 81 acres.

5.4 Probability of Future Events

Highly Likely – This is the same as the county rating. Refer to the *Lake County Base Plan*.

5.5 Impacts of Climate Change

The City of Clearlake's impacts of climate change are being updated to align with the County Planning Area, as **High**. Refer to the *Lake County Base Plan*.

5.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

5.7 Exposure & Vulnerability

Vulnerability: Extremely High – This is the same as the County rating. Refer to the *Lake County Base Plan*.

Risk and vulnerability to Clearlake from wildfire is of significant concern. High fuel loads in the County, along with geographical and topographical features, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, exacerbated by climate change, can result in frequent and sometimes catastrophic fires. No development changes affected Clearlake's overall vulnerability.

5.7.1 Population

Clearlake's over 16,000 residents live within 10.8 square miles, with several neighborhoods within or bordering a Very High Severity Zone. According to the Lake County Community Wildfire Protection Plan, the City of Clearlake is a Community at Risk with the highest threat level.

5.7.2 Property

The entire geographical area of Clearlake falls within the Local Responsibility Area[1]. The LRA contains 14,259 parcels, of which only 7,261 are improved. The LRA has 14,259

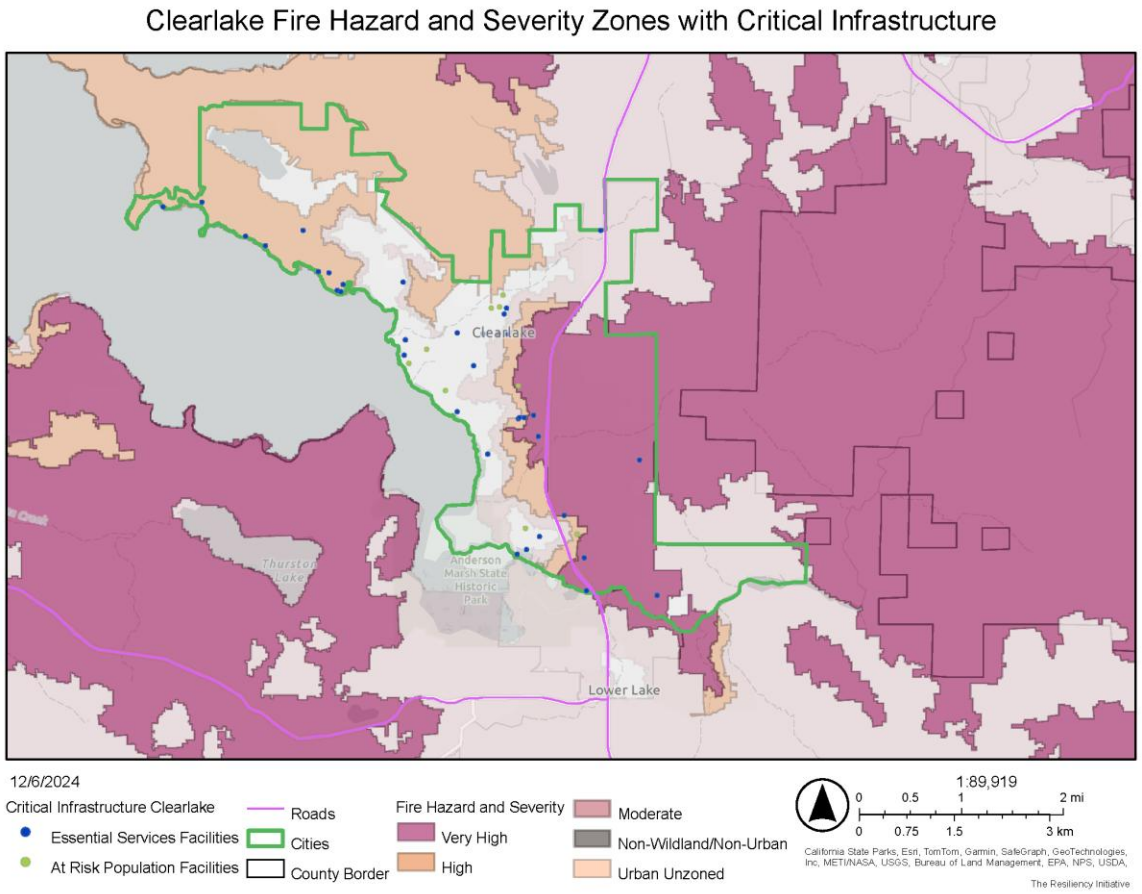
[1] LRAs are designated by the Board of Forestry and Fire Protection.

parcels with over $1.2 billion in total value. Note that fire does not only affect structural values, fire can also affect land values. As such the Assessor's land values and all parcels were accounted for in this analysis to represent total City assets at risk.

5.7.3 Critical Facilities & Infrastructure

Figure 6 outlines the critical infrastructure identified within Clearlake among the identified Fire Hazard and Severity Zones as of the hazard data December 2024.

Figure 6: Clearlake's Fire Hazard and Severity Zones with Critical Infrastructure



CHAPTER SIX: EARTHQUAKE

6.1 Clearlake and Lake County Hazard Profile Comparison

Table 7: Clearlake and Lake County Earthquake Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Extensive	Extensive	N/A
Likelihood	Occasional | Likely	Occasional | Likely	N/A
Magnitude| Severity	**Catastrophic**	**Critical**	**Maintain Catastrophic**
Significance	**Medium**	**High**	**Upgrade to High**
Climate Change Influence	Low	Low	N/A
Vulnerability	**High**	**Medium**	**Maintain High**

6.1.1 Profile Updates:

The City's Earthquake profile has been updated from its 2019 assessment in the following ways:

- The City's significance assessment has been raised to High to match the County's.

6.1.2 Differences between County and City Assessments:

The City's Earthquake Hazard differs from the County's in the following ways:

- The City's magnitude/severity assessment is higher than the county's due to the concentration of fault lines within Clearlake and the population density and critical infrastructure within the jurisdictional planning area.
- The City's vulnerability assessment is higher than the County's due to its higher population density and critical infrastructure within the jurisdictional planning area.

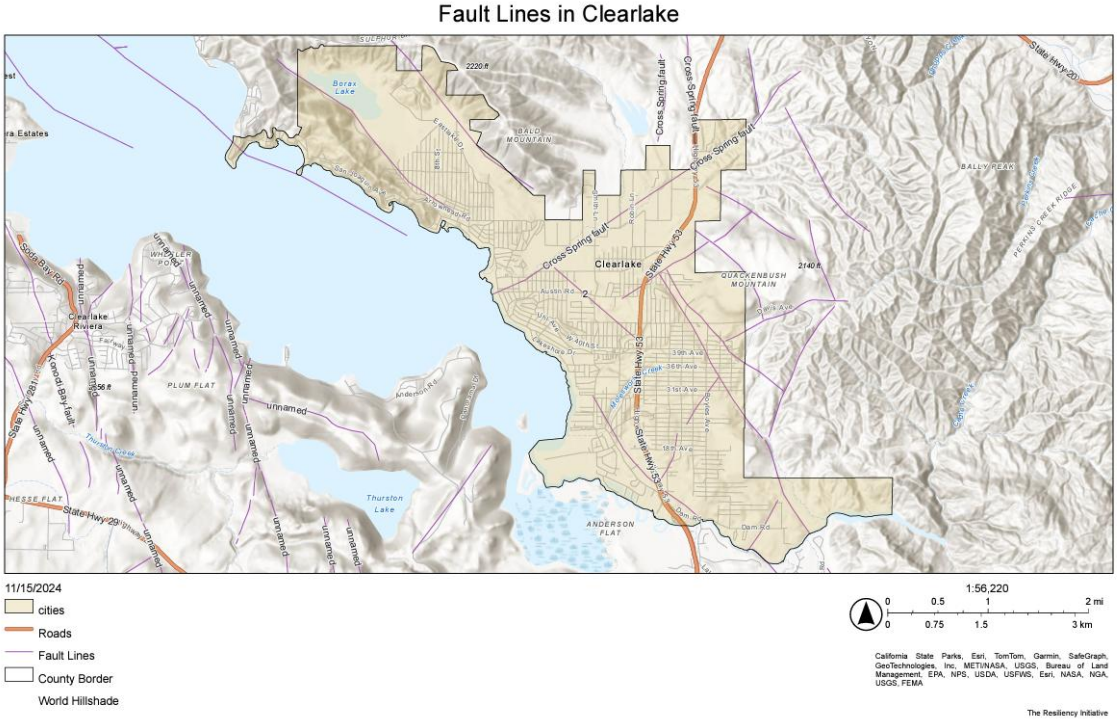
6.2 Location and Extent

In addition to the information provided in the County's Base Plan, see here for Clearlake-specific information.

While there are no major faults within the City of Clearlake, there are several quaternary faults with the City's boundaries. A quaternary (QT) fault is a specific type of fault that has shown evidence of movement within the Quaternary period, which spans the last 2.6 million years up to the present. These faults are important in seismic hazard assessments because they indicate geological activity that is relatively recent in terms of Earth's history, suggesting a higher likelihood of future seismic activity compared to older, inactive faults.

The City is in a geologically complex region shaped by faulting, lacustrine deposition and volcanism. The bedrock substrate of the area is dominated primarily by semi-consolidated sandstone and volcanic andesite. Much of the City of Clearlake is built upon Pleistocene sandstone, gravel, and shale. This material is characterized by the California Geological Survey as mostly loosely consolidated. Along the shore of Clear

Figure 7: Fault Lines in Clearlake



Lake, the substrate consists of unconsolidated or semi-consolidated alluvium. Quaternary volcanic andesite from past lava flows originating from Mt. Konocti is also present.

6.2.1 Extent

In addition to the information provided in the County's Base Plan, see here for Clearlake-specific information.

Clearlake can be affected by earthquakes in two potential scenarios. The first is in a nearby earthquake. Directly west of Clearlake are several potentially active faults. The Collayomi (<130,000 years), Big Valley (<150 years), and Konocti Bay (<15,000 years) faults are all within 15 miles of the City.

The second scenario is caused by an earthquake on a larger fault, upwards of 100 miles away. A smaller earthquake near Clearlake would cause more damage compared to a larger earthquake further away, on the San Andreas or Rogers Creek faults. While seismologists have greatly advanced the knowledge within the field, there is still considerable uncertainty about both the size and frequency with which faults will rupture.

6.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

6.4 Probability of Future Events

Occasional (major earthquake) – This is the same as the county rating. Refer to the *Lake County Base Plan*.

Likely (minor earthquake) – This is the same as the county rating. Refer to the *Lake County Base Plan*.

6.5 Impacts of Climate Change

The City of Clearlake's impacts of climate change are being updated to align with the County Planning Area, as **High**. Refer to the *Lake County Base Plan*.

6.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

6.7 Exposure & Vulnerability

Vulnerability: High. This is higher than the County's due to its higher population density.

Earthquake losses will vary depending on the source and magnitude of the event. Lakeport faces several specific vulnerabilities to earthquakes, including[2]:

- **Ground Failure:** Ground shaking and soil liquefaction in low-lying areas can damage foundations and disrupt underground utilities.
- **Utility Disruption:** Electricity, water, and gas lines may be severed by earthquakes, leading to prolonged outages and increased risks to public health and safety.
- **Fire Hazards:** Damaged electrical and gas lines may ignite.
- **Landslides**: The hilly terrain increases the likelihood of landslides, which could block roads, damage property, and disrupt transportation and communication routes.
- **Ground rupture:** Surface faulting may directly damage infrastructure.

The *Clearlake General Plan Background Report* noted that within a seismically active area, earthquakes pose hazards to development. Earthquakes occur when a slip in the fault releases built-up energy. Energy travels in waves through the earth's crust and causes ground shaking. Secondary hazards resulting from seismic activity include ground rupture along the fault, liquefaction of soils, settlement from sinking soils, and seismically-induced landslides. No development changes affected Clearlake's overall vulnerability.

[2] Adapted from the 2023 California Hazard Mitigation Plan Volume 1, Part 2 with an analysis of Lake County specific characteristics and vulnerabilities.

The geologic conditions along streambeds and the lake suggest these areas are most likely to be affected by liquefaction and settlement. Impacts to the City of Clearlake from earthquake include loss of life, damage to critical facilities, damage to residential homes, damage to commercial properties, as well as damage to infrastructure in and around the City.

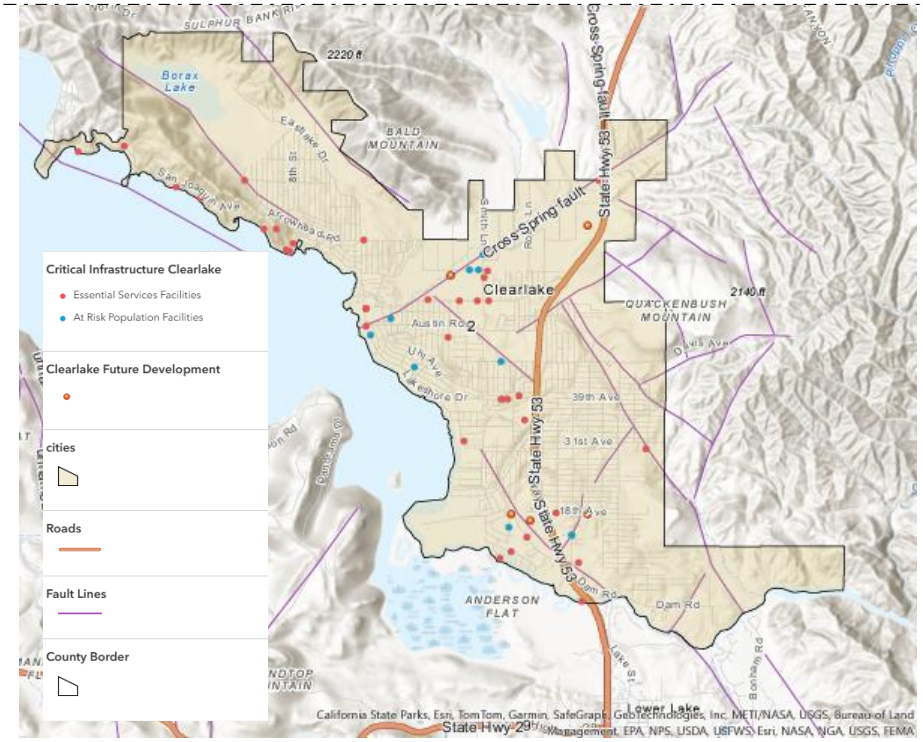
6.7.1 Population

The city rated its vulnerability as High compared to the County's rating of Medium due to the city having a higher population density.

6.7.2 Property, Critical Facilities & Infrastructure

The city does not keep an inventory of retrofitted/reinforced buildings. However, all city-owned buildings (including City Hall and the Community Center) are unreinforced. There is one known soft-story building in the city, located at 15322 Lakeshore Drive.

Figure 8: Map of Clearlake with Critical Infrastructure and Future Development



Despite the earthquake risk, new growth and development will continue in the affected area due to low likelihood of major quakes and existing building codes.

CHAPTER SEVEN: AQUATIC HAZARDS

7.1 Clearlake and Lake County Hazard Profile Comparison

Table 8: Clearlake and Lake County Aquatic Hazards Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Extensive	Extensive	N/A
Likelihood	Highly Likely	Highly Likely	N/A
Magnitude| Severity	**Catastrophic**	**Limited**	**Maintain Catastrophic**
Significance	High	High	N/A
Climate Change Influence	**Medium**	**High**	**Upgrade to High**
Vulnerability	High	High	N/A

7.1.1 Profile Updates:

The City's Aquatic Hazards profile has been updated from its 2019 assessment in the following ways:

- The City's Climate Change influence assessment has been raised to High to match the County's.

7.1.2 Differences between County and City assessments:

Due to its proximity to the lake, the City's assessment of Aquatic Hazards' magnitude and severity is higher than the County's.

7.2 Location and Extent

Aquatic Hazards have a higher magnitude/severity level for Clearlake than the County due to the City's proximity to the lake. Tourism from Clear Lake is a major driver of revenue for the city. Homes along the Lake are an important tax base for the city.

Cyanobacterial blooms and invasive species threaten the tourism industry, the value of homes along the Lake and municipal water facilities. Cyanobacterial blooms in the lake affect the water intake systems from which the water treatment plants draw.

Hydroelectric power plants and municipal water facilities face severe risks from mussel infestations, which clog pipelines, water intakes, and disrupt operations. This leads to costly cleaning, treatment, and maintenance. Preventative measures can cost $100,000 to $200,000 per facility initially, with annual costs ranging from $4,000 to $141,700. Maintenance costs for established mussel presence can run between $22,000 and $505,000 per facility, with annual recurring maintenance expenses from $26,000 to $112,000. Monitoring costs range from $1,970 to $47,245 annually, while unplanned outages can cost $44,000 to $80,000 per occurrence, amounting to $849,000 in total.

7.2.1 Cyanobacterial Blooms

While it affects Clear Lake as a whole, cyanobacteria also affect the shoreline of Clearlake that abuts Clear Lake. No other locations of the City are physically affected. While only the shoreline of the Lake is physically affected, the economic extent of cyanobacterial blooms affect the whole of the City.

7.2.2 Invasive Species

Invasive species, such as the quagga mussel, have not been detected in Clear Lake, California. However, an infestation would affect the Lake, Clearlake's shoreline, and likely the municipal water facilities.

7.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

7.4 Probability of Future Events

7.4.1 Cyanobacteria Bloom

Highly Likely – This is the same as the county rating. Refer to the *Lake County Base Plan*.

7.4.2 Invasive Species

Likely – This is the same as the county rating. Refer to the *Lake County Base Plan*.

7.5 Impacts of Climate Change

The City of Clearlake's impacts of climate change are being updated to align with the County Planning Area, as **High**. Refer to the *Lake County Base Plan*.

7.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

7.7 Exposure & Vulnerability

Vulnerability: High – This is the same as the county rating. Refer to the *Lake County Base Plan.*

7.7.1 Population

An infestation of invasive aquatic hazards would significantly impact Clearlake's population due to its proximity to the lake. Infestations could negatively impact the City's local economy and potentially cause considerable damage to the City's water facilities.

7.7.2 Property

Continued widespread and persistent cyanobacterial blooms may adversely affect lakeside property values and the desirability to visit and recreate at Clear Lake. Non-native aquatic vegetation has been shown to adversely affect real estate values of shoreline property in the county and Clearlake. Cyanobacteria blooms could impact future development by damaging Clear Lake, thereby negatively impacting tourism, including boating and fishing. No development changes affected Clearlake's overall vulnerability.

7.7.3 Critical Facilities & Infrastructure

Invasive species pose a threat to municipal water facilities. An infestation could impact the City's water supply and be a significant financial burden for the City.

CHAPTER EIGHT: Drought

8.1 Clearlake and Lake County Hazard Profile Comparison

Table 9: Clearlake and Lake County Drought Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Extensive	Extensive	N/A
Likelihood	Likely	Likely	N/A
Magnitude| Severity	Critical	Critical	N/A
Significance	**Medium**	**High**	**Upgrade to High**
Climate Change Influence	**Medium**	**High**	**Upgrade to High**
Vulnerability	**Medium**	**High**	**Upgrade to High**

8.1.1 Profile Updates:

The City's Drought Hazards profile has been updated from its 2019 assessment in the following ways:

- The City's significance assessment has been raised to High to match the County's.
- The City's climate change influence assessment has been raised to High to match the County's.
- The City's vulnerability assessment has been raised to High to match the County's.

8.1.2 Differences between County and City assessments:

There is no significant difference in drought's effects on the extent, location, exposure, or vulnerability of the City of Clearlake compared to the County's.

8.2 Location and Extent

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

8.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

8.4 Probability of Future Events

8.4.1 Drought

Likely – This is the same as the county rating. Refer to the *Lake County Base Plan*.

8.4.2 Water Shortage

Occasional – This is the same as the county rating. Refer to the *Lake County Base Plan*.

8.5 Impacts of Climate Change

The City of Clearlake's impacts of climate change are being updated to align with the County Planning Area, as **High**. Refer to the *Lake County Base Plan*.

8.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

8.7 Exposure & Vulnerability

Vulnerability: High – This is the same as the county rating; there is no significant difference in the impact of Drought on population, property, or critical facilities & infrastructure. Refer to the *Lake County Base Plan*. No development changes affected Clearlake's overall vulnerability.

CHAPTER NINE: FLOOD

9.1 Clearlake and Lake County Hazard Profile Comparison

Table 10: Clearlake and Lake County Flood Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Extensive	Extensive	N/A
Likelihood	Occasional **Occasional** Highly Likely	Occasional **Unlikely** Highly Likely	**Maintain Occasional for .02% Chance**
Magnitude| Severity	**Critical**	**Limited**	**Maintain Critical**
Significance	High	High	N/A
Climate Change Influence	Medium	Medium	N/A
Vulnerability	**High**	**Extremely High**	**Maintain High**

9.1.1 Profile Updates:

The City's Flood profile has not changed from its 2019 assessment.

9.1.2 Differences between County and City assessments:

The City's Flood Hazard differs from the County's in the following ways:

- The City's assessment of the likelihood of future events for a flood is higher than the County's due to its proximity to the Lake.
- The City's assessment of flooding's magnitude/severity is higher than the County's due to its population density and its proximity to the Lake.
- The City's assessment of vulnerability is lower than the County's due to its limited proximity to dams and levees.

9.2 Location and Extent

9.2.1 Clearlake Streams and Watersheds

The City of Clearlake is entirely within the Clear Lake watershed. The 450 square mile watershed drains from west to east, with the downstream boundary located at the Clear Lake Dam on Cache Creek.

Flood extents are usually measured in depths of flooding, the aerial extent of the floodplain, as well as flood zones that a location falls in (i.e., 1% or 0.2% annual chance flood). Expected flood depths in the city vary and are not well-defined. Flood durations in the City tend to be short- to medium-term, or until the storm drainage system can catch up or flood waters move downstream.

By downloading the National Flood Hazard Layer (NFHL) from FEMA website, it is possible to extract the 100-year flood zone. It is extracted by merging the A, AE, and AO zones which relate to flood zones specified by FEMA. Flood zones are geographic areas that the FEMA has defined according to varying levels of flood risk.

Figure 9: Map of Clearlake with 100-Year Flood Risk

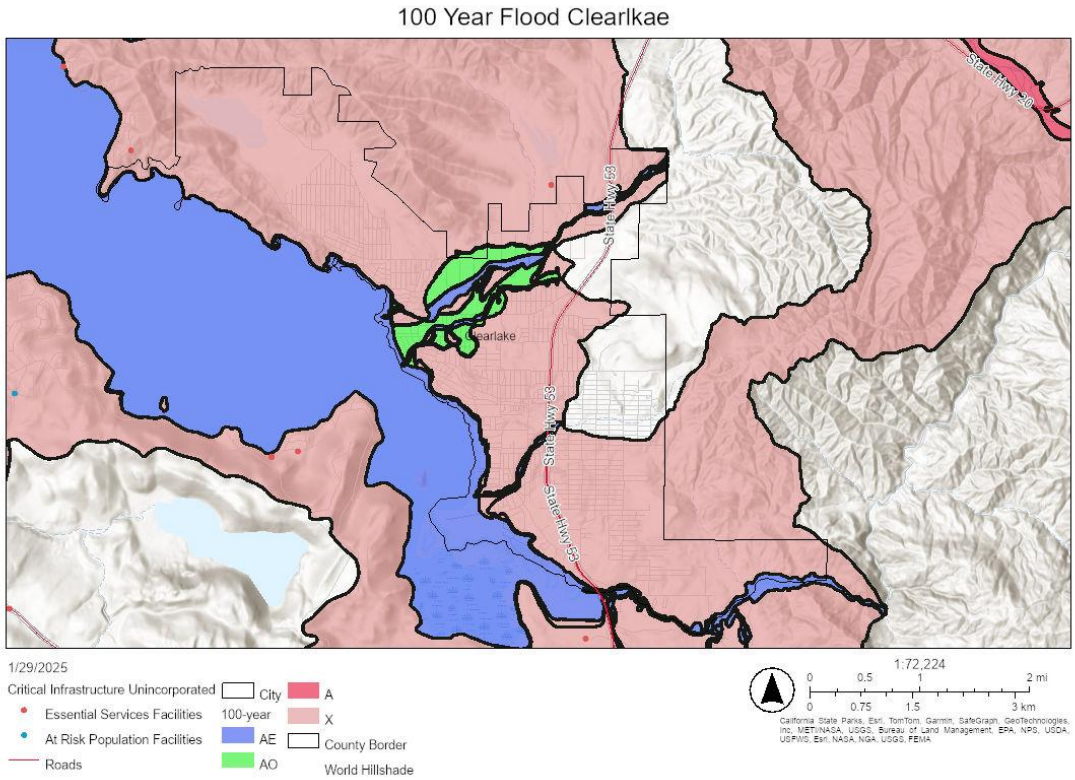
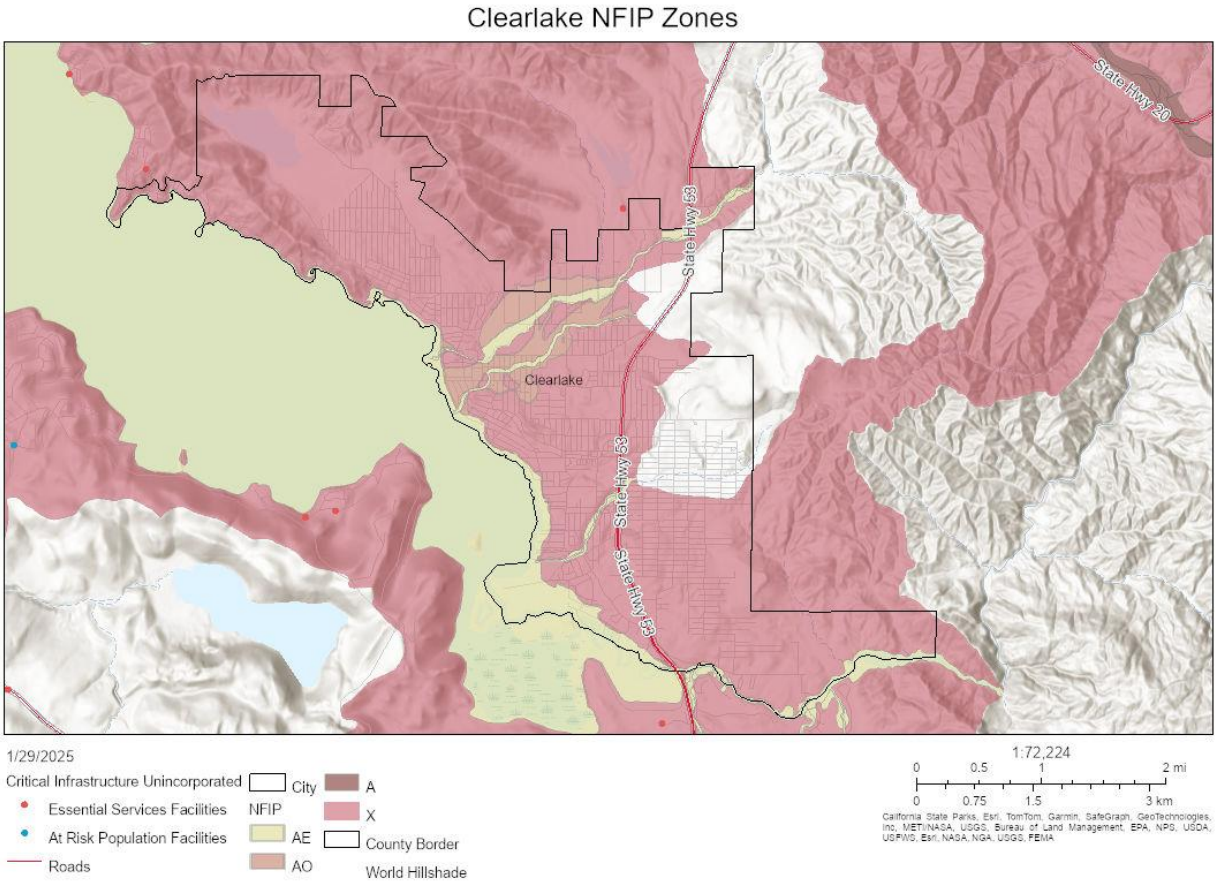


Figure 10: NFIP Zones in Clearlake



9.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

9.4 Probability of Future Events

1% Annual Chance Flood

Occasional – This is the same as the county rating. Refer to the *Lake County Base Plan.*

0.2% Annual Chance Flood

Occasional — The 0.2% annual chance flood (500-year) is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. The City of Clearlake rated this hazard higher due to the proximity to the lake.

Localized (Storm Water) Flood

Highly Likely – This is the same as the county rating. Refer to the *Lake County Base Plan.*

9.5 Impacts of Climate Change

The City of Clearlake's impacts of climate change are being updated to align with the County Planning Area, as **High**. Refer to the *Lake County Base Plan*.

9.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan.*

9.7 Exposure & Vulnerability

Vulnerability: High

9.7.1 Population, Critical Facilities & Infrastructure

Historically, the City has been at risk to flooding primarily during the winter and spring months when stream systems in the County and City swell with heavy rainfall. Localized flooding also occurs throughout the City at various times throughout the year with several areas of primary concern.

In addition to flooding, damage to these areas during heavy storms includes road closures, pavement deterioration, washouts, landslides/mudslides, debris areas, and downed trees. The amount and type of damage or flooding varies from year to year, depending on the runoff quantity.

Other areas include areas of LSD at Villas, Meadowbrook near River View, and Burn Valley at Chohozi Bridge.

The HMPC and Lake County Fire Protection District noted that a contributing factor to localized flooding is the lack of maintenance on drainage areas. Years of drought, followed by fires and rain, create significant debris and stress on drainage areas. As a result, during significant rains, flooding occurs in these areas. Impacts primarily include damages to infrastructure. Impacts to property and life safety from localized flooding would be more limited. No development changes affected Clearlake's overall vulnerability.

Table 11: Critical Facilities in Flood Zones

Flood Zone/Critical Facility Category	Facility Count
1% Annual Chance Flood Hazard	
Essential Services Facilities	21
At Risk Population Facilities	3
1% Annual Chance Flood Hazard Total	23

9.7.2 Repetitive Loss Areas

The repetitive loss areas within Clearlake are identified in *Table 25: Clearlake's NFIP Status and Floodplain Management Program.*

CHAPTER 10: LEVEE FAILURE

10.1 Clearlake and Lake County Hazard Profile Comparison

Table 12: Clearlake and Lake County Levee Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	**Limited**	**Significant**	**Maintain ratings as there are no levees in the City Boundaries**
Likelihood	**Occasional**	**Likely**	
Magnitude| Severity	**Negligible**	**Limited**	
Significance	**Low**	**Medium**	
Climate Change Influence	**Low**	**Medium**	
Vulnerability	**Extremely Low**	**Medium**	

10.1.1 Profile Updates:

The City's Levee Failure profile has no significant updates from the 2019 assessment.

10.1.2 Differences between County and City assessments:

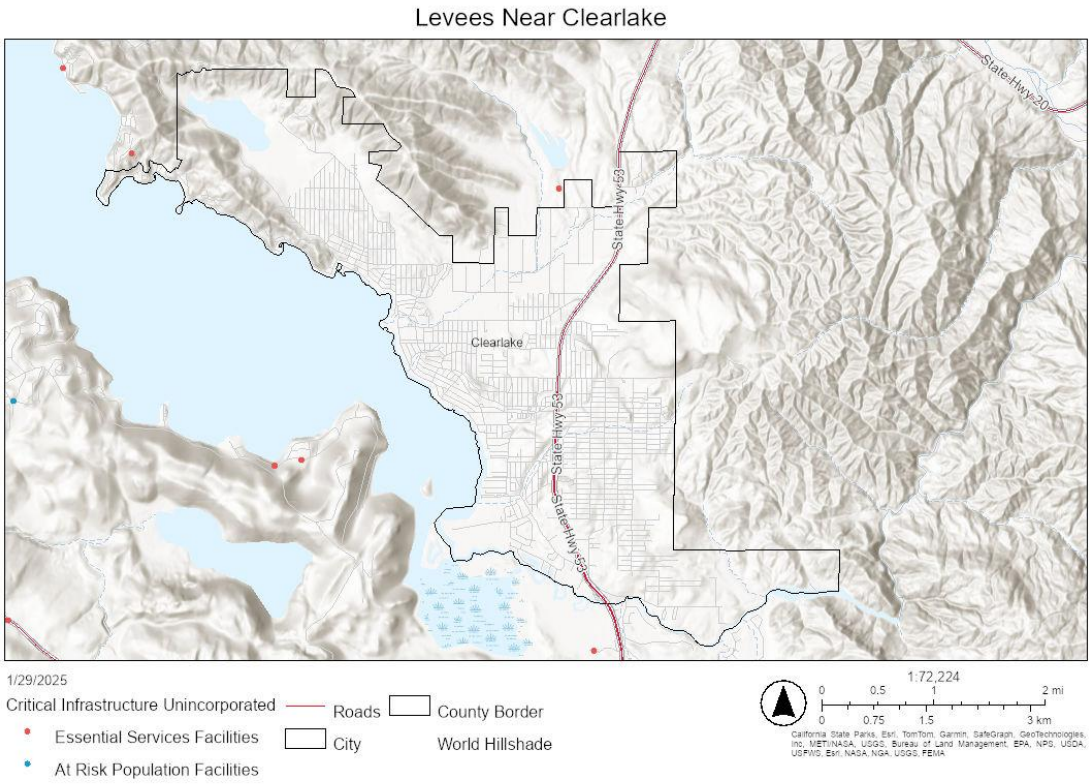
The City's Levee Failure profile differs from the County's because there are no levees within the City's boundaries. Thus, these ratings are lower than those of the County:

- Geographical risk
- Likelihood of future events
- Magnitude and severity
- Significance
- Influence of climate change
- Vulnerability

10.2 Location and Extent

There are no levees in the City Boundaries.

Figure 11: Map of Levees Near Clearlake



10.3 Previous Occurrences

There are no levees in the City Boundaries.

10.4 Probability of Future Events

There are no levees in the City Boundaries.

10.5 Impacts of Climate Change

There are no levees in the City Boundaries.

10.6 Secondary Hazards

There are no levees in the City Boundaries.

10.7 Exposure & Vulnerability

Vulnerability: Extremely Low There are no levees in the City Boundaries

CHAPTER 11: DAM FAILURE

11.1 Clearlake and Lake County Hazard Profile Comparison

Table 13: Clearlake and Lake County Dam Failure Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Limited	Limited	N/A
Likelihood	Unlikely	Occasional	N/A
Magnitude| Severity	Limited	Limited	N/A
Significance	Medium	Medium	N/A
Climate Change Influence	Medium	Low	N/A
Vulnerability	**High**	**Medium**	**Change to Medium**

11.1.1 Profile Updates:

The City's Dam profile has no significant updates from the 2019 assessment.

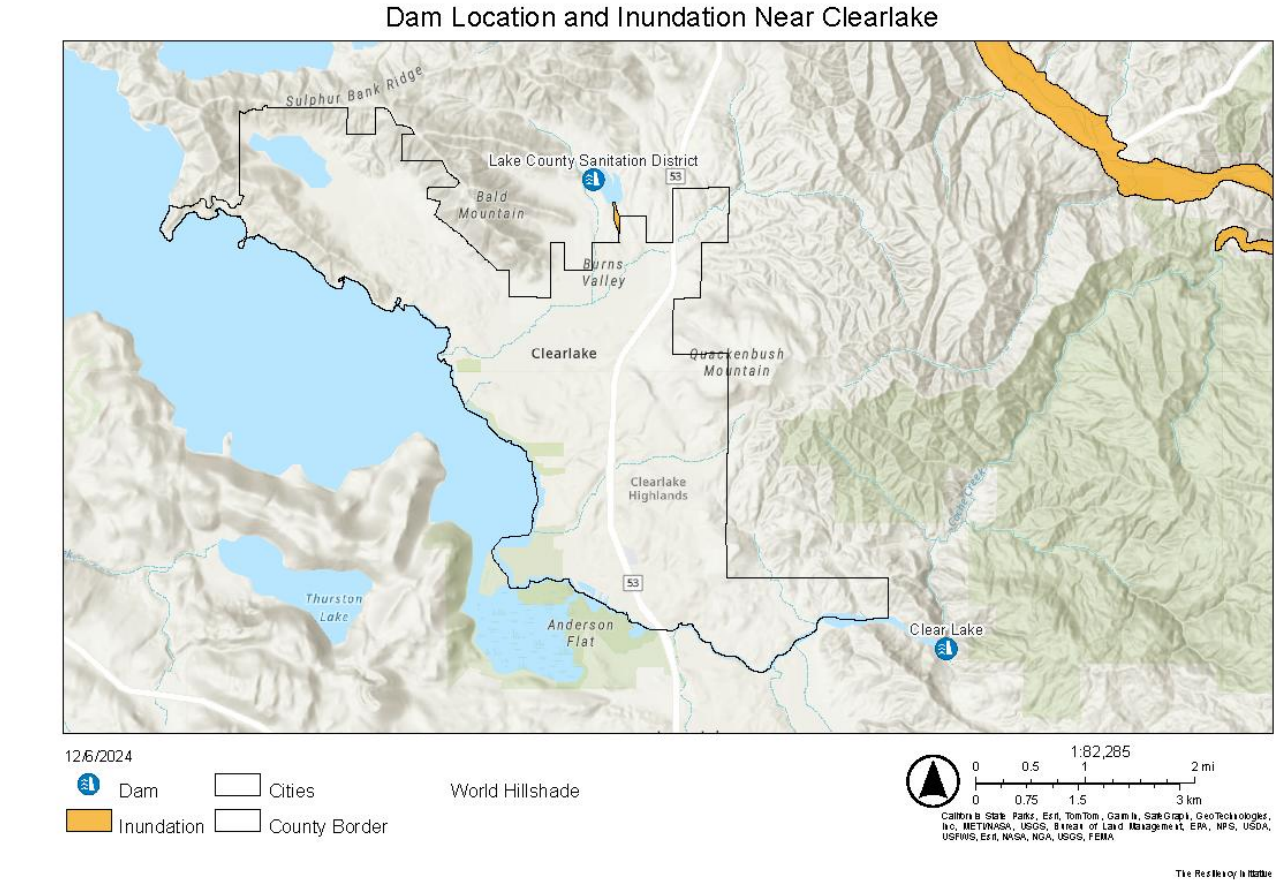
11.1.2 Differences between County and City assessments:

The City's Dam Failure profile differs from the County's in the following ways:

- The City's assessment of the likelihood of future events is lower than the County's because there is only one dam in proximity to the City.
- The City's assessment of the influence of climate change is higher than the County's due to its proximity to the Southeast Wastewater Treatment Plant and the effects that climate change could have on rainfall, particularly during the wetter winter season.
- The City's vulnerability assessment is higher than the County's because of the water treatment plant.

11.2 Location and Extent

Figure 12: Map of Dam Locations and Inundation Areas Near Clearlake



11.2.1 Southeast Wastewater Treatment Plant

Of the 21 dams, only one has the possibility to impact the City of Clearlake: the Southeast Wastewater Treatment Dam. The Southeast Wastewater Treatment Plant Dam is located approximately 1.5 miles north of the City. Failure of the dam would result in extensive property damage to residential structures along Pond Road, areas of Old Hwy 53, and Rumsey Road.

Dam inundation would affect discrete areas of the City. Dam failures usually involve partial, not total, failure. GIS analysis was performed to determine what percentages of the City would be inundated (using Cal OES dam inundation data).

11.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

11.4 Probability of Future Events

Unlikely — The City of Clearlake has a lower rating it has only one dam within close proximity.

11.5 Impacts of Climate Change

Increases in both precipitation and heat causing snow melt could increase the potential for dam failure and uncontrolled releases in Lake County.

11.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

11.7 Exposure & Vulnerability

Vulnerability: Medium

Clearlake's vulnerability is rated Medium due to its proximity to the Southeast Wastewater Treatment Plant. Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding.

The primary danger associated with dam failure is the high velocity flooding of those properties downstream of the dam. A dam failure can range from a small, uncontrolled release to a catastrophic failure. No development changes affected Clearlake's overall vulnerability.

11.7.1 Population

The most likely scenario in the City would be a small release.

11.7.2 Property

Dam failure flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect crops and livestock as well as lifeline utilities (e.g., water, sewer, and power), transportation, jobs, tourism, the environment, and the local and regional economies.

Table 14: Dam Inundation Areas

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Contents Value	Total Value	% of Total Parcel Count
Southeast Wastewater Treatment Dam							
Commercial	47	26	$3,052,453	$5,001,706	$5,001,706	$13,055,865	6%
Industrial	0	0	$0	$0	$0	$0	0%
Open Space	0	0	$0	$0	$0	$0	0%
Residential	472	378	$14,589,559	$32,628,021	$16,314,011	$63,531,591	93%
Unknown	2	1	$10,821	$24,890	$24,890	$60,601	0%
Vacant	2	0	$8,000	$0	$0	$8,000	0%
Total	523	405	$17,660,833	$37,654,617	$21,340,607	$76,656,057	100%

Source: Cal OES; US Census Bureau 2010 Estimates, Lake County 1/3/2017 Parcel/Assessor's Data

11.7.3 Critical Facilities and Infrastructure

Vulnerability to dam failures is confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility and associated revenues that accompany those functions.

CHAPTER TWELVE: SEVERE WEATHER | EXTREME HEAT

12.1 Clearlake and Lake County Hazard Profile Comparison

Table 15: Clearlake and Lake County Severe Weather - Extreme Heat Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Extensive	Extensive	N/A
Likelihood	Highly Likely	Highly Likely	N/A
Magnitude| Severity	**Limited**	**Critical**	**Upgrade to Critical**
Significance	Medium	Medium	N/A
Climate Change Influence	High	High	N/A
Vulnerability	**Medium**	**High**	**Upgrade to High**

12.1.1 Profile Updates:

Clearlake's Severe Weather – Extreme Heat hazard profile has been updated from its 2019 assessment in the following ways:

- The City's assessment magnitude/severity has been raised to Critical to match the County's.
- The City's assessment vulnerability has been raised to High to match the County's.

12.1.2 Differences between County and City assessments:

There is no significant difference in Severe Weather – Extreme Heat's effects on the extent, location, exposure, or vulnerability of the City of Clearlake compared to the County's.

12.2 Location and Extent

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

12.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

12.4 Probability of Future Events

Highly Likely – This is the same as the county rating. Refer to the *Lake County Base Plan*.

12.5 Impacts of Climate Change

The City of Clearlake's impacts of climate change are being updated to align with the County Planning Area, as **High**. Refer to the *Lake County Base Plan*.

12.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

12.7 Exposure and Vulnerability

Vulnerability: High – This is the same as the county rating. Refer to the *Lake County Base Plan*.

Extreme heat events are a recurring hazard in Lakeport, particularly during summer months, though their intensity and frequency may vary from year to year. Prolonged periods of extreme heat can strain electricity demands, locally and state-wide or beyond, particularly for air conditioning in homes and businesses, and pose health risks for individuals exposed to high temperatures. Additionally, extreme heat can exacerbate or mimic drought conditions by increasing evapotranspiration and reducing vegetation moisture, thereby heightening wildfire vulnerability.

12.7.1 Population

As the City's demographics shift, more residents will become senior citizens. The residents of nursing homes and elder care facilities, as well as elderly individuals who live alone, are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme heat. Low-income residents and homeless populations are also vulnerable.

12.7.2 Property & Critical Infrastructure

No additional City of Clearlake information. Refer to the *Lake County Base Plan*. No development changes affected Clearlake's overall vulnerability.

CHAPTER THIRTEEN: SEVERE WEATHER | HEAVY RAINS, SNOW & STORMS

13.1 Clearlake and Lake County Hazard Profile Comparison

Table 16: Clearlake and Lake County Severe Weather - Heavy Rains, Snow, and Storms Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Extensive	Extensive	N/A
Likelihood	Highly Likely	Highly Likely	N/A
Magnitude| Severity	Limited	Limited	N/A
Significance	Medium	Medium	N/A
Climate Change Influence	**High | Low**	**Medium**	**Average and match the County**
Vulnerability	High	High	N/A

13.1.1 Profile Updates:

The City's Severe Weather – Heavy Rains, snow, & Storms profile has been updated from its 2019 assessment in the following ways:

- The City's Climate Change influence assessment has been changed to match the County's.

13.1.2 Differences between County and City assessments:

There is no significant difference in drought's effects on the extent, location, exposure, or vulnerability of the City of Clearlake compared to the County's.

13.2 Location and Extent

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

13.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

13.4 Probability of Future Events

Highly Likely – This is the same as the county rating. Refer to the *Lake County Base Plan*.

13.5 Impacts of Climate Change

The City of Clearlake's impacts of climate change are being updated to align with the County Planning Area, as **Medium**. Refer to the *Lake County Base Plan*.

13.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

13.7 Exposure and Vulnerability

Vulnerability: High – This is the same as the county rating. Refer to the *Lake County Base Plan*. No development changes affected Clearlake's overall vulnerability.

CHAPTER FOURTEEN: TREE MORTALITY

14.1 Clearlake and Lake County Hazard Profile Comparison

Table 17: Clearlake and Lake County Tree Mortality Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Significant	Extensive	Lower Tree Population
Likelihood	Highly Likely	Highly Likely	
Magnitude| Severity	Critical	Critical	
Significance	Medium	High	
Climate Change Influence	High	High	
Vulnerability	Medium	Extremely High	

14.1.1 Profile Updates:

Tree Mortality has been raised from a secondary hazard to a profiled hazard.

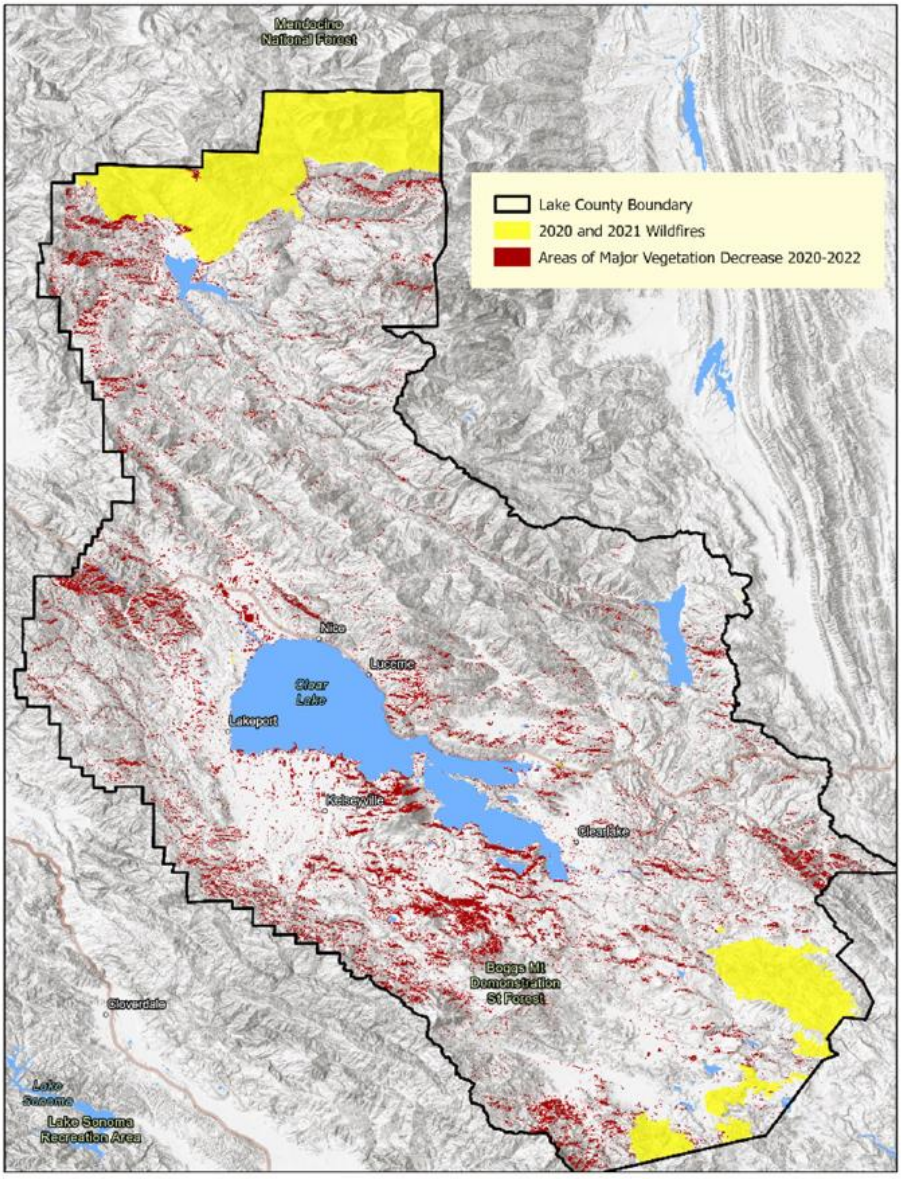
14.1.2 Differences between County and City assessments:

The City's Tree Mortality profile differs from the County's in the following ways:

- The City's geographic assessment is lower than the County's because there is a lower tree population.
- The City's assessment of significance is lower than the County's because there is a lower tree population.
- The City's assessment of vulnerability is lower than the County's because there is a lower tree population.

14.2 Location and Extent

Figure 13: Vegetation Loss Due to Tree Mortality



14.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

14.4 Probability of Future Events

Highly Likely – This is the same as the county rating. Refer to the *Lake County Base Plan*.

14.5 Impacts of Climate Change

The City of Clearlake's impacts of climate change are being updated to align with the County Planning Area, as **High**. Refer to the *Lake County Base Plan*.

14.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

14.7 Exposure & Vulnerability

Vulnerability: Medium - The City has a lower tree population due to the urban environment. Severe Tree Mortality in population-dense areas may cause loss of life and property due to trees falling. Severe Tree Mortality may also increase the risk of Wildfire. No development changes affected Clearlake's overall vulnerability.

CHAPTER FIFTEEN: VOLCANO AND GEOTHERMAL GAS RELEASE

15.1 Clearlake and Lake County Hazard Profile Comparison

Table 18: Clearlake and Lake County Volcano and Geothermal Gas Release Hazard Profile Comparison

Category	Clearlake Previous Rating	Compared to the County	Validations| Changes
Geography	Significant	Significant	N/A
Likelihood	Unlikely**/Highly Likely**	Unlikely**/Likely**	**Maintain Highly Likely for Gas Release**
Magnitude| Severity	Critical	Critical	N/A
Significance	High	High	N/A
Climate Change Influence	Low	Low	N/A
Vulnerability	**Extremely High**	**Extremely High**	N/A

15.1.1 Profile Updates:

The City's Volcano and Geothermal Gas Releases profile has no significant updates from the 2019 assessment.

15.1.2 Differences between County and City assessments:

- The City's assessment of the likelihood of future events for geothermal gas release is higher than the County's due to the proximity of active geothermal vents.

15.2 Location and Extent

Clearlake is in a region with numerous geothermal sources and mineral springs that release gases through surface vents. Hydrogen sulfide, carbon dioxide and methane gases leach out from underground magma through hot springs and during volcanic activity. The geothermal gas vents and impacted areas occur within a several-block

area in northwest Clearlake. Affected areas can be seen in Figure 14 and Figure 15, as noted in a 2011 H2S Report[3].

Figure 14: City of Clearlake – H2S Site Location

[3] 2011 *Clearlake H₂S Report*

Figure 14: City of Clearlake – Geothermal Gas Site Location

15.3 Previous Occurrences

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

15.4 Probability of Future Events

Clear Lake volcanic field is located about 90 miles north of San Francisco, California. The town of Clear Lake lies within the field, as does the 43,000-acre freshwater lake of its namesake. The most prominent volcanic feature in the field is 300,000-year-old Mount Konocti, rising about 3,200 feet above the south shore of the lake.

The 2-million-year history of Clear Lake volcanic field consists mostly of nonexplosive eruptions. However, the most recent eruptions, which occurred through the lake about 11,000 years ago, were explosive owing to flash vaporization

of water as magma ascended toward the surface. These events produced craters and cinder cones along the shoreline near Mount Konocti.

Clear Lake volcanic field is well known for steam vents and hot springs. The Geysers steam field sits along the southwest margin of the volcanic field, and hosts one of the world's most productive geothermal power facilities. Currently there are 18 plants in operation generating about 835 megawatts (MW) of electricity.

Additional research is needed to determine the likelihood of a future eruption in the Clear Lake volcanic field, but recent geophysical and geochemical surveys suggest that a reservoir of partly molten rock underlies the volcanic field, and another body of magma underlies The Geysers steam field.

Volcano: Unlikely – This is the same as the county rating. Refer to the *Lake County Base Plan*.

Geothermal Gas Release: Highly Likely – This is higher than the County's due to the proximity of active geothermal vents.

15.5 Impacts of Climate Change

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

15.6 Secondary Hazards

No additional City of Clearlake information. Refer to the *Lake County Base Plan*.

15.7 Exposure & Vulnerability

Vulnerability: Extremely High - This is the same as the county rating.

Lake County and Clearlake are known for their geothermal activity, but in early 2010, a spontaneous release of toxic and explosive levels of hydrogen sulfide and methane gases from the soil in a Clearlake residential neighborhood created a previously unidentified danger. One household was evacuated due to these gases, which continue to be detected in varying degrees. The scope and health risks associated with low-level or intermittent exposures are not fully understood.

Hydrogen sulfide, carbon dioxide, and methane seep from underground magma through hot springs and during volcanic activity. The region surrounding Clearlake, including Mount Konocti—a large volcano located only 5.13 miles (8.25 kilometers) away—has numerous geothermal sources and mineral springs that release gases

through surface vents. In the week preceding the gas leak, the USGS recorded a swarm of small earthquakes 23.5 miles (37.85 kilometers) west of Clearlake.

Hydrogen sulfide (H_2S) is a flammable, colorless gas with a characteristic rotten egg smell at low concentrations and which can linger in the atmosphere for around 18 hours. The World Health Organization advises against exposure to H_2S, as it is heavier than air and tends to accumulate in poorly ventilated, low-lying areas, posing a greater risk to children. Concentrations between 0.00011–0.00033 ppm are considered harmless, but higher levels can cause eye and nose irritation, as well as breathing difficulties in asthmatics. Most people tolerate exposure up to 20 ppm without harm for short periods, but concentrations of 500 ppm can cause symptoms of intoxication, and at 700 ppm, H_2S can lead to unconsciousness and death if resuscitation does not occur within three minutes. Survivors of severe exposure often suffer long-term effects such as headaches, impaired motor function, memory problems, and difficulty concentrating.

A 2011 H_2S report recommended assessing indoor and ambient air quality at Burns Valley Elementary School, which is located adjacent to and downwind of the gas vents. A comprehensive environmental study could help identify current vent locations, gas volume, and release rates, aiding in exposure and risk assessments. Additionally, studying the relationship between ambient and indoor concentrations of carbon dioxide and hydrogen sulfide may help determine if rising CO_2 levels can signal increasing H_2S concentrations. No development changes affected Clearlake's overall vulnerability.

Figure 15: Maps of 2010 Population Density

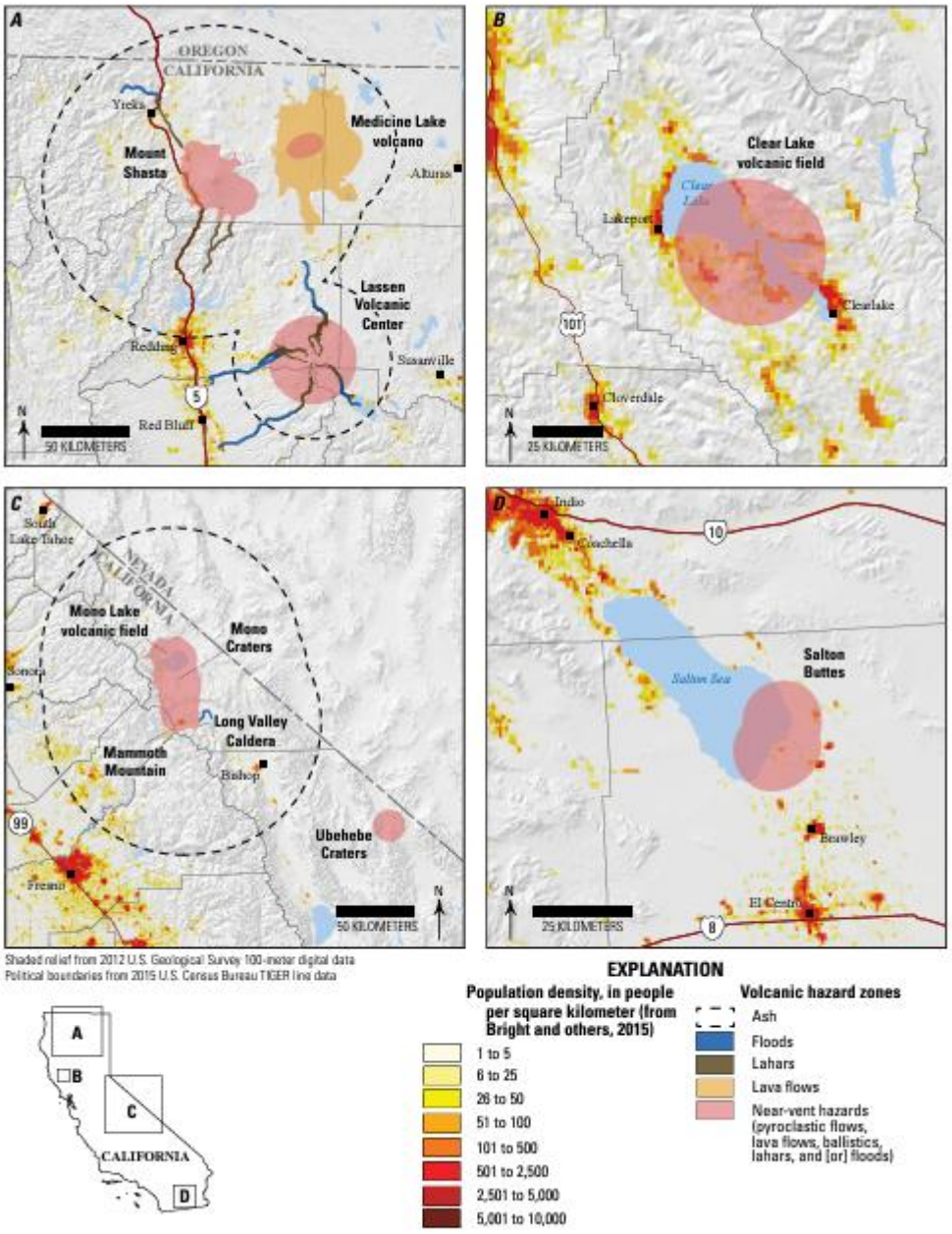


Figure 14. Maps of 2010 population density in and near (*A*) Mount Shasta, Medicine Lake volcano, and Lassen Volcanic Center; (*B*) Clear Lake volcanic field; (*C*) Long Valley volcanic region and Ubehebe Craters; and (*D*) Salton Buttes. See appendix 1 for data sources.

[4]

[4] *USGS California's Exposure to Volcanic Hazards 2018*

CHAPTER SIXTEEN Mitigation Strategy

The results of the planning process, risk assessment, goal setting, identification of mitigation actions, and the hard work of the Hazard Mitigation Planning Committee (HMPC) led to the mitigation strategy and mitigation action plan for this HMP Update. As part of the HMP Update process, a comprehensive review and update of the mitigation strategy portion of the plan was conducted. The goals from the 2019 plan were refined, and Lake County, Clearlake, and Lakeport aligned goals across all three jurisdictions and identified specific jurisdiction-specific objectives.

16.1 Capabilities

The Fiscal Year 2024-25 budget is $43,202,858.00.

For additional details on capabilities and methods to improve, refer to the following tables:

Table 19: Clearlake Regulations that Address Hazards

CLEARLAKE MUNICIPAL CODE	
Regulation	Summary
Chapter XXI – Non-Native Invasive Aquatic Plants	The purpose of this Chapter is to protect the aquatic resources of Lake County from the introduction of non-native, invasive aquatic plants by prohibiting the possession, sale, propagation or release of specific species and declaring such plants as nuisances. As such, these non-native, invasive aquatic plants are considered noxious weeds, as referenced in Government Code Section 25824. (Ord. #2007-128)
Chapter X – Property Maintenance, Nuisance and Vehicle and Abatement	This section of the Clearlake Municipal Code establishes regulations to define and address public nuisances, promote proper property maintenance, ensure compliance with applicable

	laws and land use conditions, provide fair procedures for nuisance abatement, facilitate code enforcement, and recover city costs associated with addressing violations.
CLEARLAKE MUNICIPAL CODE ZONING ORDINANCE	
Chapter XVIII - Zoning Regulations	This Code shall consist of all the regulatory, penal and administrative ordinances of the City of Clearlake. (New)
Chapter IX - Building and Housing	The purposes of these regulations is to establish proper regulations to safeguard persons and property within the City of Clearlake by establishing minimum standards of building construction, including mechanical, plumbing and wiring installations. (Ord. #2007-133)
Clearlake MUNICIPAL CODE OTHER ORDINANCES	
Chapter XVII – Flood Plain Management	The purposes and objectives of these regulations and the flood load and flood resistant construction requirements of the building codes are to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific flood hazard areas through the establishment of comprehensive regulations for management of flood hazard. areas

IMPROVEMENT: *Building capacity to increase ability to enforce current codes (including increasing staff, identifying additional equipment needed, etc. Responsible Department: Community Development)*

Table 20: County Administrative and Technical Capabilities & Improvement Needs

Administrative and Technical			
CAPABILITY	**YES/NO**	**RESPONSIBLE**	**IMPROVEMENT(S)**
Engineers	Y	Public Works	The creation of a plan will enable the City to expand capabilities and help to reduce risk. With
Planners	Y	Community Dev.	
Emergency Manager	Y	City Manager	

Administrative and Technical			
CAPABILITY	**YES/NO**	**RESPONSIBLE**	**IMPROVEMENT(S)**
GIS Analyst	N/A	City Manager	establishment of HMPC for this planning effort, annual maintenance meetings should also evaluate the need for additional staff, cross-training, and/or working with other local agencies to continue to enhance staffing capabilities for emergency management and mitigation programs. Annual maintenance meetings should be held to review the status of mitigation actions, update risk assessments as needed to build a more resilient emergency management infrastructure to ensure a coordinated response during disasters.
Building Inspector	Y	Community Dev.	
Grant Writer	Y	Administration	
Floodplain Manager	Y	Public Works	
Climate Coordinator	N/A	Community Dev.	
Various committees that directly or indirectly impact emergency management, including risk reduction	Y	Police Department, Fire Department,	

Table 21: County Financial Capabilities and Improvement Needs

Financial		
CAPABILITY	**DETAIL**	**IMPROVEMENT(S)**
Administrative and financial procedures.	Follow city policies and procedures in regards to securing funding	The policies are guided by our procurement policy which is the basis for all financial procedures. financial procedures are anchored in its established procurement policy, which serves as the foundation for all purchasing,

Financial		
CAPABILITY	**DETAIL**	**IMPROVEMENT(S)**
		contracting, and expenditure activities. This policy ensures fiscal responsibility, transparency, and compliance with local, state, and federal regulations, including those relevant to FEMA-funded programs.
Personnel	Finance Dept.	The policies are guided by our procurement policy which is the basis for all financial procedures.
Funding Sources	Property, Sales, Income or special purpose taxes General Funds Utility Service, Impact or Other Fees General Obligation or Special Purpose Bonds Federal, State, and Private Grants/Funding	• **Expedited Emergency Procurement Processes:** Streamlining emergency procurement procedures to allow for rapid mobilization of funds and resources during and immediately following hazard events, in alignment with FEMA requirements for cost eligibility and documentation. • **Dedicated Mitigation Funding:** Establishing a designated budget line or reserve fund for hazard mitigation projects to reduce reliance on post-disaster funding and ensure readiness to meet cost-share requirements for federal grants.

Financial		
CAPABILITY	**DETAIL**	**IMPROVEMENT(S)**
		• **Grant Management Capabilities:** Enhancing internal capacity to pursue, manage, and administer state and federal mitigation grants (e.g., BRIC, HMGP, PDM). This includes investing in training for finance and program staff in FEMA grant compliance, cost tracking, and quarterly reporting standards. • **Interagency Financial Coordination:** Exploring opportunities for joint funding mechanisms with neighboring jurisdictions and regional agencies to support large-scale or cross-jurisdictional mitigation projects. • **Staff Training and Development:** Providing ongoing training in FEMA's financial and grant management protocols, such as the 2 CFR Part 200 Uniform Guidance, to ensure readiness and accountability when managing federally funded mitigation efforts. Continued evaluation and improvement of the City's

Financial		
CAPABILITY	**DETAIL**	**IMPROVEMENT(S)**
		financial capabilities will be essential for sustaining long-term mitigation efforts, enhancing disaster resilience, and ensuring eligibility and competitiveness for federal funding opportunities.

Table 22: Education and Outreach Capabilities and Improvement Areas

Education and Outreach		
CAPABILITY	**RESPONSIBLE**	**IMPROVEMENT(S)**
Public Information Officer	Administrative Services	The city has identified the following improvement needs: Multi-Hazard Public Education, equity in outreach prioritization, and program evaluation. By investing in these improvements, the city can increase public engagement, improvement risk understanding and support the successful implementation of mitigation strategies identified Capabilities are reviewed and modified where necessary to accommodate hazard analysis changes. A multi-hazard public education program to include multi-media outreach and identification of local and regional partners as
Social Media	Administrative Services	
Community Outreach Events/Venues	Administrative Services	
Fire Safe Councils & Firewise Communities	Fire Department	
COAD	City of Clearlake	
NGOs	Local Community and Outreach Organizations	

Education and Outreach		
CAPABILITY	**RESPONSIBLE**	**IMPROVEMENT(S)**
		identified in the mitigation projects will contribute to the expansion of these above capabilities. Also need to identify additional staff and funding to implement and maintain these programs over the long term.

Although identified actions within the Hazard Mitigation Plan may have unique limitations, the mitigation strategy is administratively achievable. Additional State and Federal funding would strengthen our countywide capacity to meet hazard mitigation-related challenges, and the City of Clearlake's capacity, as well. The coordinated efforts this document represents have further developed relationships and capacities needed to achieve mitigation, and cultivated even greater public awareness of this as a matter of urgent priority. The County may seek additional funding via grants or take other measures to increase the identified capabilities to achieve mitigation.

To support the new HMP goals and objectives, the mitigation actions from 2019 were reviewed and assessed for their value in reducing risk and vulnerability to the Planning Area from identified hazards and evaluated for their inclusion in this HMP Update (See ***Error! Reference source not found.***).

Hazard Mitigation actions are essential to weaving long-term resiliency into all community recovery efforts so that at-risk infrastructure, development, and other community assets are stronger and more resilient for the next event. Mitigation measures to reduce the risk and vulnerability of a community to future disaster losses can be implemented in advance of a disaster event, as well as part of post-disaster recovery efforts.

Applying mitigation measures to recovery efforts improves community resilience and sustainability. It is often most efficient to fund all eligible infrastructure mitigation through FEMA's Public Assistance mitigation program if the asset was

damaged in a storm event. Mitigation work can be added to project worksheets if they can be proven to be cost-beneficial.

Applying mitigation measures to recovery efforts improves community resilience and sustainability.

The City's and County's Emergency Operations Plans seek to mitigate the effects of hazards, prepare to take measures that will preserve life and minimize damage, enhance response during emergencies, provide necessary assistance, and establish a recovery system to return the community to its normal state of affairs. The Plans emphasize mitigation as a major component of emergency management efforts.

16.2 Goals and Objectives

The working group and both jurisdictions developed the goals and objectives with input from the community, county departments, and operational area partners and were approved by the Planning Committee. The goals are consistent across the entire planning area, with each jurisdiction having its own objectives. For Clearlake, this was a change from the previous six goals of

1. Minimize risk and vulnerability of Clearlake to hazards and protect lives and prevent losses to property, economy, and the environment
2. Increase community outreach, education, and awareness of risk and vulnerability to hazards and promote preparedness and self-responsibility to reduce hazard-related losses
3. Improve City's capabilities to plan for/prevent/mitigate hazard-related losses and to be prepared for, respond to, and recover from a disaster event
4. Increase and maintain wildfire prevention and protection in Clearlake
5. Improve community resiliency to flooding in Clearlake
6. Maintain FEMA eligibility for grant funding

The goals were developed at a multi-jurisdictional level that aligned across all jurisdictions.

Goal 1: Minimize loss of life, injury, and property damage from natural hazards.

Goal 2: Increase community awareness of natural hazards and shared responsibility in preparedness, response, mitigation, and recovery.

Goal 3: Strengthen local mitigation capabilities to protect the community from natural hazards.

Clearlake aligned with these goals and priorities because they encapsulated the previous goals of the City in a simplified approach. From the previous 2019 Plan the Clearlake goals have updated, as Goals 1 and 2 remained the same with Goals 3,4,5, and 6 being combined.

Each jurisdiction then evaluated the goals and determined the objectives for their jurisdiction. The following objectives are for Clearlake:

Table 23: Clearlake's Objectives

Goal	Objective
One	1.1 - Protect life, and reduce exposure and hazard losses to City residents, businesses, vulnerable populations, and visitors.
	1.2 - Increase community resiliency to the impacts of natural hazards and promote sustainable recovery from hazard events.
	1.3 - Assure long-term protection and resiliency of existing and future development/redevelopment from natural hazards, including both public and private structures.
	1.4 - Protect/harden critical facilities from natural hazards and minimize interruption of essential infrastructure, utilities, and services.
	1.5 - Protect architectural resources in the City.
	1.6 - Plan for and prioritize measures to respond to and address potential short- and long-term hazard impacts associated with climate change.
Two	2.1 - Engage the community in disaster awareness and prevention education to reduce the risk and vulnerability of natural hazard impacts.
	2.2 - Improve the communities' understanding of natural hazards and how to effectively be prepared and take action to mitigate the impacts of hazard events; support and encourage public responsibility.
	2.3 - Develop and target outreach and education for each hazard type and risk area, and for all City populations (e.g., vulnerable populations, schools, etc.).
Three	3.1 - Maintain current service levels related to public safety.
	3.2 - Maintain and improve communication capabilities to ensure redundancy.
	3.3. - Enhance emergency services capabilities to address evacuation planning, sheltering, and other associated efforts.

16.3 Identification and Analysis of Mitigation Actions

The city followed the same identification and analysis processes as the Base Plan. For more information, refer to Section 16.3.1 of the Base Plan.

16.3.1 Prioritization Process

The city followed the same prioritization process as the Base Plan. Refer to Section 16.3.1 of the Base Plan for more information. The City of Clearlake did not remove any mitigation actions outlined in the 2019 Plan.

Table 24: Mitigation Action Status

Action Title	Hazard Addressed	Completed, In Progress, Not Started	Existing or New
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Multi-Hazard	In Progress	Existing
Action 2. Public Awareness, Education, Outreach, and Preparedness Program Enhancements.	Multi-Hazard	In Progress	Existing
Action 3. Development of Ordinance/Prevention Standards for New Development	Multi-Hazard	In Progress	Existing
Action 4. Flood/Fire Debris Removal	Multi-Hazard	In Progress	Existing
Action 5. Prescribed Burning Face of Dam	Multi-Hazard	In Progress	Existing
Action 6. Cyanobacterial Runoff to the Lake	Aquatic Biological Hazard	In Progress	Existing
Action 7. Boat Inspection/Washing Stations	Aquatic Biological Hazard	In Progress	Existing

Action Title	Hazard Addressed	Completed, In Progress, Not Started	Existing or New
Action 8. Develop Water Management Plan	Drought	In Progress	Existing
Action 9. NFIP Flood Ordinance Update	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 10. Floodproofing Critical Facilities and Infrastructure	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 11. Grigsby Riffle	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 12. Develop MOU/Partnership for Upstream Releases	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 13. Road Master Plan to Mitigate Flood Hazards	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 14. Sediment Loading Assessment/Removal	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 15. Flood Response Annex	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 16. Structure Elevation	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 17. Storm Water Master Plan and Implementation	Flood, Localized Flood, and Dam Failure Actions	In Progress	Existing
Action 18. Evaluate Signage for Hazardous Materials Restrictions	Hazardous Materials Transport Actions	Not Started	Existing

Action Title	Hazard Addressed	Completed, In Progress, Not Started	Existing or New
Action 19. Hazardous Material Response Preparations	Hazardous Materials Transport Actions	Not Started	Existing
Action 20. Identification and Implementation of Erosion Projects	Earthquake, Landslide, and Debris Flows Actions	In Progress	Existing
Action 21. Geological Study and Evaluation of Slide Areas	Earthquake, Landslide, and Debris Flows Actions	In Progress	Existing
Action 22. Seismic Evaluation and Retrofits of Public and Critical Facilities)	Earthquake, Landslide, and Debris Flows Actions	In Progress	Future
Action 23. Severe Weather Plan	Severe Weather: Extreme Heat, Heavy Rains, Storms, and Winds Actions	In Progress	Existing
Action 24. Evaluation of Geothermal Gas Release Areas and Identification of Appropriate Mitigation Measures	Volcano and Geothermal Gas Release Actions	In Progress	Existing
Action 25. Develop Tree Trimming with PG & E	Wildfire Actions	In Progress	Existing
Action 26. Vegetation Ordinance	Wildfire Actions	In Progress	Existing
Action 27. Prescribed Burning BLM Lands	Wildfire Actions	In Progress	Existing
Action 28. City Wide Tree Trimming	Wildfire Actions	In Progress	Existing

Action Title	Hazard Addressed	Completed, In Progress, Not Started	Existing or New
Tree Mortality Public Awareness.	Tree Mortality	Not Started	New
Review and update the Tree Preservation Ordinance.	Tree Mortality	Not Started	New
Assess and remove critical trees to limit the spread of tree mortality and to create defensible space.	Tree Mortality	Not Started	New

16.4 Mitigation Actions

16.4.1 Multi-Hazard

<table>
<tr><th colspan="5">Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan</th></tr>
<tr><td colspan="2" rowspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td>High</td><td>No</td><td>As soon as possible – 6 months to 1 year</td></tr>
<tr><td colspan="2" rowspan="3">Specifically, AB 2140 requires that each jurisdiction adopt a local hazard mitigation plan (LHMP) in accordance with the federal Disaster Mitigation Act of 2000 as part of the Safety Element of its General Plan. Adoption of the LHMP into the Safety Element of the General Plan may be by reference or incorporation. This project seeks to amend the General Plan within one year of adoption of the LHMP to address requirements of AB 2140 – Safety Element integration; AB 162 – Flood Hazard Mitigation; SB 1241 – Wildfire Hazard Mitigation; and SB 379 – Climate Change</td><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td>General Fund, SB 2 grant funding</td><td>$30,000.00</td><td>Prevention</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="3" rowspan="3">Benefit:
Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.</td></tr>
<tr><td colspan="2">Community Development Department maintains and updates the General Plan periodically</td></tr>
<tr><td colspan="2">Supporting Organization:
Community Development Department maintains and updates the General Plan periodically</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>In Progress</td><td>Pre</td></tr>
</table>

<table>
<tr><th colspan="6">Action 2. Public Awareness, Education, Outreach, and Preparedness Program Enhancements.</th></tr>
<tr><td colspan="2">Description:</td><td colspan="2">Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td colspan="2" rowspan="3">Improve/enhance public education, engagement, and programs for preparedness, mitigation, response, and recovery for all hazards using multi-media and other messaging to educate target audiences; promote self-responsibility and sustainability. Public awareness activities foster changes in behavior leading towards a culture of risk reduction.</td><td colspan="2">High</td><td>No</td><td>Immediate/On-going</td></tr>
<tr><td colspan="2">Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td colspan="2">FEMA Grants (HMGP, FMA), City of Clearlake General Fund</td><td>City Staff Time</td><td>Public Information</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="4">Benefit:</td></tr>
<tr><td colspan="2">City Planning Department</td><td colspan="4" rowspan="3">Protect Life and Property, Public Awareness, Community Involvement</td></tr>
<tr><td colspan="2">Supporting Organization:</td></tr>
<tr><td colspan="2">City Planning Department</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>Yes</td><td>In Progress</td><td>Pre</td></tr>
</table>

<table>
<tr><th colspan="6">Action 3. Development of Ordinance/Prevention Standards for New Development</th></tr>
<tr><td colspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td colspan="2">Timeframe:</td></tr>
<tr><td colspan="2" rowspan="2">Amend the Zoning Code to address hazard mitigation.</td><td>High</td><td>No</td><td colspan="2">6 months to one year</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td colspan="2">Action Type:</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="4">Benefit:</td></tr>
<tr><td colspan="2">Community Development Department maintains and updates the General Plan periodically</td><td colspan="4" rowspan="3">Reduction in hazards on new development.</td></tr>
<tr><td colspan="2">Supporting Organization:</td></tr>
<tr><td colspan="2">Community Development Department</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td colspan="2">Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>In Progress</td><td colspan="2">Pre</td></tr>
</table>

Action 4. Flood/Fire Debris Removal					
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**	
Remove debris from the storm drain systems throughout the City.		High	No	2 times per year	
		Financial Option:	**Cost Estimate:**	**Action Type:**	
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	$50,000.00	Prevention, Property Protection	
Leading Organization:		**Benefit:**			
City Public Works		Avoid increased fire hazards and mitigate the potential for wildfires to start and spread through the City. Avoid increased flooding hazards.			
Supporting Organization:					
City Public Works					
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**	
Yes	Yes	Yes	In Progress	Pre/Post	

<table>
<tr><th colspan="6">Action 5. Prescribed Burning Face of Dam</th></tr>
<tr><td colspan="3">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td colspan="3" rowspan="3">Remove dry brush, mow or maintain grasses and weeds during the springtime to reduce the amount of available fuel that could contribute to any wildfires in the area. Burn the weeds/grasses from the Dam Face so that it is clean for inspection of potential Dam Failures.</td><td>High</td><td>No</td><td>6 months to 1 year</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td>FEMA Grants (HMGP, FMA), General Fund, and Local Budget</td><td>Unknown</td><td>Prevention,
Property Protection</td></tr>
<tr><td colspan="3">Leading Organization:</td><td colspan="3">Benefit:</td></tr>
<tr><td colspan="3">Dam Owners – County of Yolo</td><td colspan="3" rowspan="3">Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.</td></tr>
<tr><td colspan="3">Supporting Organization:</td></tr>
<tr><td colspan="3">Dam Owners – County of Yolo</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>Yes</td><td>In Progress</td><td>Pre</td></tr>
</table>

16.4.2 Aquatic Hazards

<table>
<tr><th colspan="5">Action 6. Cyanobacterial Runoff to the Lake</th></tr>
<tr><td colspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td colspan="2" rowspan="2">Determine a way to eliminate cyanobacteria in runoff to the Lake.</td><td>High</td><td>No</td><td>1-5 years</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td colspan="2" rowspan="3"></td><td>FEMA Grants (HMGP, FMA), General Fund, and Local Budget</td><td>Unknown</td><td>Prevention
Natural Resource Protection</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="3">Benefit:</td></tr>
<tr><td colspan="2">City, Lake County and State Water Board</td><td colspan="3" rowspan="3">Reduced costs to treat drinking water, increased beauty of Lake, increased tourism dollars flowing to City.</td></tr>
<tr><td colspan="2">Supporting Organization:</td></tr>
<tr><td colspan="2">City, Lake County and State Water Board</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>In Progress</td><td>Pre/Post</td></tr>
</table>

Action 7. Boat Inspection/Washing Stations				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Identify additional strategies to prevent biological quagga mussel infestations. Work with County to come up with a cohesive plan and seek state funding.		High	No	1-3 years
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	$500,000.00	Prevention, Property Protection
Leading Organization:		**Benefit:**		
City of Clearlake and Lake County		Financial losses from reduced tourism, financial losses to water companies.		
Supporting Organization:				
City of Clearlake and Lake County				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	In Progress	Pre

16.4.3 Drought

<table>
<tr><th colspan="5">Action 8. Develop Water Management Plan</th></tr>
<tr><td colspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td colspan="2" rowspan="3">Development and implementation of Integrated Regional Water Management Plan</td><td>Moderate</td><td>No</td><td>6 months to 1 year</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td>FEMA Grants (HMGP, FMA), General Fund, and Local Budget</td><td>$1,000,000.00</td><td>Prevention, Property Protection, Natural Resource Protection</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="3" rowspan="3">Benefit:
Ensure sustainable water uses. Ensure quality water. Ensure water costs do not go high during times of drought. Ensure water availability for firefighting and suppression.</td></tr>
<tr><td colspan="2">City of Clearlake, water companies (Konocti, Highlands, Golden State)</td></tr>
<tr><td colspan="2">Supporting Organization:</td></tr>
<tr><td colspan="2">City of Clearlake, water companies (Konocti, Highlands, Golden State)</td><td colspan="3"></td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>In Progress</td><td>Pre</td></tr>
</table>

16.4.4 Earthquake

<table>
<tr><th colspan="5">Action 20. Identification and Implementation of Erosion Projects</th></tr>
<tr><td colspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td colspan="2" rowspan="3">Perform a survey to identify erosion hazard areas. Install drainage to prevent erosion and perform slope stabilization.</td><td>Very High</td><td>No</td><td>Within 1-5 years</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td>FEMA Grants (HMGP, FMA), General Fund, and Local Budget</td><td>$500,000.00</td><td>Property Protection, Natural Resource Protection</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="3">Benefit:</td></tr>
<tr><td colspan="2">City of Clearlake Public Works.</td><td colspan="3" rowspan="3">Reduced risk to people and property from flooding, erosion, and landslide.</td></tr>
<tr><td colspan="2">Supporting Organization:</td></tr>
<tr><td colspan="2">City Public Work/ City Engineer</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>In Progress</td><td>Pre</td></tr>
</table>

Action 21. Geological Study and Evaluation of Slide Areas				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Conduct a detailed geotechnical study of specific areas which evaluates the existing conditions, and proposes solutions to handle landslides. Implement the recommendations of the geotechnical study/ engineering plans by construction of improvements.		High	No	6 months to 2 years for the Study and 10 years for the implementation
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	$8 Million	Prevention, Property Protection, Natural Resource Protection
Leading Organization:		**Benefit:**		
City Public Works/ City Engineer		Reduction in the potential for landslides.		
Supporting Organization:				
Consultant				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	In Progress	Pre

Action 22. Seismic Evaluation and Retrofits of Public and Critical Facilities				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Conduct a detailed evaluation of all essential public facilities and assess their suitability for withstanding an earthquake.		High	No	6 months to 1 year
		Financial Option:	**Cost Estimate:**	**Action Type:**
		City Road Maintenance, Measure V, Gas Tax	Unknown	Prevention, Property Protection
Leading Organization:		**Benefit:**		
City Public Works Department and Building Department		Eliminate fire hazard and destruction of buildings and bridges in the City		
Supporting Organization:				
City Public Works Department and Building Department				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
No	Yes	N/A	In Progress	Pre

16.4.5 Flood/Dam Failure

Action 9. NFIP Flood Ordinance Update				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Adopt/update City's flood ordinance and evaluate existing flood areas to mitigate current and future flood hazards.		High	No	1 year
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	Unknown	Property Protection
Leading Organization:		**Benefit:**		
City Public Works/Engineering		Reduction of FEMA reimbursements from disasters and individuals loss claims		
Supporting Organization:				
Engineering and Planning				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	Yes	In Progress	Pre

Action 10. Floodproofing Critical Facilities and Infrastructure				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Require critical facilities to meet required Executive Order to build 1 foot above the 500-year (0.2% annual chance) floodplain, or be located outside of flood prone areas.		High	No	Within 2-5 years.
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, Local Budget, and Cal-DWR Grants	$3,000,000.00	Property Protection, Emergency Services
Leading Organization:		**Benefit:**		
City of Clearlake, private owners of facilities.		Reduced risk to property and critical facilities from flooding.		
Supporting Organization:				
City of Clearlake, private owners of facilities.				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	Yes	In Progress	Pre/Post

Action 11. Grigsby Riffle				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Clean out sediment that has built up over the years due to lack of funding for maintenance activities.		Medium	No	Within 5 years
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	$2,000,000.00	Property Protection, Structural Projects
Leading Organization:		**Benefit:**		
City of Clearlake Public Works, Lake County		Reduced flooding in Clear Lake would reduce the risk to people and property.		
Supporting Organization:				
Yolo County				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	Yes	In Progress	Pre/Post

<table>
<tr><th colspan="5">Action 12. Develop MOU/Partnership for Upstream Releases</th></tr>
<tr><td colspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td colspan="2" rowspan="2">Development of a partnership with Yolo County to control and manage upstream releases from dams to increase the amount of time the City has to prepare for flooding.</td><td>Medium</td><td>No</td><td>Within 2-4 years</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td colspan="2" rowspan="2">Leading Organization:</td><td colspan="3">Benefit:</td></tr>
<tr><td rowspan="3">FEMA Grants (HMGP, FMA), Local Budget and General Fund</td><td>$500,000.00</td><td>Prevention, Property Protection</td></tr>
<tr><td colspan="2">City of Clearlake, Lake County, Yolo County</td><td colspan="3" rowspan="3">Increased life safety, reduced risk to property and critical facilities.</td></tr>
<tr><td colspan="2">Supporting Organization:</td></tr>
<tr><td colspan="2">City of Clearlake, Lake County, Yolo County</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>Yes</td><td>In Progress</td><td>Pre</td></tr>
</table>

Action 13. Road Master Plan to Mitigate Flood Hazards				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Create a plan to preserve and promote maintenance of drainage systems and flood control structures.		High	No	Within 1-5 years.
		Financial Option:	**Cost Estimate:**	**Action Type:**
		Measure V of SB1.	$3,000,000.00	Property Protection, Structural Projects, Natural Resource Protection
Leading Organization:		**Benefit:**		
City of Clearlake		Reduced costs to fix roads, flood reductions and prevention.		
Supporting Organization:				
City of Clearlake				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	Yes	In Progress	Pre

Action 14. Sediment Loading Assessment/Removal				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Assessment and removal of sediment.		High	No	Within 1-2 years
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	$500,000.00	Property Protection, Structural Projects, Natural Resource Protection
Leading Organization:		**Benefit:**		
City of Clearlake, Lake County		Reduction in flood risk to people, property, and infrastructure.		
Supporting Organization:				
Lake County Water Resources				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	Yes	In Progress	Pre/Post

Action 15. Flood Response Annex					
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**	
Establish a plan of action for when the Lake rises to certain levels.		Medium	No	Within 2 years.	
		Financial Option:	**Cost Estimate:**	**Action Type:**	
		FEMA Grants (HMGP, FMA), Local Budget and General Fund	$200,000.00	Prevention, Emergency Services	
Leading Organization:		**Benefit:**			
City of Clearlake		Reduced risk to docks at launch facility			
Supporting Organization:					
City of Clearlake					
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**	
Yes	Yes	Yes	In Progress	Pre/Post	

Action 16. Structure Elevation				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Raise homes to high elevation or build barriers		Low	No	Within 5 years
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	To be determined on a case by case basis, but total is estimated to be $5,000,000	Property Protection, Structural Projects
Leading Organization:		**Benefit:**		
City of Clearlake and Lake County		Reduced risk to property		
Supporting Organization:				
County of Lake				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	Yes	In Progress	Pre

Action 17. Storm Water Master Plan and Implementation					
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**	
Conduct a detailed storm drain study, citywide within the existing subbasins, which evaluates the existing conditions, and proposes solutions to handle storm water runoff. Implement the recommendations of the storm drainage plan by construction of improvements.		High	No	6 months to 2 years for the Study and 10 years for the implementation	
		Financial Option:	**Cost Estimate:**	**Action Type:**	
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	$5 Million	Property Protection, Structural Projects	
Leading Organization:		**Benefit:**			
City Public Work/ City Engineer		Reduction in flooding, and FEMA disaster Claims.			
Supporting Organization:					
City Public Work/ City Engineer					
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**	
Yes	Yes	Yes	In Progress	Pre	

16.4.6 Severe Weather: All (Extreme Heat and Heavy Rains, Snow & Storms)

<table>
<tr><th colspan="5">Action 23. Severe Weather Plan</th></tr>
<tr><td colspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td colspan="2" rowspan="3">Establish standard mitigation plan to combat severe weather.</td><td>High</td><td>No</td><td>Within 1-2 years</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td>FEMA Grants (HMGP, FMA), General Fund, and Local Budget</td><td>$50,000.00</td><td>Prevention
Emergency Services</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="3" rowspan="3">Benefit:
Increased life safety during times of severe weather.</td></tr>
<tr><td colspan="2">Fire Department, Police Department, Public Works, and utility companies.</td></tr>
<tr><td colspan="2">Supporting Organization:
Fire Department, Police Department, Public Works, and utility companies.</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>In Progress</td><td>Pre</td></tr>
</table>

16.4.7 Tree Mortality

<table>
<tr><th colspan="5">Action 29. Tree Mortality Public Awareness</th></tr>
<tr><td colspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td colspan="2" rowspan="3">Community outreach and education on new invasive species (such as MOB, Pine beetle, etc.) and actions to remove or limit the spread.</td><td>Medium</td><td>N/A (New)</td><td>2027</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td>FEMA Grants (HMGP, FMA), General Fund, and Local Budget</td><td>TBD</td><td>Public Information</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="3">Benefit:</td></tr>
<tr><td colspan="2">City Public Works Department/ Land Owners</td><td colspan="3" rowspan="3">Reduce the spread of invasive species and prolong the life of a sustainable healthy habitat.</td></tr>
<tr><td colspan="2">Supporting Organization:</td></tr>
<tr><td colspan="2">City Public Works Department/ Land Owners</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>New/ Not Started</td><td>Pre</td></tr>
</table>

<table>
<tr><th colspan="6">Action 30. Review and update the Tree Preservations Ordinance.</th></tr>
<tr><td colspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td colspan="2">Timeframe:</td></tr>
<tr><td colspan="2" rowspan="3">Review and update the Tree Preservations Ordinance: https://clearlake.municipal.codes/CMC/10-1.6</td><td>Medium</td><td>N/A (New)</td><td colspan="2">2027</td></tr>
<tr><td>Financial Option:</td><td>Cost Estimate:</td><td colspan="2">Action Type:</td></tr>
<tr><td>FEMA Grants (HMGP, FMA), General Fund, and Local Budget</td><td>TBD</td><td colspan="2">Protection</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="4" rowspan="3">Benefit:
Preserve and enhance existing Heritage Oaks.</td></tr>
<tr><td colspan="2">City Public Works Department</td></tr>
<tr><td colspan="2">Supporting Organization:
City Public Works Department</td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td colspan="2">Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>New/ Not Started</td><td colspan="2">Pre</td></tr>
</table>

Action 31. Assess and remove critical trees to limit the spread of tree mortality and to create defensible space.				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Assess and remove critical trees to limit the spread of tree mortality and to create defensible space.		High	N/A (New)	Ongoing
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	TBD	Prevention, Property Protection
Leading Organization:		**Benefit:**		
City Public Works Department		To enhance fire resiliency and safety of the community.		
Supporting Organization:				
City Public Works Department				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	New/ Not Started	Pre/Post

16.4.8 Volcano and Geothermic Gasses

<table>
<tr><th colspan="5">Action 24. Evaluation of Geothermal Gas Release Areas and Identification of Appropriate Mitigation Measures</th></tr>
<tr><td colspan="2" rowspan="2">Description:</td><td>Priority:</td><td>Change in Priority?</td><td>Timeframe:</td></tr>
<tr><td>High</td><td>No</td><td>6 months to 1 year</td></tr>
<tr><td colspan="2" rowspan="2">Conduct a detailed geothermal and groundwater evaluation of the extent and severity of volcanic and local geothermal gasses to handle storm water runoff. Implement the recommendations of the storm drainage plan by construction of improvements.</td><td>Financial Option:</td><td>Cost Estimate:</td><td>Action Type:</td></tr>
<tr><td>FEMA Grants (HMGP, FMA), General Fund, and Local Budget</td><td>Unknown</td><td>Prevention
Property Protection
Emergency Services</td></tr>
<tr><td colspan="2">Leading Organization:</td><td colspan="3" rowspan="3">Benefit:
Understand the short- and long-term impacts these gasses may be having on the public.</td></tr>
<tr><td colspan="2">City Public Works Department</td></tr>
<tr><td colspan="2">Supporting Organization:</td></tr>
<tr><td colspan="2">Fire Department</td><td colspan="3"></td></tr>
<tr><td>Addresses Current Development:</td><td>Addresses Future Development:</td><td>Compliance with NFIP:</td><td>Status:</td><td>Pre or Post Disaster:</td></tr>
<tr><td>Yes</td><td>Yes</td><td>N/A</td><td>In Progress</td><td>Pre/Post</td></tr>
</table>

16.4.9 Wildfire

Action 25. Develop Tree Trimming with PG & E				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Develop or enhance a formalized tree trimming program in the City in conjunction with PG & E.		Medium	No	Within 1-3 years.
		Financial Option:	**Cost Estimate:**	**Action Type:**
		GFEMA Grants (HMGP, FMA), General Fund, Local Budget, and PG & E	$300,000.00	Property Protection
Leading Organization:		**Benefit:**		
PG & E, City of Clearlake Public Works, City of Clearlake Code Enforcement		Reduced risk to property, critical facilities, and loss of life.		
Supporting Organization:				
PG & E, City of Clearlake Public Works, City of Clearlake Code Enforcement				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	In Progress	Pre

Action 26. Vegetation Ordinance				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Remove all vegetation overgrowth on public and private property		High	No	6 months to 1 year
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	$30,000/year	Prevention, Property Protection
Leading Organization:		**Benefit:**		
City Public Works Department/ Land Owners		Eliminate fire hazard to the City		
Supporting Organization:				
City Public Works Department/ Land Owners				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	In Progress	Pre

Action 27. Clearing and Maintaining BLM Lands					
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**	
Remove dry brush, mow or maintain grasses and weeds during the springtime so that it reduces the amount of available fuel that could contribute to any wildfires in the area.		High	No	6 months to 1 year	
		Financial Option:	**Cost Estimate:**	**Action Type:**	
		FEMA Grants (HMGP, FMA), Local Budget and General Fund	Unknown	Prevention, Property Protection	
Leading Organization:		**Benefit:**			
Bureau of Land Management		Avoid increased fire hazards and the mitigate the potential for wildfires to start and spread through the City			
Supporting Organization:					
Bureau of Land Management					
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**	
Yes	Yes	N/A	In Progress	Pre	

Action 28. Citywide Tree Trimming				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Trim and remove all overgrowth from City's Right of Way		High	No	6 months to 1 year
		Financial Option:	**Cost Estimate:**	**Action Type:**
		City Road Maintenance, Measure V, Gas Tax	$65,000/year	Prevention
Leading Organization:		**Benefit:**		
City Public Works Department		Eliminate fire hazard to the City		
Supporting Organization:				
City Public Works Department				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	In Progress	Pre

Action 32. Community Wildfire Protection Plan				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
This project seeks to maintain a Community Wildfire Protection Plan (CWPP), specific to the District and the City that identifies project priorities to reduce risks and hazards from wildfire.		High	No	2-3 years
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	Staff time	Prevention, Property Protection, Natural Resource Protection"
Leading Organization:		**Benefit:**		
Lake County Fire Protection District, City of Clearlake, Lake County		Reduced risk to property, increased life safety.		
Supporting Organization:				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	In Progress	Pre

16.4.10 Hazardous Materials

Action 18. Evaluate Signage for Hazardous Materials Restrictions				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
Ensure signage is in place to alert truck drivers to not drive in key areas.		Low	No	Within 5 years
		Financial Option:	**Cost Estimate:**	**Action Type:**
		FEMA Grants (HMGP, FMA), General Fund, and Local Budget	$50,000.00	Prevention, Property Protection, Public Information
Leading Organization:		**Benefit:**		
City of Clearlake Public Works, Fire Department, Police Department		Reduced risk to people and property, reduced costs to City of spill recovery.		
Supporting Organization:				
City of Clearlake Public Works, Fire Department, Police Department				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	Not Started	Pre

Action 19. Hazardous Material Response Preparations				
Description:		**Priority:**	**Change in Priority?**	**Timeframe:**
The City seeks to train staff in the event of a "First on Scene" hazardous materials control.		Low	No	Within 1 year.
		Financial Option:	**Cost Estimate:**	**Action Type:**
		City, Police Department, and Fire Department funds	$5 Million	Prevention, Property Protection, Natural Resource Protection, Emergency Services
Leading Organization:		**Benefit:**		
City of Clearlake Public Works, Fire Department, Police Department		Reduced risk to people, environment, and property, reduced costs to City of spill recovery.		
Supporting Organization:				
City of Clearlake Public Works, Fire Department, Police Department				
Addresses Current Development:	**Addresses Future Development:**	**Compliance with NFIP:**	**Status:**	**Pre or Post Disaster:**
Yes	Yes	N/A	Not Started	Pre

16.4.11 Reviewed and Not Pursued

The City of Clearlake did not remove any Mitigation Actions from the previous LHMP.

16.5 Compliance with the National Flood Insurance Program (NFIP)

16.5.1 Clearlake's Flood Management Program

The City of Clearlake has participated in the Regular Phase of the NFIP since October 10, 1978. Since then, the City has administered floodplain management regulations that meet the minimum requirements of the NFIP. Under that arrangement, residents and businesses paid the same flood insurance premium rates as most other communities in the country.

The City does not currently participate in the CRS program, but will evaluate the overall value of joining CRS in the future during the implementation phase of this MJHMP.

The City of Clearlake adopted its current Floodplain Management regulations under Chapter XVII of the Clearlake Municipal Code to establish standards for minimizing flood risks, promoting public health and safety, and regulating responsible development within designated flood hazard areas. These regulations incorporate the Flood Insurance Study for the City of Clearlake, including Flood Insurance Rate Maps (FIRMs) and all subsequent amendments or revisions.

Chapter XVII mandates construction standards aimed at reducing future flood damage, including maintaining appropriate elevation levels and managing alterations to natural floodplains. Specifically, the ordinance requires that structures and equipment servicing structures be elevated to or above the established Base Flood Elevation (BFE), with appropriate buffer requirements to mitigate flood risks.

Implementation and enforcement responsibilities for Clearlake's Floodplain Management regulations are shared by the City's Building Department and the Floodplain Administrator. The Building Department manages the review and issuance of building permits, construction inspections, and compliance verification. Technical responsibilities, such as determining Base Flood Elevations, reviewing Elevation Certificates before, during, and after construction, and providing floodplain technical assistance, are conducted by the designated Floodplain Administrator.

Substantial Damages and Substantial Improvements are defined under Clearlake's Floodplain Management regulations, assessed by comparing the project's cost against the market value of the structure. Determinations regarding substantial improvements during permitting and evaluations of substantial damages following

storm events are collaboratively managed by the Chief Building Official and the Floodplain Administrator to ensure compliance and effective flood risk management. In addition, the City's floodplain management activities apply to existing and new development areas; implementing flood protection measures for structures and maintaining drainage systems help reduce the potential of flooding within the City.

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

The City will continue to manage its floodplains in continued compliance with the NFIP. An overview of the City's NFIP status and floodplain management program are discussed In Table 24.

Table 25: Clearlake's NFIP Status and Floodplain Management Program

NFIP Topic	Comments
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	181 policies $259,188 in premiums $42,455,000 in coverage
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	60 claims $649,468 in paid losses 2 substantial damage claims since 1978
Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Properties	14 RL 0 SRL
How many structures are exposed to flood risk within the community?	1,063 in 1% annual chance 145 in 0.2% annual chance
Describe any areas of flood risk with limited NFIP policy coverage	This is currently under investigation by new floodplain manager.
Community Floodplain Administration	
Is the Community Floodplain Administrator or NFIP Coordinator certified?	New floodplain manager was recently named. Seeking certification.
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Permit Review, Engineering, Outreach, Inspections
What are the barriers to running an effective NFIP program in the community, if any?	Dedicated Funding - Staffing
Compliance History	
Is the community in good standing with the NFIP?	Y
Are there any outstanding compliance issues (i.e., current violations)?	N
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	CAV – 9/11/2018
Is a CAV or CAC scheduled or needed?	No
Regulation	
When did the community enter the NFIP?	10/17/1978
Are the FIRMs digital or paper?	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so,	Meet requirements

in what ways?	
Provide an explanation of the permitting process.	Public Works, Flood Plain Mgr. Planning Dept., and Building Department all provide review before permits are issued. Floodplain requirements are followed if the permit falls in the floodplain.
Community Rating System (CRS)	
Does the community participate in CRS?	No
What is the community's CRS Class Ranking?	N/A
What categories and activities provide CRS points and how can the class be improved?	N/A
Does the plan include CRS planning requirements?	N/A

CHAPTER SEVENTEEN: PLAN ADOPTION AND MAINTENANCE

17.1 Adoption

The 2025 Lake County Multi-Jurisdictional Hazard Mitigation Plan was FEMA on August 12, 2025. The Clearlake City Council's adopted Resolution No. 2025-31, A resolution of the City Council of the City of Clearlake adopting the Lake County Multi-Jurisdictional Hazard Mitigation Plan, September 4, 2025 and incorporating hazard mitigation information into the safety element of the City of Clearlake General Plan. The resolution is available in Attachment 1: City of Clearlake Adoption.

The Lake County Board of Supervisors resolutions for adoptions is in the Base Plan Section 18.1 and Lakeport City Council adoption in Section 17.1 of the Lakeport Annex.

17.2 Implementation

After Cal OES/FEMA review and approval, and local adoption by all jurisdictions, the MJHMP will be ready to implement. All stakeholders will be notified that the Plan is current, and the mitigation strategy ready to begin.

17.2.1 Continued Public Involvement

Residents of Lake County, Clearlake, and Lakeport will stay informed about MJHMP actions through the Lake County OES website and annual progress report updates. Upon the initiation of the MJHMP update process as outlined in 17.3.2, a new public involvement strategy will be initiated based on the guidance from the HMPC. This strategy will be based on the needs and capabilities of the jurisdictions at the time of the update.

17.2.2 Integration with Other Planning Mechanisms

The effectiveness of the MJHMP depends on implementing the plan and incorporating the outlined actions into existing plans, policies, and programs. The MJHMP includes hazard, risk, and vulnerability profiles based on the best data available at the time of the plan. Additionally, the mitigation actions can be implemented through the creation of new educational programs, interagency coordination, or improved public partnership. Planning processes and programs to be coordinated with the recommended of the MJHMP include the following:

- Clearlake EOP
- Building Codes

- Climate Vulnerability Assessment

FEMA BRIC Information

17.3 Maintenance

17.3.1 Ongoing

Not less than annually, and following any significant hazard event or disaster declaration, Clearlake will work with Lake County OES to conduct a maintenance review of the effectiveness and progression of the mitigation actions.

17.3.2 Five-year Update

Lake County OES will initiate the 2029 Update no later than January 30, 2028. If funding is necessary to complete the update, Clearlake will work with Lake County OES will seek funds in the 2027 grant cycle.

CHAPTER EIGHTEEN: DATA SOURCES

The profiles were completed utilizing web-based research and a review of plans, current reports and other available documents. Only high-quality, consistent, peer reviewed and publicly accessible data sources are used. Where possible, other County and State plans was incorporated. Data sources can be found in the Base Plan.

Attachment 1: Clear of Clearlake Adoption

CITY OF CLEARLAKE
RESOLUTION NO. 2025-31

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CLEARLAKE ADOPTING THE **LAKE COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN** September 4, 2025, AND INCORPORATING HAZARD MITIGATION INFORMATION INTO THE SAFETY ELEMENT OF THE CITY OF CLEARLAKE GENERAL PLAN

WHEREAS, the City Council of the City of Clearlake recognizes the threat that natural and human-caused hazards pose to people, property, and the economy within the City of Clearlake; and

WHEREAS, the City of Clearlake has participated in the preparation of the **Lake County Multi-Jurisdictional Hazard Mitigation Plan** ("MJHMP") in accordance with the Disaster Mitigation Act of 2000 and implementing regulations at 44 CFR Part 201; and

WHEREAS, the MJHMP identifies hazard mitigation goals and actions intended to reduce or eliminate long-term risk to people and property from the impacts of future hazards and disasters; and

WHEREAS, California Government Code §65302(g)(4) requires that upon the next revision of the housing element on or after January 1, 2017, the safety element of the general plan must be reviewed and updated as necessary to address climate adaptation and resiliency strategies, and must be consistent with the hazard mitigation plan adopted pursuant to federal law; and

WHEREAS, adoption of the MJHMP by the City Council of the City of Clearlake will allow the City to integrate relevant hazard mitigation data, goals, and actions into the Safety Element of the City's General Plan, ensuring consistency between the MJHMP and the General Plan as required by state law; and

WHEREAS, adoption further ensures the City's continued eligibility for certain federal disaster assistance and hazard mitigation funding through the Federal Emergency Management Agency (FEMA);

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Clearlake, State of California, that:

Section 1. The City Council hereby adopts the **Lake County Multi-Jurisdictional Hazard Mitigation Plan**, dated *September 4, 2025,* as the City's official hazard mitigation plan.

Section 2. The City Council directs that the applicable data, goals, and policies of the MJHMP be incorporated into the Safety Element of the City of Clearlake General Plan to ensure consistency and compliance with California Government Code §65302(g).

Section 3. While the City-specific content within the MJHMP may require revisions to meet plan approval requirements, changes occurring after adoption will not require the City of Clearlake to re-adopt any further iterations of the plan until the next required update cycle.

PASSED AND ADOPTED by the City Council of the City of Clearlake, County of Lake, State of California on this 4th day of September 2025 by the following vote:

I, the undersigned, hereby certify that the foregoing Resolution was duly adopted by

AYES: Mayor Cremer, Vice Mayor Slooten, Council Members Downey, Wilson and Hooten

NOES: None

ABSENT OR NOT VOTING: None

Mayor, City of Clearlake

ATTEST:

Deputy City Clerk