Annex N North Tahoe Public Utility District

N.1 Introduction

This Annex details the hazard mitigation planning elements specific to North Tahoe Public Utility District (NTPUD or District), a previously participating jurisdiction to the 2016 Placer 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 District. This Annex provides additional information specific to NTPUD, with a focus on providing additional details on the risk assessment and mitigation strategy for this community.

N.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Placer County Hazard Mitigation Planning Committee (HMPC), the District 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 N-1. Additional details on plan participation and District representatives are included in Appendix A.

Table N-1 NTPUD – Planning Team

Name	Position/Title	How Participated
Suzi Gibbons	Contracts and Planning Coordinator	Attended meetings. Provided input on past hazards. Filled out hazard ID table. Provided information on capabilities. Provided information on past and future mitigation actions. Reviewed and provided information and edits to Annex. Provided logo and base map.
Joe Pomroy, P.E.	Engineering and Operations Manager	Provided input on hazard ID table. Provided information on capabilities. Provided information on past and future mitigation actions. Reviewed and provided information and edits to Annex.
Vanetta Van Cleave	Chief Financial Officer	Provided financial information.

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the District integrated the previously approved 2016 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2016 LHMP through other plans and programs shown in Table N-2.

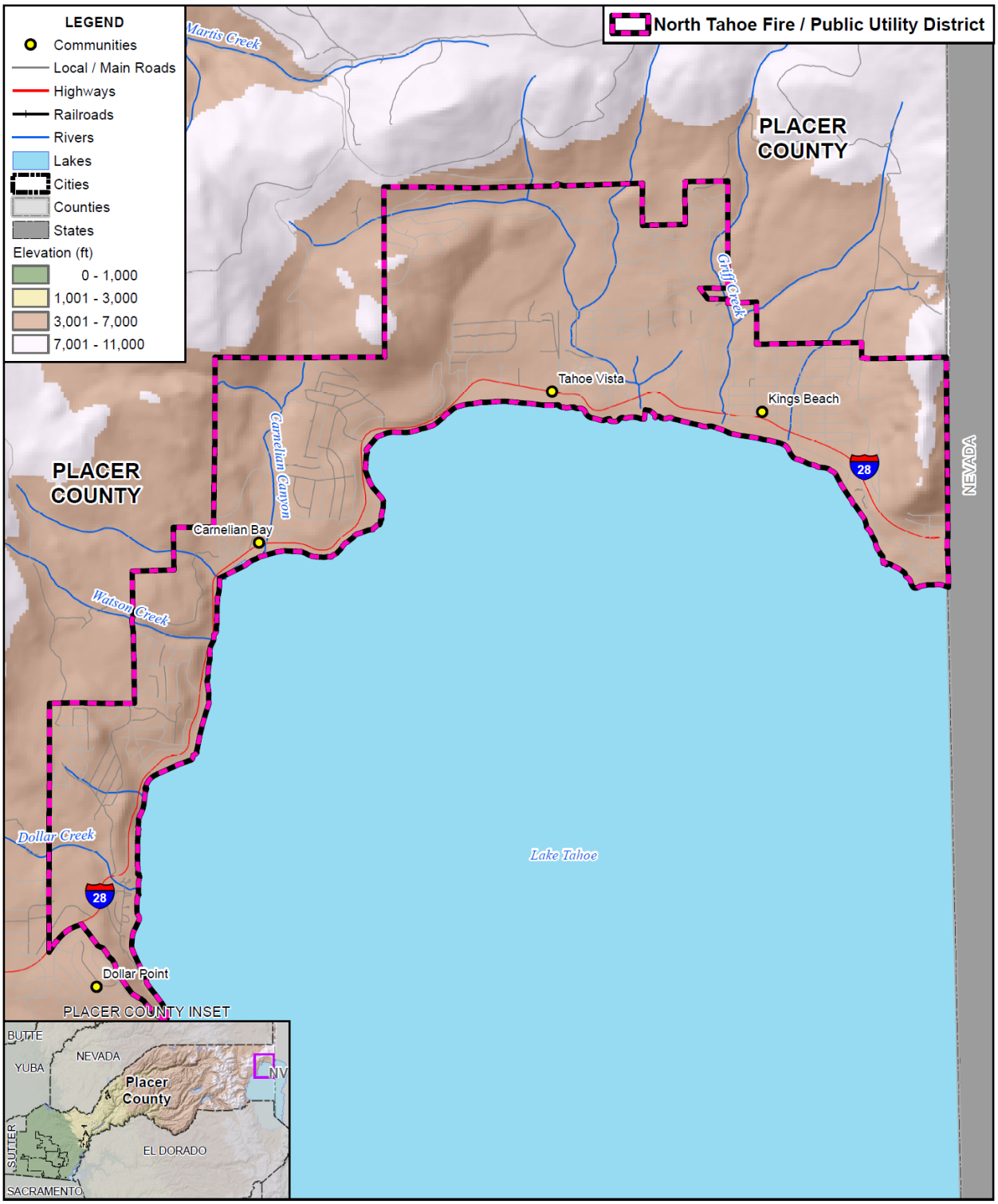
Table N-2 2016 LHMP Incorporation

Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
N/A	No mitigation related planning mechanisms have been completed since 2016

N.3 District Profile

The District profile for the NTPUD is detailed in the following sections. Figure N-1 displays a map and the location of the District within Placer County.

Figure N-1 NTPUD



FOSTER MORRISON CONSULTING

0 1 2 Miles

COUNTY OF Placer

Data Source: Placer County GIS, Cal-Atlas, NVBLM; Map Date: 2021.

N.3.1. Overview and Background

The North Tahoe Public Utility District (NTPUD) was formed in 1948 under the State of California Public Utilities Code to provide sewer services to the residents of the north shore of Lake Tahoe. The District's boundaries range from the Nevada state line in Crystal Bay to Dollar Hill. Our service area includes the communities of Kings Beach, Tahoe Vista, Brockway Vista, Carnelian Bay, Cedar Flat and Agate Bay.

In November of 1967, water services were added to the District's responsibility with the Recreation and Parks Department being created in 1968. The District manages and maintains most of the public beaches in our service area as well as the North Tahoe Regional Park in Tahoe Vista.

The North Tahoe Event Center is also owned and managed by the District. The District currently serves 5,467 sewer connections and 3,948 metered water connections.

N.4 Hazard Identification

NTPUD identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table N-3).

Table N-3 NTPUD—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Agriculture Pests and Diseases	Limited	Unlikely	Negligible	Low	Medium
Avalanche	Limited	Unlikely	Negligible	Low	Medium
Climate Change	Extensive	Occasional	Negligible	Low	–
Dam Failure	Limited	Unlikely	Negligible	Low	Medium
Drought & Water Shortage	Significant	Likely	Critical	High	High
Earthquake	Extensive	Occasional	Critical	High	Low
Floods: 1%/0.2% annual chance	Significant	Unlikely	Limited	Medium	Medium
Floods: Localized Stormwater	Significant	Occasional	Limited	Medium	Medium
Landslides, Mudslides, and Debris Flows	Limited	Occasional	Negligible	Low	Medium
Levee Failure	Limited	Unlikely	Negligible	Low	Medium
Pandemic	Extensive	Occasional	Limited	Medium	Medium
Seiche	Limited	Unlikely	Limited	Medium	Medium
Severe Weather: Extreme Heat	Limited	Unlikely	Negligible	Medium	High
Severe Weather: Freeze and Snow	Extensive	Highly Likely	Negligible	Medium	Medium
Severe Weather: Heavy Rains and Storms	Significant	Likely	Negligible	Low	Medium
Severe Weather: High Winds and Tornadoes	Limited	Occasional	Negligible	Low	Low
Tree Mortality	Significant	Likely	Limited	Medium	High
Wildfire	Significant	Likely	Critical	High	High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—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
Limited—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
Negligible—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
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Climate Change Influence
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

N.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the District's hazards and assess the District's vulnerability separate from that of the Placer County Planning Area as a whole, which has already been assessed in Section 4.3 Hazard Profiles and Vulnerability Assessment in the Base Plan. The hazard profiles in the Base Plan discuss overall impacts to the Placer County Planning Area and describes the hazard problem description, hazard location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the District is included in this Annex. This vulnerability assessment analyzes the property and other assets at risk to hazards ranked of medium or high significance specific to the District. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

N.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section N.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table N-3) affects the District and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Placer County Planning Area.

N.5.2. Vulnerability Assessment and Assets at Risk

This section identifies the District's total assets at risk, including values at risk, populations at risk, critical facilities and infrastructure, natural resources, and historic and cultural resources. Growth and development trends are also presented for the District. This data is not hazard specific, but is representative of total assets at risk within the District.

Assets at Risk and Critical Facilities

This section considers the NTPUD's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District 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.***

This definition is further refined by separating out three classes of critical facilities:

> ***Class 1 facilities include those facilities that contribute to command, control, communications and computer capabilities associated with managing an incident from initial response through recovery.***

Class 2 facilities include those facilities that house Emergency Services capabilities.

Class 3 facilities are those facilities that enable key utilities and can be used as evacuation centers/shelters/mass prophylaxis sites, etc.

Additional information on the three classes of critical facilities is described further in Section 4.3.1 of the Base Plan.

Table N-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. NTPUD's physical assets, valued at over $17 million, consist of the buildings and infrastructure to support the District's operations.

Table N-4 NTPUD Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Base Administration Facilities	District Operations Base	$3,913,767	Severe Weather
National Avenue Water Treatment Plant	Potable Water Intake & Treatment Plant	$1,617,000	Seiche Flood
Park Well	Potable Water Well and Emergency Generator	$310,000	Wildfire Drought
Park Tank	Potable Water Tank	$200,000	Wildfire
Carnelian Woods Well	Potable Water Well	$206,000	Wildfire Drought
Carnelian Woods Tank I	Potable Water Tank	$200,000	Wildfire
Carnelian Woods Tank II	Potable Water Tank & Booster Pump Station	$400,000	Wildfire
Dollar Hill Tank	Potable Water Tank	$225,000	Wildfire
Dollar Cove Water Intake (currently inactive)	Potable Water Intake & Pump House	$100,000	Soil Bank Erosion Drought
Brockway Water Intake (currently inactive)	Potable Water Intake & Pump House	$75,000	Soil Bank Erosion Drought Seiche
Kings Beach Tank	Potable Water Tank	$200,000	Wildfire
Zone 1 Tank	Potable Water Tank & Booster Pump Station	$450,000	Wildfire
Zone 2 Tank	Potable Water Tank	$200,000	Wildfire
Kingswood West Water Tank	Potable Water Tank	$400,000	Wildfire
Kingswood West Booster Pump Station	Potable Water Booster Pump Station	$147,900	Wildfire
Secline Sewer Pump Station	Sewer Pump Station	$385,000	Severe Weather Flood: Localized Stormwater Flooding Seiche

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
National Sewer Pump Station	Sewer Pump Station	$675,000	Severe Weather Flood: Localized Stormwater Flooding Seiche
Carnelian Sewer Pump Station	Sewer Pump Station	$505,900	Severe Weather Flood: Localized Stormwater Flooding
Dollar Sewer Pump Station	Sewer Pump Station	$488,000	Severe Weather Flood: Localized Stormwater Flooding
S1, S2, N2, C1, D1, D2, D3, D4, D5, D6, D7 Satellite Sewer Pump Stations	Model 15 and Model 16 Satellite Sewer Pump Stations	Model 15: $32,000/ea Model 16: $101,350/ea	Severe Weather
N1 Satellite Pump Station	Model 16 Satellite Sewer Pump Station with Backup Generator	$136,350	Severe Weather
N3 Satellite Pump Station	Model 16 Satellite Sewer Pump Station with Backup Generator	$126,350	Severe Weather
C2 Satellite Pump Station	Model 16 Satellite Sewer Pump Station with Backup Generator	$181,350	Severe Weather
North Tahoe Event Center	Community Conference Center & Emergency Evacuation Shelter	$2,405,000	Severe Weather (wind) Seiche Flood
Tahoe Vista Recreation Area	Beach & Facilities, Boat Launch, & Parking Areas	$289,000	Severe Weather Seiche Flood
Secline Beach Park	Park	$10,000	Flood Seiche
North Tahoe Regional Park	Park with numerous amenities	$1,913,559	Wildfire

Source: NTPUD

Populations Served

Also potentially at risk should the District be affected by natural hazard events are the populations served by the District. NTPUD provides services to residential, commercial, and visitors to North Lake Tahoe. Services provided includes sewer collection and pumping, domestic water, and fire suppression facilities.

Natural Resources

NTPUD has a variety of natural resources of value to the District. These natural resources parallel that of the Tahoe area of Placer County as a whole. Information can be found in Section 4.3.1 of the Base Plan

Historic and Cultural Resources

NTPUD has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallel that of Placer County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Growth and Development Trends

General growth in the District parallels that of the Placer County Planning Area as a whole. Information can be found in Section 4.3.1 of the Base Plan. There is no growth occurring, therefore no expansion of facilities. There is infill development and redevelopment that is served by the existing infrastructure.

Development since 2016

No District facilities have been constructed since 2016. The District continues to rehabilitate existing facilities and improve fire suppression capabilities.

Future Development

The District has no control over future development in areas the District services. Future development in these areas parallels that of the Placer County Planning Area. There is no growth occurring, therefore no expansion of facilities. There is infill development and redevelopment that is served by the existing infrastructure. More general information on growth and development in Placer County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Placer County Vulnerability and Assets at Risk of the Base Plan.

N.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table N-3 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Placer County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

An estimate of the vulnerability of the District to each identified priority hazard, in addition to the estimate of likelihood 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.

Depending on the hazard and availability of data for analysis, this hazard specific vulnerability assessment also includes information on values at risk, critical facilities and infrastructure, populations at risk, and future development.

Drought & Water Shortage

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile and Problem Description

Drought is a complex issue 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 can often be 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 is the most critical issue and is critical for agriculture, manufacturing, tourism, recreation, and commercial and domestic use. 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 County, as well as the whole of the District, 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 and for longer periods. Should a drought last for a long period of time, water shortage becomes a larger issue. Current drought conditions in the District and the County are shown in Section 4.3.10 of the Base Plan.

Past Occurrences

There has been one state and one federal disaster declaration due to drought since 1950. This can be seen in Table N-5.

Table N-5 Placer County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	1	2014	1	1977

Source: Cal OES, FEMA

Since drought is a regional phenomenon, past occurrences of drought for the District are the same as those for the County and includes 5 multi-year droughts over an 85-year period. Details on past drought occurrences can be found in Section 4.3.10 of the Base Plan.

Vulnerability to and Impacts from Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including the District, 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. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult.

The most significant qualitative impacts associated with drought in the Placer County Planning Area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. With a reduction in water, water supply issues based on water rights becomes more evident. Climate change may create additional impacts to drought and water shortage in the County and the District.

During periods of drought, vegetation can dry out which increases fire risk. Drought that occurs during periods of extreme heat and high winds can cause Public Safety Power Shutoff (PSPS) events to be declared in the County. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section below, as well as in Section 4.3.2 of the Base Plan.

As a public water purveyor, droughts and water shortages may have an impact on the District's well water levels during prolonged drought conditions. It is doubtful it would have an impact on the District's lake intake due to the length of the intake and the District's pumps are submersible.

Assets at Risk

Assets at risk from droughts are the Park Well and Carnelian Woods Well due to low groundwater levels.

Earthquake

Likelihood of Future Occurrence–Occasional
Vulnerability–High

Hazard Profile and Problem Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. The degree of damage depends on many interrelated factors. Among these are: the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction.

Location and Extent

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales, as discussed in Section 4.3.11 of the Base Plan. Placer County itself is traversed by a series of northwest-trending faults, called the Foothill Fault Zone, that are related to the Sierra Nevada uplift. This was the source of Oroville's 1975 earthquake (and an earlier event in the 1940s). Subsequent research of these events led to the identification and naming of the zone and questions about the siting and design of the proposed Auburn Dam. Earthquakes on nearby fault segments in the zone could be the source of ground shaking in the Placer County Planning Area.

Although portions of western and eastern Placer County are located in a seismically active region, no known faults actually go through any of the cities or towns. However, the Bear Mountain and the Melones faults are situated approximately three to four miles west and east of the City of Auburn respectively. Earthquakes on these two faults would have the greatest potential for damaging buildings in Auburn, especially the unreinforced masonry structures in the older part of the city and homes built before 1960 without adequate anchorage of framing and foundations. Similar lower magnitude but nearby earthquakes are capable of producing comparable damages in other Placer County communities.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. Seismic shaking maps for the area show Placer County and the District fall within a moderate shake risk.

Past Occurrences

There have be no past federal or state disaster declarations from this hazard. The District noted no past occurrences of earthquakes or that affected the District in any meaningful way.

Vulnerability to and Impacts from Earthquake

The combination of plate tectonics and associated California coastal mountain range building geology generates earthquake as a result of the periodic release of tectonic stresses. Placer County lies in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the California north coastal mountain region.

Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault; however, liquefaction can occur further from the source of the earthquake. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. Manufactured buildings can be very susceptible to damage because their foundation systems are rarely braced for earthquake motions. Locally generated earthquake motions and associated liquefaction, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry (URM) and soft story buildings. The District noted that there may be URM, but a seismic analysis would need to be completed to identify which structures. The only building identified so far is the Base Annex building which houses emergency response equipment.

The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The NTPUD is within the less hazardous Zone 3.

Impacts from earthquake in the District will vary depending on the fault that the earthquake occurs on, the depth of the earthquake strike, and the intensity of shaking. Large events could cause damages to infrastructure, critical facilities, residential and commercial properties, and possible injuries or loss of life.

Assets at Risk

A seismic analysis would need to be completed to identify which structures may be at risk from Earthquakes. The only asset currently identified for retrofit is the Base Annex building which houses emergency response equipment; such as portable generators, portable pumps, and other emergency response equipment. The National Sewer Pump Station block building is being reinforced with a capital project in 2021. It is expected there could be substantial water pipeline and sewer pipeline breaks and failures as a result of ground movement which would have a high impact on service.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–Medium

Hazard Profile and Problem Description

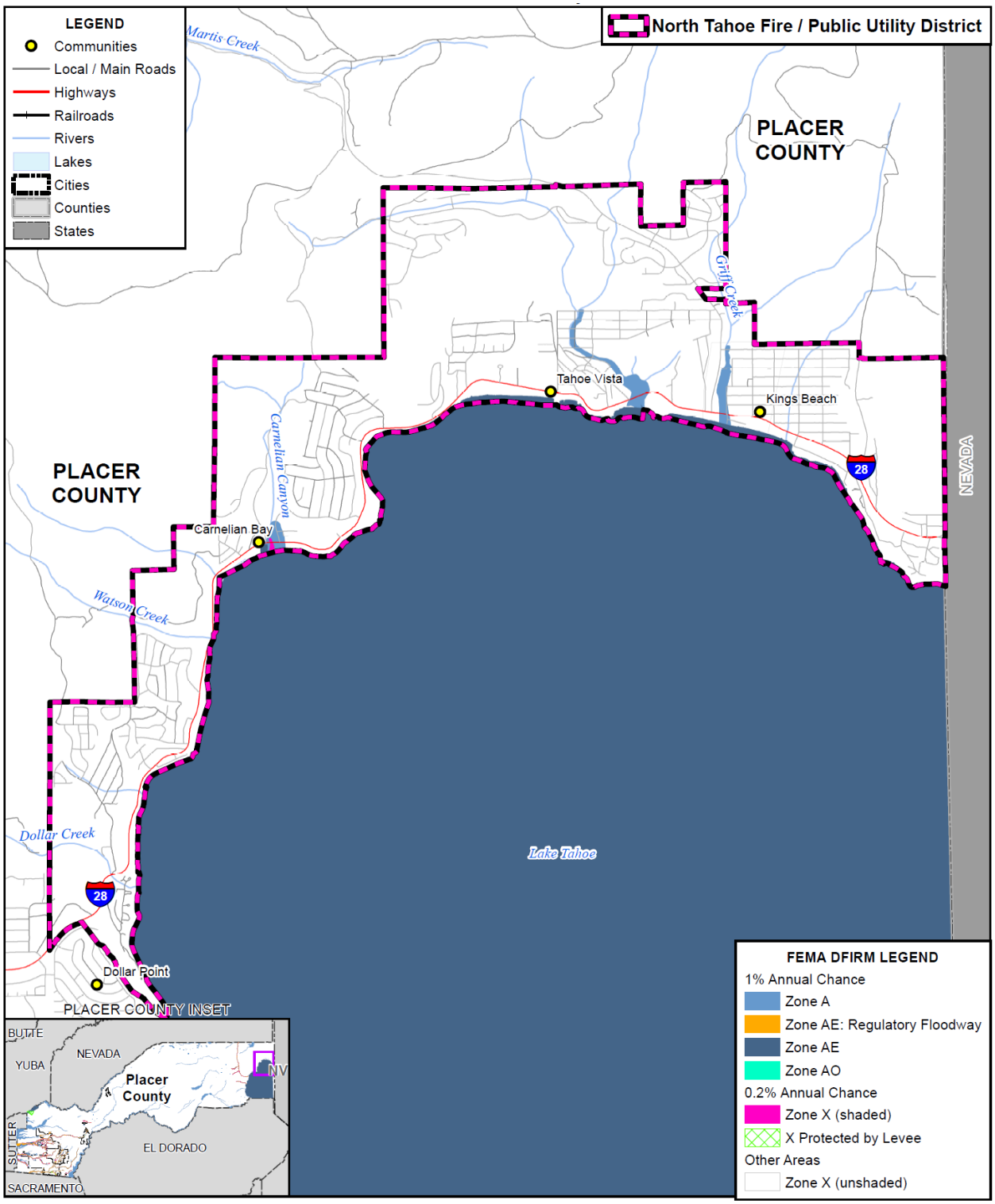
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Placer County and the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage.

As previously described in Section 4.3.12 of the Base Plan, the Placer County Planning Area and the NTPUD have been subject to historical flooding.

Location and Extent

The NTPUD has areas located in the 1% annual chance floodplain. This is seen in Figure N-2.

Figure N-2 NTPUD – FEMA DFIRM Flood Zones



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COUNTY OF Placer

Data Source: FEMA DFIRM 11/2/2018, Placer County GIS, Cal-Atlas, NVBLM; Map Date: 2021.

Table N-6 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District.

Table N-6 NTPUD– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in the District
A	Areas subject to inundation by the 1% annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.	X
AE	Areas subject to inundation by the 1% annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.	
AE – Regulatory Floodway	Areas subject to inundation by the 1% annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. Different from AE in that it adds the water course and adjacent lands that must be reserved in order to discharge the base flood without increasing the water surface elevation by more than one foot.	
AH	An area inundated by 1% annual chance flooding (usually an area of ponding), for which BFEs have been determined; flood depths range from 1 to 3 feet	
AO	Areas subject to inundation by 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet	
Shaded X	500-year flood the areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	
X Protected by Levee	An area determined to be outside the 500-year flood and protected by levee from 100-year flood	
X	Areas outside of known floodplains.	X

Source: FEMA

Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the District tends to have a shorter speed of onset, due to the amount of water that flows through the District.

Past Occurrences

A list of state and federal disaster declarations for Placer County from flooding is shown on Table N-7. These events also likely affected the District to some degree.

Table N-7 Placer County – State and Federal Disaster Declarations from Flood 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	16	1950, 1955, 1958 (twice), 1962, 1963, 1969, 1973, 1980, 1983, 1986, 1995 (twice), 1997, 2008, 2017	13	1955, 1958, 1962, 1964, 1969, 1983, 1986, 1995 (twice), 1997, 2006 (twice), 2017

Source: Cal OES, FEMA

January 1997 – A USGS Report titled Flood of January 1997 in the Lake Tahoe Basin, California and Nevada (Fact Sheet FS-005-98) contained the following information on a January 1997 flood event: Northern California and western Nevada, including the Lake Tahoe Basin, were affected by floods during January 1-3, 1997. In the two California counties surrounding Lake Tahoe, El Dorado and Placer, about $91 million in estimated damage was attributed to flood waters (Reno Gazette-Journal, May 30, 1997). Flooding in the Lake Tahoe Basin was mainly along the Upper Truckee River in the city of South Lake Tahoe (Tahoe Daily Tribune, January 7, 1997). In late December 1996, several storms produced a large snowpack (more than 180 percent of normal) in higher altitudes of the Sierra Nevada (Daniel Greenlee, Natural Resource Conservation Service, oral commun., 1997). Valleys along the eastern Sierra Nevada front were covered with a large snowpack as well. A subtropical storm system originating in the central Pacific Ocean near the Hawaiian Islands then brought heavy rain to the Sierra Nevada from December 30, 1996, through January 3, 1997. During this period, the Natural Resource Conservation Service recorded 27.7 in. (provisional data; Daniel Greenlee, oral commun., 1997) of precipitation at Squaw Valley, Calif. (8,200 ft above sea level), and the National Weather Service recorded 11.6 in. (Gary Barbate, oral commun., 1997) at Tahoe City, Calif. (6,230 ft). Rain falling below 10,000 ft depleted about 20 percent of the high-altitude snowpack between 7,000 and 10,000 feet and melted about 80 percent of the snowpack below 7,000 ft. The level of Lake Tahoe rose more than a foot during the storm, to 6,229.40 ft (Bureau of Reclamation datum), the highest elevation since 1917, and more than the maximum permissible by Federal Court decree (6,229.10 ft). The peak for the period of record (1900-97) for Lake Tahoe at Tahoe City, Calif, is 6,231.26 ft in July 1907.

December 2005/January 2006 – A very brief but productive storm period in early December and a much more prolonged wet and stormy period spanning Dec 17th through the 2nd of January2006 brought copious rainfall to northern California, southwest Oregon, and western Nevada. Initially, the generally dry antecedent soil moisture conditions and the spacing between storms of mid to late December allowed rivers to rise and fall with only minor consequences. However, river flows ratcheted higher with each passing storm to the point where a larger storm occurring on the 28th of December and an even wetter New Year's Eve storm would drive several rivers to rise well above flood stages with high inflows into northern Sierra Nevada reservoirs. Advanced releases in anticipation of the heavy rains and weir flows into the bypass system allowed the major controlled river systems like the Sacramento, Feather, and American watersheds to weather the storm without major incidents. However, the smaller and quicker responding rivers such as the Russian and Napa Rivers were exposed to the direct impact of these storms and resulted in major flooding. Several rivers along California's north coast including the Klamath River and the Eel River rose several feet above flood stage and rivaled flows dating back to the December 1996 - January 1997 flood event. In addition, more localized flood damage occurred as many of the area's smaller creeks and streams overflowed into neighborhoods and streets, including the San Francisco Bay Area and greater Sacramento

area. The heavy rains also posed a major problem for area transportation with several road closures due to rock and mud slides. A mudslide on the 30th temporarily closed Interstate 5 north of the Oregon border and a large rockslide closed Interstate 80 near Floriston east of Truckee for about a day and a half. Westbound lanes of Interstate 80 in Fairfield, CA sat under four feet of water forcing the CHP to shut down the major thoroughfare between Sacramento and San Francisco on the 31st.

Vulnerability to and Impacts from Flood

Floods have been a part of the District's historical past and will continue to be so in the future. During winter months, long periods of precipitation and the timing of that precipitation are critical in determining the threat of flood, and these characteristics further dictate the potential for widespread structural and property damages. Predominantly, the effects of flooding are generally confined to areas near the waterways of the County. As waterways grow in size from local drainages, so grows the threat of flood and dimensions of the threat. This threatens structures in the floodplain. Structures can also be damaged from trees falling as a result of water-saturated soils. Electrical power outages happen, and the interruption of power causes major problems. Loss of power is usually a precursor to closure of governmental offices and community businesses. Roads can be damaged and closed, causing safety and evacuation issues. People may be swept away in floodwaters, causing injuries or deaths.

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Assets at Risk

The District has a number of critical sewer and water facilities near the shoreline of Lake Tahoe that may be subject to flooding during a 100/500 year storm. Floodwaters could inundate the sewer pump stations, making it difficult to keep up with pumping the sewage out of the Tahoe Basin. Likewise, the District's water treatment plant is on the shoreline underground, making it susceptible to flooding during a 100/500 year storm. Power outages would also affect the District's ability to keep sewer and water pump stations operational, which would have an impact on District customers.

For the most part, the larger sewer pumping and many of the small sewer pumping facilities are located adjacent to the shoreline of Lake Tahoe where flooding would be very minimal that could impact the facility, since it would all drain to the lake and the lake will not rise any measurable amount. The risk is from the inundation of flood waters into the sewer system that overwhelms the conveyance facilities. Water tanks are located along ridge lines and sited on prepared pads that keep them at low risk from floodwaters.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

Flooding occurs in areas other than the FEMA mapped 1% and 0.2% annual chance floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Localized, stormwater flooding occurs throughout the County during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration.

Location and Extent

The NTPUD is subject to localized flooding throughout the District. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Localized flooding in the District tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

Past Occurrences

There have been no federal or state disaster declarations in the County due to localized flooding. The District noted the following past occurrences of localized flooding:

- From **December 31, 2005 to January 6, 2006**, severe flooding occurred in the North Tahoe PUD area. There was snow on the ground in the area at the time of a rain. The rain on snow event caused mild to moderate flood damage in the area. It was considered a 50-year flood event. State Highway 28 was closed due to flooding. Fortunately, schools were already closed for the Christmas holiday. The North Tahoe PUD received reimbursement of $37,768 from State OES for staff time (regular and overtime) and equipment costs to keep sewer and water pump stations operational during power outages. The HMPC noted that there is a high likelihood of reoccurrence, depending on weather conditions. Additional/alternative fuel supplies should be considered for these types of catastrophic events. All local gas stations ran out of fuel (regular and diesel) and gas trucks were not able to get into the area due to week-long road closures on Interstate 80.

No events since 2016 were noted.

Vulnerability to and Impacts from Localized Flooding

Historically, much of the growth in the District and County has occurred adjacent to streams, resulting in significant damages to property, and losses from disruption of community activities when the streams overflow. Additional development in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff.

Primary concerns associated with stormwater flooding include life safety issues, and impacts to property and to infrastructure that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Assets at Risk

The District has a number of critical sewer and water facilities near the shoreline of Lake Tahoe that may be subject to flooding during localized stormwater flooding. Floodwaters could inundate the sewer pump stations, making it difficult to keep up with pumping the sewage out of the Tahoe Basin. Likewise, the District's water treatment plant is on the shoreline underground, making it susceptible to flooding during localized stormwater flooding. Power outages would also affect the District's ability to keep sewer and water pump stations operational, which would have an impact on District customers.

For the most part the larger sewer pumping and many of the small sewer pumping facilities are located adjacent to the shoreline of Lake Tahoe where flooding would be very minimal that could impact the facility, since it would all drain to the lake and the lake will not rise any measurable amount. The risk is from the inundation of flood waters into the sewer system that overwhelms the conveyance facilities. Water tanks are located along ridge lines and sited on prepared pads that keep them at low risk from floodwaters.

Pandemic

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

According to the World Health Organization (WHO), a disease epidemic occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. A pandemic may occur when a new virus appears against which the human population has no immunity.

A pandemic occurs when a new virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time. The U.S. Centers for Disease Control (CDC) and Prevention has been working closely with other countries and the WHO to strengthen systems to detect outbreaks of that might cause a pandemic and to assist with pandemic planning and preparation. An especially severe pandemic could lead to high levels of illness, death, social disruption, and economic loss.

Location and Extent

During a pandemic, the whole of the District, County, and surrounding region is at risk, as pandemic is a regional, national, and international event. The speed of onset of pandemic is usually short, while the duration is variable, but can last for more than a year as shown in the 1918/1919 Spanish Flu. There is no

scientific scale to measure the magnitude of pandemic. Pandemics are usually measured in numbers affected by the pandemic, and by number who die from complications from the pandemic.

Past Occurrences

There has been one state and federal disaster declaration due to pandemic, as shown in Table N-8.

Table N-8 Placer County – State and Federal Pandemic Disaster Declarations 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Pandemic	1	2020	1	2020

Source: Cal OES, FEMA

The 20th century saw three outbreaks of pandemic flu.

- The 1918-1919 Influenza Pandemic (H1N1)
- The February 1957-1958 Influenza Pandemic (H2N2)
- The 1968 Influenza Pandemic (H3N2)

To date, the 21st century has seen two acknowledged pandemics.

- 2009 Swine Flu (H1N1)
- 2019/2020 COVID 19

The District was not affected by the 2009 Swine Flu. During the 2019/2020 COVID 19 pandemic, the District closed the Administration building and North Tahoe Event Center to the public except by appointment only, began sanitizing work-stations and facilities several times each day, established remote working for office staff, instituted mandatory mask wearing and social distancing for all staff, closed all playgrounds, and cancelled all sporting and social events. The District has a CalOSHA Covid-19 Prevention Program.

Vulnerability to and Impacts from Pandemic

Pandemics have and will continue to have impacts on human health in the region. A pandemic occurs when a new virus emerges for which there is little or no immunity in the human population; the virus causes serious illness and spreads easily from person-to-person worldwide. There are several strategies that public health officials can use to combat a pandemic. Constant surveillance regarding the current pandemic, use of infection control techniques, and administration of vaccines once they become available. Citizens can help prevent the spread of a pandemic by staying home, or "self-quarantining," if they suspect they are infected. Pandemic does not affect the buildings, critical facilities, and infrastructure in the District. Pandemic can have varying levels of impact to the citizens of the District and greater County, depending on the nature of the pandemic.

Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Hospitalizations and deaths can occur, especially to the elderly or those with pre-existing underlying conditions. As seen with Covid-

19, multiple businesses were forced to close temporarily (some permanently), and unemployment rose significantly. Supply chains for food and essentials can be interrupted. Prisons may need to release prisoners to prevent significant outbreaks.

Assets at Risk

Pandemics do not affect District facilities, but can affect District personnel who operate District facilities.

Seiche

Likelihood of Future Occurrence–Unlikely
Vulnerability–Medium

Hazard Profile and Problem Description

U.S. Army Corps of Engineers defines seiche as:

- A standing wave oscillation of an enclosed water body that continues, pendulum fashion, after the cessation of the originating force, which may have been either seismic or atmospheric.
- An oscillation of a fluid body in response to a disturbing force having the same frequency as the natural frequency of the fluid system. Tides are now considered to be seiches induced primarily by the periodic forces caused by the sun and moon.
- In the Great Lakes area, any sudden rise in the water of a harbor or a lake whether or not it is oscillatory (although inaccurate in a strict sense, this usage is well established in the Great Lakes area).

Seiches can be generated when the water is subject to changes in wind or atmospheric pressure gradients or, in the case of semi-enclosed basins, by the oscillation of adjacent connected water bodies having a periodicity close to that of the seiche or of one of its harmonics. Other, less frequent causes of seiches include heavy precipitation over a portion of the lake, flood discharge from rivers, seismic disturbances, submarine mudslides or slumps, and tides. The most dramatic seiches have been observed after earthquakes and large landslide events.

Location and Extent

Within Placer County, locations with the highest probability of impact are shore areas of Lake Tahoe from 0 to 30 feet above mean lake water level. Speed of onset of seiche is short. The duration of the event tends to be short as well, continuing until the waves naturally dissipate.

Past Occurrences

There have been no state or federal disasters in the County related to seiche. No events of past seiche have affected the District.

Vulnerability to and Impacts from Seiche

Research from the University of Nevada estimates that an earthquake must be at least a magnitude 6.5 to cause a damaging seiche at Lake Tahoe. The two faults directly underneath the lake are considered capable

of generating magnitude 7.1 earthquakes. Computer models of seiche activity at Lake Tahoe prepared by the University of Nevada research team estimate that waves as high as 30 feet could strike the shore. These projections suggest largest waves might hit Sugar Pine Point, Rubicon Point and the casinos in South Lake Tahoe. The seiche risk is potentially devastating as hundreds of houses are built along the lake and more than 17,000 people enjoy the Lake Tahoe shoreline every day in the summer.

Potential impacts of a seiche could affect sewer and water facilities in close proximity to the lake. A seiche may also impact the North Tahoe Event Center, which is the region's emergency shelter and evacuation center. The impacts could be severe if the wave compromises the control buildings and destroys electrical equipment, generators and communications equipment. The District does have an alternative groundwater supply that can provide for base water use. Emergency equipment can be set up for sewer bypass operations in case of failure of lakeside sewer pumping stations. There are significant Liberty Energy power lines along North Lake Blvd that could be impacted causing widespread power loss, which could impact District facilities.

Assets at Risk

District assets at risk due to a seiche are the National Avenue Water Treatment Plant, Secline Sewer Pump Station, National Avenue Sewer Pump Station, North Tahoe Event Center, Tahoe Vista Recreation Area, and Secline Beach Park. Loss of Liberty Energy power line along North Lake Blvd could cause widespread power loss and potentially affect every District facility.

Severe Weather: Extreme Heat

Likelihood of Future Occurrence–Unlikely
Vulnerability–Medium

Hazard Profile and Problem Description

According to FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last 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, and those who are sick or overweight are more likely to succumb to extreme heat.

In addition to the risks faced by citizens of the District, there are risk to the built environment from extreme heat. While extreme heat on its own does not usually affect structure, extreme heat during times of drought can cause wildfire risk to heighten. Extreme heat and high winds can cause power outages and PSPS events, causing issues to buildings in the District.

Extreme Heat and Power Shortage/Power Failure

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 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 4.3.2 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 weather. To help protect customers and communities during extreme weather events, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3.2 of the Base Plan.

Location and Extent

Heat is a regional phenomenon and affects the whole of the District. 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 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 4.3.2 of the Base Plan.

Past Occurrences

There has been no federal or state disaster declarations in the County for heat. The District Planning Team noted that since extreme heat is a regional phenomenon, events that affected the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.2.

Vulnerability to and Impacts from Extreme Heat

The District experiences temperatures in excess of 90°F during the summer and fall months. During these times, drought conditions may worsen. Also, power outages and PSPS events may occur during these times as well. Health impacts, including loss of life, are the primary concern with this hazard, though economic impacts are also an issue.

Days of extreme heat have been known to result in medical emergencies, and unpredictable human behavior. Periods of extended heat and dryness (droughts) can have major economic, agricultural, and water resources impacts. Extreme heat can also dry out vegetations, making it more vulnerable to wildfire ignitions.

Assets at Risk

The District does not have any assets at risk from extreme heat. However, if during a PSPS event, the District has several assets at risk due to lack of permanent emergency generators. Those assets include the North Tahoe Event Center, water booster pump stations and satellite sewer pump stations. The District does have portable generators for the satellite sewer and water booster pump stations.

Severe Weather: Freeze and Snow

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

According to the NWS and the WRCC, winter snowstorms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until the damage can be repaired. Power outages can have a significant impact on communities, especially critical facilities such as public utilities. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds accompanying these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibility to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents with injuries and deaths can result. Freezing temperatures can cause significant damage to the agricultural industry.

Location and Extent

Freeze and snow are regional issues, meaning the entire District is at risk to cold weather and freeze events. While there is no scale (i.e. Richter, Enhanced Fujita) to measure the effects of freeze, the WRCC reports that in a typical year, minimum temperatures fall below 32°F on 209.0 days with 0.4 days falling below 0°F in eastern Placer County. Snowfall is measured in depths, and the WRCC reports that average snowfall on the eastern side of the County is 190.7 inches. Freeze and snow have a slow onset and can generally be predicted in advance for the County. Freeze events can last for hours (in a cold overnight), or for days to

weeks at a time. Snow event can last for hours or days, and the snow stays all winter in the eastern portion of the County, often with significant snow depths.

Past Occurrences

There has been no federal and one state disaster declarations in the County for freeze and snow, as shown on Table N-9.

Table N-9 Placer County – State and Federal Disaster Declarations from Freeze and Snow 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Freeze	1	1972	0	–

Source: Cal OES, FEMA

The District noted that cold and freeze is a regional phenomenon; events that affected the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.3. A specific event was recalled by the District:

January 3 – 12, 2017 – Multiple days of heavy snow and power outages District-wide. Communities of Kings Beach, Tahoe Vista, and Carnelian Bay, CA. $35,995 of damage was suffered by the District, as well as $22,536 in economic impacts. Business/Economic Impacts cost is for Protective Measures (snow removal, generators, staff overtime, fuel, etc.) to keep critical infrastructure operational during the power outage. These costs were borne by FEMA. No deaths or injuries were recorded.

Vulnerability to and Impacts from Severe Weather: Freeze and Snow

The District experiences temperatures below 32 degrees during the winter months. Freeze can cause injury or loss of life to residents of the District. While it is rare for buildings to be affected directly by freeze, damages to pipes that feed building can be damaged during periods of extreme cold. Freeze and snow can occasionally be accompanied by high winds, which can cause downed trees and power lines, power outages, accidents, and road closures. Transportation networks, communications, and utilities infrastructure are the most vulnerable physical assets to impacts of severe winter weather in the County. Freeze and Snow can cause small water mains to break which affects water services in the surrounding neighborhood. Freeze and snow can also cause power outages which would affect the District's ability to keep sewer and water pump stations operational, which would have an impact on District customers.

Assets at Risk

The District has several assets at risk due to lack of permanent emergency generators. Those assets include the North Tahoe Event Center, water booster pump stations and satellite sewer pump stations. The District does have portable generators for the satellite sewer and water booster pump stations.

Tree Mortality

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

One of the many vulnerabilities of drought in Placer County is the increased risk of widespread tree mortality events that pose hazards to people, homes, and community infrastructure, create a regional economic burden to mitigate, and contribute to future fuel loads in forests surrounding communities. During extended drought, tree mortality is driven by a build-up in endemic bark beetle populations and exacerbated by latent populations of a suite of native insects and disease. Non-native forest pests (insects and/or pathogens) can also contribute to tree mortality events.

Location and Extent

Onset of tree mortality events can be relatively fast; however conditions – such as high stand densities – that lead to tree mortality accumulate slowly over time. Duration of tree mortality is lengthy, as once the tree dies, it remains in place until removed by human activity, wildfire, or breakdown of the wood by nature. Many areas in Placer County have seen increases in tree mortality. The County has mapped these areas, and that map was shown in Section 4.3.18 of the Base Plan. Using a color legend, the map provided by CAL FIRE shows a scale of:

- Deep burgundy depicting areas with more than 40 dead trees per acre
- Red depicting 15 - 40 dead trees per acre
- Orange depicting 5 -15 dead trees per acre
- Yellow depicting 5 or less dead trees per acre

In the past decade, mortality has increased in the eastern portion of Placer County. During the 2012-2018 drought, the state of California Tree Mortality Task force designated multiple Tier 1 and Tier 2 High Hazard Zones where tree morality posed an elevated risk to human health, properties, and resource values. A number of Placer County areas were designated during this event and the majority of Placer County watersheds were designated as Tier 2 high hazard zones because of the significant levels of tree mortality, along with numerous Tier 1 High hazard "hot spots". A map of these areas was shown in in Section 4.3.18 of the Base Plan.

Past Occurrences

There have been no state or federal disasters in the County related directly to tree mortality, though it has most likely contributed to the intensity of past wildfires in the County. Those events are shown in the Past Occurrences section of Wildfire below. In 2015, then-Governor Edmund G. Brown Jr. proclaimed a state of emergency due to the extreme hazard of the dead and dying trees. Following the proclamation, 10 counties were determined to be most affected, which included Placer County. Placer County proclaimed a local emergency due to tree mortality conditions on Dec. 8, 2015. No events of past tree mortality have affected the District.

Vulnerability to and Impacts from Tree Mortality

Placer County is unique in that many residential and business areas of the community are in the wildland urban interface/intermix with the forest. Trees in these interface/intermix areas are particularly vulnerable to insect and/or drought driven mortality because of the additional stressors that urban environments impose on trees (i.e. soil compaction, altered hydrology, physical damage, heat islands etc.). This exacerbates the occurrence of tree mortality within the populated settings of the County.

Dead trees are a hazard to the general public and forest visitors, but the risk of injury, death, property damage or infrastructure damages varies depending how the hazard interacts with potential targets. Dead trees within the wildland urban intermix or wildland urban interface or urban areas therefore pose a greater risk to due to their proximity to residents, businesses, and road, power, and communication infrastructure.

Dead trees may fall or deteriorate in their entirety or in part – either mechanism has the potential for injury, death, or inflicting severe damage to targets. As the time since tree mortality increases, so does the deterioration of wood and the potential for tree failure. Falling trees could damage District facilities in forested areas. They could also block access roads to these facilities. Dead and dying trees could also impact various facilities due to increased risk for catastrophic wildfires.

Assets at Risk

All of the District's wells, water storage tanks, and the Kingswood West water booster pump station are at risk from Tree Mortality, mainly due to the increased risk of Wildfires and the impacts from them. Also at risk is the North Tahoe Regional Park. Fallen dead wood is a temporary impact.

Wildfire

Likelihood of Future Occurrence–Likely
Vulnerability–High

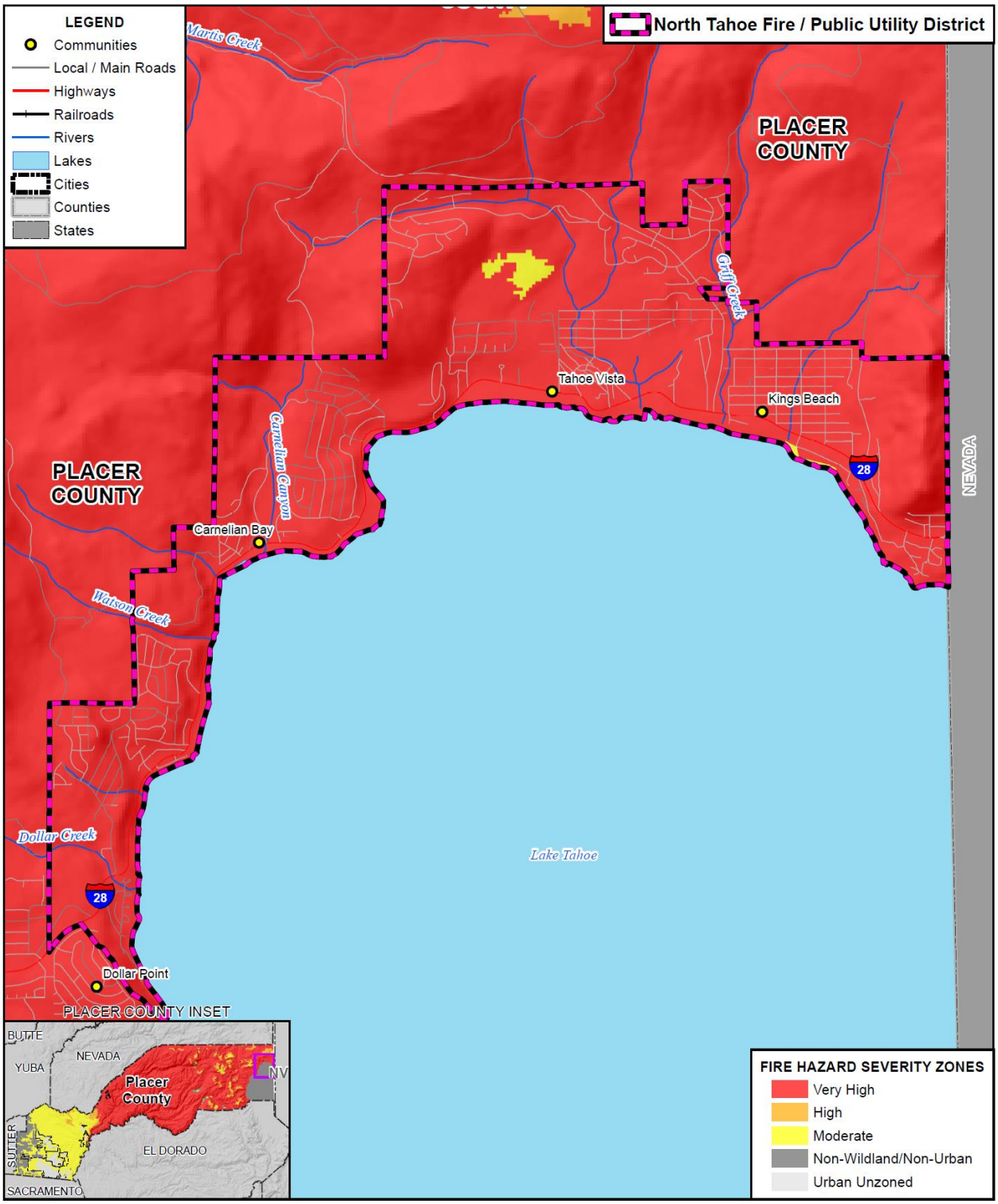
Hazard Profile and Problem Description

Wildland fire and the risk of a conflagration is an ongoing concern for the NTPUD. 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 the ecosystem. Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. 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. 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.

Location and Extent

Wildfire can affect all areas of the District. CAL FIRE has estimated that the risk varies across the District and has created maps showing risk variance. Following the methodology described in Section 4.3.19 of the Base Plan, wildfire maps for the NTPUD were created. Figure N-3 shows the CAL FIRE FHSZ in the District. As shown on the maps, FHSZs within the District range from High to Very High.

Figure N-3 NTPUD – Fire Hazard Severity Zones



FOSTER MORRISON CONSULTING

0 1 2 Miles

COUNTY OF Placer

Data Source: Cal-Fire (Draft 09/2007 - c31fhszl06_1, Adopted 11/2007 - fhszs06_3_31, Recommended 12/2008 - c31fhszl06_3), Placer County GIS, Cal-Atlas, NVBLM; Map Date: 2021.

Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on acres burned. Fires can have a quick speed of onset, especially during periods of drought or during hot dry summer months. Fires can burn for a short period of time, or may have durations lasting for a week or more.

Past Occurrences

There has been five state and six federal disaster declarations for Placer County from fire. These can be seen in Table N-10.

Table N-10 Placer County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	5	1961, 1965, 1973, 1987, 2010	6	2002, 2004, 2008, 2009, 2014 (twice)

Source: Cal OES, FEMA

Vulnerability to and Impacts from Wildfire

Risk and vulnerability to the Placer County Planning Area and the District from wildfire is of significant concern, with some areas of the Planning Area being at greater risk than others as described further in this section. High fuel loads in the Planning Area, combined with a large built environment and population, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and potentially catastrophic fires. During the nearly year around fire season, the dry vegetation and hot and sometimes windy weather results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. As development continues throughout the County and the District, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

Potential impacts from wildfire include loss of life and injuries; damage to structures and other improvements, natural and cultural resources, croplands, and loss of recreational opportunities. Wildfires can cause short-term and long-term disruption to the District. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the District 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 District; smoke and air pollution from wildfires can be a severe health hazard.

Although the physical damages and casualties arising from large 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 PSPSs 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. More information on power shortage

and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

The District has several assets that would be at risk during a wildfire due to the location of existing wooden structures. These assets include the North Tahoe Regional Park, the Park Well building, Kingswood West Booster Pump Station building, and the Carnelian Well building. Wildfire would also cut off access to critical water infrastructure which could impact the District's ability to provide safe drinking water and fire protection. Structure fires in other areas of the service area also put a large demand on water supplies that impact delivery of potable water to all customers.

Assets at Risk

All of the District's wells, and Kingswood West water booster pump station and, to a lesser extent, water reservoirs are at a direct risk from Wildfires and the impacts from them. Also at risk is the North Tahoe Regional Park. The impacts that property damage can have on water and sewer assets is high. The destruction of the watershed has the potential of high impact to water quality and severely impacting the National Avenue Water Plant and the ability to provide potable drinking water.

N.6 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.

N.6.1. Regulatory Mitigation Capabilities

Table N-11 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 NTPUD.

Table N-11 NTPUD Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	Sewer – 1991 Water - 1999	Can be used to implement mitigation actions, but needs to be updated. These are more planning documents
Capital Improvements Plan	2020	Five-year plan updated each fiscal year.
Economic Development Plan	n/a	County
Local Emergency Operations Plan	2005	The ERP addresses hazards and risks. Never adopted; will be updated in 2021.

Continuity of Operations Plan	No	The District does not have a formal plan. The ERP serves as the guiding document for continuity of operations.
Transportation Plan	n/a	County
Stormwater Management Plan/Program	n/a	County
Engineering Studies for Streams	n/a	County
Community Wildfire Protection Plan	n/a	Fire District
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Yes	Sanitary Sewer Management Plan Urban Water Management Plan
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	N/A	Version/Year:
Building Code Effectiveness Grading Schedule (BCEGS) Score	N/A	Score:
Fire department ISO rating:	N/A	Rating:
Site plan review requirements	Yes	District Ordinances are adequately enforced for sewer & water
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	N/A	
Subdivision ordinance	N/A	
Floodplain ordinance	N/A	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N/A	
Flood insurance rate maps	N/A	
Elevation Certificates	N/A	
Acquisition of land for open space and public recreation uses	N/A	
Erosion or sediment control program	N/A	
Other		
How can these capabilities be expanded and improved to reduce risk?		
The District does not have Planning and Development responsibilities. The District will be updating its Emergency Response Plan in 2021 after completing the risk and resilience assessment.		

Source: NTPUD

As indicated above, the District has several programs, plans, policies, and codes and ordinances that guide hazard mitigation. Some of these are described in more detail below.

5-Year CIP: The District has a rolling 5-Year CIP plan for sewer and water capital projects that is updated annually. The District has a rate structure in place to be able to do $1,485,000 in sewer capital replacement projects and $1,430,000 in water capital replacement projects each year.

Sanitary Sewer Management Plan (SSMP): As a requirement of the District's State Water Resources Control Board Waste Discharge Permit, the Board has adopted an SSMP. The plan sets the goals to maintain the District's sewer collection system.

The goals are to:

- Properly manage, operate, and maintain all parts of the wastewater collection system
- Provide adequate capacity to convey peak flows
- Minimize the frequency of SSOs
- Mitigate impacts of SSOs
- Justify appropriate funding levels to support the program objectives
- Meet all applicable regulatory notification and reporting requirements

Urban Water Management Plan (UWMP): The State of California Urban Water Management Planning Act (Act) requires each urban water supplier with 3,000 or more connections, or which supplies at least 3,000 acre-feet per year (AFY) of water, to submit UWMPs to the California Department of Water Resources (DWR) every five years. The District has approximately 3,948 water connections.

The UWMP Act requires urban suppliers to report, describe, and evaluate water deliveries and uses, water supply sources, efficient water uses, and demand management measures (DMMs), including implementation schedule and strategy. The purpose of developing an UWMP is to evaluate whether a water supplier can meet the water demands of its water customers as projected over a 20- or 25-year period. The UWMP Act directs water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies are available to meet existing and future demands. This evaluation is accomplished through analysis of current and projected water supply and demand for normal or average conditions, as well as during water shortages.

N.6.2. Administrative/Technical Mitigation Capabilities

Table N-12 identifies the District department(s) responsible for activities related to mitigation and loss prevention in NTPUD.

Table N-12 NTPUD's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N/A	County
Mitigation Planning Committee	N/A	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	N/A	Operations Department
Mutual aid agreements	Yes	Mutual Aid agreement in place for Truckee-Tahoe area sewer and water agencies.
Other	N/A	

Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	N/A	
Floodplain Administrator	N/A	
Emergency Manager	N/A	
Community Planner	N/A	
Civil Engineer	Yes	Staffing is adequate; trained on sewer/water emergencies; coordination is effective.
GIS Coordinator	Yes	n/a
Other	N/A	
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	No	
Hazard data and information	No	
Grant writing	Yes	We have limited staff and time to write grants; but take advantage of grant opportunities as they arise.
Hazus analysis	No	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increase staffing will give us the ability to improve in areas that pertain to NTPUD but are lacking.		

Source: NTPUD

N.6.3. Fiscal Mitigation Capabilities

Table N-13 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table N-13 NTPUD's Fiscal Mitigation Capabilities

Funding Resource	Access/ Eligibility (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	Yes	Limited funding; adopted new rate structure in 2020 to increase Capital project funding; grants help with being able to do more Capital projects.
Authority to levy taxes for specific purposes	Yes	Limited capability; mostly for sewer and recreation.
Fees for water, sewer, gas, or electric services	Yes	Water and sewer fees are currently used for Capital improvements as funding allows.
Impact fees for new development	N/A	
Storm water utility fee	N/A	

Funding Resource	Access/ Eligibility (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?
Incur debt through general obligation bonds and/or special tax bonds	Yes	We have incurred debt in the past with bonds and loans for Capital projects.
Incur debt through private activities	N/A	
Community Development Block Grant	N/A	
Other federal funding programs	Yes	Have received funds through the Lake Tahoe Restoration Act for fire protection. Funds have been limited in recent years.
State funding programs	Yes	Have received funds for various recreation projects. Funds are limited for mitigation actions.
Other		
How can these capabilities be expanded and improved to reduce risk?		
The District's rate setting process is designed to fully fund the utility over a multi-year planning horizon.		

Source: NTPUD

N.6.4. Mitigation Education, Outreach, and Partnerships

Table N-14 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 N-14 NTPUD's Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	N/A	
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	We have on-going public education and outreach programs in place for water conservation.
Natural disaster or safety related school programs	N/A	
StormReady certification	N/A	
Firewise Communities certification	N/A	
Public-private partnership initiatives addressing disaster-related issues	N/A	
Other		
How can these capabilities be expanded and improved to reduce risk?		
NTPUD does not provide hazard communications as a special District function.		

Source: NTPUD

N.6.5. Other Mitigation Efforts

The District has many other completed or ongoing mitigation efforts that include the following:

- Fuels reduction in the North Tahoe Regional Park
- Constructed a 500,000 gallon water storage tank
- Constructed a 1.3 million gallon water storage tank
- Upsized the Carnelian Bay West water system from 2" water mains to 8" water mains and installed numerous hydrants for fire protection
- Rehabilitated 4 of the 4 main sewer pump stations
- Rehabilitated the 22" Dollar sewer force main for redundancy and to allow for maintenance of the 16" Dollar sewer force main
- Rehabilitated 3 water storage tanks
- Rehabilitated the Carnelian Sewer Pump Station and installed a new natural gas generator.
- Ongoing upsizing of small diameter water mains (2" or less) to 8" water mains and installation of numerous hydrants for fire protection in the Kings Beach grid neighborhood
- Rehabilitated approximately 7,000 linear feet of sewer main using trenchless methods (Cured in Place Pipe lining)
- Installed an emergency stand-by generator at the NTPUD Base Facilities, connecting the Administration, Shop, servers and communication, Annex buildings and fuel pumps to the generator through automatic transfer switches.
- Installed a new natural gas generator for the National Avenue Water Treatment Facility.
- Upgraded the District's SCADA and telemetry systems.

N.7 Mitigation Strategy

N.7.1. Mitigation Goals and Objectives

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

N.7.2. Mitigation Actions

The planning team for the NTPUD 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:

- Drought & Water Shortage
- Earthquake
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Pandemic
- Seiche
- Severe Weather: Extreme Heat
- Severe Weather: Freeze and Snow
- Tree Mortality

- 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.

Multi-Hazard Actions

Action 1. Backup Generator Installation at Critical Facilities

Hazards Addressed: Multi-hazard (Drought & Water Shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Pandemic, Seiche, Severe Weather: Extreme Heat, Severe Weather: Freeze and Snow, Tree Mortality, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: During power outages for various hazards, the NTPUD does not have backup generators for all critical water, sewer and evacutation center facilities. The critical facilities include:

- North Tahoe Event Center – This facility is a designated Emergency Shelter and Evacuation Center. There is no generator for this facility.
- Various Satellite Sewer and Water Booster Pump Stations

Project Description: Project includes electrical and civil design, permitting, and construction of backup generators and transfers switches.

Other Alternatives: No Project – There will be an impact to water and sewer service and facilities during power outages. The emergency evacuation center will not be fully functional during a power outage.

Existing Planning Mechanism(s) through which Action Will Be Implemented: NTPUD either has or will soon have the generators sized. Implementation would be within 6 months of grant approval.

Responsible Agency/ Department/Partners: NTPUD Engineering

Cost Estimate: $200,000 per generator

Benefits (Losses Avoided):

- Emergency power to serve the community

- Avoid sanitary sewer overflow into Lake Tahoe
- Ensure potable water service

Potential Funding: Rate Revenue, ARB funds

Timeline: 1-3 Years

Project Priority (H, M, L): Medium/High

Action 2. Fuels Reduction around Critical Infrastructure and Access Roads, and within the North Tahoe Regional Park

Hazards Addressed: Wildfire

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: NTPUD's water tanks, booster pump stations, and access roads are in heavily forested areas. Several of the water booster pump stations are in wooden structures. Hardened structures would reduce threat from wildfire and reduce impacts to the equipment.

The North Tahoe Regional Park (NTRP) is heavily wooded and NTPUD has a water well and tank within the NTRP.

Project Description: Identify hazards, design, permitting, and construction (vegetation and tree removal).

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Agency/ Department/Partners: NTPUD; North Tahoe Fire Protection District

Cost Estimate: $75,000 per year

Benefits (Losses Avoided): Minimize damage due to catastrophic wildfire

Potential Funding: None identified

Timeline: 5-10 Years

Project Priority (H, M, L): Medium

Action 3. Increased Fireflow Capacity and Reliability for Dollar Cove and Carnelian Water Systems

Hazards Addressed: Wildfire; Drought; Water Supply

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: The Dollar Cove and Carnelian water systems are located at the wildland urban interface and each system has approximately 300 residential and commercial customers. The two water systems are comprised of watermains ranging from 2 inches to 8 inches in diameter. The system is deficient in fire flows and in the number and spacing of fire hydrants and does not meet current fire codes

Project Description: This project proposes to rebuild approximately 10,000 lineal feet of water mains and install 20 fire hydrants in the two water systems..

Other Alternatives: No Project Continue to operate a water system that is deficient in supplying adequate fire flows.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Water system hydraulic modeling of watermains and hydrants has been completed for proposed project alternatives

Responsible Agency/ Department/Partners: NTPUD Engineering

Cost Estimate: $4,000,000

Benefits (Losses Avoided):

- Ensure sufficient water supply for fire suppression. Adds additional protection at the wildland urban interface to reduce the probability of structure fires entering the wildland and wildland fires from entering the developed areas.

Potential Funding: Rate Revenue, State Revolving Fund, Placer County Water Agency

Timeline: 5-10 Years

Project Priority (H, M, L): High

Action 4. Cybersecurity Assessment and Improvements

Hazards Addressed: Multi-hazard (Drought & Water Shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Pandemic, Seiche, Severe Weather: Extreme Heat, Severe Weather: Freeze and Snow, Tree Mortality, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: NTPUD's existing Information Technology (IT) and Operational Technology (OT) need continuous improvements to stay abreast of increasing sophisticated cybersecurity threats and attacks from bad actors. Ransomware and computer viruses can cause widespread disruption in utility control systems.

Project Description: Analysis of IT and OT through master planning and assessments through the Department of Homeland Security and the American Water Works association Cybersecurity Guidance Tool.

Other Alternatives: None.

Existing Planning Mechanism(s) through which Action Will Be Implemented: American Water Works Association supports water agencies to assess cybersecurity risk.

Responsible Agency/ Department/Partners: NTPUD IT and Public Information Officer in coordination with other agencies in the Tahoe-Truckee region.

Cost Estimate: $250,000

Benefits (Losses Avoided):

- Insure timely and appropriate response to emergencies
- Ensure water and sewer system controls are hardened for reliability
- Insure IT and OT are resilient to malevolent attacks

Potential Funding: Rate Revenue

Timeline: 3-5 Years and on-going

Project Priority (H, M, L): Medium

Action 5. Seismic Analysis and Retrofit of Critical Infrastructure

Hazards Addressed: Earthquake

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: Conduct a seismic evaluation of NTPUD's critical infrastructure and recommend improvements. Existing structures have been constructed and renovated to improve structural soundness during improvements project. This project would do a site specific analysis to improve reliability of facilities.

Project Description: Project includes seismic analysis of critical facilities, design, permitting, and construction.

Other Alternatives: None

E**xisting Planning Mechanism(s) through which Action Will Be Implemented**: None identified

Responsible Agency/ Department/Partners: NTPUD Engineering

Cost Estimate:

- $100,000 for the study
- $100,000 for each water tank retrofit
- $100,000 for each main sewer pump station
- Unknown cost estimate for other unidentified facilities

Benefits (Losses Avoided):

- Prevent essential water service loss to community
- Prevent sanitary sewer overflows to Lake Tahoe due to infrastructure failure

Potential Funding: Rate Revenue

Timeline: 5-10 Years

Project Priority (H, M, L): Medium

Action 6. Sewer Main Replacements in Shorezone of Lake Tahoe

Hazards Addressed: Earthquake; Flood, Localized Flood, Heavy Rains and Storms, Seiche

Goals Addressed: 1, 2, 3, 4, 5, 7

Issue/Background: The NTPUD has approximately 5 miles of sewer mains that are within or immediately adjacent to the shore zone of Lake Tahoe. The NTPUD also has two main sewer pump stations and a number of small, satellite pump stations adjacent to the shore zone of Lake Tahoe. The long-term goal of the Lake Tahoe Basin Framework Study would be to relocate these facilities to the further in-shore where the risk of sanitary sewer overflows reaching Lake Tahoe would be better controlled. Other measures include providing underground passive storage to increase time for emergency response and installation of redundant critical pipelines.

Project Description: Project includes property acquisition, design, permitting, and construction of new sewer mains and underground storage structures in the public right of way, relocation and reconnection of existing services, and abandonment of facilities.

Other Alternatives: No Project.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Lake Tahoe Basin Framework Study completed by the US Army Corps of Engineers

Responsible Agency/ Department/Partners: NTPUD Engineering

Cost Estimate: $20,000,000

Benefits (Losses Avoided): Minimize sanitary sewer overflows to Lake Tahoe due to infrastructure failure that also impacts Lake Tahoe water quality which is the drinking water source for multiple public water systems located at Lake Tahoe

Potential Funding: None identified

Timeline: 20 Years

Project Priority (H, M, L): Low

Action 7. Water Booster Pump Station Rehabilitation/Replacement

Hazards Addressed: Wildfire, Tree Mortality, Drought and Water Shortage, High Winds and Tornadoes

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: NTPUD's water tanks, booster pump stations, and access roads are in heavily forested areas. Several of the water booster pump stations are in wooden structures. Hardened structures would reduce threat from wildfire and reduce impacts to the equipment.

Project Description: This project would include design, permitting, and construction to rehabilitate the existing wooden structures using fire resistant materials or replacing the wooden structures with either underground booster stations or concrete buildings.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Agency/ Department/Partners: NTPUD Engineering

Cost Estimate: $250,000 per station

Benefits (Losses Avoided): Improve potable water service resiliency by improving fire protection of the existing facility.

Potential Funding: None identified

Timeline: 5-10 Years

Project Priority (H, M, L): Medium

Action 8. Water System Interties

Hazards Addressed: Drought; Water Supply

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: The existing water system interties between the public and private water systems is insufficient to provide adequate, reliable potable water supplies in the event of impacts to water sources and water reservoirs.

Project Description: This project would either install intertie connections between water systems, or install larger diameter water mains (12-14 inches) in the State highway, or a combination of the two. Scope includes analysis, design, permitting, and construction of the selected approach.

Other Alternatives: No Project Continue to operate multiple water systems that are deficient in supplying adequate fire flows.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Placer County Water Agency Northwest Lake Tahoe Area Water System Master Plan Project. .

Responsible Agency/ Department/Partners: NTPUD, TCPUD, North Tahoe Fire District, PCWA, various private water companies.

Cost Estimate: $5 - $40 million, depending on approach

Benefits (Losses Avoided):

- Insure sufficient potable water supply during severe droughts .
- Insure sufficient water supply and flow for fire suppression.

Potential Funding: Rate Revenue; Placer County Water Agency

Timeline: 5-20 Years

Project Priority (H, M, L): High

Action 9. Joint Grant Application with North Tahoe Public Utilities District (NTPUD) for an Emergency Back-up Generator System at the North Tahoe Event Center (NTEC) located at 8318 North Lake Blvd, Kings Beach, CA 96143.

Hazards Addressed: Multi-hazard (Drought & Water Shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Pandemic, Seiche, Severe Weather: Extreme Heat, Severe Weather: Freeze and Snow, Tree Mortality, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: During power outages, the NTPUD does not have back-up emergency power at the North Tahoe Event Center. This facility is designated by Placer County Office of Emergency Services as an Emergency Shelter and Evacuation Center for the residents and visitors of the North Shore of Lake Tahoe, as well as during Mutual Aid shelter and evacuation operations for the Truckee and Lake Tahoe basin. There is currently no back-up generator or provisions for emergency power at this facility. The addition of a generator would allow for expanded shelter operations including 24-hour operations, heating, air conditioning, and providing hot meals for evacuees. No other building in the region provides the flexibility for reconfiguration to accommodate shelter, food preparation, and services to local residents during a planned power outage or declared emergency.

Project Description: The integration of power disruption mitigation measures into this planned infrastructure project will provide tangible benefits to the community and its public works staff. This generator project will reduce Emergency Shelter and Evacuation Shelter downtime resulting from power failure by reducing the risks associated with planned and unplanned events. Without an Emergency Generator and appurtenances, the North Tahoe Event Center cannot operate as an Emergency Shelter or Evacuation Center during power outages, leaving the North Tahoe community at risk of traveling longer distances to an alternative shelter that has power, potentially causing over-crowded road and shelter

conditions and loss of life. Mitigation is most effective when it is part of the local community planning process and resilience by adapting to changing conditions and prepare for, withstand, and rapidly recover from disruption. This plan will allow for local jurisdictions to adapt, cooperate, and recover from multiple hazards.This project includes the installation of a complete UL 2200 listed, prototype tested, series produced 130kW Natural Gas generator set in a Level 2 acoustic locking weather enclosure, on site, as installed (no altitude derating) with engineered seismically-adequate reinforced concrete support pad and all conduit and wiring, with on-site load bank testing and startup services by vendor. It will provide all standard accessories including battery charger, Automatic Transfer Switch, block heater, battery charger, battery warming pads, protective traffic bollards. Approximate dimensions for generator is 12' L x 3' 6" W x 6' 6" H. There is adequate, paved areas that will be used for construction staging and parking. Water use will not be necessary as part of this project.

Other Alternatives: Trailer Mount Portable Generator System, Battery Back-up System

Existing Planning Mechanism(s) through which Action Will Be Implemented: North Tahoe PUD is preparing a joint agency grant application for submittal to the California Office of Emergency Services ("CalOES") for funding through the Hazard Mitigation Grant Program ("HMGP") for the acquisition and installation of a permanent Generator at the North Tahoe Event Center.

Responsible Agency/ Department/Partners: North Tahoe Public Utility District and Placer County

Cost Estimate: $300,000

Benefits (Losses Avoided): Expanded shelter operations including 24-hour operations, heating, air conditioning, and providing hot meals for evacuees.

Potential Funding: Hazard Mitigation Grant Program

Timeline: Fiscal year FY2021/22

Project Priority (H, M, L): High

Action 10. Kings Beach Grid Watermain Replacement and Fire Hydrant Installation Project

Hazards Addressed: Wildfire; Drought; Water Supply

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: The Kings Beach grid water system was constructed in the early 1930's and the existing water distribution pipelines range in size from one (1) to twelve (12) inches in diameter and are routed in inaccessible backyards and in public rights of ways. The system is deficient in fire flows and in the number and spacing of fire hydrants and does not meet current fire codes.

Project Description: This project proposes to rebuild approximately 15,000 lineal feet of water mains and install 30 fire hydrants and all new water services and meters to the properties served.

Other Alternatives: No Project - Continue to operate a water system that is deficient in supplying adequate fire flows.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Kings beach Grid Waterline Replacement Project Preliminary Design Report is complete.

Responsible Agency/ Department/Partners: NTPUD

Cost Estimate: $7,500,000

Benefits (Losses Avoided): Ensure sufficient water supply for fire suppression. Adds additional protection at the wildland urban interface to reduce the probability of structure fires entering the wildland and wildland fires from entering the developed areas.

Potential Funding: Rate Revenue, State Revolving Fund, Placer County Water Agency

Timeline: 5 years

Project Priority (H, M, L): H

Action 11. NTPUD Water System Infill and Fire Suppression Improvements Project

Hazards Addressed: Wildfire; Drought; Water Supply

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: In the NTPUD service area there are numerous areas that were constructed as early as the 1930's and the existing water distribution pipelines range in size from one (1) to twelve (12) inches in diameter and are routed in inaccessible backyards and in public rights of ways. The system is deficient in fire flows and in the number and spacing of fire hydrants and does not meet current fire codes. Portions of these pipelines have been replaced but there are still non-contiguous segments of one (1) to four (4) inch diameter pipelines in various locations.

Project Description: This project proposes to rebuild approximately 5,000 lineal feet of water mains and install 12 fire hydrants and all new water services and meters to the properties served.

Other Alternatives: No Project - Continue to operate a water system that is deficient in supplying adequate fire flows.

Existing Planning Mechanism(s) through which Action Will Be Implemented: NTPUD Water System Infill and Fire Suppression Improvements Project assets are identified in the District's GIS and asset management system

Responsible Agency/ Department/Partners: NTPUD

Cost Estimate: $2,500,000

Benefits (Losses Avoided): Ensure sufficient water supply for fire suppression. Adds additional protection at the wildland urban interface to reduce the probability of structure fires entering the wildland and wildland fires from entering the developed areas.

Potential Funding: Rate Revenue, State Revolving Fund, Placer County Water Agency

Timeline: 10 years

Project Priority (H, M, L): H