Nevada Irrigation District

Staff Report

for the Board of Directors Meeting of August 22, 2018

TO: **Members of the Board of Directors**

FROM: **Greg Jones, Assistant General Manager**

DATE: **August 15, 2018**

SUBJECT: **Nevada County OES Local Hazard Mitigation Plan Adoption**

ADMINISTRATION

RECOMMENDATION:
Adopt Resolution 2018-19 - Nevada County Office of Emergency Services Local Hazard Mitigation Plan, as recommended by the Administrative Practices Committee on August 7, 2018.

BACKGROUND:
Staff has been involved in the 2017 update in the Nevada County Local Hazard Mitigation Planning process. The full plan can be viewed on the Nevada County OES website.

The Federal Emergency Management Agency's (FEMA) Local Hazard Mitigation Plan (LHMP) requirements, under 44 CFR §201.6, specifically identify criteria that allow for the development of and the adoption of multi-jurisdictional mitigation plans. Local jurisdictions have determined there are many issues which are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level. The Nevada Irrigation District has participated in this coordinated effort since February 2017 and is party to the final approval from FEMA pending adoption by all participating jurisdictions, including NID.

During this Update process, NID staff engaged in a formal planning process which included:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals;
- Documentation of an effective process to maintain and implement the plan.

It is the recommendation of staff to advance this Resolution to Adopt the 2017 Nevada County Office of Emergency Services Local Hazard Mitigation Plan to the Board of Directors.

BUDGETARY IMPACT:
None.

Attachments (3):
Resolution 2018-19
FEMA Eligibility Letter (5/2/2018)
LHMP Annex D

RESOLUTION No. 2018-19

OF THE BOARD OF DIRECTORS OF THE NEVADA IRRIGATION DISTRICT

Nevada County Office of Emergency Services Local Hazard Mitigation Plan

Whereas, the U.S. Congress Disaster Mitigation Act of 2000 requires all jurisdictions to be covered by a Pre-Disaster All Hazards Mitigation Plan to be eligible for Federal Emergency Management Agency pre and post-disaster mitigation funds; and

Whereas, the Federal Emergency Management Agency and California Governor's Office of Emergency Services have developed a natural hazards mitigation program that assists communities in their efforts to become Disaster-Resistant Communities that focus, not just on disaster response and recovery, but also on preparedness and hazard mitigation, which enhances economic sustainability, environmental stability and social well-being; and

Whereas, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, the Nevada Irrigation District recognizes the threat that natural hazards pose to people and property within our community; and undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the Nevada Irrigation District fully participated in the FEMA-prescribed mitigation planning process to prepare this local hazard mitigation plan; and

Whereas, the California Office of Emergency Services and Federal Emergency Management Agency, Region IX officials have reviewed the Nevada County Local Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body;

Whereas, the Nevada Irrigation District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Nevada County Local Hazard Mitigation Plan;

Whereas, adoption by the governing body for the Nevada Irrigation District, demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Local Hazard Mitigation Plan.

Whereas, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

Now, therefore, be it resolved, that the Nevada Irrigation District adopts the Nevada County Local Hazard Mitigation Plan as an official plan; and

Be it further resolved, the Nevada Irrigation District will submit this adoption resolution to the California Office of Emergency Services and FEMA Region IX officials to enable the plan's final approval in accordance with the requirements of the Disaster Mitigation Act of 2000.

PASSED AND ADOPTED, by the Board of Directors of the Nevada Irrigation District at a regular meeting thereof held on the 22nd day of August, 2018, by the following roll call vote:

AYES:	Directors:
NOES:	Directors:
ABSTAINING:	Directors:
ABSENT:	Directors:

_____
President of the Board

ATTEST:

_____
Board Secretary

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

FEMA

May 2, 2018

John Gulserian
Emergency Manager
Nevada County Office of Emergency Services
10014 North Bloomfield Road
Nevada City, CA 95959

Dear Mr. Gulserian:

We have completed our review of the *Nevada County Local Hazard Mitigation Plan,* and have determined that this plan is eligible for final approval pending its adoption by Nevada County and all participating jurisdictions. Please see the enclosed list of approvable pending adoption jurisdictions.

Formal adoption documentation must be submitted to the FEMA Region IX office by the lead jurisdiction within one calendar year of the date of this letter, or the entire plan must be updated and resubmitted for review. We will approve the plan upon receipt of the documentation of formal adoption.

If you have any questions regarding the planning or review processes, please contact Alison Kearns, Senior Community Planner, at (510) 627-7125 or by email at alison.kearns@fema.dhs.gov.

Sincerely,

Juliette Hayes
Division Director
Mitigation Division
FEMA Region IX

Enclosure

cc: Julie Norris, Mitigation and Dam Safety Branch Chief, California Governor's Office of Emergency Services
Jennifer Hogan, State Hazard Mitigation Officer, California Governor's Office of Emergency Services

Status of Participating Jurisdictions as of May 2, 2018

Jurisdictions – Adopted and Approved

#	Jurisdiction	Date of Adoption

Jurisdictions – Approvable Pending Adoption

#	Jurisdiction
1	Nevada County
2	Grass Valley, City of
3	Nevada City, City of
4	Truckee, Town of
5	Nevada Irrigation District
6	Truckee Donner Public Utility District
7	Washington County Water District

Annex D Nevada Irrigation District

D.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Nevada Irrigation District (NID), a new participating jurisdiction to the Nevada 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 NID. This Annex provides additional information specific to NID, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

D.2 Planning Process

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

Table D-1 NID Planning Team

Name	Position/Title	How Participated
Greg Jones	Assistant General Manager	Organize Resources, Agency Coordination, Public Involvement, Vulnerability Assessment, Asset Identification, Mitigation Strategy & Goals, Draft Plan Review & Comments
Chip Close	Water Operations Manager	Organize Resources, Vulnerability Assessment, Asset Identification, Mitigation Strategy
Keane Sommers	Hydroelectric Manager	Organize Resources, Vulnerability Assessment, Asset Identification, Mitigation Strategy

Source: NID

D.3 District Profile

The district profile for NID is detailed in the following sections. Figure D-1 displays a map and the location of NID's current Sphere of Influence boundaries within Nevada County. The additional map outlines the District's 2017 proposed Sphere of Influence with the addition of an "Area of Interest", a Nevada County LAFCo unique designation indicating upper watershed lands where NID owns and operates critical infrastructure necessary for District operations, including canals, reservoirs, hydroelectric plants, dams, campgrounds, etc. The Area of Interest is outside the District's delivery service area

Figure D-1 Current District Sphere of Influence Map

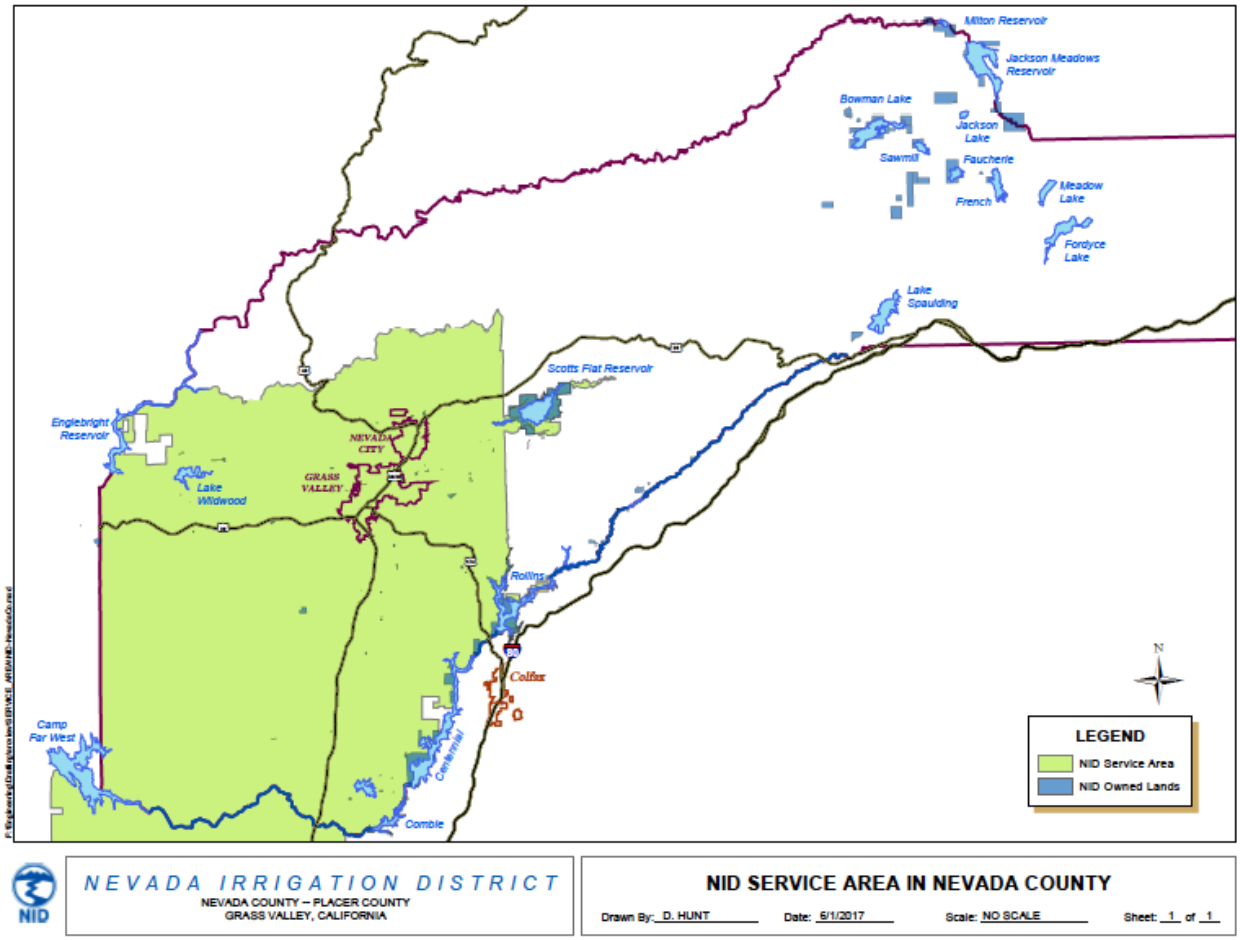
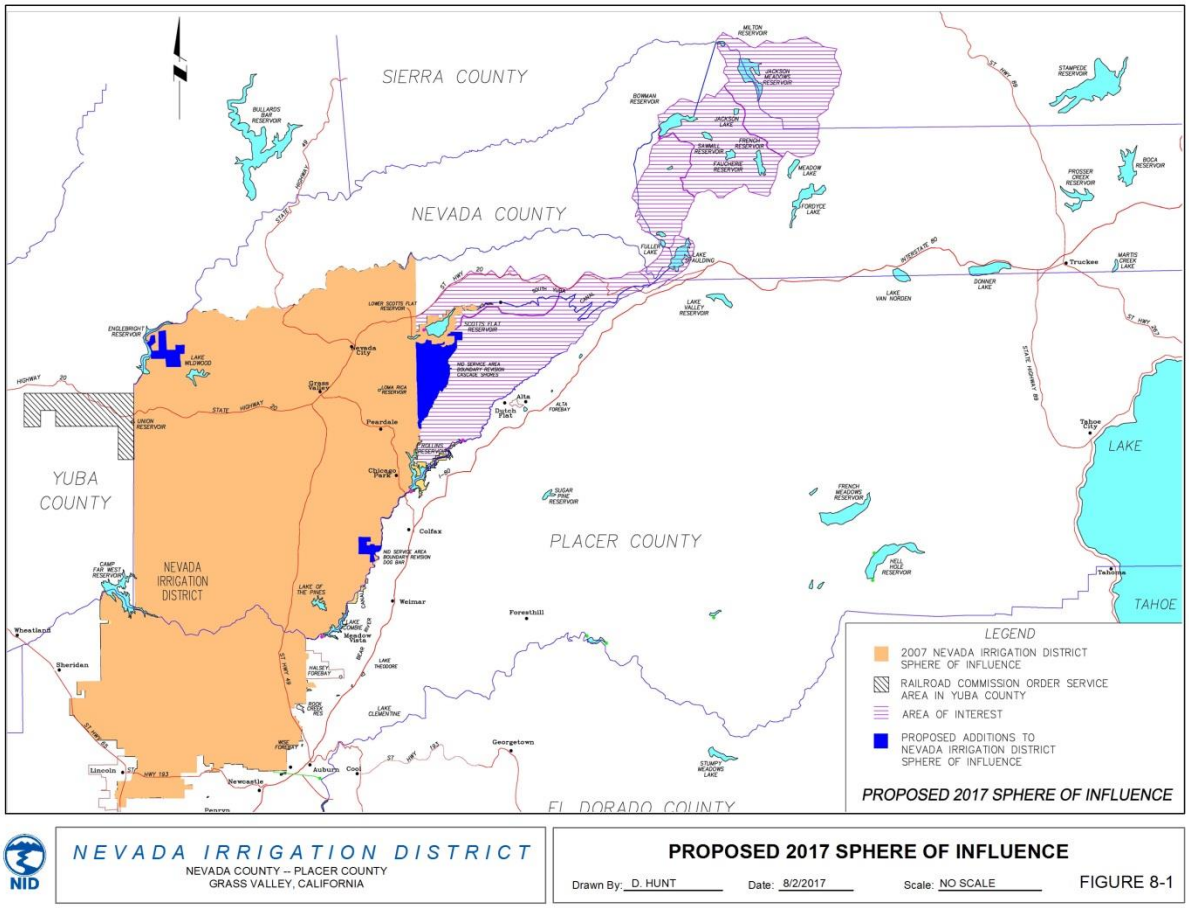


Figure D-2 2017 Proposed NID Sphere of Influence & Area of Interest Map



Source: NID

D.3.1. District Overview, History, and Background

Formed in 1921, the Nevada Irrigation District is a diversified water resource agency that supplies over 28,000 homes, farms, and businesses in Nevada, Placer and Yuba Counties in the foothills of Northern California's Sierra Nevada Mountains. NID provides service in an expansive geographic area covering 287,000 acres that makes the District one of the largest in the State of California.

The District is organized primarily to supply water for irrigation, municipal, domestic, industrial, and hydroelectric purposes. The District owns land and/or has water rights over a considerable amount of area in the upper Sierra elevations, including approximately 44,600 acres of high mountain watershed in Nevada and Sierra Counties. NID collects water from the mountain snowpack and stores it in an extensive system of storage reservoirs. NID has seven upper elevation and three lower elevation reservoirs. Water flows to customers in the foothills through approximately 475 miles of raw water canals and approximately 400

miles of distribution pipeline. Along the path, NID utilizes water to generate clean hydroelectric energy and to provide public recreational opportunities at NIDs multiple reservoirs and campgrounds.

The highest elevation on NID mountain watershed is the peak of 8,373-foot English Mountain which rises east of Bowman Reservoir. The District's highest reservoir is French Lake at 6,835 feet. The District's lowest elevation water service is located about 100 miles to the southwest, at 150 feet above sea level, south of Lincoln in Placer County.

NID has precipitation records for Bowman Reservoir (elev. 5,650 ft.) dating back to 1929. The 69.2-inch annual average precipitation at Bowman compares to an annual average of 56 inches at 2,700 feet near Nevada City and 52 inches at 2,400 feet in Grass Valley.

Irrigation Water

Although NID has rights to 450,000 AF/yr., the historical average supply available to NID from all sources is approximately 386,500 AF/yr. This amount can vary significantly from year to year depending on climatic conditions that effect natural runoff and the amount of carry over storage available to NID. Water is provided to the District by four sources: water coming from the watershed, carry-over storage, contract purchases, and recycled water.. About 90 percent of this total is used for local agriculture. NID serves approximately 5,400 raw water customers. Most purchase their water on a seasonal basis — the six-month irrigation season normally runs from on or about April 15 through October 14. Some irrigation customers purchase both summer and winter water for year-around service.

Irrigation water is used to irrigate pasture, golf courses, gardens, nurseries, orchards, and vineyards for both commercial and home production. Grapes, apples, peaches, nuts, berries, corn, rice, wheat, and oats are among the many crops grown with NID water.

Many customers realize other benefits from NID Irrigation water including filling ponds and reservoirs for stock watering, fire suppression, and recreation. Availability of irrigation water is an important factor in the preservation of open space, and greenbelt areas. There are an estimated 97,000 irrigable acres in the Nevada Irrigation District, about a third of which are presently in irrigation.

Treated Drinking Water

Through the years, NID service has changed along with the communities it supplies. The District continues to supply irrigation water, as it has since the 1920s, but today's demand is for piped and treated drinking water.

NID's treated water service areas are located in and around Grass Valley and Nevada City, , Alta Sierra, Lake of the Pines, Penn Valley, Lake Wildwood, Smartville, and North Auburn areas.

Generally, treated water is available in the more populated areas, as it can be very expensive to extend treated water main lines into rural areas where there are few customers to share the costs. In recent years, the District has been successful in working with local property owners to form local water quality improvement districts.

The transition to treated drinking water began in the late 1960s and early 1970s when NID constructed its first water treatment plants. Today, the District operates a network of six modern water treatment plants in Nevada, Placer, and Yuba counties.

NID presently produces about 3 billion gallons — approximately 9,000 acre-feet — of treated drinking water per year. The district's treatment plants are operated by state-licensed and certified technicians. Water treatment processes include chlorination, coagulation, flocculation, sedimentation, and filtration.

The District operates a state-certified water laboratory where water samples from throughout the district are tested regularly.

NID treated water meets and exceeds standards set by the California State Water Resources Control Board Division of Drinking Water. As required by state law, NID produces an annual water quality report, the Consumer Confidence Report, which is updated each spring to and posted on NID's web site.

NID's flushing program is conducted annually in the winter months and is designed to keep treated water pipelines clean and ensure a fresh, high quality water supply.

D.4 Hazard Identification

NID's planning team identified the hazards that affect the District and summarized their geographic extent, probability of future occurrences, potential magnitude/severity, and significance specific to NID (see Table D-2).

Table D-2 NID—Hazard Identification Assessment

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Insect Pests	Significant	Highly Likely	Critical	Low	High
Avalanche	Significant	Highly Likely	Critical	Medium	High
Climate Change	Significant	Highly Likely	Critical	Medium	High
Dam Failure	Significant	Occasional	Critical	High	Low
Drought and Water Shortage	Significant	Highly Likely	Critical	High	High
Earthquake	Extensive	Occasional	Critical	Medium	Low
Flood: 100/500–year	Significant	Likely	Critical	Medium	High
Flood: Localized/Stormwater	Significant	Highly Likely	Limited	Medium	High
Hazardous Materials Transportation (interstates, railroads, pipelines)	Significant	Occasional	Critical	High	Low
Landslide, Debris & Mud Flows	Significant	Highly Likely	Critical	Medium	High
Levee Failure	Limited	Unlikely	Limited	Low	Medium
Severe Weather: Extreme Heat	Significant	Highly Likely	Limited	Low	High
Severe Weather: Extreme Cold, Snow, and Freeze	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rains and Storms (wind/tornado, hail, lightning)	Significant	Highly Likely	Critical	High	High
Subsidence	Limited	Occasional	Limited	Medium	Medium
Volcano	Limited	Unlikely	Critical	Low	Low
Wildfire (smoke, tree mortality, conflagration)	Extensive	Highly Likely	Catastrophic	High	High

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

Probability 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 Impact:
Low: Climate change is not likely to increase the probability of this hazard.
Medium: Climate change is likely to increase the probability of this hazard.
High: Climate change is very likely to increase the probability of this hazard.

D.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile NID's hazards and assess the District's vulnerability separate from that of the planning area as a whole, which has already been assessed in Sections 4.2 and 4.3 Hazard Profiles and Vulnerability Assessment in the base plan. The hazard profiles in the base plan discuss overall impacts to the planning area and describes the hazard problem description, hazard extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to NID is included in this Annex. This vulnerability assessment analyzes the property, population, critical facilities, 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.

D.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section D.5.3, includes a description as to how the hazard affects the NID and information on past occurrences. The intent of this section is to provide jurisdictional specific information on hazards and further describe how the hazards and risks differ across the Planning Area.

D.5.2. Vulnerability Assessment and Assets at Risk

This section identifies NID's assets at risk, including values, critical facilities and infrastructure, natural resources, historic and cultural resources, and growth and development trends. 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 District'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:

> *Any facility (a structure, infrastructure, equipment or service), that is adversely affected during a hazardous event may result in interruption of services and operations for the District at any time before, during and after the hazard event. A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-risk Populations Facilities, and (3) Hazardous Materials Facilities.*

Table D-3 lists District assets, including their critical facilities, identified by the NID's planning team as important to protect in the event of a disaster. NID's physical assets, valued at over $190 million, consist of the buildings and infrastructure to support the NID operations.

Table D-3 NID's Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Hazard Info
Chicago Park Power House	Critical Facilities	$58,600,000	Earthquake, Flood, Fire
Dutch Flat Power House	Critical Facilites	$36,955,000	Earthquake, Flood, Fire
Rollins Power House	Critical Facilities	$18,325,000	Earthquake, Flood, Fire

Name of Asset	Facility Type	Replacement Value	Hazard Info
Bowman Power House	Critical Facilities	$8,000,000	Earthquake, Flood, Fire
Combie South Power House	Critical Facilities	$5,600,000	Earthquake, Flood, Fire
Combie North Power House	Critical Facilities	$2,500,000	Earthquake, Flood, Fire
Scotts Flate Power House	Critical Facilities	$2,500,000	Earthquake, Flood, Fire
Rollins Reservoir	Critical Facilities	$67,500,000	Earthquake, Flood
Combie Reservoir	Critical Facilities	$5,600,000	Earthquake, Flood
Elizabeth George Water Treatment Plant	Critical Facilities	$12,100,000	Earthquake, Flood, Fire
North Auburn Water Treatment Plant	Critical Facilities	$3,500,000	Earthquake, Flood, Fire
Lake Of The Pines Water Treatment Plant	Critical Facilities	$11,000,000	Earthquake, Flood, Fire
Water Canal System	Critical Facilities	$58,400,000	Earthquake, Flood
Orr Creek Reservoir	Critical Facilities	$10,000	Earthquake, Flood
Pickett Reservoir	Critical Facilities	$3,000	Earthquake, Flood
Buildings and Warehouses	Critical Facilities	$5,750,000	Earthquake, Flood, Fire
Administration buildings	Critical Facilities	$4,300,000	Earthquake, Flood, Fire
Pipelines and tanks	Critical Facilities	$30,000,000	Earthquake, Flood, Fire
Other assets	Critical Facilities	$190,000,000	Earthquake, Flood, Fire

Source: NID

Natural Resources

Several state or federally listed species may be found within the District boundary. These are identified, along with other species of concern found in the District, in Table D-4 and Table D-5.

Table D-4 Plant Species of Concern in the Nevada Irrigation District

Name	Status	Habitat	Potential Occurrence
Dwarf downingia *Downingia pusilla*	CNPS 2.2	Vernal Pools in valley foothill grasslands	Unlikely to occur. No appropriate habitat in the project area. Nearest known occurrence 2.2 air miles northwest of downtown Lincoln, 1.2 road miles south of Wise Road/Hwy. 65 intersection.
Legenere *Legenere limosa*	CNPS 1B.1	Vernal pools and swales, seasonal marshes, artificial ponds, floodplains of intermittent streams, and other seasonally inundated habitats.	May occur in floodplains of intermittent streams in the project area. Known from only two occurrences in the project vicinity. One located north of Pleasant Grove Creek, south of Placer Boulevard, east of Highway 65. The second is at the Orchard Creek Conservation Bank approximately 3 miles southwest of Lincoln (Jones & Stokes 2002).

Name	Status	Habitat	Potential Occurrence
big-scale balsamroot *Balsamorhiza macrolepis var. macrolepis*	CNPS 1B.2	Chaparral, cismontane woodland and valley and foothill grassland, and vernally moist meadows on sandstone, serpentine, or basalt outcrops. From 300 to 4,600 feet in elevation.	Added to table August 2009, no analysis for the project area completed.
Stebbins's morning-glory *Calystegia stebbinsii*	FE, CE, CNPS 1B.1	Chaparral (openings), cismontane woodland, serpentinite or gabbroic. 600–2,400 ft.	Unlikely to occur. No appropriate habitat present in the project area. This plant is known from fewer than 15 occurrences in specific, isolated areas of Nevada and El Dorado counties (CDFG 2004).
Dubious pea *Lathyrus sulphureus var. argillaceus*	CNPS 3	Cismontane woodland, chaparral, lower and upper montane coniferous forest. Usually full sun to part shade, woodland openings. 500–1,000 ft.	May occur in woodland habitats on the project site.
Ahart's Dwarf Rush *Juncus leiospermus var. ahartii*	CNPS 1B.2	Vernal pool margins and mesic valley and foothill grassland areas at elevations of 30–100 meters.	May occur in non-native grassland habitats in the project area. Reported in Placer County only from one occurrence at the Lincoln Airport.
Red Bluff Dwarf Rush *Juncus leiospermus var. leiospermus*	CNPS 1B.1	Meadows and seeps, vernal pools, and vernally mesic areas in chaparral, cismontane woodland, and valley and foothill grassland from 115 to 3,350 feet.	May occur in woodland and non-native grasslands habitats. Known from north of Roseville in 1982, but was relocated in 1997 (CNDDB 2002).
Butte County fritillary *Fritillaria eastwoodiae*	CNPS 3	Chaparral, cismontane woodland, lower montane coniferous forest (openings), wet and dry slopes red clay or sandy loam. 100–5,000 ft.	May occur in woodland habitats on the project site.
Brandegee's clarkia *Clarkia biloba ssp. brandegeae*	CNPS 1B.2	Chaparral, cismontane woodland, often roadcuts. 900–3,000 ft.	May occur in woodland habitats on the project site. The nearest occurrences are in the Lake Combie Quad along the Bear River (CDFG 2004).
Boggs Lake Hedge-hyssop *Gratiola heterosepala*	CE, CNPS 1B.1	Foothill Riparian	May occur in riparian habitat present in the project area. Known from only three occurrences in the project vicinity. Two of these occurrences are located between Rocklin and Roseville; the third is located just north of Lincoln (Placer County 2003).
Pincushion navarretia *Navarretia myersii ssp. myersii*	CNPS 1B.1	Vernal pools, valley and foothill (non-native) grasslands in clay soils. 66–1,083 feet	Northern limits of City of Lincoln. Exact location unknown (needs more fieldwork).

Name	Status	Habitat	Potential Occurrence
Status Codes:			
Federal FE = Federally listed as Endangered FT = Federally listed as Threatened FC = Federal Candidate species	State CE = California listed as Endangered CT = California listed as Threatened CR = California listed as Rare CSC = California Species of Concern CFP = California Fully Protected		California Native Plant Society 1B = rare, threatened or endangered in California and elsewhere. 2 = rare in California but more common elsewhere. 3 = need more information 4 = plants of limited distribution; a watch list. _.1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat) _.2 = Fairly endangered in California (20-80% occurrences threatened) _.3 = Not very endangered in California (<20% of occurrences threatened or no current threats known)

Status and habitat information from California Natural Diversity Database (CDFG 2004), California Native Plant Society Electronic Inventory (CNPS 2003), and USFWS Official Species Lists.

[1]Based on table presented in the Lincoln Area Water Treatment Plant Planning and Site Study (NID 2005). Updated by Robertson-Bryan, Inc. for internal use only by NID (August 2009)

Table D-5 Wildlife Species of Concern in the Nevada Irrigation District

Name	Status	Habitat	Potential Occurrence
Invertebrates			
Vernal pool fairy shrimp *Branchinecta lynchi*	FT	Found in vernal pools (seasonal wetlands)	Unlikely to occur. No appropriate habitat present.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE –	Vernal pools containing clear to highly turbid water.	Unlikely to occur. No appropriate habitat present.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT –	Associated with various species of elderberry shrubs (Sambucus spp.); generally occurs along waterways and in floodplains.	May occur if elderberry shrubs are present in the project area. Nearest known occurrences in the vicinity of the Lincoln airport and Lincoln Rodeo Grounds.
Fish			
Delta smelt *Hypomesus transpacificus*	FT CT	Found only in the Sacramento-San Joaquin Estuary and they reside primarily in the interface between salt and freshwater. Decline in population due in large part to reductions in delta water outflow.	Unlikely to occur. Project is located outside of species' known distribution.

Name	Status	Habitat	Potential Occurrence
Longfin smelt *Spirinchus thaleichthys*	– CT, CSC	In the Sacramento-San Joaquin estuary adults and juveniles can be found in water ranging from nearly pure sea water to completely fresh water. Adult and juvenile longfin smelt occupy mostly the middle or bottom of the water column in the salt or brackish water portions of the estuary, although larval smelt are concentrated in near-surface brackish waters. Spawning takes place in fresh water, over sandy-gravel substrates, rocks, and aquatic plants.	Unlikely to occur. Project is located outside of species' known distribution.
Central Valley steelhead *Oncorhynchus mykiss irideus*	FT –	Found in tributaries to the San Francisco Bay, including the south Bay. Pass through the San Francisco Estuary during migration to streams for spawning, and during outmigration to the ocean. Spawn in small streams and tributaries with cold, clean water flowing over graveled bottoms and deep pools.	Rainbow trout/steelhead adults and fry have been seen in Coon Creek, Auburn Ravine, Dry Creek, Secret Ravine, and Miners Ravine (CALFED Bay-Delta Program 2000).
Central Valley spring-run chinook salmon *Oncorhynchus tshawytscha*	FT CT	Found in tributaries to the San Francisco Bay. Pass through the San Francisco Estuary during migration to streams for spawning, and during outmigration to the ocean. Spawn in well oxygenated water in swift, shallow riffles, or at edges of fast runs with loose gravel.	Unlikely to occur. Project is located outside of species' known distribution.
Sacramento winter-run chinook salmon *Oncorhynchus tshawytscha*	FE CE	Found in tributaries to the San Francisco Bay. Pass through the San Francisco Estuary during migration to streams for spawning, and during outmigration to the ocean. Spawn in well oxygenated water in swift, shallow riffles, or at edges of fast runs with loose gravel.	Unlikely to occur. Project is located outside of species' known distribution.
Central Valley fall/late fall-run chinook salmon *Oncorhychus tshawytscha*	– CSC	Found in tributaries to the San Francisco Bay, including the south Bay. Pass through the San Francisco Estuary during migration to streams for spawning, and during outmigration to the ocean. Spawn in well oxygenated water in swift, shallow riffles, or at edges of fast runs with loose gravel.	The Bear River supports an occasional run of adult fall-run chinook salmon in years when flows are sufficient to provide passage (Yoshiyama et al. 1996).
Green sturgeon *Acipenser medirostris*	FT CSC	In the Sacramento River, adult sturgeon are in the river, presumably spawning, when temperatures range between 8 14°C. Preferred spawning substrate likely is large cobble, but can range from clean sand to bedrock.	Unlikely to occur. Project is located outside of species' known distribution.

Name	Status	Habitat	Potential Occurrence
Amphibians			
California tiger salamander *Ambystoma californiense*	FT CSC	Breeds in freshwater ponds or vernal pools, in association with upland areas with small mammal burrows	Unlikely to occur. Project is located outside of species' known distribution.
Western spadefoot toad *Spea hammondii*	– CSC	Requires vernal pools and seasonal wetlands below 4,500 feet that lack predators for breeding. Also occurs in grassland habitat and occasionally in valley-foothill oak woodlands and orchards.	Unlikely to occur. Project is located outside of species' known distribution.
California red-legged frog *Rana aurora draytonii*	FT CSC	Breeds in quiet streams and permanent, deep, cool ponds with overhanging and emergent vegetation below 5,200 feet elevation. Known to occur adjacent to breeding habitats in riparian areas, heavily vegetated streamside shorelines, and non-native grasslands. Sierran streams historically supported populations of red-legged frog; however, these populations have been eliminated.	Unlikely to occur. Project supports minimal suitable habitat and species in not known from the project vicinity. Project area is not designated by USFWS as critical habitat or a core recovery unit. However, the project area is in the historical range of the species. Nearest known occurrence is in El Dorado National Forest, near Michigan Bluff (CNDDB 2004).
Foothill yellow-legged frog *Rana boylii*	– CSC	Inhabits valley and foothill oak woodland, riparian forest, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadows. Breeds in rocky streams with cool, clear water from 0 to 4,500 feet.	Appropriate habitat present in intermittent drainages within the proposed project site. Nearest known occurrences are located in Missouri Creek Canyon in Tahoe National Forest and Greenhorn Creek, where two adults were detected in 1999 (CDFG 2004).
Reptiles			
Western pond turtle *Actinemys marmorata*	– CSC	Occurs up to 6,000 feet in perennial wetlands and slow moving creeks and ponds with overhanging vegetation. Requires suitable basking sites such as logs and rocks above the waterline.	Appropriate habitat present in Orr Creek Reservoir and stock ponds located within the project area. Nearest known occurrences are located 4 mi. WNW of Newcastle and on Wolf Creek in Nevada County (CDFG 2004).
California horned lizard *Phrynosoma coronatum frontale*	– CSC	Occurs in riparian woodlands and annual grasslands, exposed sandy-gravelly substrate with scattered shrubs, and clearings from 0 to 6,500 feet.	Appropriate habitat present in the non-native grasslands in the project area. Nearest known occurrences are 2.5 miles west of Highway 49 and 20 Junction in Nevada City and on Alta Vista Road in Grass Valley (CDFG 2004).

Name	Status	Habitat	Potential Occurrence
Giant garter snake *Thamnophis gigas*	FT CT	Primarily associated with marshes and sloughs, less with slow-moving creeks, and absent from larger rivers. Nocturnal retreat is holes, especially mammal burrows, crevices, and surface objects. During the day the giant garter snake often basks on emergent vegetation such as cattails and tules.	Unlikely to occur. Project is located outside of species' known distribution.
Birds			
White-tailed (black shouldered) kite *Elanus leucurus*	– CFP	Inhabits herbaceous and open stages of most habitats mostly in cismontane California. Forages in undisturbed, open grasslands, meadows, farmlands and emergent wetlands.	Appropriate nesting and foraging habitat present within the project area.
Northern harrier (nesting) *Circus cyaneus*	– CSC	Frequents meadows, grasslands, open rangelands, desert sinks, fresh and saltwater emergent wetlands. Mostly found in flat, or hummocky, open areas of tall, dense grasses, moist or dry shrubs, and edges for nesting, cover, and feeding.	May forage in non-native grasslands and nest in the project area.
Swainson's hawk *Buteo swainsoni*	BCC CT	Breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley. Forages in adjacent grasslands, suitable grain or alfalfa fields, or livestock pastures.	Unlikely to occur. Project is located outside of species' known distribution.
Ferruginous hawk (wintering) *Buteo regalis*	BCC –	Winter visitor along the coast from Sonoma County to San Diego County, eastward to the Sierra Nevada foothills and southeastern deserts, the Inyo-White Mountains, the plains east of the Cascade Range, and Siskiyou County. Prefers open terrain, plains, and foothills. Does not nest in California.	Winter Visitor. May forage in non-native grasslands in the project area.
Bald eagle *Haliaeetus leucocephalus*	FD (Delisted 7/9/07) CE, CFP (nesting and winteri ng)	Local winter migrant to various California lakes. Most of the breeding population is restricted to northern counties. Regular winter migrants to the region.	Foraging habitat present in Combie Reservoir.

Name	Status	Habitat	Potential Occurrence
American peregrine falcon *Falco peregrinus anatum*	Former FE (Delisted on 8/20/99), BCC CE, CFP (nesting)	Breeds in woodlands, forests, coastal habitats, and riparian areas near wetlands, lakes, rivers, or other water on high cliffs, banks, dunes, or mounds	Unlikely to occur. No appropriate habitat present in the project area.
California black rail *Laterallus jamaicensis*	BCC CFP, CT	Forages and nests in tidal emergent wetlands dominated by pickleweed or in brackish marshes supporting bulrushes and pickleweed; Usually found in immediate vicinity of tidal sloughs.	Unlikely to occur due to lack of suitable habitat. Previously unknown populations were recently discovered in the foothills of Nevada County (Tecklin 1990). Known to occur in isolated marshes along Garden Bar Road, McCourney Road, and in and near Spenceville Wildlife Area (CDFG 2004).
Mountain plover *Charadrius montanus*	BCC CSC	Short grasslands and plowed fields with little vegetation, and open sagebrush areas of the Central Valley from Sutter and Yuba counties southward.	Unlikely to occur. Project is located outside of species' known distribution.
Long-billed curlew *Numenius americanus*	BCC	F ound in wet meadow habitat in northeastern California in Siskiyou, Modoc, and Lassen counties. Winter visitor along the California coast and in the Central and Imperial valleys.	Winter Visitor. May forage in wet meadows in the project area.
Yellow-billed cuckoo *Coccyzus americanus*	FC, BCC CE	Inhabits extensive deciduous riparian thickets or forests with dense, low-level or understory foliage, and which abut on slow-moving watercourses, backwaters, or seeps. Willow almost always a dominant component of the vegetation.	Unlikely to occur. Project is located outside of species' known distribution.
Western burrowing owl *Athene cunicularia*	BCC CSC (Burrow sites.)	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably the California ground squirrel.	Unlikely to occur. Project is located outside of species' known distribution.
Vaux's swift *Chaetura vauxi*	– CSC (nesting)	Prefers redwood and Douglas fir habitats with nest sites in large, hollow trees and snags, especially tall, burned-out stubs. Forages over moist terrain and habitats, preferring rivers and lakes.	Unlikely to occur. Project is located outside of species' known distribution.
Black swift *Cypseloides niger*	BCC CSC (nesting)	Breeds locally in Sierra Nevada and Cascades. Nests in moist crevices or caves, or on cliffs near waterfalls in deep canyons. Forages widely over many habitats; seems to avoid arid regions.	Unlikely to occur. Project is located outside of species' known distribution.

Name	Status	Habitat	Potential Occurrence
Lewis' woodpecker *Melanerpes lewis*	BCC (nesting)	Winter resident in open oak savannas, broken deciduous, and coniferous habitats with brushy understory. Uses logged and burned areas. Winters in the Central Valley, Modoc Plateau, and the Transverse and other ranges in Southern California. Breeds locally along eastern slopes of the Coast Ranges, and in Sierra Nevada, Warner Mts., Klamath Mts., and in the Cascade Range.	Winter Visitor. May forage in the project area.
Little willow flycatcher *Empidonax traillii brewsteri*	– CE (nesting)	Wet meadow and montane riparian habitats from 2,000 to 8,000 feet. Breeding seldom occurs below 5,000 feet. Most often occurs in broad, open river valleys or large mountain meadows with lush growth of shrubby willows	Unlikely to occur. Project is located outside of species' known distribution.
Bank swallow *Riparia riparia*	– CT (nesting)	Migrant found primarily in riparian and other lowland habitats in California west of the deserts. Requires vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, lakes, and the ocean for nesting. Feeds primarily over riparian areas during breeding season and over grassland and cropland during migration.	Unlikely to occur. Project is located outside of species' known distribution.
Yellow warbler (nesting) *Dendroica petechia brewsteri*	– CSC	Uncommon nester over most of California, except the Central Valley, Mojave Desert, and high elevations of the Sierra. Winters along the lower Colorado River and in parts of Imperial and Riverside counties. Nests in riparian habitats dominated by willows, cottonwoods, sycamores, or alders or in mature chaparral. May also use oaks, conifers, and urban areas nears streams.	May occur in woodland and riparian habitats in the project area
Yellow-breasted chat (nesting) *Icteria virens*	– CSC	Uncommon migrant in California. Nests in a few locations such as Sweetwater and Weber Creeks, El Dorado County; Pit River, Shasta County; Russian River, Sonoma County; Little Lake Valley, Mendocino County; and upper Putah Creek, Yolo County. Nests in dense riparian habitats dominated by willows, alders, Oregon ash, tall weeds, blackberry, and grape.	May occur in woodland and riparian habitat in the project area. Documented nesting at Little Wolf Creek, Bear River, Dry Creek, Indian Springs Creek, Deer Creek, and the Middle and South Yuba River (Nevada Co. Planning Dept. 2002).
Modesto song sparrow *Melospiza melodia mailliardi*	– CSC	Found in a variety of habitats including: riparian willow thickets, valley oak riparian with an understory of blackberry, ruderal areas along levees and irrigation canals, and cattail and tule marshes.	May occur in riparian habitats in the project area. Known to occur in western Placer County and adjacent Sierra foothill counties (Grinnell and Miller 1944; Gardali 2002).

Name	Status	Habitat	Potential Occurrence
Grasshopper sparrow *Ammodramus savannarum*	– CSC	Occurs in dry, dense grasslands, especially those with a variety of grasses and tall forbs and scattered shrubs for singing perches	May occur irregularly in non-native grasslands in the project area. One singing male was found in an annual grassland east of Lincoln; it was only present for a few days (April 1999). A fall migrant was found along Brewer Road (September 1999). (Easterla pers. comm.; Webb 2003.)
Tricolored blackbird *Agelaius tricolor*	BCC CSC (nesting colony)	Breeds near freshwater, preferably in emergent wetland with tall dense cattails or tules, but also in thickets of willow, blackberry, wild rose, and tall herbs. Feeds in grassland and cropland habitats. Found throughout the Central Valley and on the coast.	May forage in non-native grasslands and next in some raw water storage facilities.
Lawrence's goldfinch *Carduelis lawrencei*	BCC	Occurs in valley foothill hardwood and valley foothill hardwood-conifer. Breeds in open oak or other arid woodland and chaparral, near water.	May occur in woodland habitats in the project area.
Loggerhead shrike *Lanius ludovicianus*	– CSC (nesting)	Open habitats with sparse shrubs and trees (or other suitable perch sites) and bare ground and/or low, sparse herbaceous cover; oak woodlands for nesting. Found in lowlands and foothills throughout California	May forage in non-native grasslands and nest in woodland habitats in the project area.
Mammals			
Spotted bat *Euderma maculatum*	– CSC	Habitats range from arid deserts and grasslands through mixed conifer forests up to 10,600 feet in southern California. Prefers sites with adequate roosting habitat, such as cliffs. Often limited by the availability of cliff habitat. Feeds over water and along marshes.	May roost or forage in the project area in all habitat types, but project area outside of species' historic range.
Greater western mastiff bat *Eumops perotis californicus*	– CSC	Occurs in many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, chaparral, desert scrub, and urban areas in southeastern San Joaquin Valley and Coastal Ranges from Monterey County south. Typically roosts in caves, crevices or other rock formations. Requires open areas for foraging.	Unlikely to occur. Project area is outside of species' known distribution.
Townsend's big-eared bat *Corynorhinus townsendii*	– CSC	Occurs from low desert to mid-elevation montane habitat. Occurs in rural settings, inland deserts, coastal redwoods, oak woodland of the inner Coast Range and Sierra, and low to mid-elevation mixed forest.	May roost or forage in the project area in all habitat types, but project area outside of species' historic range.

Name	Status	Habitat	Potential Occurrence
Status Codes			
Federal FE = Federally listed as Endangered FT = Federally listed as Threatened = Federal Species of Concern FC = Federal Candidate species FPT = Federally Proposed Threatened BCC = Birds of Conservation Concern		State CE = California listed as Endangered CT = California listed as Threatened CR = California listed as Rare CSC = California Species of Concern CFP = California Fully Protected	

Status and habitat information is taken from California Natural Diversity Database (CDFG 2004), Zeiner et al. (1990), and USFWS Official Species List

[1] Based on table presented in the Lincoln Area Water Treatment Plant Planning and Site Study (NID 2005). Updated by Robertson-Bryan, Inc. for internal use only by NID (August 2009).

Growth and Development Trends

Past growth for the District is the same as the incorporated communities falling within the service area of the District.

D.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table D-2 as medium or high significance hazards. Impacts of past events and vulnerability of the NID 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 Nevada County Planning Area). In general, the most vulnerable structures are those located within the floodplain or within dam inundation areas or high risk wildfire areas. Also, older facilities that may be constructed with unreinforced masonry and buildings built prior to the introduction of modern building codes are also more vulnerable to hazard events.

An assessment of the vulnerability of the NID to each identified priority hazard, in addition to the estimate of probability 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.

Avalanche

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

NID has critical water supply facilities in the high alpine watershed that supply a majority of the District's annual water needs. These facilities are located in remote, steep terrain that is subject to avalanche during heavy winters. The primary danger with an avalanche is the potential for blockage of canals and damage to the many elevated flumes relied upon for conveyance.

Past Occurrences

Heavy snow in the early 1990's blocked water flow in the South Yuba Canal and created constraints on the Districts water delivery system. Emergency pumps were brought in to pump water from Scotts Flat as a backup while the snow was cleared vulnerability to Drought and Water Shortage

Although a permanent emergency pump station was completed in 2016 to bolster water supplies during wintertime outages, full summertime demands cannot be met. A major landslide that causes significant damage to NID water delivery infrastructure would create a water supply shortage for most of Nevada County

Future Development

None.

Climate Change

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

Climate change adaptation is a key priority of the State of California. The 2013 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

In Nevada County, the HMPC noted that each year it seems to get a bit warmer and snow seems to start at higher levels. It was also noted that 2017 was one of the wettest years ever. California's Adaptation

Planning Guide: Understanding Regional Characteristics has divide California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Nevada County falls within the North Sierra Region characterized as a sparsely settled mountainous region where the region's economy is primarily tourism-based. The region is rich in natural resources, biodiversity, and is the source for the majority of water used by the state.

Past Occurrences

The winter of 2016/2017 saw an increase in storm water runoff, localized flooding and landslides throughout NID's service territory and source water areas.

Vulnerability to Climate Change

The California Adaptation Planning Guide (APG) prepared by California OES and CNRA was developed to provide guidance and support for local governments and regional collaboratives to address the unavoidable consequences of climate change.

The APG: Defining Local and Regional Impacts focuses on understanding the ways in which climate change can affect a community. According to this APG, climate change impacts (temperature, precipitation, sea level rise, ocean acidification, and wind) affect a wide range of community structures, functions and populations. These impacts further defined by regional and local characteristics are discussed by secondary impacts and seven sectors found in local communities: Public Health, Socioeconomic, and equity impacts; Ocean and Coastal Resources; Water Management; Forest and Rangeland; Biodiversity and Habitat; Agriculture; and Infrastructure.

Future Development

NID in general could see population fluctuations in the District as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to impact demand for housing and other development. For example, sea level rise may disrupt economic activity and housing in coastal communities, resulting in migration to inland urban areas. Other interior western states may experience an exodus of population due to challenges in adapting to heat even more extreme than that which is projected to occur here. While there are currently no formal studies of specific migration patterns expected to impact the Nevada County region, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2015 and is expected to be the focus of future studies

Dam Failure

Likelihood of Future Occurrence–Low
Vulnerability–High

Hazard Profile and Problem Description

Dams are manmade structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they are usually engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed

to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped and fail. Overtopping is the primary cause of earthen dam failure in the United States.

Past Occurrences

There have been no disasters declarations related to dam failure in the District.

Vulnerability to Dam Failure

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

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. Based on the risk assessment, it is apparent that a major dam failure could have a devastating impact on the District.

Future Development

Although new growth and development corridors would fall in the area flooded by a dam failure, given the limited potential of total dam failure and the large area that a dam failure would affect, development in the dam inundation area will continue to occur.

Drought and Water Shortage

Likelihood of Future Occurrence–Occasional
Vulnerability–High

Hazard Profile and Problem Description

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 for agricultural, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Northern Sacramento Valley counties, including Nevada County, generally have sufficient groundwater and surface water supplies to mitigate even the severest droughts of the past century. Many other areas of the State, however, also place demands on these water resources during severe drought. For example, Northern California agencies, including those from Nevada County, were major participants in the Governor's Drought Water Bank of 1991, 1992, and 1994.

Past Occurrences

Based on historical information, the occurrence of drought in California, including Nevada County, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. There

has been two state disaster related to drought and water shortage in Nevada County issued in 1976 and 2014.

Vulnerability to Drought and Water Shortage

The vulnerability of NID to drought is districtwide, but impacts may vary and include reduction in water supply, agricultural losses, and an increase in dry forest fuels leading to bark beetle infestation and catastrophic wildfire. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult.

Future Development

According to the HMPC, NID has access to large quantities of water through surface water. However, population growth in the District will add additional pressure to the District during periods of drought and water shortage. NID will need to continue to plan for and add infrastructure capacity for population growth.

Earthquake

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

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. 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. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. A 1986 study by the California Bureau of Reclamation concluded that the Dog Valley Fault and Mohawk Valley Faults could result in a maximum credible earthquake of 6.75 and 7.0 magnitude respectively.

Past Occurrences

There have been no past occurrences of Earthquake in the District.

Vulnerability to Earthquake

Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while uninhabited areas are less vulnerable. NID is subject to some seismic activity, although this risk is relatively low compared to other places in the State.

Future Development

Although new growth and development corridors would fall in the area affected by earthquake, given the small chance of major earthquake and the building codes in effect, development in the earthquake area will continue to occur.

Flood: 100/500-year

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile and Problem Description

Flooding is the rising and overflowing of a body of water onto normally dry land. History clearly highlights floods as one of the most frequent natural hazards impacting Nevada County. Floods are among the most costly 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. A car will float in less than two feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else. 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, such as dam spillways. 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. Where flooding occurs in populated areas, warning and evacuation will be of critical importance to reduce life and safety impacts from any type of flooding.

The most recent flood event to impact the District is the late December floods of 2005. Excessive rain for a prolonged period caused severe flooding in the Sierra foothills, in and around Nevada County. Impacts included damage to the District's canal system as well as damage to roads and properties throughout District boundaries.

Heavy prolong precipitation in late 1996 caused flood damage across much of the District's service area. President Clinton proclaimed the area a disaster area while Governor Wilson followed suit. Many of the Districts main diversion dams and canals were washed out. Over 50 applications for flood damage assistance for the repair of NID facilities were submitted to FEMA and Cal OES.

Past Occurrences

1996 and 2005 events are described above. NID submitted 12 occurrences of infrastructure damage due to excessive flow rates to Cal OES ranging from diversion structure erosion to reservoir spillway damage.

Vulnerability to Flood 100/500 year

Flooding is a significant problem in 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. Flooding has occurred both within the 100- and 500-year floodplains and in other localized areas.

Historically, much of the growth in the 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. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Future Development

If any development is to occur in the floodplain, it would have to conform to the elevation standards of the floodplain ordinance. No development is expected in floodplains in the future.

Flood: Localized/Stormwater

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

Localized, stormwater flooding also 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. Flooding is more severe when previous rainfall has created saturated ground conditions. Urban storm drainpipes and pump stations have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in the street until it reaches a level of overland release. This type of flooding may occur when intense storms occur over areas of development.

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

Past Occurrences

Past flooding incidents, although minor in scope, have occurred on nearly every District canal. In 2017, the District observed prolonged precipitation resulting in localized flooding occurrences which resulted in canal breaches, culvert flooding, and spill channel flow increases.

Vulnerability to Localized/Stormwater flooding

The District supplies both drinking and irrigation water to portions of Nevada County. The conveyance of water is accomplished through over 400 miles of pipe and over 475 miles of open canal. The Districts treated water system is susceptible to localized flooding damages from concentrated storm water runoff causing erosion of soil and exposing the water main. The exposed water main is then weekend and vulnerable to breakage due to the loss of securing soils. Treated water pipelines also have the potential to cause localized flooding during water main breaks.

The Districts canal system is susceptible to storm water flooding from heavy precipitation events that create heavy runoff that enters District canals and overburdens the system. These high runoff flows can cause overtopping of the canal and erosion of the canal berm potentially causing property damage.

Future Development

The potential for flooding may increase as stormwater is channeled due to land development. Such changes can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. Floodplain modeling and master planning should be based on build out property use to ensure that all new development remains safe from future flooding. While local floodplain management, stormwater management, and water quality regulations and policies address these changes on a site-by-site basis, their cumulative effects can have a negative impact on the floodplain.

Hazardous Materials Transportation

Likelihood of Future Occurrence–Occasional
Vulnerability–High

Hazard Profile and Problem Description

Hazardous materials include a wide variety of substances commonly used in households and businesses. Used motor oil, paint, solvents, lawn care and gardening products, household cleaners, gasoline and refrigerants are among the diverse range of substances classified as hazardous materials. Nearly all businesses and residences generate some amount of hazardous waste; certain businesses and industries generate larger amounts of such substances, including gas stations, automotive service and repair shops, printers, dry cleaners and photo processors. Hospitals, clinics and laboratories generate medical waste, which is also potentially hazardous.

Past Occurrences

There have been no federal or state disaster declarations for hazardous materials in the District.

Vulnerability to Hazardous Materials Transportation

NID storage and conveyance facilities are located along the heavily traveled Interstate 80 corridor. This is the main artery for transportation in and out of Northern CA and includes a major railway. A multitude of

hazardous chemicals are transported through this area on a daily basis. A spill along the interstate or railway has the potential to cause contamination to the Districts main water supply.

Future Development

Development will continue to happen within hazardous materials transportation zones. Those who choose to develop in these areas should be made aware of the risks associated with living within close proximity to a hazardous materials transportation route.

Landslide, Debris and Mud Flows

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

The susceptibility of an area to landslides depends on many variables including steepness of slope, type of slope material, structure and physical properties of materials, water content, amount of vegetation, and proximity to areas undergoing rapid erosion or changes caused by human activities. These activities include mining, construction, and changes to surface drainage areas.

Landslides often accompany other natural hazard events, such as floods, wildfires, or earthquakes. Landslides can occur slowly or very suddenly and can damage and destroy structures, roads, utilities, and forested areas, and can cause injuries and death.

Past Occurrences

There have been no federal or state disaster declarations for Landslides, Debris and Mud flows in the District. However, in February 2017 NID declared a Declaration of Emergency for the South Yuba Canal. In a remote canyon near Bear Valley, a landslide occurred on a steep hillside that the South Yuba Canal traverses. The slide caused a section of elevated canal to break free of its footings creating a breach and interrupting service. The canal is is one of the main water conveyance facilities for NID's Nevada County operations. Waters conveyed through the canal supply homes and businesses, including farms and ranches throughout Nevada County. The District used natural flow of Deer Creek and backup pump systems to meet customer demand. The declaration of emergency facilitated immediate repairs to the canal in an attempt to reduce water supply impacts.

Vulnerability to Landslide, Debris Flow and Mud Flows

Landslides, debris flows, and mud flow impacts vary by location and severity of any given event and will likely only affect certain areas of the District during specific times. Based on the risk assessment, it is evident that landslides will continue to have potentially large impacts to certain areas. However, many of the landslides in the District are minor, localized events that are more of a nuisance than a disaster.

Future Development

Although new growth and development corridors would fall in the area affected by moderate risk of landslide, given the small chance of a major landslide and the building codes and erosion ordinance in effect, development in the landslide area will continue to occur.

Severe Weather: Extreme Heat

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Severe Weather: Extreme Cold, Snow and Freeze

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

According to the WRCC, in the western portion of Nevada County, monthly average minimum temperatures from November through April range from the low to mid-30s. The lowest recorded daily extreme was 3°F on December 9, 1972. In a typical year, minimum temperatures fall below 32°F on 72.7 days with no days falling below 0°F. Average snowfall is 10.0 inches. The highest annual snowfall fell in 1972, when 26.7 inches fell. Highest monthly snowfall accumulation came in March of 1974, when 23.0 inches fell. Average snow depths in January through March fall at 1 inches.

Snow accumulation does not directly follow precipitation in the Sierra Nevada. While the greatest total precipitation occurs in the northern part of the range, the greatest snow accumulation occurs in the central and high southern parts of the range, due to higher elevations and colder temperatures which inhibit snow melt. The western slope of the Sierra Nevada acts as trap for winter storms, wringing out the moisture before it can get to the east side. Weather stations located on the west side begin registering measurable snow between 2,500 and 3,000 feet elevation. On the east side, measurable snow accumulation doesn't begin until about 4,000 feet and increases more slowly with altitude. Snow depths drop dramatically on the east side of the range due to the rain shadow effect.

Past Occurrences

A disaster declaration for Nevada County was issued by the state government in 1972 for freeze and severe weather conditions.

Vulnerability to Severe Weather: Extreme Cold, Snow and Freeze

NID is subject to multiple hazards during severe frees events. First, NIDs high sierra facilities are vulnerable to freezing so severe that the waters within the supply canals become solid ice. When this occurs, water deliveries to the system become impossible. NID has experienced multiple events where crews were sent out day and night to break ice to keep water flowing to critical water treatment facilities.

Second, freezing in the lower reaches of NID's service area where customers are not acclimated or prepared for cold temperatures causes freezing of water distribution systems and burst pipes. Once the pipes thaw, water free flows through the broken pipes and creates water demands that NID treatment systems have a tough time keeping up with.

Future Development

Future development built to code should be able to withstand snow loads from severe winter storms. Pipes at risk of freezing should be mitigated be either burying or insulating them from freeze as new facilities are improved or added. Current County codes provide such provisions for new construction. Vulnerability to extreme cold will increase as the average age of the population in the District shifts. Greater numbers of future senior citizens will result from the large number of baby boomers in the Planning Area as well as people retiring to the area.

Severe Weather: Heavy Rains and Storms (wind/tornado, hail, lightening)

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

Hazard Profile and Problem Description

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

Past Occurrences

A search of FEMA and Cal OES disaster declarations turned up multiple events. 11 state disaster declarations have occurred in the County – 1950, 1955, 1958 (twice), 1963, 1982, 1986, 1990, 1995, 1997, and 2008. 9 federal disaster declarations have occurred in the County – 1955, 1958, 1963, 1964, 1983, 1986, 1995, 1997, twice in 2006, 2017.

Vulnerability to Severe Weather: Heavy Rains and Storms (Hail, Lightning/Wind/Tornadoes)

Often during these events, the raw water distribution system can be impacted. Heavy runoff from storm activity can cause excessive water in District canals resulting in an overtopping of the canal. An overtopping will washout the canal berm resulting in localized flood damage and interruption of the water supply. On an annual basis the District receives 20 to 40 claims stemming from these overtopping events.

Future Development

New critical facilities should be built to withstand hail damage, lightning, and thunderstorm winds. While minimal damages have occurred to critical facilities in the past due to lightning, hail, or high winds and tornadoes, there still remains future risk. With development occurring in the region, future losses to new development may occur.

Subsidence

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

In Nevada County, the type of subsidence of greatest concern is the settling of the ground over abandoned mine workings (i.e., the creation of sinkholes). Past mining activities have created surface subsidence in some areas and have created the potential for subsidence in other areas. Nevada County is home to many abandoned mines.

A substantial portion of the District is underlain by a deep, extensive labyrinth of abandoned mine tunnels. The Empire Mine tunnels alone extend some 365 miles beneath the City of Grass Valley. Dozens of mining claims were worked in the Grass Valley and Nevada City area during the heyday of gold mining. Some were large, mechanized operations. Most were small and more labor-intensive.

Past Occurrences

There have been no disaster declarations related to subsidence in the District.

Vulnerability to Subsidence

To the extent NID's canals and pipe are above open tunnel mines, there is a vulnerability to these assets.

Future Development

Many of the subsidence and mine areas in the District are known, but many still remain unknown and untracked. The risk of subsidence to future development can be minimized by accurate recordkeeping and tracking of previously unknown abandoned mines. Knowing these locations and choosing not to develop in those areas or mitigating against future issues will reduce future risks of losses due to subsidence.

Wildfire

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

Hazard Profile and Problem Description

Over one hundred years of aggressive fire suppression under the national fire suppression policy has rendered wildlands severely overgrown. Much of the private land in the District's area is in the wildland urban interface with increasing residential development.

As more people move into the area and impacts from recreational demands increase, there will be more human-caused wildfire starts each year. And, the increased number of widely scattered homes within the District adds greatly to the danger, complexity, and cost of fighting these fires.

Forest overgrowth due to the efficiency of modern firefighting techniques, and to society's current election to limit forest thinning and harvesting, is a serious problem. If wildfire does not impact the forest first, native insects will eventually kill millions of trees. Explosions in insect populations usually start during a drought, when the lack of water combined with too many trees per acre render the trees too weak to fight off the insect attacks. Without a change in management practices on public lands, there is little hope of avoiding a kill off of trees similar to the kill off experienced by other national forests.

The Scott's Flat Reservoir in Nevada County is within the area ranked by Cal Fire as a Very High Fire Severity Zone based on inputs, such as fuel, slope, brush density (ladder), and tree density (crown cover), prolonged drought and beetle infestation. This means that if a fire were to start on the property, the fire would most likely crown-out, developing into a conflagration preheated by the understory fuels on September 13, 2016 the Nevada County Board of Supervisors found that the forgoing conditions and scope of extreme peril warrant and necessitate the proclamation of Local Emergency and, on said date, adopted a Resolution To Proclaim A Local Emergency In Nevada County Due To Extreme Tree Mortality.

Past Occurrences

A search of FEMA and Cal OES disaster declarations turned up multiple events. State disaster declarations occurred in 1961, 1987, and 1988. Federal disaster declarations occurred in 1998 (twice), and the Lowel Hill fire in August of 2015.

Vulnerability to Wildfire

Risk and vulnerability to the District from wildfire is of significant concern, with some areas of the District being at greater risk than others. High fuel loads, along with geographical and topographical features, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and sometimes catastrophic fires. During the May to October fire season, the dry vegetation and hot and sometimes windy weather, combined with continued growth in the WUI areas, 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 District, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

In the case of a catastrophic wildfire in the county, many District assets are at risk. Depending on the location and severity of the fire, any of the District's power houses, reservoirs, canals, pipes, treatment plants, offices and/or campgrounds could be at risk.

Future Development

Population growth and development in the District has recently slowed. However, additional growth and development within the WUI areas of the County would place additional assets at risk to wildfire.

D.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.

D.6.1. Regulatory Mitigation Capabilities

Table D-6 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 NID.

Table D-6 NID's 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	Y	Last update 2011. The plan covers the expected expansion of District facilities over the next 30 years. The hazards covered include the expected flow ranges thus allowing for upsizing of pipes and canals to prevent storm water flooding.
Capital Improvements Plan	Y	Ongoing annually. Projects are initiated based on Master Planning, facility inspection, and available capacity.
Economic Development Plan		N/A
Local Emergency Operations Plan	Y	The District has multiple Emergency Plans that are updated annually. These plans cover emergencies ranging from treated water supply to a major dam failures.
Continuity of Operations Plan		
Transportation Plan		N/A
Stormwater Management Plan/Program	Y	Storm water management is covered by District policy. The policy states all future facilities will be designed in a manner that doesn't allow storms water to infiltrate District canals.

Engineering Studies for Streams	Y	Only for stream health.
Community Wildfire Protection Plan	N	Covered in our Emergency Response Plans.
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		The District also maintains a drought contingency plan to assist water management during periods of drought or water supply shortages
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	N/A	
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	N/A	
How can these capabilities be expanded and improved to reduce risk?		

Source: NID

D.6.2. Administrative/Technical Mitigation Capabilities

Table D-7 identifies the department(s) responsible for activities related to mitigation and loss prevention for NID.

Table D-7 NID's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	Y	Planning is included through the Districts Engineering Department
Mitigation Planning Committee	Y	Planning is included through the Districts Engineering Department

Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	The District has a fully staffed maintenance division with 64 dedicated positions to keep facilities in proper order.
Mutual aid agreements	Y	The District has mutual aid agreements with many neighboring agencies including, PG&E, PCWA, City of Grass Valley, City of Nevada City, and Placer County.
Other		
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	Yes	The District has a risk manager that will act as an emergency manager during an emergency. Table top emergency exercises are practiced with multiple agencies every 5 years.
Community Planner		
Civil Engineer	Yes	The District has an in house engineering department with a staff of 5 licensed engineers trained in all aspects of District functions.
GIS Coordinator	Yes	The District has a drafting division that maintains the Districts GIS system. The group has coordinated with outside agencies during emergencies to provide mapping information.
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	The District has electronic warning systems for its dams, water treatment plants and its canals. Facilities are manned or monitored on a 24 hour a day 7 day a week basis. The District also utilizes an answering service as backup.
Hazard data and information	Yes	The District maintains a current SDS data base
Grant writing	Yes	The District has an in house grant writer
Hazardous analysis		
Other		
How can these capabilities be expanded and improved to reduce risk?		

Source: NID

D.6.3. Fiscal Mitigation Capabilities

Table D-8 identifies financial tools or resources that the NID could potentially use to help fund mitigation activities.

Table D-8 NID'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	Funding source is included in water rates includes pipeline replacement, PRV replacement, raw water system improvement, backbone extension and community investment programs.
Authority to levy taxes for specific purposes	Yes	The District receives a small portion of local government taxes through an agreement with the Counties
Fees for water, sewer, gas, or electric services	Yes	Fees include funding for service operations and maintenance
Impact fees for new development	No	
Storm water utility fee	No	
Incur debt through general obligation bonds and/or special tax bonds	Yes	Bonds and special taxes have both been utilized to fund projects within the District
Incur debt through private activities	No	
Community Development Block Grant	No	
Other federal funding programs	Yes	The District has been the recipient of Depart. of Water Resources grant funding
State funding programs	Yes	State Revolving Loan Funding
Other		
How can these capabilities be expanded and improved to reduce risk?		

Source: NID

D.6.4. Mitigation Education, Outreach, and Partnerships

Table D-9 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 D-9 NID'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.	Yes	The District works with Multiple NGO's that focus on watershed protection such as: Nevada County Economic Resource Council, The Sierra Fund, SYRCL, Bear Yuba Land Trust and others that could help spread the word during emergency

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	The District has a dedicated Water Efficiency Staff to help spread the water conservation message
Natural disaster or safety related school programs	N/A	
StormReady certification	N/A	The District has a storm water action plan in place that is implemented during forecasted heavy storms
Firewise Communities certification	Yes	The District works with Multiple NGO's that focus on watershed protection such as: Nevada County Economic Resource Council, The Sierra Fund, SYRCL, Bear Yuba Land Trust and others that could help spread the word during emergency
Public-private partnership initiatives addressing disaster-related issues		
Other		
How can these capabilities be expanded and improved to reduce risk?		

Source: NID

D.6.5. Other Mitigation Efforts

Heavy rains in early February 2017 created a landslide that caused significant damage to PG&E's South Yuba Canal in the Lowell Hill area east of Nevada City. The canal is owned and operated by PG&E and serves the Deer Creek Powerhouse; in addition it is one of the main water conveyance facilities for NID, supplying homes, businesses, farms and ranches throughout Nevada County. The slide caused a section of the elevated canal to break free of its footings, creating a breach and interrupting service. NID declared a state of emergency to help expedite repairs in the steep and shifting terrain. In order to maintain adequate water supply, NID asked for a voluntary conservation of 25% from the community who responded with overwhelming support. Voluntary reductions eliminated the need for mandatory reduction measures.

D.7 During the repair, NID completed a planned Banner Cascade Pipeline Project to facilitate the transport of raw water from Upper Cascade to the raw water canals below the E. George and Loma Rica Treatment Facilities allowing for additional supply during the South Yuba Canal repair. These canals convey raw water to NID's irrigation customers and to both water treatment plants to be converted into drinking water serving residential customers in Grass Valley and Nevada City. A treated water pipeline with fire hydrants has also been included to further serve residents along the alignment. intertie and were able to connect some customers through additional infrastructure delivery options. Mitigation Strategy

D.7.1. Mitigation Goals and Objectives

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

D.7.2. Mitigation Actions

The planning team for NID 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.

Action 1. NID Headquarters Office & Facilities Generator

Hazards Addressed: Long term power outages and emergency operations

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

Issue/Background: The headquarters office of the District located at 1036 West Main St, Grass Valley, is the main communications hub for day to day operations and acts as the Districts EOC during Emergency events. Emergency backup power is needed to keep all District operations running during an extended power outage.

Other Alternatives: Rental of a power generator, however this would not be timely enough during an emergency event.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project oversight will be provided by the District's Engineering and Electrical Departments.

Responsible Office/Partners: Nevada Irrigation District

Project Priority: High priority

Cost Estimate: $450,000

Benefits (Losses Avoided): Backup generator power will allow the District to continue functioning in the event of an extended power outage at Headquarters in Grass Valley. This will allow for the continued operation of the Districts emergency command center during a power outage.

Potential Funding: District Funding, Grants,

Timeline: 2017

Action 2. Reservoir Sediment Removal Program

Hazards Addressed: Water Supply Reliability, Drought & Water Shortage, Flood Control

Goals Addressed: 1, 2, 3, 6

Issue/Background: Large reservoirs located within the Sierra foothills are filling with sediment from years of upstream erosion, historic mining activities, and natural sediment transport. Adequate reservoir storage capacity is beneficial during storms and heavy rain. As the reservoir accumulates sediment, water storage

capacity is reduced which can result in supply variability for NID raw and treated water customers. Nevada Irrigation District has initiated an ongoing large reservoir sediment removal program to alleviate this problem.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Nevada Irrigation Districts Engineering and Maintenance Departments provide oversite on these projects

Responsible Office/Partners: Nevada Irrigation District

Project Priority: High

Cost Estimate: Approximately $500,000 - $1,000,000 per year

Benefits (Losses Avoided): Water Quality, Water Storage, Drought and Water Shortage

Potential Funding: District Funding, Grants,

Timeline: 1 to 20 years

Action 3. Scotts Flat Spillway Repair

Hazards Addressed: Dam Failure, Drought & Water Shortage

Goals Addressed: 1, 2, 3, 6

Issue/Background: Early February 2017 storms caused damage to the Scotts Flat spillway. NID is repairing the damage.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project oversight will be provided by the District's Engineering and Hydroelectric Departments.

Responsible Office/Partners: Nevada Irrigation District

Project Priority: High priority

Cost Estimate: $450,000

Benefits (Losses Avoided): Repairs enhance spillway integrity

Potential Funding: District Funding

Timeline: Summer 2017

Action 4. Small Reservoir Cleaning

Hazards Addressed: Water Supply Reliability, Drought & Water Shortage, Flood Control

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

Issue/Background: Small reservoirs located within the canal system are filling with sediment from continued years of use. Adequate reservoir storage is very beneficial during storms and heavy rain. As the reservoir accumulates sediment, water storage is reduced and the ability to regulate water efficiency is diminished. Reduced reservoir storage can result in upstream canal overtopping and property damage. Nevada Irrigation District has initiated a small reservoir cleaning program to alleviate this problem.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Nevada Irrigation Districts Engineering and Maintenance Departments provide oversite on these projects

Responsible Office/Partners: Nevada Irrigation District

Project Priority: Medium

Cost Estimate: Approximately $20,000 per reservoir

Benefits (Losses Avoided): Water Quality, Water storage and prevention of property damage

Potential Funding: District Funding, Grants,

Timeline: 1 to 5 years

Action 5. Community Investment Projects

Hazards Addressed: Drought & Water Shortage, Wildfire, Climate Change

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

Issue/Background: Ongoing program to install fire hydrants and to extend water & pipelines for existing neighborhoods within the NID boundary.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project oversight will be provided by the District's Engineering Department.

Responsible Office/Partners: Nevada Irrigation District

Project Priority: High priority

Cost Estimate: >$2,000,000 annually

Benefits (Losses Avoided): Extension of water lines and installation of fire hydrants increases wildfire resiliency for communities in the district.

Potential Funding: District Funding

Timeline: Ongoing

Action 6. Canal Culvert Replacement Program

Hazards Addressed: Water Supply Reliability, Climate Change, Flood Localized,

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

Issue/Background: Canal Crossings are facilitated with numerous culverts throughout the Placer County area. These culverts are often undersized, aged, and failing. During heavy rain events these culverts backup water causing flooding and overtopping of the canal upstream of the culvert. Overtopping often results in erosion of the canal berm and presents possible property damage. Nevada Irrigation District is currently engaged in a culvert replacement project aimed at resolving these issues.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Nevada Irrigation Districts Engineering and Encroachment Departments provide oversite on these projects

Responsible Office/Partners: Nevada Irrigation District and associated property owners

Project Priority: Medium

Cost Estimate: Costs vary for each culvert replacement; however, the estimated cost to replace the average large culvert is about $12,000.

Benefits (Losses Avoided): Life, Safety, and the reduction of property loss

Potential Funding: District Funding, Grants,

Timeline: 1 to 5 years

Action 7. Hazard Tree & Fire Fuel Removal

Hazards Addressed: Multi-Hazard, Wildfire, Climate Change, Landslide

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

Issue/Background: Data collected by state and federal agencies demonstrate that tree mortality has reached epidemic levels across the entire western slope of the Sierra Nevada range, which includes a large

portion of the NID sphere. This data predicts further tree mortality increases in the very near future, resulting in stands of dead/dying trees that constitute extremely dangerous levels of combustible fuels, directly contributing to the severity and scale of wildfires. The hazard trees within the area pose a significant threat to public health and safety threatening power lines, roads, evacuation corridors, infrastructure, and other existing structures. Forest conditions adjacent to Scotts Flat Reservoir and other NID reservoirs, camping facilities, operations & hydro facilities are rapidly worsening as persistent drought stress and bark beetle infestations have created increased pockets of diseased, dying and dead tree stands.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project oversight will be provided by the District's Watershed and Recreation departments.

Responsible Office/Partners: Nevada Irrigation District

Project Priority: High priority

Cost Estimate: >$1,000,000

Benefits (Losses Avoided): Reduction in catastrophic wildfire potential, loss to property and life avoided

Potential Funding: District Funding, Grants,

Timeline: 1 - 15 years