



Annex E Kletsel Dehe Wintun Nation

E.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Kletsel Dehe Wintun Nation (KDWN, Tribe, or Nation), a new participating jurisdiction to the 2024 Colusa County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the Nation. This Annex provides additional information specific to the Nation, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for the Tribe.

E.2 Planning Process

As described above, the planning process detailed in Chapter 3 of the Base Plan applied to and was followed by the Nation as a participating jurisdiction. In addition to providing representation on the Colusa County Hazard Mitigation Planning Committee (HMPC), the Nation formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table E-1. Additional details on Plan participation and Nation representatives are included in Appendix A.

Table E-1 KDWN – Planning Team

Name	Position/Title	How Participated
Kelly Baucom	Environmental Director	Provided hazard ID table. Attended meetings. Provided input on annex development and drafts. Provided mitigation actions. Coordinated LHMP elements with the Tribal Administrator and Tribal Chairman.
Charlie Wright	Tribal Chairman	Provided input on hazard ID table, local concerns on hazards and past events. Coordinated as needed with tribal members on LHMP input. Reviewed draft prior to submittal.

Public Involvement

As detailed in Chapter 3 Planning Process of the Base Plan, all public involvement and outreach activities were conducted on behalf of all participating jurisdictions, including the KDWN. KDWN's definition of the public is the same as that of the County as described in Chapter 3 and is generally defined as any stakeholders not attached to local government. The KDWN does have unique characteristics which should be considered as part of the outreach conducted for this project. As is discussed below in the Section E.3.1 and E.4.1 below, the tribal lands consist of 640 acres, or 1 square mile within Colusa County. The total land mass of the County is 1,156 square miles; as such, Tribal lands make up 0.09% of the County. The

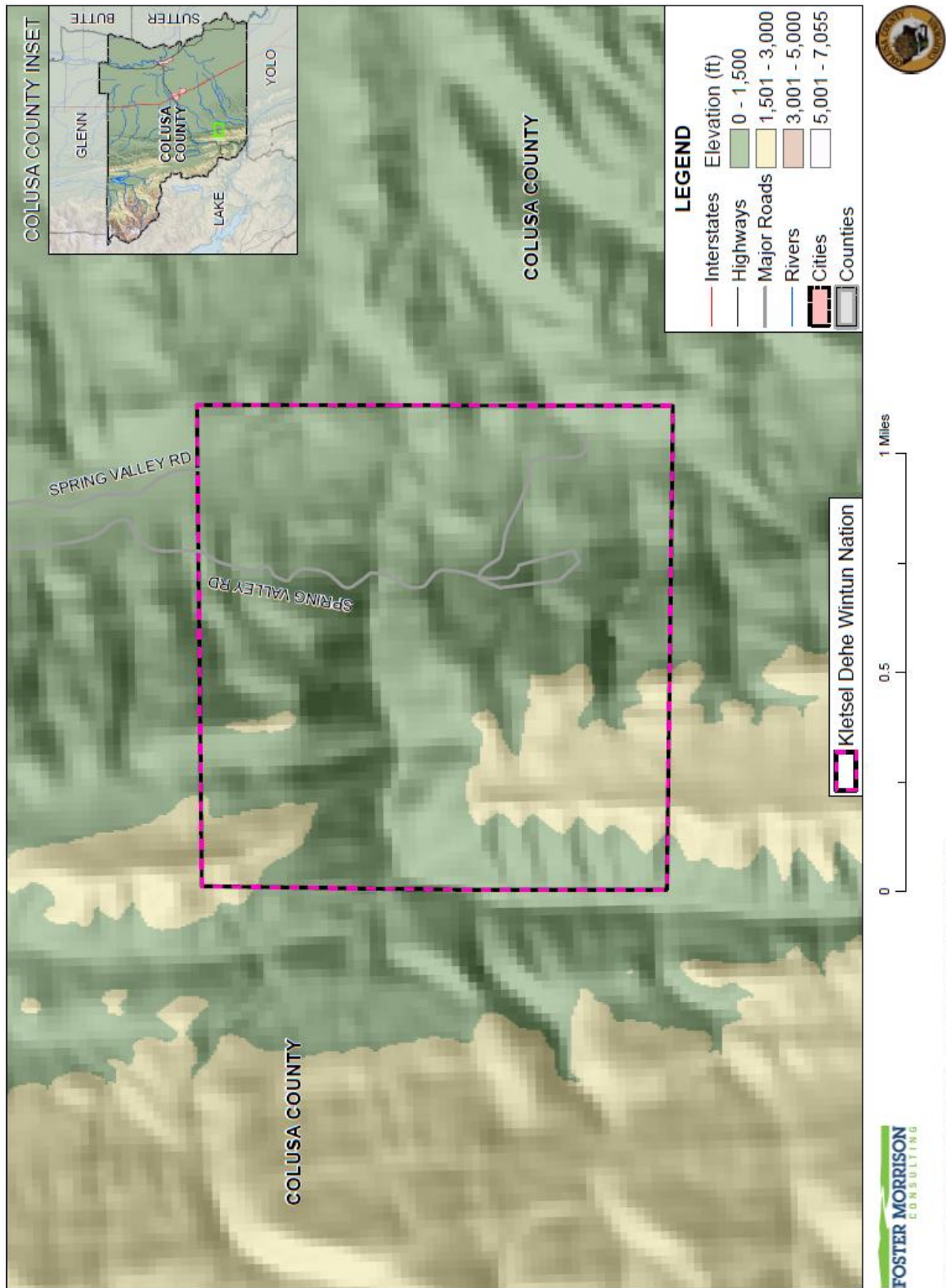
Tribe has 249 members; however, only 5 residences are on tribal lands with approximately 12 people dwelling there. The rest of the Tribe's population lives off of tribal lands, with a portion of these members residing in greater Colusa County. With this in mind, the Tribe primarily relied on the public engagement process and outreach mechanisms conducted for all participating jurisdictions to this LHMP Update as described in detail Chapter 3 and documented in Appendix A. The stakeholder and public involvement efforts of the County served as outreach for the KDWN. The KDWN was specifically named in the public outreach efforts. This can be seen in Section A.7 of Appendix A of the LHMP Update. With the small number of residents residing on the KDWN lands and other members located in other areas of the County, informal discussions also occurred between the KDWN LHMP Lead, the Tribal Administrator, the Tribal Chair, and other Tribal members to inform the Nation's Annex.

This is the first time the KDWN has engaged in mitigation planning. As such, through their involvement in this planning process, the KDWN has identified enhanced strategies for continued public involvement for both the final adoption of this LHMP and throughout plan maintenance and implementation efforts. The Tribe noted that it has three primary ways to outreach to its members: the KDWN webpage, the KDWN Facebook page, and a KDWN Newsletter. These outreach efforts were not well utilized during this LHMP Update. This is partly due to the fact that the KDWN webpage was being revamped during the planning process. In future planning processes and for continued tribal public outreach, the Tribe will utilize these and other outreach methods to greater effect.

E.3 Nation Profile

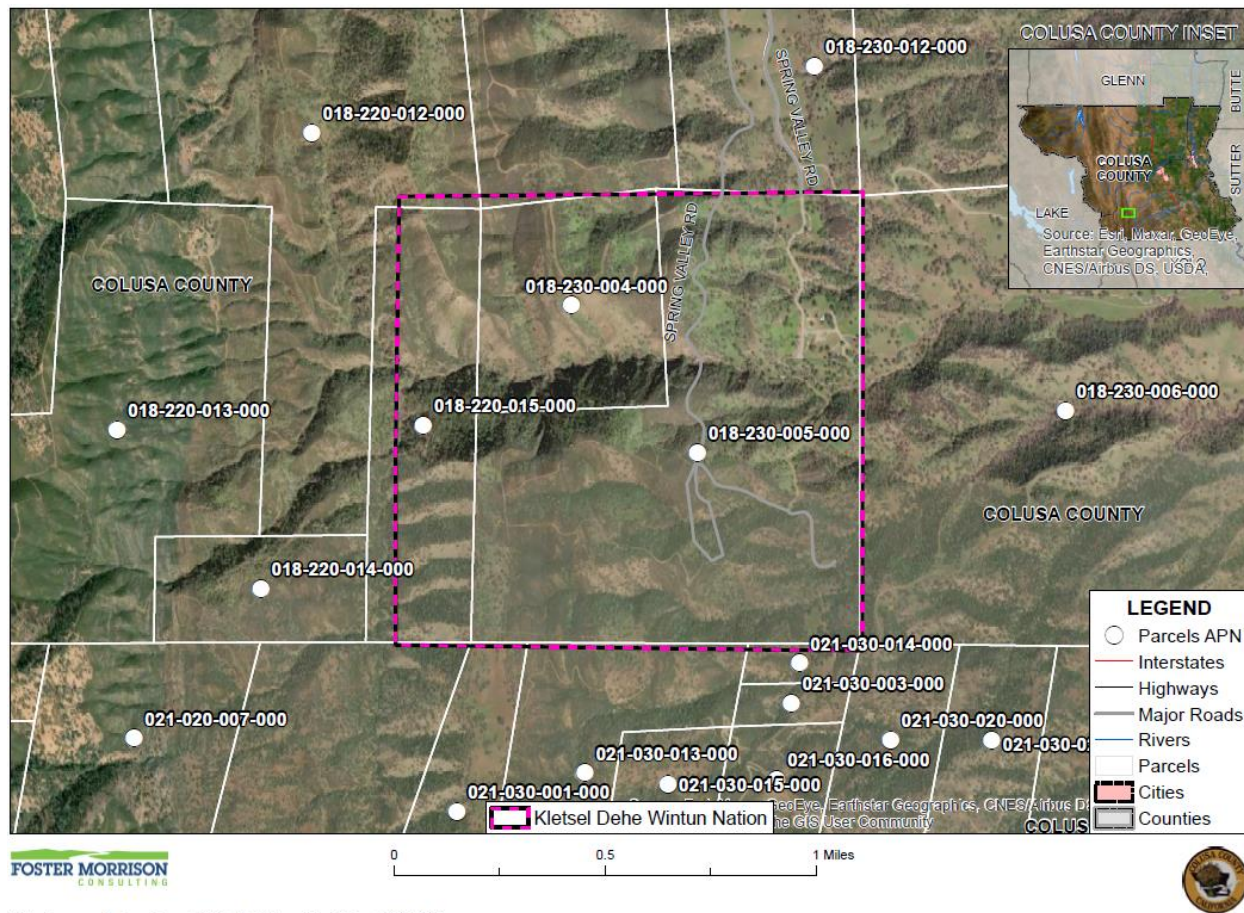
The Nation profile for the KDWN is detailed in the following sections. Figure E-1 displays a map and the location of the Tribe's lands within Colusa County. Figure E-2 shows the parcels that lie inside the Tribe's lands.

Figure E-1 KDWN



Data Source: Colusa County GIS, Cal-Atlas; Map Date: 3/21/2024.

Figure E-2 KDWN - Parcels Map



Data Source: Colusa County GIS, Cal-Atlas; Map Date: 3/22/2024.

E.3.1. Overview and Background

The KDWN website noted that the Nation is a federally recognized tribal nation located in southwestern Colusa County, California. The Nation's population at present stands at 249 tribal citizens located primarily within a four-county service area in California including and adjacent to Colusa County. The Cortina Indian Rancheria was established on June 26, 1907, by order of the Secretary of the Interior, to set aside 160 acres of land for the exclusive use of the tribe, subsequently ordering an additional 480 acres of land adding to the initial trust land holdings bringing the total to 640 acres comprising the Cortina Indian Rancheria.

On December 15, 2018, the voters of the tribe amended the Constitution and Bylaws of the Cortina Band of Wintun Indians and adopted the Governing Law of the Kletsel Dehe Wintun Nation as well an updated name for the Nation, which was a return to the traditional name of the Nation while retaining the name of Cortina Rancheria as the official name of the Nation's federal trust land. The Kletsel Dehe Wintun Nation's historical territory encompassed much of southwestern Colusa County totaling more than 200 Square miles of oak forests, chaparral, foothills, canyons, creeks, springs, and parts of valley plains. The Nation identifies by its traditional name of Kletsel Dehe which means Home of the Ground squirrel Tribe, and by the specific name of Kletwin which means Ground Squirrel People, as well as more general names such as Wintun, Patwin and Hill-Patwin.

The Nation recognizes thirteen traditional villages that once comprised the villages of Kletwin Peoples including: Klet, Ko-Te-Nah, Nik-me, Shoo-Koo-ee, Ke-der Hlab-be, Loo-Kus, Bah-kah-'Hhlab-be, Cho-Che, Wi-Ko'Sel, Oo-Le, Mun-Maht-Lah, To-e-de-he, Yakut.

The Seal of Nation holds many symbolic meanings, starting from the center, four acorns arranged in for directions to pay respect to the primary traditional food source of the Nation, then a basket design known as the “Stairway to Heaven” design, followed by two sets of thirteen diamonds on either side to represent the thirteen traditional villages of the Nation, followed by the first federally recognized name of the Nation and establishment year of 1907, and followed finally by the current name of the Nation as the Kletsel Dehe Wintun Nation bracketed by four diamonds in four directions to honor balance in all directions with the primary colors of the Nation being red black and white.

A 2020 Water Quality Standards report for the KDWN noted that the KDWN Rancheria is located in southwestern Colusa County. The Rancheria covers 640 acres at the base of the Coast Range foothills. The topography mainly consists of rolling to steep hills with elevations ranging from 610 feet above mean sea level (msl) to 1,718 feet msl. There are six canyons and a relatively flat area on the northeastern portion of the Rancheria. The Rancheria is located within the Strode Creek Sub watershed of Cortina Creek Watershed. Strode Creek (i.e. Canyon Creek) drains into Cortina Creek (approximately 1.81 miles). From there the water continues down to the Colusa Basin Drainage Ditch (approximately 19.2 miles) and finally into the Sacramento River at Knights Landing (approximately 31.5 miles).

Strode Creek flows within Strode Canyon, the main topographic feature traversing through the Rancheria from west to east. Strode Creek is spring-fed and flows during the wet season (winter through spring) and is mostly dry during summer and early fall with the exception of some pooling within Strode Canyon. The Rancheria has had limited residences (currently less than five (5) housing units) mostly due to the lack of high-quality potable water.

The 2023 KDWN Emergency Response Plan noted that there are two major geologic formations underlying the Rancheria. The oldest of these, the Cortina Formation, covers roughly the western half of the Rancheria. It is characterized by steep, easterly dipping saline water-bearing rocks of the Cretaceous age, consisting of two separate units: an upper unit of interbedded sandstones, siltstones, and mudstones, and a lower unit that dominates most of the outcrop area and is characterized by a predominance of sandstone. The Cortina Formation is overlain by a Monoclinial fold, which covers the eastern third of the Rancheria, and consists of a distinctive formation of fresh water-bearing rocks of clay stone, which contain beds and lenses of poorly indurated conglomerate, sandstone, and siltstone.

The surface water resources of the Rancheria consist of approximately 7.65 miles of perennial, intermittent, and ephemeral streams in four main drainage ways, of which approximately 1.26 miles are perennial streams and 6.39 miles are ephemeral and intermittent streams. Additionally, there are nine seeps, one spring, and 0.011 acres of wetlands. Surface water flows and ponding are primarily a result of surface runoff during storm events, although some surface flow is a result of springs and seepage areas. The principal stream on the Rancheria is spring-fed Strode Creek, which is a third-order channel that drains a 4,800-acre (7.5-square-mile) watershed. Strode Creek and its ephemeral drainages flow into Cortina Creek at a point that is approximately 1.80 miles east of the Rancheria. Cortina Creek drains a (40.6-square-mile) watershed that flows 19.2 miles east-northeast to the Colusa Basin Drainage Canal, or (Irrigation Trough). The Colusa

Basin Drainage Canal drains a 650,000-acre (1,016-square-mile) watershed in the western Sacramento Valley, which continues southeast approximately 31.5 miles before discharging into the Sacramento River at Knights Landing.

E.4 Risk Assessment

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.”

The KDWN risk assessment identifies and profiles relevant hazards and assesses the exposure of lives, property, infrastructure, and the environment to these hazards. The process allows for a better understanding of the Nation’s potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Overview and Background above, a risk assessment was performed for the Nation. This includes the following sections:

- E.4.1 Nation Assets Inventory and Growth and Development Trends
- E.4.2 Hazard Identification
- E.4.3 Hazard Profiles and Vulnerability to Specific Hazards

E.4.1. Nation Assets Inventory and Growth and Development Trends

This section provides an inventory of the Nation’s total assets potentially at risk to hazards and an overview of growth and development trends. This section is broken into two parts:

- **Asset Inventory** – The assets inventory identifies the Nation’s total assets, including the people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. This data is not hazard specific, but is representative of total assets within the Nation, potentially at risk to identified hazards as discussed in Section E.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the Nation, both current and future, is presented.

Assets Inventory

The Nation’s asset inventory is detailed in the following sections:

- People and Populations (Populations Served)
- Structures
- Critical Facilities and Infrastructure
- Community Lifelines
- Natural, Historic, and Cultural Resources
- Economic Assets and Community Activities of Value

A discussion of each of these assets follows and serves as the template for the asset discussion for each hazard in Section E.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the Nation. The Nation has 249 members, though very few live on the tribal lands. Only five residences are currently on KDWN lands, with approximately 12 people living in these residences.

Special Populations and Disadvantaged Communities

The entire Nation is considered a disadvantaged community. Many are elderly and low-income residents. The Tribe is considered a SB 535 Disadvantaged Community.

Structures and Critical Facilities

This section considers the KDWN's assets at risk, with a focus on key Nation assets such as critical facilities, infrastructure, and other Nation assets and their values. With respect to Nation assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan as:

Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.

Table E-2 lists critical facilities and other Nation assets identified by the Nation Planning Team as important to protect in the event of a disaster. KDWN's physical assets, valued at over \$1.5 million, consist of the buildings and infrastructure to support the Nation's operations. These can be seen on Figure E-3.

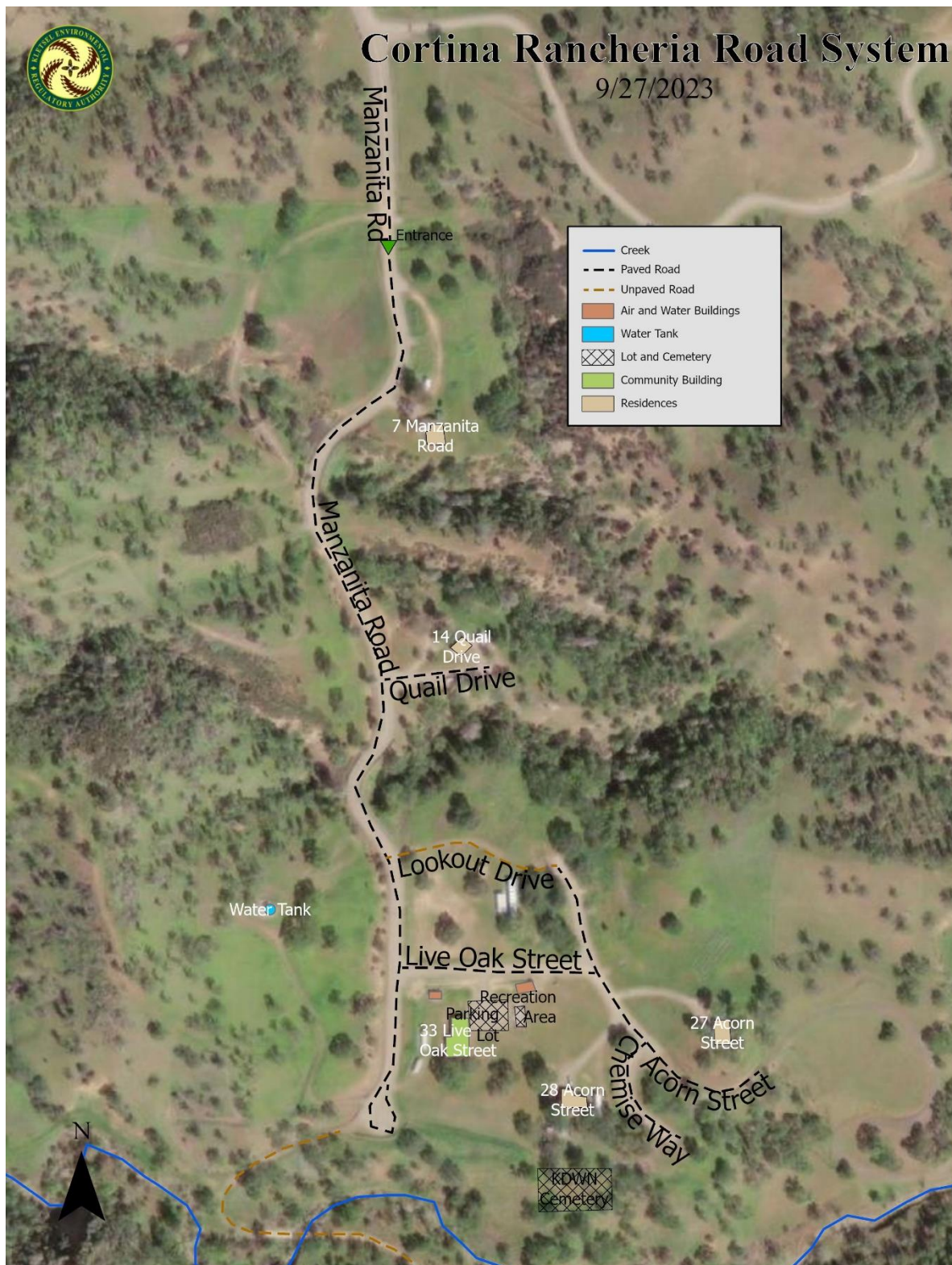
Table E-2 KDWN Critical Facilities, Infrastructure, and Other Nation Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Water Tank	Infrastructure	\$25,000	Climate Change, Drought and Water Shortage, Landslide, Extreme Heat, Wildfire
Community Building	Building	Est. \$1,100,000 \$1,500,000?	Climate Change, Drought and Water Shortage, Landslide, Extreme Heat, Wildfire
Roads	Infrastructure	N/A	Landslide, Streambank erosion
Water Treatment Building	Building	\$50,000	Climate Change, Drought and Water Shortage, Landslide, Wildfire

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Total		\$1,175,000-1,575,000	

Source: KDWN

Figure E-3 KDWN Assets



Source: KDWN

Community Lifelines

Assessing the vulnerability of the Nation to natural hazards and disasters also involves reviewing and inventorying the community lifelines in place that could be affected. It is important to include these items in hazard discussions as the continuous operation of critical government and business functions is essential to human health and safety, property protection, and economic security. The importance of community lifelines is discussed below:

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.
- The integrated network of assets, services, and capabilities that provide lifeline services are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function.
- When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident.

Community lifelines, as defined by FEMA, include the following:

- **Safety and Security** – Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- **Food, Hydration, Shelter** – Food, Water, Shelter, Agriculture
- **Health and Medical** – Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- **Energy** – Power Grid, Fuel
- **Communications** – Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- **Transportation** – Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- **Hazardous Material** – Facilities, HAZMAT, Pollutants, Contaminants
- **Water Systems** – Potable Water Infrastructure, Wastewater Management

It should be noted that these community lifelines are all in place and functional as part of regular government operations in the Nation as a partnership between the Nation, local cities, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the Nation's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the Nation and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in the Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the Nation to natural hazards and disasters also involves inventorying the natural, historic, and cultural assets of the area. This step is important for the following reasons:

- Environmental and natural resources add to a community's identity and quality of life. They also help the local economy through agriculture, tourism and recreation. They support ecosystem services, such as clean air and water.
- Conserving the environment may help people mitigate risk. It can also protect sensitive habitats, develop parks and trails, and build the economy.
- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

The KDWN has a variety of natural resources of value to the Nation. Some of these natural resources parallels that of Colusa County as a whole. A Water Quality Standards report noted natural resources in the Nation. It noted that surface waters indicate the ability to support wildlife habitat and aquatic uses. California species of special concern include the Northern Western Pond Turtle and Foothill Yellow-legged Frog, both have been observed in Strode Creek. To date neither of these two species have been Federally listed. The presence of fish on the Rancheria has not been documented. There are reports of sightings of a small fish in Strode Creek. Until the Nation can verify these sightings we will maintain the status of no fish on the Rancheria.

The Nation Planning Team noted that about 76% of the Rancheria supports blue oak-gray pine woodlands, 18% is occupied by non-commercial brush species, and 3% is non-forested. Riparian areas along streams make up about 3% of the Rancheria. No mining, quarrying, forestry, fishing, or other industry currently operates within the Rancheria.

Historic and Cultural Resources

KDWN has a variety of historic and cultural resources of value to the Nation. Many of these historic resources are sacred to the Nation and its members. Due to the sensitive nature of these locations, they are not presented in this LHMP Update.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the KDWN to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the Nation.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. There are limited economic assets in the Nation, due to its size, topography, and lack of potable water.

Community Activities of Value

Inventorying economic assets in the Nation and their vulnerability to natural hazards and disasters also involves inventorying activities that have value to the community. This includes activities that are important to a community, like long-standing traditions such as a festival or fair. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the Nation.

Growth and Development Trends

As part of the planning process, the Nation looked at changes in growth and development, both current and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability over time.

Population Trends and Projections

There is limited development that has occurred in the KDWN. Much of this is due to topography and a lack of water supply.

Future Development Areas

It is important to review future development plans for the Nation. Future development should be sited in areas that are away from known hazard risks. If this is not possible, mitigation should be done to ensure that future development is protected against future hazards. There are not future developments plans for the Nation at this juncture.

E.4.2. Hazard Identification

KDWN identified the hazards that affect the Nation and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the Nation (see Table E-3).

Table E-3 KDWN—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Significant	Likely	Limited	Low	Medium
Climate Change	Extensive	Highly Likely	Limited	High	–
Dam Failure	Limited	Unlikely	Negligible	Low	Medium
Drought & Water shortage	Extensive	Highly Likely	Critical	High	High
Earthquake	Extensive	Occasional	Critical	Low	Low
Floods: 1%/0.5%/0.2% annual chance	Significant	Occasional	Critical	Low	Medium
Floods: Localized Stormwater	Significant	Likely	Limited	Low	Medium
Landslide, Mudslide, and Debris Flow	Significant	Highly Likely	Critical	Medium	Medium
Levee Failure	Limited	Unlikely	Negligible	Low	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Limited	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely/ Occasional	Limited	Low	Low
Stream Bank Erosion	Significant	Highly Likely	Critical	Medium	Medium
Subsidence	Limited	Likely	Limited	Low	Low
Wildfire	Extensive	Highly Likely	Catastrophic	High	Medium
Geographic Extent <i>Limited:</i> Less than 10% of planning area <i>Significant:</i> 10-50% of planning area <i>Extensive:</i> 50-100% of planning area Likelihood of Future Occurrences <i>Highly Likely:</i> Near 100% chance of occurrence in next year, or happens every year. <i>Likely:</i> Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. <i>Occasional:</i> Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. <i>Unlikely:</i> Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years. Magnitude/Severity <i>Catastrophic:</i> More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths <i>Critical:</i> 25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability <i>Limited:</i> 10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability <i>Negligible:</i> Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid Significance <i>Low:</i> Minimal potential impact <i>Medium:</i> Moderate potential impact <i>High:</i> Widespread potential impact Climate Change Influence <i>Low:</i> Minimal potential impact <i>Medium:</i> Moderate potential impact <i>High:</i> Widespread potential impact					

E.4.3. Hazard Profiles and Vulnerability to Specific Hazards

This section includes the hazard profiles and vulnerability assessment for hazards ranked of medium or high significance specific to the Nation (as identified in the Significance column of Table E-3) and also includes a hazard profile and vulnerability assessment to the four primary hazards to the State of California: dam failure, earthquake, flood, and wildfire, regardless of the significance ranking by the Nation. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Colusa County Planning Area. Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.2 of the Base Plan.

Hazard Profiles and Vulnerability Assessment Format

Each hazard is profiled in the following format:

- **Hazard Profile**— A hazard profile is included for each hazard. This includes information on:
 - ✓ A general discussion of the hazard and related issues.
 - ✓ **Location** and **Extent** - Location is the geographic area within the Nation that is affected by the hazard. Extent is the expected range of intensity for each hazard. These are discussed in specific detail for mapped hazards, and in more general detail for those hazards that do not have discrete mapped hazard areas.
 - ✓ **Past Occurrences** – Past occurrences are discussed for each hazard. NCDC events are also discussed. A discussion of disaster declarations is included in each hazard section. Other past occurrence data specific to the Nation follows the disaster declarations for each hazard.
 - ✓ **Climate Change**—This section contains the effects of climate change (as applicable). The possible influence of climate change on the hazard is discussed.

After the hazard profile, a vulnerability assessment is presented. As part of the vulnerability assessment, an estimate of the vulnerability of the Nation to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **Low**—Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**—Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**—Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.
- **Extremely High**—Very widespread with catastrophic impact.

After this classification, a general discussion of hazard vulnerabilities occurs. This is done in the following format:

- **Local Concerns** – This includes Nation provided information on how the Nation is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same format as in Section E.4.1 above. This includes sections on: People and Populations Served; Structures and Critical Facilities, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the Nation and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset. Impacts are also affected by the community’s ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by the hazard is also included.

Power Interruption/Power Failure: A Common Vulnerability of all Hazards

An impact of almost all hazards evaluated as part of this LHMP Update relates to power shortage and/or power failures. The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the U.S. Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power disruptions can be found in Section 4.3 of the Base Plan.

Public Safety Power Shutoff (PSPS)

A new intentional disruption type of power shortage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California’s three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme (fire) weather. To help protect customers and communities during extreme fire weather events, electric power may be shut off for public safety in an effort to prevent wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3 of the Base Plan.

In addition to PSPSs, to help prevent wildfires, electric utilities have begun to evolve safety efforts. This includes installing safety settings on powerlines in and around high fire-risk areas. These are known as Enhanced Powerline Safety Settings (EPSS), and they help prevent falling tree branches, animals and other hazards from starting a wildfire. By stopping ignitions, it helps prevent wildfires from starting and spreading. According to PG&E, if ignitions occur, the size of fires are much smaller due to EPSS. In 2022, there was a 99% decrease in acres impacted by ignitions (as measured by fire size from electric distribution equipment (compared to the 2018-2020 average). This decrease occurred despite dry conditions.

Local Concerns

The Tribe is affected by PSPS shutoffs during periods of high fire danger. Loss of power can cause issues for residents including loss of HVAC systems during extreme heat, and loss of refrigeration for food preservation.

Climate Change

Likelihood of Future Occurrence—Highly Likely

Vulnerability—High

Hazard Profile

Climate change adaptation is a key priority of the State of California. The 2023 State of California Multi-Hazard Mitigation Plan noted that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the State’s infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

California’s Adaptation Planning Guide: Understanding Regional Characteristics (from 2017) has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. The Nation falls in the North Central Valley Region. A map and climate projections for this region are shown in Section 4.3.7 of the Base Plan and include an increase in temperatures, moderate changes in rainfall, and increased risk to wildfire.

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the KDWN, the Colusa County Planning Area, surrounding counties, and State of California. There is no scale to measure the extent of climate change. Climate change exacerbates other hazards, such as drought, extreme heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known but is feared to be tens to hundreds of years.

Past Occurrences

Disaster Declaration History

Climate change has never been directly linked to any declared disasters.

NCDC Events

NCDC does not track climate change events.

KDWN Events

Members of the KDWD Planning Team noted that groundwater wells continue to have to be dug deeper due to a lowering water table from extreme heat and climate change. Climate change is expected to exacerbate multiple other hazards that affect the Rancheria, including extreme heat and wildfire.

Vulnerability to Climate Change

The whole of the Nation is at some measure of vulnerability to climate change. The Nation Planning Team has concerns that the vulnerability of the Nation will grow to be greater in the future. An assessment of a community's vulnerability to climate change begins with an understanding of local exposure to climate change. This is included in the Local Concerns section below followed by a discussion of the Nation's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

The 2017 KDWN Climate Action Plan noted that The findings of likely climate change for the Rancheria are that temperatures already are increasing and will continue to increase. The local climate data from the WEPA weather station suggests increases in summer maximum daily temperatures starting about 2014. Also, about 2013, winter daily maximum temperatures appear to show increased warming. WEPA monthly rainfall shows a trend of increases for the years 2011-2014 versus the years 2007-2010. Long-term data sets from climate stations in nearby cities in the northern California region suggest slow warming has been occurring since the 1960's. These long-term data precipitation data from Sacramento indicates a pattern of decline in precipitation beginning about 1995 with increases since 2001. The Cal-adapt website using Global Circulation Models (GCMs) downscaled for the general area of the Rancheria forecast increasing temperatures and precipitation. These models forecast increases in the annual mean of the daily maximum temperatures for the Rancheria of about 8° F by the end of the century. The Cal-adapt models for annual precipitation forecast a 12 % increase by the end of the century. A review of the literature shows a consensus that fire frequency is increasing in northern California and the western US, at least for acres burned or sizes of fires.

After reviewing the evidence for climate change, the effects on three areas considered most vulnerable for the Rancheria were assessed. These three areas were fire severity hazard, vegetation changes, and human health responses. Other areas such as ground water levels, ground water chemistry, soils and erosion, and wildlife species based on data sets of WEPA and discussion with WEPA staff were also considered but changes in these were judged to be due mostly to other factors than climate change. Though declines in groundwater elevations since 2003 may be related to changes in hydrology that could be climate related.

KDWN also noted that depth to water in groundwater wells shows a gradual decrease year-to-year due to prolonged drought conditions. There has been an increased risk of wildfires during summer months. Heat waves are more intense.

Assets at Risk

Assets at risk from climate change include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

Climate change affects people and populations within a community, especially those climate change issues related to increases in temperature over time. While all populations can be affected by temperature extremes, populations particularly vulnerable include the very old and very young, medically fragile people, people without means of shelter (and air conditioning or heat) or transportation, people who are socially isolated and other socially vulnerable or underserved populations, which includes the whole of the KDWN (as shown in the Special Populations discussion in Section E.4.1). Acclimatization to extreme temperatures and other weather extremes may help reduce impacts from these extreme events, such as from heat waves, in the healthy general population but may not be sufficient to protect those with underlying medical conditions.

Structures and Critical Facilities

Climate change, on its own, does not generally impact structures. However, structures in areas of increased wildfire or flood areas exacerbated by the effects of climate change would be at increased risk, as described throughout this LHMP. More information on how structures may be affected by climate change can be found in Section 4.3.7 of the Base Plan. As with structures, critical facilities and infrastructure in areas of increased wildfire or flood areas due to the effects of climate change would be at increased risk. Climate change is expected to increase the vulnerability of critical facilities and infrastructure to natural hazards.

Community Lifelines

Due to the slow onset of climate change, community lifelines in the Nation are expected to adapt over time to new climate normal. It is thought that community lifelines in the Nation would not be overwhelmed by climate change. This was discussed in greater detail in Section 4.3.7 of the Base Plan.

Natural, Historic, and Cultural Resources

The rivers, streams, agricultural areas, and open space areas of the Nation supports rich biodiversity, including many special-status species. These are all at risk from the effects of climate change. In addition, if heat contributes to changes in wildfire patterns, all areas (on land) of the Nation are at increased risk from fire – including areas of natural, historic, and cultural resources. Furthermore, as climate change exacerbates the drought hazard, areas of wetlands in the City may be reduced or dry up temporarily, which could damage habitat areas for waterfowl and other species that depend on these areas.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.7 of the Base Plan.

Impacts from Climate Change

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Central Valley region in which the Nation is part of:

- Increased temperatures
- Reduced precipitation
- Public health – heat and air pollution
- Reduced agricultural productivity (e.g., wine grapes)
- Reduced tourism

In addition to these sources, the 2023 State of California Hazard Mitigation Plan noted that according to California’s Fourth Climate Change Assessment, the state will experience the following climate impacts:

- Annual average daily high temperatures are expected to rise by 2.7° F by 2040, 5.8°F by 2070, and 8.8°F by 2100 compared to observed and modeled historical conditions. These changes are statewide averages.
- Heat waves are projected to become longer, more intense, and more frequent.
- Warming temperatures are expected to increase soil moisture loss and lead to drier conditions. Summer dryness may become prolonged, with soil drying beginning earlier in the spring and lasting longer into the fall and winter.
- Droughts are likely to become more frequent and persistent through 2100.
- The strength of the most intense precipitation and storm events affecting California is expected to increase.
- Snowpack levels are projected to decline significantly by 2100 due to reduced snowfall and faster snowmelt.
- Marine layer clouds are projected to decrease.
- Extreme wildfires (i.e., fires larger than 24,710 acres) would occur 50 percent more frequently. The maximum area burned statewide may increase 178 percent by the end of the century.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to get worse over time. Due to limited water resources, anticipated changes in population for the KDWN are relatively small, which limits

additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in future land use and development will affect climate change in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Climate change can influence development in the Nation over time. The Nation could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to affect the Nation. While there are currently no formal studies of specific migration patterns expected to impact the Nation, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2022.

Drought & Water Shortage

Likelihood of Future Occurrence—Highly Likely

Vulnerability—High

Hazard Profile

Drought and water shortages are complex issues involving many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area’s usual water-consuming activities. Drought is often defined regionally based on its effects. Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water supply is the most significant issue and is critical for agriculture, manufacturing, tourism, recreation, and commercial and domestic use. Drought has also affected tree mortality in the area in the past. As the population in the area continues to grow, so will the demand for water.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the Nation and County is at risk. The US Drought Monitor categorizes drought conditions with the following scale:

- None
- D0 – Abnormally dry
- D1 – Moderate Drought
- D2 – Severe Drought
- D3 – Extreme drought
- D4 – Exceptional drought

Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time (which does not usually affect water shortages) or for longer periods (which may challenge water supplies). Should a drought last for a long period of time, water shortage becomes a larger issue. Current drought conditions in the Nation are shown in Section 4.3.9 of the Base Plan.

Past Occurrences

Disaster Declaration History

There have been one federal and three state disaster declarations from drought. This can be seen in Table E-4.

Table E-4 Colusa County – Federal and State Drought Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Drought	1	1977	3	1976, 2014, 2021

Source: Cal OES, FEMA

NCDC Events

There have been 58 NCDC drought events in Colusa County. These most likely had some impact on the Nation.

KDWN Events

During the most recent drought (from 2014 until 2022), KDWN had issues with drought and water shortage impacts. Tree mortality, plant moisture stress and increased insect populations occurred, causing increased fuel load and reducing forest resilience to wildfire. There were increasing invasive species such as yellow starthistle that choked out native species.

Climate Change and Drought and Water Shortage

It is likely that climate change will increase the chance of future occurrence as well future impacts associated with drought and water shortage. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state’s water storage, distribution, management, conservation, and use policies. The 2021 CAS stresses the need for public policy development addressing long term climate change impacts on water supplies. The CAS notes that climate change is likely to significantly diminish California’s future water supply, stating that: California must change its water management and uses because climate change will likely create greater competition for limited water supplies needed by the environment, agriculture, and cities.

A 2018 report from the Public Policy Institute of California noted that thousands of Californians – mostly in rural, small, disadvantaged communities – already face acute water scarcity, contaminated groundwater, or complete water loss. Climate change would make these effects worse.

The 2017 KDWN Climate Plan noted that groundwater elevations do not track annual precipitation totals very well. The increase in groundwater elevations between 1995 and 2003 occurred during the period of

apparent decrease in total annual precipitation. The decline in groundwater elevations, particularly since 2013 has occurred during an apparent increase in total annual precipitation. Perhaps one would need to examine the rainfall intensity events as some models predict more rain but in more intense storm events. Indeed, the year-to-year variability of annual rainfall is increasing since 2011 and the WEPA data show two months of unusually high precipitation in 2012 and 2014. More intense rainstorms while increasing total rainfall, will likely result in a greater proportion of the rainfall to be diverted as runoff and reduced infiltration to the underlying aquifer.

Cal Adapt scenarios for modeled future drought scenarios were shown in Section 4.3.9 of the Base Plan.

Vulnerability to Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including the Nation, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. The vulnerability of the Nation to drought may vary and include reduction in water supply, turf losses, impacts to natural resources, and an increase in dry fuels and tree dieback.

Tree Mortality and Drought

One of the specific impacts of drought in the Nation and Colusa County Planning Area is the increased risk to trees from beetle kill and other insects, pathogens and parasites, and other tree mortality and die back issues. Drought weakens trees and makes them more susceptible to insect infestation and other pathogens. Insects, such as bark beetles and others, frequently attack trees weakened by drought, disease, injuries, or other factors that may stress the tree. These insects and other pathogens can contribute to the decline and eventual death of trees throughout the Nation.

The tree mortality and dieback problem are a high priority because of the issue of hazardous trees and an increased wildfire hazard. In addition to an increase in wildfire fuels, hazardous trees can fall onto structures causing damage and a result in a reduction on the tree canopy within the City that provides relief during extreme heat days.

The whole of the Nation is at some measure of vulnerability to drought and water shortage. An assessment of a community's vulnerability to drought and water shortage begins with an understanding of local exposure to drought. This is included in the Local Concerns section below followed by a discussion of the Nation's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

The KDWN relies on a network of groundwater wells. However, water produced by these wells is not potable due to naturally high saline and mineral concentrations. Residences instead make use of 2 solar distillation panels at each house, which provide potable water at low quantities (3-5 liters/day). Prior to installation of solar panels (Summer 2023), residents had to purchase potable water and bring it onto the Rancheria.

The 2023 KDWN Emergency Response Plan noted that Groundwater elevation contours reveal substantial differences in the gradients between the Cortina and Tehama Formations, both of which are present below the Rancheria. Depth to groundwater on the Rancheria was found to range from zero to as much as 280 feet below the ground surface, and contours of first encountered groundwater in the Cortina Formation indicate a subdued image of the surface topography and a generally eastward flow, with a steep gradient (25 percent to 50 percent) in some areas. The groundwater table in the Tehama Formation, unlike the Cortina Formation, does not appear to be influenced by topography, even though the groundwater has an eastward flow direction. Groundwater elevations in the Tehama Formation are much more consistent than in the Cortina Formation, which runs consistently between 610 and 670 feet above sea level. Wells completed in the Tehama Formation above these elevations are dry. These observations suggest that the Tehama Formation is both more transmissive and more homogeneous than the Cortina Formation. Although the Tehama contains apparently low-permeability materials, groundwater occurs under unconfined conditions. Monitoring wells drilled in 1995 into the Cortina and Tehama layers have shown varied degrees of water quality and quantity.

Assets at Risk

Assets at risk from drought and water shortage include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

The people and populations of the Nation are not directly affected by drought; although, their turfed areas, trees, and other water dependent resources can all be affected. In extreme drought conditions, however, residents and other populations within the Nation may be vulnerability to drought and water shortage issues. Water quality can be impacted causing health problems, especially to vulnerable populations. Drought and water shortage can lead to an increase in wildfires threatening Nation residents. Water shortages can have an effect on all of the population in the Nation, but often have a greater effect on the unhoused and other vulnerable populations that may be unable to access clean drinking water during shortages. During periods of drought as the costs of water usage may increase, especially during mandated conservation times, those who are economically disadvantaged may be unable to afford the increased costs of potable water.

Structures and Critical Facilities

Most Nation structures and critical facilities have a limited vulnerability to drought and water shortage. Should drought conditions be severe enough to cause water shortage reliability issues, some facilities and infrastructure may be affected. Water systems may be impacted during times of reduced water supply and need to employ contingencies to remain functional and fully operational. Other water dependent systems

may also be adversely affected. Further, the secondary hazard of drought (increased potential for spread of urban fires and wildfire) can pose a significant risk to critical facilities and infrastructure. Drought can also stress trees, causing die off. These trees may fall on critical infrastructure adjacent to them and impact power lines and other utilities.

The District noted the following assets (from Table E-2) at risk to drought:

- Water Tank
- Community Building
- Water Treatment Building

Community Lifelines

While limited, community lifelines can have a vulnerability to drought and water shortage. Many of the Nation's community lifelines are the same as or similar to Colusa County's. Drought is unlikely to overwhelm community lifelines. This was discussed in greater detail in Section 4.3.9 of the Base Plan.

Natural, Historic, and Cultural Resources

Drought and water shortage can have a significant impact on natural resources. Water levels in reservoirs and lakes may be reduced and a loss of wetlands and coastal marsh areas may occur. Severe drought conditions can contribute to an increase in erosion of soils and lead to poor soil quality. Further, all of the trees in the Nation are at risk to drought impacts and a reduction in water supply. These trees provide a wealth of social and environmental benefits to Nation residents and visitors, from shade and beauty to air quality, carbon reduction and stormwater management. Drought can devastate crops and dry out pastures, dry out forests and critical habitat areas, and reduce food and water available for wildlife and livestock. Additionally, drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. It is unlikely that drought and water shortage would have a significant impact on historic and cultural resources in the Nation.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.9 of the Base Plan.

Impacts from Drought and Water Shortage

The vulnerability of the Nation to drought is Nationwide, but impacts may vary and include reduction in water supply and an increase in dry fuels. The potential for a reduction in water supply during drought conditions generally leads to both mandated and voluntary conservation measures during extended droughts. During these times, the costs of water can also increase. Also of concern, the increased dry fuels and fuel loads associated with drought conditions can result in an increased fire danger. In areas of extremely dry fuels, the intensity and speed of fires can be significant. Water supply and flows for fire suppression can also be an issue during extended droughts. Drought can also lead to turf losses and cause tree die off within the City.

Other qualitative impacts associated with drought in the Nation are those related to water intensive activities such as municipal usage, commerce, tourism, and recreation use. With more precipitation likely falling as rain instead of snow in the Sierra's, and warmer temperatures causing decreased snowfall to melt faster and earlier, water supply is likely to become more unreliable. In addition, drought and water shortage is predicted to become more common. This means less water available for use over the long run, and additional challenges for water supply reliability, especially during periods of extended drought.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. With respect to changes in populations, due to the current limited water supplies, anticipated changes in population are relatively small, which limits additional impacts. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect drought and water shortage in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions

As the population in the area continues to grow, so will the demand for water. Ongoing planning will be needed by the Nation and water companies to account for population growth and increased future water demands. The Nation continues to make efforts to be proactive on future drought and water supply issues.

Landslide, Mudslide, and Debris Flow

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

Hazard Profile

Like its earthquake-generating faults, California's mountainous terrain is a consequence of dynamic geologic processes in operation as the North American Plate grinds past the Pacific Plate. According to the CGS, a landslide is a general term for a variety of mass-movement processes that generate a down-slope movement of mud, soil, rock, and/or vegetation. Landslides are classified into many different types based on form and type of movement. They range from slow-moving rotational slumps and earth flows, which can slowly distress structures but are less threatening to personal safety, to fast-moving rock avalanches and debris flows that are a serious threat to structures and have been responsible for most fatalities during landslide events. For the purposes of this LHMP Update, the term landslide includes mudslides, debris flows, and rockfalls that tend to occur suddenly; as well as hillside erosion, which is a similar process that tends to occur on smaller scales and more gradually but can exacerbate landslide events.

Landslides, debris flows and mudslides are closely related to flooding, as both processes are related to precipitation, runoff, and the saturation of ground by water. In addition, landslides, mud flows, and debris flows can occur on small, steep stream channels and are often mistaken for floods. However, landslide events may be much more destructive than floods because of their higher densities, high debris loads, and high velocities.

Soil erosion is another common form of soil instability. Erosion is a function of soil type, slope, rainfall intensity, and groundcover. It accounts for a loss in many dollars of valuable soil, is aesthetically displeasing, and often induces even greater rates of erosion and sedimentation. Sedimentation is simply the accumulation of soil as a result of erosion. Construction activities often contribute greatly to erosion and sedimentation. Besides being a pollutant in its own right, sediment acts as a transport medium for other pollutants, especially nutrients, pesticides, and heavy metals, which adhere to the eroded soil particles. As the sediment drains into watercourses, the combination of these pollutants adversely affects water quality.

Natural conditions that contribute to landslide, mudslides, debris flows, hillside and streambank erosion, include the following:

- Degree of slope
- Water (heavy rain, river flows, or wave action)
- Unconsolidated soil or soft rock and sediments
- Lack of vegetation (no stabilizing root structure)
- Previous wildfires and other forest disturbances (discussed in the Wildfire section below)
- Road building, excavation, and grading
- Earthquake

The 2023 California State Hazard Mitigation Plan noted that more than one third of California is mountainous terrain that generally trends parallel to the coast, forming a barrier that captures moisture from offshore storms originating in the Gulf of Alaska and Mexico. Steep topography, weak rocks, heavy winter rains, and occasional earthquakes all lead to slope failures more frequently than would otherwise occur under gravity alone. This is true in the sloped areas that reside in the Nation.

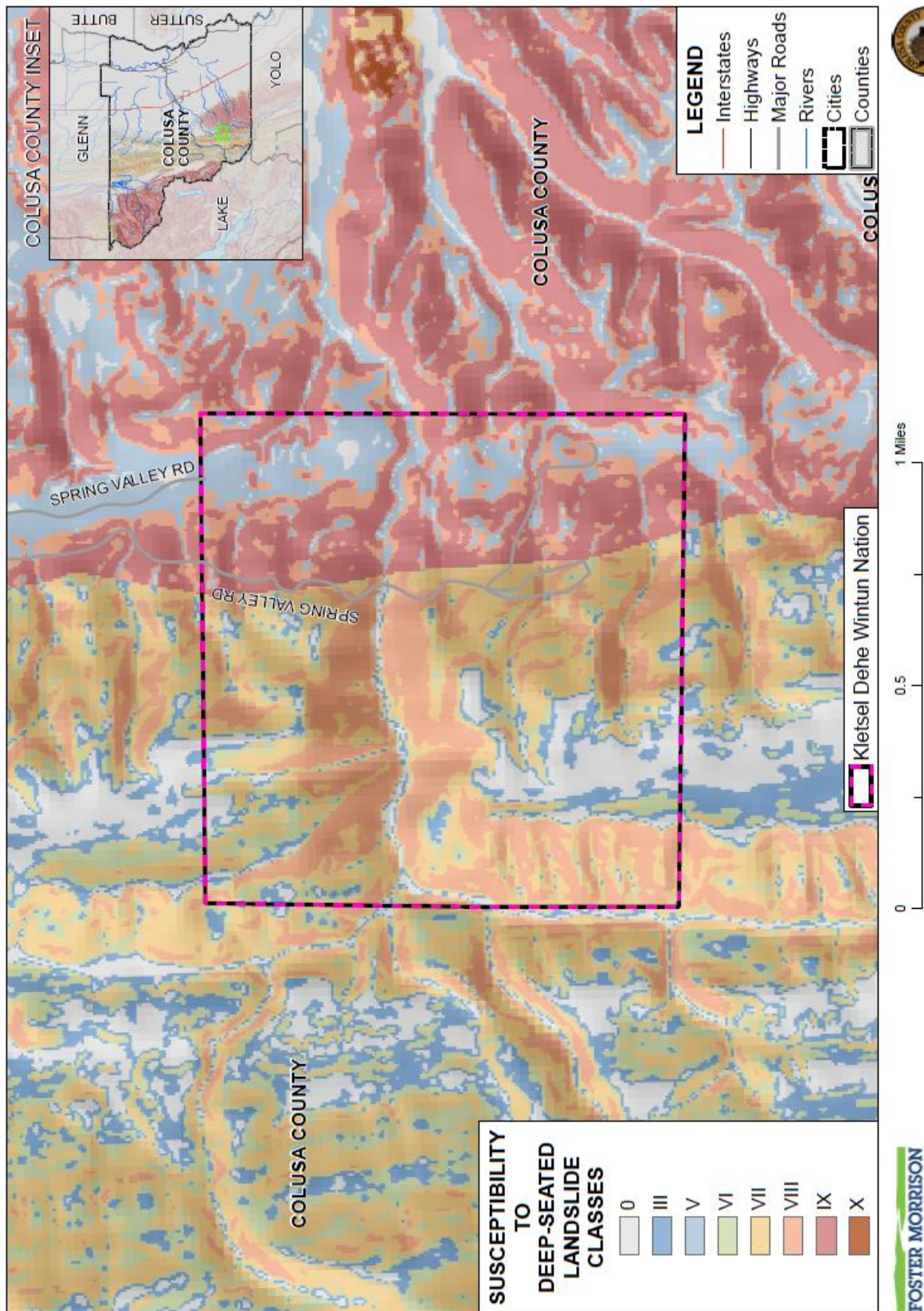
Location and Extent

Landslides can be expected in areas with steep slopes and weak soils. It can also occur in areas where erosion has previously occurred. Both winter storms (precipitation-induced) and earthquake triggered landslides tend to occur in or near places that have experienced previous landslides. However, landslides may also occur in other locations over time.

Figure E-4 shows the CGS areas at susceptible to deep-seated landslides. The legend on Figure E-4 shows the susceptibility scale (from 0-X with 0 being the least and X being the most susceptible) that the CGS uses to show the susceptibility of landslides. It is a primarily a combination of slope class and rock strength. According to the 2023 State Hazard Mitigation Plan, the susceptibility classes were further categorized into Very High (susceptibility class X) and High (susceptibility classes VII, VIII, & IX) for exposure analysis. The rest of the classes were not categorized. CGS mapping indicates that the eastern portions of the Nation and surrounding area are at high to very high susceptibility areas for landslides. This can be seen in the

darker orange and red colors. The speed of onset of landslide is often short, especially in post-wildfire burn scar areas, but it can also take years for a slope to fail. Landslide duration is usually short, though digging out and repairing landslide areas can take some time.

Figure E-4 KDWN – Susceptibility to Deep-Seated Landslides



Data Source: Susceptibility to Deep-Seated Landslides map - CGS Map Sheet 58 (May 2011), Colusa County GIS, Cal-Atlas; Map Date: 3/21/2024.

Past Occurrences

Disaster Declarations

There have been no federal or state disaster declarations from landslide.

NCDC Events

The NCDC contains no records for landslides in Colusa County.

KDWN Events

None have occurred in recent years, according to the KDWN Planning Team.

Climate Change and Landslide and Debris Flows

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with landslide and debris flow. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 2021 CAS, climate change may result in precipitation extremes (i.e., wetter wet periods and drier dry periods). While total average annual rainfall may decrease only slightly, rainfall is predicted to occur in fewer, more intense precipitation events. The combination of a generally drier climate in the future, which will increase the chance of drought and wildfires, and the occasional extreme downpour is likely to cause more mudslides, landslides, and debris flows.

Vulnerability from Landslide

Portions of the Nation are at some measure of vulnerability to landslide. An assessment of a community's vulnerability to landslide begins with an understanding of local exposure to landslide. This is included in the Local Concerns section below followed by a discussion of the Nation's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

Steep terrain on rancheria increases risk of landslides. Most roads are unpaved, and there are limited ingress/egress routes to the Nation. A landslide affecting a road would cause great impacts to the KDWN. Additionally, slopes are susceptible to erosion caused by stormwater runoff.

Rancheria residents noted that landslides have occurred in the past, mainly in the areas surrounding Strode Creek, but have not yet affected residences.

Assets at Risk

Assets at risk from landslide include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

All populations located within areas of landslide susceptibility, especially in the High to Very High hazard areas (i.e., Classes VII to X) are at some vulnerability to landslide. This includes those people residing in these landslide potential areas as well as those that might reside or work within the landslide run out areas. People residing in these areas may also be cut off from transportation routes if roads and streets providing a means of ingress and egress are impacted. Certain vulnerable populations may be at greater risk due to the often sudden onset of a landslide event and include: the unsheltered, those with limited mobility, and those that lack the resources to leave the area.

Nation residents that live in the High and Very High landslide susceptibility areas are often the most vulnerable, but those who live in the landslide run out areas (which are not mapped) are also vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events.

Structures and Critical Facilities

Landslides can affect the built environment of the Nation and those structures located within the High to Very High hazard areas (i.e., Classes VII to X) are especially vulnerable, as are the structures located within the landslide run out areas.

The District noted the following assets (from Table E-2) at risk to landslide:

- Water Tank
- Community Building
- Roads
- Water Treatment Building

Community Lifelines

Community lifelines may be affected by landslide. Many of the Nation's community lifelines are the same as or similar to Colusa County's. Landslide is unlikely to overwhelm community lifelines. This was discussed in greater detail in Section 4.3.13 of the Base Plan.

Natural, Historic, and Cultural Resources

Landslides can affect natural, historic, and cultural resources that lie in the landslide area, or the landslide run out area. Landslides can destroy large tracts of forest and open space areas, destroy wildlife habitat, and remove productive soils and vegetation from slopes. It can also fill in waterways, impact water quality, and potentially affect flooding potential. Natural resources that fall in the High or Very High susceptibility areas shown on Figure E-4 would be most vulnerable, as well as those in the run-out areas.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.13 of the Base Plan.

Impacts from Landslide

Any type of landslide may result in damages or complete destruction of buildings in their path, as well as deaths and injuries. Landslides can cause road blockages by depositing debris on road surfaces or road damage if the road surface itself slides downhill. Utility lines and pipes are also prone to breakage in slide areas. Large landslides can collapse into water bodies, causing seiches. Landslides can relocate river channels. Landslides and debris flows can also impact water quality and the storage capacity of surface water reservoirs used to store potable water.

Landslides, debris flows, and mud flows impacts vary by location and severity of any given event and will likely only affect certain areas of the Nation susceptible to landslide. Based on the risk assessment, there is sizable potential for significant landslides to occur in the Nation. Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect landslides in the Nation. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions,

Although new growth and development corridors may fall in areas affected by High or Very High risk of landslide (shown as classes VII to X), Nation building codes in effect regarding the siting and construction of structures in identified hazard areas should limit risk to future development.

Severe Weather: Extreme Heat

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile

According to FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and lasts for several weeks. Heat kills by taxing the human body beyond its abilities. In extreme heat and high humidity, evaporation is slowed, and the body must work extra hard to maintain a normal temperature.” Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, those who are sick or overweight, and those that work or recreate outdoors are more likely to experience heat exhaustion or succumb to extreme heat.

In addition to the risks faced by citizens of the Nation, there are risks to the built environment from extreme heat. While extreme heat on its own does not usually affect structures, extreme heat during times of drought can cause wildfire risk to heighten. Extreme heat can lead to interruptions in power, power outages, and when combined with high winds, to Public Safety Power Shutdown (PSPS) events, creating significant issues in the Nation.

Location and Extent

Heat is a regional phenomenon and affects the whole of the Nation. The Nation experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-110°F in rather extreme situations. Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly affect general and vulnerable populations and communities. Heat waves do not generally cause damage or elicit the immediate response of floods, fires, earthquakes, or other more “typical” disaster scenarios.

The NWS has in place a system to initiate alert procedures (advisories or warnings) when extreme heat is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. This can be seen in Section 4.3.3 of the Base Plan.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations from extreme heat.

NCDC Events

The NCDC data shows 38 extreme heat incidents for Colusa County since 1993.

KDWN Events

The Nation noted that extreme heat occurs every year, causing the issues discussed in the Local Concerns section below.

Climate Change and Extreme Heat

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with extreme heat. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

The California Climate Adaptation Strategy (CAS), citing a California Energy Commission study, states that “over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined.” This study shows that California is getting warmer, leading to an increased frequency, magnitude, and duration of heat waves. These factors may lead to increased mortality from excessive heat.

As temperatures increase, California and Colusa County will face increased risk of death from dehydration, heat stroke, heat exhaustion, heart attack, stroke and respiratory distress caused by extreme heat. According to the 2013 California Climate Adaptation Study (CAS) report and the 2023 State of California Hazard Mitigation Plan, by 2100, hotter temperatures are expected throughout the state, with projected increases of 3-5.5°F (under a lower emissions scenario) to 8-10.5°F (under a higher emissions scenario). These changes could lead to an increase in deaths related to extreme heat in Colusa County.

Vulnerability to Severe Weather: Extreme Heat

Extreme heat is becoming more frequent, intense, longer lasting and geographically widespread. Extreme heat occurs on an annual basis in the County and the Nation. In recent years, compounded by climate change conditions, summer months continue to get a bit hotter. The whole of the Nation is at some measure of vulnerability to extreme heat. An assessment of a community’s vulnerability to extreme heat begins with an understanding of local exposure to extreme heat. This is included in the Local Concerns section below followed by a discussion of the Nation’s Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

Extreme summertime heat, high wind events, rainwater runoff causing increased erosion of slopes, unpaved roads can be hazardous during wet periods. Rancheria is subject to PSPS shutoffs during extreme weather events and periods of elevated fire risk. There are concerns due to the age of Rancheria residents, the lack

of HVAC systems, and accompanying heat stroke. Only one house has a landline, and cell service is spotty so residents use Starlink for Wifi calling on their cell phones.

Assets at Risk

Assets at risk from extreme heat include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

All populations within the Nation are vulnerable to extreme heat, but it generally affects people (including Nation staff) spending large amounts of time outside or without means of cooling indoor structures. During extended periods of high temperatures, extreme heat may overload the demands for electricity to run air conditioners and can present health concerns to individuals. When interruptions in power occur during extreme heat, the risk of heat related illnesses and deaths increases. Extreme heat is a significant concern to vulnerable populations. The unhoused; individuals who exercise or train outdoors; outdoor workers; individuals that lack the resources to afford heat; and the young, old, or medically fragile individuals that are more susceptible to heat related impacts. In addition to vulnerable populations, pets and livestock are at risk to extreme heat conditions.

Structures and Critical Facilities

Extreme heat normally does not generally impact structures and critical facilities, but individuals working in structures may be affected during periods of extended heat, especially in structures that might not be equipped with air conditioning or other means of cooling. The Nation noted that extreme heat has caused interruptions to power in the past. Also depending on the structure, sensitive contents such as IT equipment can be impacted, especially if a power outage occurs.

The District noted the following assets (from Table E-2) at risk to extreme heat:

- Water Tank
- Community Building

Community Lifelines

Community lifelines may be affected by extreme heat. Many of the Nation's community lifelines are the same as or similar to Colusa County's. Extreme heat is unlikely to overwhelm community lifelines. These were discussed in greater detail in Section 4.3.2 of the Base Plan.

Natural, Historic, and Cultural Resources

Natural resource assets in the Nation may be vulnerable during periods of extreme heat. These include turfed areas; landscapes, Nation trees, wildlife and habitat areas, and wetlands and marsh lands. Recently, trees were lost in areas of the Nation that were weakened by drought and extreme heat. Extreme heat may also cause drought-like conditions, contributing to other issues. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire

vulnerability in the region for that time period, even if the rest of the season is relatively moist. Historic and cultural resources are not expected to be affected by extreme heat.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.2 of the Base Plan.

Impacts from Severe Weather: Extreme Heat

The Nation experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-110°F in rather extreme situations. During these times, drought conditions may worsen, and the Nation may see an increase in dry fuels. Also, power outage and PSPS events may occur during these times as well. Health issues are the primary concern with this hazard, although economic impacts can also be an issue.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect extreme heat in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Future development of new buildings in the Nation will likely not be affected by extreme heat. Extreme heat is more likely to affect vulnerable populations. Vulnerability to extreme heat will increase as the average age of the population shifts. It is encouraged that nursing homes and elder care facilities have emergency plans or backup power to address power failure during times of extreme heat and in the event of a PSPS. Low-income residents and unhoused populations are also more vulnerable and should be considered in future growth plans for the Nation.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile

Storms in the Nation occur annually and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the Nation falls mainly in the fall, winter, and spring months. Wind often accompanies these storms; hail and lightning are rare in the Nation.

Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the Nation. All portions of the Nation are at risk to heavy rains and storms. Most of the severe rains occur during the fall, winter, and spring months in the Nation. There is no scale by which heavy rains and severe storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Hail and lightning are rare in the Nation and Colusa County. Duration of severe storms in the Nation can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

Disaster Declaration History

According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the Nation. This is the cause of many of the federal disaster declarations related to flooding. Disaster declarations from flooding are shown on Table E-5.

Table E-5 Colusa County Disaster Declarations from Flood (Heavy Rain and Storms) 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC data recorded 30 hail, heavy rain, and winter weather incidents for Colusa County since 1950.

KDWN Events

The KDWN noted that during atmospheric river events Strode Creek can have high flows. This occurred in the winter of 2022/2023.

The Rancheria is susceptible to road flooding, especially during El Nino years. KDWN Residents specified the years '95 and '97, noting that the flooding of 1997 caused residents to be trapped on the Rancheria for a period of two weeks.

Climate Change and Heavy Rains and Storms

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with heavy rains and storms. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is unlikely that hail will become more common in the County. The amount of lightning is not projected to change.

Cal-Adapt noted that, on average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. Cal-Adapt modeled scenarios are shown in Section 4.3.4 of the Base Plan.

Vulnerability to Heavy Rain and Storms

Heavy rain and severe storms are the most frequent type of severe weather occurrences in the Nation. These events can cause both significant and localized flooding. Flooding can be worse during times where the ground is already saturated. Wind often accompanies these storms and has caused damage in the past. Hail and lightning are rare in the Nation, but also can cause damage, with lightning occasionally igniting wildfires.

The whole of the Nation is at some measure of vulnerability to heavy rain and storms. An assessment of a community's vulnerability to heavy rains and storms begins with an understanding of local exposure to heavy rain and storms. This is included in the Local Concerns section below followed by a discussion of the Nation's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

KDWN noted that Strode Creek runs adjacent to the Rancheria. Strode Creek causes some erosion within the Rancheria during high flow periods. Extreme erosion can endanger nearby dirt roads and limit access to undeveloped parts of Rancheria. The Rancheria is susceptible to road flooding, especially during El Nino years. KDWN Residents specified the years '95 and '97, noting that the flooding of 1997 caused residents to be trapped on the Rancheria for a period of two weeks.

Assets at Risk

Assets at risk from heavy rain and storms include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

All populations in the Nation have some measure of risk to heavy rains and storms. Those populations that work or recreate outside and unhoused individuals are more vulnerable to impacts from heavy storm events. Heavy rains and storms occur every year and do not generally cause significant adverse impacts to individuals; it is the secondary hazard, flooding, which poses the biggest impact to people. Populations at risk to flooding resulting from heavy rains and storm events include those who live in floodplains (discussed in further detail in the Flood: 1%/0.2% Annual Chance section above) and those who live in and near localized flooding areas and floodplains (discussed in further detail in the Flood: Localized Stormwater Flooding section above).

Structures and Critical Facilities

Structures and critical facilities in the Nation have some risk to heavy rains and storms. Structures built to modern building codes are built to withstand heavy rains and storms (including high winds and lightning). During a heavy storm, localized flooding may cause water intrusion into buildings from the outside. Trees can be downed causing impacts to structures. Water intrusion into facilities and infrastructure can impact operations. Older buildings may be at increased risk to heavy rains and storms. Power outages during severe storm events can occur, impacting the use of structures until the power is back online. In certain areas, large storms can cause erosion and localized landslides which can impact affected facilities. Many critical facilities are built to modern design standards that take heavy rains and storms into account when siting and building these structures, and others may need to be retrofitted to better withstand these events.

The District noted the following assets (from Table E-2) at risk to flooding from heavy rains and storms:

➤ Roads

Community Lifelines

Community lifelines may be affected by heavy rains and storms. Many of the Nation's community lifelines are the same as or similar to Colusa County's. Heavy rains and storms are unlikely to overwhelm community lifelines. These were discussed in greater detail in Section 4.3.4 of the Base Plan.

Natural, Historic, and Cultural Resources

Large storm events and associated flooding can affect natural, historic, and cultural resources. Silt and sediment can damage natural areas. Trees can be uprooted and downed by high winds. Extended periods of rainfall can erode natural banks along waterways and degrade soil stability for terrestrial species. While some natural systems can be adversely impacted during these large storms, heavy rain events can also provide benefits. Groundwater and wetland areas can be recharged and water supplies replenished. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures affected by large storm events, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged, and lost during extreme storm and flood events.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.4 of the Base Plan.

Impacts from Heavy Rain and Storms

Impacts from heavy rains and storms include damage to property, critical facilities and infrastructure, and the natural landscape. This includes: erosion; downed trees; damaged utility structures and infrastructure; power outages; road damage and blockages; and even lightning strikes to critical infrastructure and people. Lightning can also cause wildfires and urban fires to occur. Landslides occur when the soil on slopes becomes oversaturated and fails. Climate change may cause these impacts to worsen.

Actual damage associated with the primary effects of severe storms and heavy rains has been somewhat limited. It is the secondary hazards caused by these severe weather events, such as floods and erosion that would likely have the greatest impact.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect heavy rains and storms in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Building codes in the Nation ensure that new development is built to current building standards, which should reduce the risk to future development in the Nation from heavy rains and storms. New critical facilities such as communications towers and others should be built to withstand hail damage, lightning, and thunderstorm winds. With adherence to development standards, future losses to new development should be minimal. Changes in population could increase the number of people impacted by heavy rains and storms. Changes in land use may also amplify the impacts of heavy rains and storms, as additional impervious surfaces can cause additional runoff and localized flooding throughout the Nation.

Stream Bank Erosion

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile

Erosion is the general process whereby rocks and soils are broken down, removed by weathering, or fragmented and then deposited in other places by water or air. Stream bank erosion poses problems for the Nation. The rate of erosion depends on many variables, including the soil or rock texture and composition, soil permeability, slope, extent of vegetative cover, and precipitation amounts and patterns. Erosion increases with increasing slope and precipitation and with decreasing vegetative cover, which includes areas where protective vegetation has been removed by fire, construction, or cultivation. The Nation is traversed by many waterways. These locations are all subject to bank erosion. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects.

Location and Extent

Stream bank erosion occurs on rivers, streams, and other moving waterways, including leveed areas, in the Nation. Erosion and deposition are occurring continually at varying rates over the Planning Area. Swiftly moving floodwaters cause rapid local erosion as the water carries away earth materials. Severe erosion removes the earth from beneath bridges, roads and foundations of structures adjacent to streams. By undercutting it can lead to increased rockfall and landslide hazard. The deposition of material can block culverts, aggravate flooding, destroy crops and lawns by burying them, and reduce the capacity of water reservoirs as the deposited materials displace water.

The speed of onset of stream bank erosion is slow, as the erosion takes place over periods of years. Duration of erosion is extended. Greater erosion occurs during periods of high stream flow and during storm and wind events when wave action contributes to the extent and speed of streambank erosion.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations related to erosion.

NCDC

The NCDC does not track stream bank erosion.

KDWN Events

The KDWN noted that streambank erosion occurs every year, but in years of high water flows it is worse.

Climate Change and Stream Bank Erosion

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with streambank erosion. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding which contributes to erosion in Colusa County. While average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is possible that average soil moisture and runoff could decline, however, due to increasing temperature, evapotranspiration rates, and spacing between rainfall events. Reduced snowpack and increased number of intense rainfall events are likely to put additional pressure on water infrastructure which could increase the chance of flooding associated with breaches or failures of flood control structures such as levees and dams. Future precipitation projections were shown in Section 4.3.4 of the Base Plan. Also, according to the National Center for Atmospheric Research in Boulder, Colorado, atmospheric rivers are likely to grow more intense in coming decades, as climate changes warms the atmosphere enabling it to hold more water. All of the events above could exacerbate stream bank erosion in the County.

Vulnerability to Stream Bank Erosion

Parts of the Nation located along streambanks are at some measure of vulnerability to streambank erosion. An assessment of a community's vulnerability begins with an understanding of local exposure to streambank erosion. This is included in the Local Concerns section below followed by a discussion of the Nation's Assets at Risk to this hazard.

Local Concerns

The 2020 Water Quality Standards Report noted that Strode Creek is located within Strode Canyon which is steep-walled and rock-lined for the majority of its length. There are several areas along Strode Creek where water pools and is present for most of the year. Drainage channels 1 through 11 are located throughout the Rancheria, within the banks of ephemeral drainages. Seeps 1, 2, 3, 8, and 9 are located on the southern half of the Rancheria with Seep 6 located near the southeastern corner. Seeps 3, 4, and 5 are located on the northwestern portion with Seep 4 being located within Strode Canyon just east (downstream) of the surface water sampling location within Cortina Creek. The seeps are formed from either underground water percolating from a spring, or in places where the water table is high due to excessive water within Strode Creek or other ephemeral drainages. The Canyon 4 wetland is located directly adjacent to an asbestos containment/settlement pond. The asbestos settlement pond was built and used for monofil settlement and is a potential contaminate source for surface and groundwater on the Rancheria. The Canyon

4 wetland appears to be influenced by a dirt road embankment which allows water to collect on the west side of the road: making a wetland type habitat. The Strode Creek wetland area is influenced by a dirt road and a paved creek crossing. The majority of the area spans the lower portion of Strode Creek prior to crossing the road.

Strode Creek causes some erosion within the Rancheria during high flow periods. Extreme erosion can endanger nearby dirt roads and limit access to undeveloped parts of Rancheria. Mitigation efforts for streambank erosion will focus on stabilization of at-risk areas.

Assets at Risk

Assets at risk from streambank erosion include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

Streambank erosion will have a minimal direct effect on Nation staff, people, and populations in the Nation. Indirect effects on people and populations include damages to roads or bridges from streambank erosion, causing transportation issues. Streambank erosion can also cause high sediment loads. While rare, this can cause water quality impacts. Water quality can be impacted causing health problems, especially to vulnerable populations where access to clean water supplies can be more challenging.

Structures and Critical Facilities

Structures and critical facilities near rivers are at some risk from the effects of streambank erosion. Streambank erosion can undercut structure foundations causing instability and other issues. Structures that are in areas protected by levees are at greater risk of streambank erosion. Should levees erode quickly, their risk of failure increases. Those structures behind the levees would be at risk. This is discussed in greater detail in Levee Failure section above. Damage to any one of these systems can threaten public safety, wreak havoc on daily life, impact properties far from flood zones, and result in economic impacts that cascade throughout California.

The District noted the following assets (from Table E-2) at risk to stream bank erosion:

➤ Roads

Community Lifelines

Streambank erosion that causes significant impacts such as levee failures presents a threat to life and property, including community lifelines in the Nation. Many of the Nation's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.15 of the Base Plan.

Natural, Historic, and Cultural Resources

Streambank erosion could cause levee failure flooding. Large flood events can affect natural, historic, and cultural resources. There are a number of ways floodwaters can impact natural resources and the environment: Wildlife habitats can be destroyed by floodwaters. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levées can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survive the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures within the flooded areas, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme flood events. Any of these resources that fall in the flood zones would be vulnerable.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.15 of the Base Plan.

Impacts from Streambank Erosion

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes

in land use and development will affect stream bank erosion in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Planned developments should take erosion risk areas into account during the construction of new homes and commercial properties

Wildfire

Likelihood of Future Occurrence—Highly Likely

Vulnerability—High

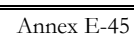
Hazard Profile

Wildland fire and the risk of a conflagration is an ongoing concern for the KDWN. Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of fire regimes. Wildland fires affect grass, forest, and brushlands, as well as structures. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Historically, the fire season extends from early spring through late fall of each year during the hotter, dryer months; however, in recent years, the risk of wildfire has become a year around concern. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. These weather conditions can result in red flag (e.g., fire weather) days, and can result in PSPS events in the Nation. While wildfire risk has predominantly been associated with more remote forested areas and wildland urban interface (WUI) areas, significant wildfires can also occur in more populated, urban areas. There is also the concern of wildfires occurring in these more remote, forested areas that under certain weather conditions, can extend into areas not generally considered at a high risk to wildfire. Smoke and air quality also becomes an issue, both from fires occurring inside and outside of the Colusa County Planning Area and the City.

Location and Extent

Wildfire can affect all areas of the Nation. CAL FIRE has estimated that the risk varies across the Nation and has created maps showing risk variance. Following the methodology described in Section 4.3.17 of the Base Plan, wildfire maps for the KDWN were created. Figure E-5 shows the CAL FIRE Fire Hazard Severity Zone (FHSZ) in the Nation. As shown on the maps, FHSZs within the Nation range from Moderate to Very High.

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Past Occurrences

Disaster Declaration History

There has been one federal and two state disaster declaration due to fire, as shown in Table E-6.

Table E-6 Colusa County – Federal and State Wildfire Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Wildfire	1	2018	2	1987, 2018

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked 13 wildfire events in the County dating back to 1993.

KDWN Events

No wildfires have occurred within the area of the rancheria since 2012 (Sixteen Complex Fire). The human-caused Sixteen Complex fire (CA-LNU-7072) started on Bureau of Land Management land southwest of Cortina Rancheria September 4, 2012. The complex (two fires in Yolo and Colusa counties) eventually burned a total of 17,944 acres. It spread onto ten acres of the Cortina Rancheria at approximately 1100 hours on September 7, and was attacked by Cal Fire and Tribal units consisting of several Type 2 hand crews, two dozers, five engines (Types 3, 4, & 5), and four water tenders at 1130 hours. The fire burned through mature chaparral on the western part of the Rancheria, burning 600 out of the 640 acres held in trust. Since Wildland Urban Interface (WUI) hazardous fuel reduction treatments had recently been completed on the west side of the main reservation road, BIA 236, the crews were able to use the treated area as a fuel break and burn out from it, protecting both structures and cultural resources from the fire in the process.

The Rancheria also noted that it occasionally receives fugitive smoke from regional wildfires. These include major fires from the past five years, including the Camp Fire and the Dixie Fire.

Climate Change and Wildfire

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with wildfire. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Warmer temperatures can exacerbate drought conditions. Drought often kills plants and trees, which serve as fuel for wildfires. Warmer temperatures could increase the number of wildfires and pest outbreaks, such as the western pine beetle. Cal-Adapt's wildfire tool predicts the potential increase in the amount of burned areas for the year 2090-2099, as compared to recent (2010) conditions. This is shown in Section 4.3.17 of the Base Plan. Based on this model, Cal-Adapt predicts that wildfire risk in Colusa County will increase moderately at the end of the century. However, wildfire models can vary depending on the parameters used. Cal-Adapt does not take landscape and fuel sources into account in their model. In all likelihood, in

the Colusa County Planning Area, precipitation patterns, high levels of heat, topography, and fuel load will determine the frequency and intensity of future wildfire.

Vulnerability to Wildfire

Risk and vulnerability to the Nation from wildfire is of limited concern. Wildfires that occur in the Nation occur from a variety of both natural and manmade causes. The Nation can be affected both by fires that start on or near Nation lands as well as those that start elsewhere and move into the Nation. In addition to burning large areas of land, air quality can be affected in the Nation by fires occurring inside the Nation as well as those from many miles away. As growth continues and populations increase in the Nation, the potential for wildfires will also increase.

The whole of the Nation is at some measure of vulnerability to wildfire. An assessment of a community's vulnerability to wildfire begins with an understanding of local exposure to wildfire. This is included in the Local Concerns section below. After that section, assets at risk are discussed.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

The 2023 KDWN Emergency Response Plan noted that due to the location and facilities within the Plan Area, structural and wildfires pose risks to residences, community buildings, people, and natural resources. The rolling oak and grasslands include limited underbrush; however, wind-driven grass fires are a threat, whether caused by nature or humans. The City of Williams Fire Department (Williams Fire Department) provides emergency medical services to the City and surrounding rural areas, including the Rancheria and Plan Area. The Williams Fire Department is located at 810 E Street in Williams, California, approximately 12 miles northeast of the Plan Area. This station houses two Type-1 engines, two Type-3 engines (including a 77-foot ladder truck and two water tenders), and one heavy-duty rescue engine. Typically, the Williams Fire Department responds to approximately 1,000 calls per year. The Williams Fire Department also has mutual aid agreements with the California Department of Forestry and Fire Protection (CAL FIRE). The Plan Area is located in a high-fire hazard area within a State Responsibility Area, as mapped by CAL FIRE, where CAL FIRE is responsible to provide wildland fire protection services.

The KDWN also noted that regional smoke drift and ensuing health/respiratory problems is the main concern from wildfire. Another concern is that there is only one ingress/egress point from the Rancheria, so evacuation can be at risk if that road is blocked.

Wildfire Smoke and Air Quality

Smoke from wildfires is made up of gas and particulate matter, which can be easily observed in the air. Air quality standards have been established to protect human health with the pollutant referred to as PM_{2.5} which consists of particles 2.5 microns or less in diameter. These smaller sizes of particles are responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract.

Wildfire smoke can have negative effects to those who live in or near a fire burn area. Smoke and air pollution from wildfires can be a severe health hazard. Significant wildfires occurring in both the County and nearby northern California communities since the 2018 LHMP Update have created significant air pollution affecting area residents. This was the case during the 2020 North Complex Fire, as well as others that affected the nearby areas.

Assets at Risk

Assets at risk from wildfire include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

All populations are at some vulnerability to wildfire. Certain vulnerable populations are at greater risk to the effects of wildfire as well as smoke and air quality issues that wildfires bring. Vulnerable populations include:

- Unhoused
- Infants and children under age five and their caregivers
- Elderly (65 and older)
- Individuals with disabilities
- Individuals' dependent on medical equipment
- Individuals who exercise or recreate outdoors
- Individuals who work outdoors
- Individuals with impaired mobility

Structures and Critical Facilities

All structures in the Nation have some risk to wildfire. Wildfire presents a threat to critical facilities and infrastructure. The District noted the following assets (from Table E-2) at risk to wildfire:

- Water Tank
- Community Building
- Roads
- Water Treatment Building

Community Lifelines

Wildfire presents a threat to life and property, including to community lifelines in the Nation. Many of the Nation's community lifelines are the same as or similar to Colusa County's. A large wildfire may temporarily overwhelm these community lifelines. These were discussed in greater detail in Section 4.3.17 of the Base Plan.

Natural, Historic, and Cultural Resources

Natural, historic, and cultural resources located within areas at risk to wildfire would be vulnerable. Should a wildfire occur in the Nation, the impacts to natural, historic and cultural resources could be extensive and include air pollution, contamination from water runoff containing toxic products, and other environmental discharges or releases from burned materials affecting soils, habitat areas, wildlife, and aquatic resources. Historic and cultural resources can be affected and are often more vulnerable due to their older age, construction type, and lack of fire prevention infrastructure such as sprinklers.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.17 of the Base Plan.

Impacts from Wildfire

Potential impacts from wildfire include loss of life and injuries; damage to structures (commercial, industrial, and residential) and other improvements, natural and cultural resources, croplands, and timber; and loss of recreational opportunities. Wildfires can cause short-term and long-term disruption to the Nation. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the Nation by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires can also affect air quality in the Nation; smoke and air pollution from wildfires can be a severe health hazard. Smoke impacts may come from wildfires outside the Nation, as well as from within.

Although the physical damages and casualties arising from wildland-urban interface fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Schools and businesses can be forced to close for extended periods of time. Recently, the threat of wildfire, combined with the potential for high winds, heat, and low humidity, has caused PG&E to initiate a PSPS which can also significantly impact a community through loss of services, business closures, and other impacts associated with loss of power for an extended period. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

The impacts of a fire are felt long after the fire is extinguished. In addition to the loss of property in fires, the loss in vegetation and changes in surface soils alters the environment. When supporting vegetation is burned, hillsides become destabilized and prone to erosion. The burnt surface soils are harder and absorb less water. When winter rains come, this leads to increased runoff, erosion, and landslides in hilly areas.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;

- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Additional growth within the WUI and other high fire hazard areas of the County would place additional populations at risk to wildfire. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in future land use and development will affect wildfire in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Additional growth and development within moderate or higher fire hazard severity zones in the Nation would place additional values at risk to wildfire. Tribal building codes are in effect and should continue to be updated as appropriate to reduce this risk.

E.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation education, outreach, and partnerships, and other mitigation efforts.

It should be noted (for all of the tables in the sections below) that these tables were designed to display capability information for a county or city. The Nation has very few of these capabilities, due to their lack of size, lack of complexity, as well as their lack of statutory ability to regulate. The District depends on other jurisdictions for many of these capabilities, and partners with them on case-by-case issues that affect the District.

E.5.1. Regulatory Mitigation Capabilities

Table E-7 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the KDWN.

Table E-7 KDWN's Regulatory Mitigation Capabilities

Plans	In Place Y/N	Does the plan address hazards? Can the plan be used to carry out mitigation actions? When was it last updated??
Capital Improvements Plan	N	
Climate Change Adaptation Plan	Y	Last updated 2017
Community Wildfire Protection Plan	N	Wildfire assessment, 2023
Comprehensive/Master Plan	N	
Continuity of Operations Plan	N	
Economic Development Plan	N	
Land Use Plan		
Local Emergency Operations Plan	N	Not an emergency operations plan, but we have an emergency response plan from 2023
Stormwater Management Plan	N	
Transportation Plan	N	
Other (describe)		Drought assessment, 2023. Emergency Response Plan, 2023.
Land Use Planning and Ordinances		Is the ordinance an effective way to reduce hazard impacts?
	Y/N	Is the ordinance adequately administered and enforced?
Acquisition of land for open space and public recreation use	N	
Building code	N	
Flood insurance rate maps	N	
Floodplain ordinance	N	
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	N	
Zoning ordinance	N	
Other	Y	Air Quality Ordinance, Environmental Code, General Water Pollution Ordinance, Pesticide Ordinance, Public Utilities Ordinance, Solid Waste Management Code, Source Water Protection Resolution, Surface and Groundwater Antidegradation Policy, Water Quality Standards, Well Standards Ordinance
How can these capabilities be expanded and improved to reduce risk?		
Expanding land use planning and ordinances.		

Source: KDWN

E.5.2. Administrative/Technical Mitigation Capabilities

Table E-8 identifies the Nation department(s) responsible for activities related to mitigation and loss prevention in the Nation.

Table E-8 KDWN's Administrative and Technical Mitigation Capabilities

Administration	In Place Y/N	Describe capability Is coordination effective?
Staff Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?		
Chief Building Official	N	
Civil Engineer, including dam and levee safety	N	
Community Planner	N	
Emergency Manager	N	
Floodplain Administrator	N	
GIS Coordinator	N	
Planning Commission	N	
Other		
Technical	Y/N	Has capability been used to assess/mitigate risk in the past?
Grant writing	N	
Hazard data and information	N	
GIS analysis	N	
Mutual aid agreements	N	
Other		
How can these capabilities be expanded and improved to reduce risk? Staff is small and specific roles are usually wearing multiple hats. GIS analysis, grant writing, and hazard information, for example, could be done by the Environmental Department but there is currently no specific staff role for it.		

Source: KDWN

E.5.3. Fiscal Mitigation Capabilities

Table E-9 identifies financial tools or resources that the Nation could potentially use to help fund mitigation activities.

Table E-9 KDWN's Fiscal Mitigation Capabilities

Funding Resource	In Place Y/N	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Eligible	
Community Development Block Grant	Eligible	

Funding Resource	In Place Y/N	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Federal funding programs (non-FEMA)	Y	Yes, EPA grants can include activities such as fuel reduction and erosion control
Fees for water, sewer, gas, or electric services	N/A	
Impact fees for new development	Unknown	
State funding programs	Eligible	
Stormwater utility fee	Unknown	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Expanding active grant programs and applying for additional grants		

Source: KDWN

E.5.4. Mitigation Education, Outreach, and Partnerships

Table E-10 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table E-10 KDWN's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Quarterly newsletters go out to all tribal members via email
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	N	
Local news	N	
Organizations that interact with underserved and vulnerable communities	N	
Social media	Y	Facebook page and tribal website: KletselDehe.org
Other		
How can these capabilities be expanded and improved to reduce risk?		
More frequent updates to Facebook page and tribal website, providing links to hazard awareness campaigns such as those suggested. Newsletters do occasionally provide resources like these especially for fire hazards and severe weather. Could also potentially increase frequency of newsletters from quarterly to bimonthly		

Source: KDWN

E.5.5. Other Mitigation Efforts

The Nation has many other completed or ongoing mitigation projects/efforts that include the following:

- Past fuel reduction projects via CAL FIRE, erosion control on Strode Creek.

E.6 Mitigation Strategy

E.6.1. Mitigation Goals and Objectives

The KDWN adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

E.6.2. Mitigation Actions

The planning team for the KDWN identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. The following hazards were considered a priority for purposes of mitigation action planning:

- Climate Change
- Drought and Water Shortage
- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms
- Stream Bank Erosion
- Wildfire

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide public outreach action, as well as many of the emergency services actions, apply to all hazards regardless of hazard priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Project Closeouts

For all of the mitigation actions contemplated below (as well as for those that will be contemplated in the future), the KDWN will use applicable project closeout requirements.

Award closeout is the process by which the recipient and FEMA verify that a sub-award scope of work has been completed as approved and that all reimbursable costs are eligible. It verifies that the recipient and FEMA complied with terms and conditions of the award and completed the project or program objectives.

Projects will be closed out according to the specific requirements of the funding source. If the source is Tribal funds or staff time, a closeout meeting will be held with the lead planner and/or the Planning Team to review the project in full and determine any opportunities to celebrate success. If the source is FEMA grants, closeout requests must be submitted to FEMA within 90 days of the end of the Period of Performance (POP), which is the time when grant activities must be completed, or it may occur earlier if a recipient completes all required work or expends all available federal funding in advance of the scheduled closeout timeline. If from another source, project closeout procedures specific to that grant funding source will be followed.

Mitigation Actions

Action 1. Update Cortina Rancheria Climate Change Adaptation Plan (2017)

Hazards Addressed: All

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Climate change continues to cause more extreme climate hazards and influences the severity of existing natural hazards

Project Description: The Rancheria's last climate change adaptation plan was prepared in 2017 and needs updating to include the drought and precipitation swings of the last several years. Updating the plan will also improve future climate change mitigation planning.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Environmental Regulatory Authority

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Enhance planning process for climate-change driven hazards and vulnerabilities

Potential Funding: Grant funding, EPA

Timeline: 2029

Project Priority (H, M, L): Medium

Action 2. Water Tank

Hazards Addressed: Climate Change; Drought/Water Storage; Severe Weather: Extreme Heat; Wildfire

Goals Addressed: 1, 3, 4

Issue/Background: The Rancheria currently has a 10,000 gallon tank, but an increased supply of fire and sanitation water is needed in case of emergency

Project Description: Replace existing tank with a new 50,000 gallon water tank

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Fire plan, drought plan

Responsible Office/Partners: Kletsel Environmental Regulatory Authority

Benefits (Losses Avoided): Provide for fire protection and increase water supply for residents in case of emergency

Potential Funding: Grant funding, EPA, BIA WUI

Timeline: When funding is available

Project Priority (H, M, L): High

Action 3. *Emergency Generator*

Hazards Addressed: All

Goals Addressed: 1, 3, 4

Issue/Background: The Cortina Rancheria is isolated and vulnerable to power loss during natural disasters and emergencies. Loss of power can also occur during PSPS shutdowns.

Project Description: Purchase and install a new backup generator

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Dehe Wintun Nation Tribal Office, Kletsel Environmental Regulatory Authority

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Preservation of life and property

Potential Funding: Grant funds, FEMA

Timeline: 2024-2030

Project Priority (H, M, L): High

Action 4. Improve Erosion Control Management Practices

Hazards Addressed: Landslide, Mudslide, and Debris Flow; Stream Bank Erosion

Goals Addressed: 1, 3, 4

Issue/Background: Many roads in the rancheria are unpaved, increasing risk of erosion caused by runoff, and Strode creek is a source of stream bank erosion

Project Description: Soil control and drainage, possible culvert work or rip rap for erosion projects within rancheria

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Environmental Regulatory Authority erosion control program

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Safety, evacuation, avoiding repetitive road damage, improving road conditions

Potential Funding: Grant funding, EPA, FEMA, OES

Timeline: By 2029

Project Priority (H, M, L): High

Action 5. Secondary Evacuation Route

Hazards Addressed: All

Goals Addressed: 1, 3, 4

Issue/Background: Green Road, once a county-maintained road, has been gated and is no longer accessible to the Rancheria.

Project Description: There is currently only one road in and out of the Rancheria; the lack of a secondary egress point means the evacuation route can be easily blocked off or compromised in the event of a natural disaster or other hazard. Restoring the use of a secondary road would provide an alternate exit from the Rancheria.

Other Alternatives: Request that Colusa County maintain Green Road again

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Dehe Wintun Nation Tribal Office

Responsible Office/Partners: Kletsel Dehe Wintun Nation, Colusa County

Benefits (Losses Avoided): Increased safety with additional ingress and egress point. Also allows emergency services better access to Rancheria during natural disasters

Potential Funding: General fund

Timeline: As soon as possible

Project Priority (H, M, L): High

Action 6. *Fuel Reduction and Defensible Space Projects*

Hazards Addressed: Wildfire

Goals Addressed: 1, 3, 4

Issue/Background: Threat of wildfire is very high for our area, and fuel reduction will reduce risk of structure loss in the event of a wildfire

Project Description: Remove grass and brush from within 300 feet of the residential areas for fire safety. Reduce fuel in other community locations.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Environmental Regulatory Authority

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Reduction in wildfire severity, protection of existing structures

Potential Funding: Grant funding, EPA, OES, Cal Fire, BIA WUI, USFS

Timeline: Annually

Project Priority (H, M, L): High

Action 7. *Enhanced Mapping and Assessing Rancheria Vulnerability to Hazards*

Hazards Addressed: Climate change; Landslide, Mudslide and Debris Flow; Stream Bank Erosion; Wildfire

Goals Addressed: 1, 3, 4

Issue/Background: Lack of high-quality mapping for most of the Rancheria makes it difficult to assess hazard risks

Project Description: KERA will undertake mapping projects to develop better knowledge of rancheria vulnerability to various hazards.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Environmental Regulatory Authority

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Improving knowledge of potential hazard areas, protecting lives and reducing damages from hazards

Potential Funding: Grants, EPA

Timeline: 2029

Project Priority (H, M, L): Medium

Action 8. *Public Education and Outreach*

Hazards Addressed: Climate Change; Drought/Water Shortage; Severe Weather: Extreme Heat; Wildfire

Goals Addressed: 1, 2, 3, 4

Issue/Background: Communicating potential risks and community vulnerabilities to natural hazard is of vital importance for residents of the Cortina Rancheria, and will allow residents to be better informed of hazards and potential actions prior to the next event.

Project Description: Enhancing the Rancheria's public outreach to develop consistent communication with residents, in order to convey the risk and vulnerability of natural hazards of concern to the community. This will include information about local hazards as well as measures the public can take to be better prepared and reduce damages and other impacts from a hazard event.

Other Alternatives: Continue public information activities currently in place

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing Rancheria outreach programs will be reviewed and expanded upon

Responsible Office/Partners: Kletsel Dehe Wintun Nation, Kletsel Environmental Regulatory Authority

Benefits (Losses Avoided): Increasing residents' knowledge of potential hazards and activities, protecting lives and reducing damages from hazards

Potential Funding: Grant funds

Timeline: Annually throughout the year

Project Priority (H, M, L): Medium