Annex I  Jackson Valley Irrigation District

I.1  Introduction

This Annex details the hazard mitigation planning elements specific to Jackson Valley Irrigation District (JVID or District), a new participating jurisdiction to the 2020 Amador County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the District. This Annex provides additional information specific to JVID, with a focus on providing additional details on the risk assessment and mitigation strategy for the JVID.

I.2  Planning Process

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

Table I-1  JVID – Planning Team

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Title</th>
<th>How Participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steven Fredrick</td>
<td>General Manager</td>
<td>Attended all LHMP meetings, completed worksheets, provided feedback on draft documents.</td>
</tr>
</tbody>
</table>

I.3  District Profile

The District profile for the JVID is detailed in the following sections. Figure I-1 displays a map and the location of the District within Amador County.
Figure I-1 JVID
I.3.1. Overview and Background

JVID provides wholesale water supply, distribution of raw water to irrigation, industrial and domestic users, distribution of bottled water to domestic users, and hydroelectric power generation. JVID has an agreement with a private company to operate the Lake Amador recreation facilities. Its recreation concessionaire operates domestic water treatment and wastewater services at Lake Amador.

JVID was formed in October of 1956 as an independent special district to provide irrigation services to the Jackson Valley area. The principal act that governs the District is the Irrigation District Law. The principal act empowers such districts to provide water “for any beneficial use” and may do any act to put to any beneficial use any water under its control. In addition, irrigation districts may provide water-related drainage services and, under certain circumstances, electric and wastewater services. Districts must apply and obtain LAFCO approval to exercise those services authorized by the principal act but not already provided by the district in 2000 (i.e., latent powers).

The JVID boundary is located in southwestern Amador County, west of the Pardee Reservoir and east of the Amador-San Joaquin County line. Lake Amador is located within the northeast portion of the District. Communities in the vicinity of JVID include Buena Vista and the Buena Vista Rancheria, Camanche Village and Camanche North Shore. The boundary of JVID encompasses the residential community of Buena Vista Estates. The District has a boundary area of approximately 13,665 acres (21 square miles). Records of the District’s boundary history include four annexations and three detachments.

I.4 Hazard Identification

JVID identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table I-2).
<table>
<thead>
<tr>
<th>Hazard</th>
<th>Geographic Extent</th>
<th>Likelihood of Future Occurrences</th>
<th>Magnitude/Severity</th>
<th>Significance</th>
<th>Climate Change Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Hazards: Severe Weather/Insect - Pests</td>
<td>Extensive</td>
<td>Likely</td>
<td>Catastrophic</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Aquatic Invasive Species</td>
<td>Extensive</td>
<td>Occasional</td>
<td>Critical</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Avalanche</td>
<td>Limited</td>
<td>Unlikely</td>
<td>Negligible</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Climate Change</td>
<td>Significant</td>
<td>Occasional</td>
<td>Limited</td>
<td>Medium</td>
<td>–</td>
</tr>
<tr>
<td>Dam Failure</td>
<td>Extensive</td>
<td>Unlikely</td>
<td>Catastrophic</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Drought &amp; Water shortage</td>
<td>Extensive</td>
<td>Likely</td>
<td>Critical</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Earthquake (large damaging/small)</td>
<td>Extensive</td>
<td>Occasional</td>
<td>Limited</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Floods: 1%/0.2% annual chance</td>
<td>Significant</td>
<td>Occasional</td>
<td>Limited</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Floods: Localized Stormwater</td>
<td>Limited</td>
<td>Likely</td>
<td>Limited</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Landslide, Mudslide, Debris Flow</td>
<td>Limited</td>
<td>Likely</td>
<td>Limited</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Levee Failure</td>
<td>Significant</td>
<td>Occasional</td>
<td>Critical</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Severe Weather: Extreme Heat</td>
<td>Extensive</td>
<td>Likely</td>
<td>Limited</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Severe Weather: Heavy Rains and Storms (Hail, Lightning)</td>
<td>Extensive</td>
<td>Likely</td>
<td>Limited</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Severe Weather: High Winds and Tornadoes</td>
<td>Extensive</td>
<td>Likely</td>
<td>Limited</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Severe Weather: Winter Storms and Freeze</td>
<td>Limited</td>
<td>Occasional</td>
<td>Limited</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Wildfire</td>
<td>Extensive</td>
<td>Occasional</td>
<td>Critical</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

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

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

**Magnitude/Severity**
- Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
- Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
- Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
- Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

**Significance**
- Low: minimal potential impact
- Medium: moderate potential impact
- High: widespread potential impact

**Climate Change Influence**
- Low: minimal potential impact
- Medium: moderate potential impact
- High: widespread potential impact
I.5  Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the District’s hazards and assess the District’s vulnerability separate from that of the Amador County Planning Area as a whole, which has already been assessed in Sections 4.2 Hazard Profiles and 4.3 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 location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the District is included in this Annex. This vulnerability assessment analyzes the property and other assets at risk to hazards ranked of medium or high significance specific to the District. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

I.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section I.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table I-2) affects the District and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Planning Area.

I.5.2. Vulnerability Assessment and Assets at Risk

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

Assets at Risk and Critical Facilities

This section considers the JVID’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 LHMP Update. Critical facilities are defined for this Plan as:

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

A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-Risk Populations Facilities, and (3) Hazardous Materials Facilities, as discussed in Section 4.3.1 of the Base Plan.
Table I-3 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. JVID’s physical assets, valued at over $72 million, consist of the buildings and infrastructure to support the District’s operations.

Table I-3 JVID Critical Facilities, Infrastructure, and Other District Assets

<table>
<thead>
<tr>
<th>Name of Asset</th>
<th>Facility Type</th>
<th>Replacement Value</th>
<th>Which Hazards Pose Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam</td>
<td>Earth Fill Reservoir Storage</td>
<td>$50,000,000</td>
<td>Earthquake, Dam Failure</td>
</tr>
<tr>
<td>Transmission, Piping, Outlet Works</td>
<td>Water Transmission</td>
<td>$15,000,000</td>
<td>Earthquake, Dam Failure, Aquatic Invasive Species, Freezing</td>
</tr>
<tr>
<td>Spillway</td>
<td>Water / Flood releases</td>
<td>$2,000,000</td>
<td>Flood</td>
</tr>
<tr>
<td>Power House</td>
<td>Power Generation</td>
<td>$1,300,000</td>
<td>Dam Failure, Drought, Aquatic Invasive Species</td>
</tr>
<tr>
<td>Irrigation Pump Station</td>
<td>Water Transmission</td>
<td>$150,000</td>
<td>Levee Failure</td>
</tr>
<tr>
<td>Water Treatment Plant</td>
<td>Domestic Water Production</td>
<td>$2,500,000</td>
<td>Dam Failure, Drought, Severe Weather, Aquatic Invasive Species</td>
</tr>
<tr>
<td>Admin Office and Shop</td>
<td>Governmental Administration</td>
<td>$1,200,000</td>
<td>Earthquake, Drought, Severe Weather, Agriculture Hazards</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$72,150,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: JVID

There is estimated to be about 400 homes within the service area of JVID. Within the immediate JVID facility there is an Earth fill Dam, Outlet works/piping, Spillway Structure, Powerhouse w/ (4) generators, water treatment plant w/ 200,000-gallon tank, and Administration office.

**Natural Resources**

JVID has a variety of natural resources of value to the District. These natural resources parallels that of Amador County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

**Historic and Cultural Resources**

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

**Growth and Development Trends**

General growth in the District parallels that of Amador County as a whole. Information can be found in Section 4.3.1 of the Base Plan.
Being a primarily agriculture zone there has not been much growth or development within the District itself. Most of the parcels are 5 acres to 100+ acre parcels that are used for small to large ranching and farming activities. There has been some development nearby which has increase traffic flows through the District to a new Harrah’s Casino that was completed in 2019. There is also another small proposed development of a 50+ spot R.V. Park less than 2/3rds of mile downstream of Lake Amador in the inundation area. Not sure of the likelihood of the project actually occurring but just of recently they have approached the County Planning Department for a request in zoning change to move forward with this development. The project is a conversion of a gravel quarry to R.V. park that could increase vulnerability and some concerns for JVID operations because of the increased population in the inundation zone that JVID as the dam owner would have to mitigate for.

There is a low-income community (The Oaks Community Association) located in the JVID service area, that JVID supplies treated water to that consists of 210 mobile / manufactured homes. Also, the Buena Vista community is downstream from the JVID facility within the immediate dam inundation area that is comprised of about 5-10 homes that is less than 1 mile from the dam.

Future Development

The District has no control over future development in areas the District provides water in. Future development in these areas parallels that of Amador County. More general information on growth and development in Amador County as a whole can be found in “Growth and Development Trends” in Section 4.3.1 Amador County Vulnerability and Assets at Risk of the Base Plan.

1.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table I-2 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Amador County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

An estimate of the vulnerability of the District to each identified priority hazard, in addition to the estimate of likelihood of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

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

➢ **Extremely High**—Very widespread with catastrophic impact.

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

**Agricultural Hazards: Severe Weather/Insects and Pests**

**Likelihood of Future Occurrence**—Likely

**Vulnerability**—High

**Hazard Profile and Problem Description**

According to the USDA and County Agricultural Commissioner, agricultural losses generally occur on an annual basis and are often associated with severe weather events, including heavy rains, floods, heat, and drought. The 2018 State of California Multi-Hazard Mitigation Plan attributes most of the agricultural disasters statewide to drought, freeze, and insect infestations. Other agricultural hazards include fires, heavy rains, flooding, crop and livestock disease, and noxious weeds.

In addition to severe weather, invasive species can affect the agricultural industry in the County. Invasive species are organisms that are introduced into an area beyond their natural range and become a pest in the new environment. This hazard addresses the issues related to severe weather and invasive species that pose a significant threat to the agricultural industry and are therefore a concern in the Amador County Planning Area. This hazard does not address pest and plants that cause impacts to human health, as those issues are addressed in other planning mechanisms in the County.

Jackson Valley Irrigation District provides irrigation water to many types or crops including approximately; 300 acres of Alfalfa, 200 acres of Nut Trees, 400 acres of Grapes, 50 acres of miscellaneous vegetables, and 2,800 acres of irrigated pasture. Drought & water shortage, severe weather, climate change, and invasive pests are all specific concerns that JVID has when it comes to crop production.

**Location and Extent**

Severe weather events that can affect agriculture are often regional events (droughts, wind, freeze, heavy rains, and extreme heat). The entirety of the agriculture producing areas of the County are at risk to these severe weather events. The speed of onset varies. Winds, freeze, extreme heat, and heavy rains can have short onset speeds, the onset of drought is much longer. Duration of events varies as well, with longer durations possible for drought and extreme temperatures and shorter durations for winds and heavy rains.

Insects and pests can affect areas and can vary between being localized or regional events. Speed of onset of insects is often short, though this can vary depending on the type of insect infestation occurs. Duration of these events varies as well. Insects often have shorter lifespans, but can reproduce multiple times. If these insects are not controlled, they can affect large areas of land in the County.
Past Occurrences

The District noted that agriculture events occur yearly, though with varying levels of damages to a variety of crops. The most recent notable event was the 2014 drought where JVID had to allocate water which in consequence reduced crop production in some cases up to 50% due to the lack of water. There was a handful of farming operations that completely fallowed fields and elected to not even take water. The financial damage it caused the district was it took nearly two years before those irrigators to go back into production because of the drought.

Vulnerability and Impacts from Agricultural Hazards

According to the USDA, every year natural disasters, such as droughts, extreme heat and cold, floods, fires, earthquakes, hail, landslides, and tornadoes, challenge agricultural production. Because agriculture relies on the weather, climate, and water availability to thrive, it is easily impacted by natural events and disasters. Given the importance of agriculture to the District and Amador County, agricultural hazards continue to be an ongoing concern. The primary causes of agricultural losses in the District are severe weather events, such as drought, freeze, and extreme heat; insect/pest infestations; and noxious weeds.

JVID includes alfalfa, nut trees (walnuts), grapes, vegetables (corn, row crops), and pasture. Drought and lack of water is the biggest concern for the district when it comes to operation. Severe weather such as freezing, extreme heat and invasive pests can be hazards that are a concern for perennial crops (trees, grapes) that can have a large investment and be compromised in one season due to the unforeseen hazards. Row crops and Pasture being more of annual crop is less vulnerable to the long-term impacts of from agriculture hazards but is still a large concern for the district because of the financial impacts to the not only the district but the County itself.

Assets at Risk

Agricultural hazards; drought & water shortage, severe weather, invasive plants, invasive pests directly impact the financial wellbeing of the district and the asset directly impacted would be the administration office and internal operations and functionality of JVID.

Future Development

JVID cannot do much to mitigate for agricultural hazards when it comes to future development besides implementing best management practices for water efficiently and proper maintenance of the existing facility and distribution system to ensure a reliable consistent water source. JVID is always considering building more water storage to mitigate drought concerns but it is extremely expensive in today’s environmental and governmental climate.
Aquatic Invasive Species

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Hazard Profile and Problem Description

Invasive species are organisms that are introduced into an area beyond their natural range and become a pest in the new environment. The terms: Marine Invasive Species and Non-native Aquatic Species (NAS) are used interchangeably. This hazard considers the economic, environmental, and other issues related to invasive pests of a marine and freshwater nature, particularly euryhaline organisms. These are species having the ability to tolerate a wide range of salinity and can transition in and out of fresh and saltwater.

Currently there are no known aquatic invasive species in the District. JVID does monitor along with California Fish and Wildlife for the Quagga and Zebra Mussel in Lake Amador but to date none have been found. Invasive plant species, algae and hydrogen sulfides from bacteria present in the reservoir are a concern that the District monitors closely and can affect the operation of the District.

Location and Extent

All freshwater lakes, streams, and rivers in Amador County are potentially at risk from aquatic invasive species. There is no established scale for aquatic invasive species. Magnitude is measured by the presence and counts of aquatic invasive species in waterways in the District and Amador County. Speed of onset of these invasive species is short, as it only takes a careless resident or visitor to accidentally introduce an invasive species. However, the impacts associated with the introduction of a new invasive species can last years.

Past Occurrences

The HMPC was able to find no past occurrences that affected the District. No past occurrences regarding invasive aquatic animal species, there have been occasional problems with invasive plant or algae and annual issues with hydrogen sulfide gas from bacteria in the reservoir.

Vulnerability to and Impacts from Aquatic Invasive Species

Once introduced, aquatic invasive species have the ability to tolerate a wide range of conditions and are extremely adaptable, creating environmental imbalances and wreaking economic havoc. Once they have infected a water body, they are difficult to eradicate. They can readily spread into downstream waters. Examples include the zebra mussel infestation in the Great Lakes and the propagation of water hyacinth in the California Delta. Quagga and zebra mussels are an invasive, non-native species that breed very fast, have no known predators, and can quickly colonize new areas within California waters. Once established, these mussels can clog water intake and delivery pipes; dam intake gates and pipes; adhere to boats, pilings, and most hard and some soft substrates, and litter beaches and shores with jagged, foul smelling shells. Both the zebra mussel and the quagga mussel are concerns for California, Amador County, and the District. These mussels have not affected the waters in Amador County yet, but are still a cause for concern. A local bull frog is also a concern to the aquatic systems within the County.
Some of California’s most serious weed problems occur in waterways, lakes and streams. The aquatic plant hydrilla is considered one of the most serious aquatic weed problems in the world and the California Department of Food and Agriculture (CDFA) maintains an intensive program to survey and eradicate this aquatic weed pest. It can quickly take over lakes and streams, crowding out native animals and plants and blocking hydroelectric plants, while impeding water flow and delivery. Its rapid growth and ease of spread by boats makes it critical to detect early and eradicate.

The most serious measurable economic impacts associated with aquatic invasive species are suffered by communities, water districts and other users of water who may have increased maintenance costs due to plugged water pipes, intake screens, and possible damage to pumps and other equipment. It even impacts citizens through increased costs for drinking water and food prices passed along to consumers by the water and agriculture industries brought on by their increased costs in maintenance and equipment repair. It impacts the local fisheries, and in some lakes, has caused a collapse in the populations of sport fish.

If the Quagga or Zebra Mussel was able to establish in the Lake Amador it would cause severe damage to the infrastructure. An invasive species like the mussel or plant species could cause damage the dam outlet works, valves, piping, and generators to the point they would not function properly which could lead to catastrophic failure. On a seasonal basis during lake turnover JVID deals with a large amount of hydrogen sulfide gas in the water at levels that can kill fish. This greatly impacts the two fish raising operations below the dam on an annual basis sometimes impacting a large number of fish depending on the levels.

**Assets at Risk**

Assets at risk would include the transmission system, dam outlet works, piping, valves, powerhouse generators and water treatment plant.

**Future Development**

There is not much JVID can do to mitigate the aquatic invasive species besides monitor and address the problem as it arises. This could include cleaning screens more often or implement chemical agents to mitigate problems. This hazard would not dictate how future development would occur but could impact operation procedures.

**Climate Change**

**Likelihood of Future Occurrence**–Occasional

**Vulnerability**–Medium

**Hazard Profile and Problem Description**

Climate change adaptation is a key priority of the State of California. The 2018 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 Amador County and the District, 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. Depending on the severity of extremely dry verses extremely wet consequences of Climate Change the District could be impacted in different ways. Dry would exacerbate the drought concerns which would impact the district financially and wet consequences would focus more on the flood hazard and damages that could occur to the assets such as the dam, spillway and pumping stations.

**Location and Extent**

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

**Past Occurrences**

Climate change has never been directly linked to any declared disasters. While the District noted that climate change is of concern, no specific impacts of climate change could be recalled. The District and HMPC members noted that the strength of storms does seem to be increasing and the temperatures seem to be getting hotter.

**Vulnerability to and Impacts from 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. California’s APG: Understanding Regional Characteristics has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Amador 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. This information can be used to guide climate adaptation planning in the District and Amador County Planning Area.

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Sierra region in which the Amador County Planning Area is part of:

- Temperature increases
- Decreased precipitation
- Reduced snowpack
- Reduced tourism
- Ecosystem change
- Sensitive species stress
➢ Water temperature increase (potential for increase in bacteria and invasive plant species)
➢ Increased wildfire

Assets at Risk

The District noted that its facilities will most likely not be at risk from climate change.

Future Development

Future development of District facilities is unlikely to be affected by climate change.

Dam Failure

Likelihood of Future Occurrence—Unlikely
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 or fail. Overtopping is the primary cause of earthen dam failure in the United States.

Location and Extent

Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, a total dam failure would most probably happen as a consequence of the natural disaster triggering the event, such as an earthquake. There is no scale with which to measure dam failure. However, Cal DWR Division of Safety of Dams (DOSD) assigns hazard ratings to dams within the State that provides information on the potential impact should a dam fail. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in four categories that identify the potential hazard to life and property: Low, Significant, High, and Extremely High. These were discussed in more detail in Section 4.2.10 of the Base Plan.

While a dam may fill slowly with runoff from winter storms, a dam break has a very quick speed of onset. The duration of dam failure is generally not long – only as long as it takes to empty the reservoir of water the dam held back. The District would be affected for as long as the flood waters from the dam failure took to drain downstream.

Maps showing the available DSOD and Cal OES inundation areas and how the intersect the District boundaries are shown on Figure I-2 (for extremely high hazard dams) and Figure I-3 (for high hazard dams).
Figure I-2 JVID - Extremely High Hazard Dam Inundation Areas
Figure I-3 JVID - Extremely High Hazard Dam Inundation Areas
The District also noted that, while inundation data was not available, the following dams are also a concern to the District. The North Spillway Dam of Pardee Reservoir located roughly 1 mile upstream of Lake Amador. The Lake Tabeaud dam and reservoir located roughly 15 miles upstream on the Jackson Creek. There are also several other small dams that store water or mine tailings located throughout the watershed above Lake Amador. The mine tailing dams around the City of Jackson pose and environmental risk due to the fact some of these dams were constructed 100 plus years ago and if they fail could send arsenic laden and highly toxic contaminated soil into Lake Amador.

**Past Occurrences**

The District noted no dam failure occurrences that have affected the District.

In January and February of 2017, Lake Amador Dam suffered erosion in the spillway. 5,000 cfs plus flowed over the Lake Amador Spillway and heavy stormwater runoff on dam face. Considerable erosion took place in our downstream spillway area due to high spill flows from the Jackson Creek. There was also some residual damage to the concrete sill and apron that this event contributed to where some additional concrete reinforcement had to be done to protect the sill from future damage. There was also some superficial erosion to the dam face from stormwater runoff. JVID received Approximately $225,000 of FEMA funding to repair and mitigate the eroded areas that were damage from the large storm event.

**Vulnerability to and Impacts from Dam Failure**

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. Impacts to the District from a dam failure flood include loss of life and injury, flooding and damage to property and structures, damage to critical facilities and infrastructure, loss of natural resources, and all other flood related impacts. Additionally, mass evacuations and associated economic losses can also be significant.

The small community of Buena Vista less than 1 miles downstream could see losses of houses and or lives. It would be very hard for JVID to recover from a dam failure as the costs to rebuild would be insurmountable.

**Assets at Risk**

Assets at risk include the dam, water transmission system, hydro plant, and water treatment plant raw water source.

**Future Development**

Mitigation measures to educate and inform the public of the potential consequences of a dam failure within the inundation area and create evacuation plans and notification systems for such of an event. This Dam Failure hazard is considered a minimal risk and most likely will not affect future development.

**Drought & Water Shortage**

**Likelihood of Future Occurrence**–Likely
Vulnerability—High

Hazard Profile and Problem Description

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

Location and Extent

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

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

Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time, which does not usually affect water shortages and for longer periods. Should a drought last for a long period of time, water shortage becomes a larger issue. Current drought conditions in the District and the County are shown in Section 4.2.11 of the Base Plan.

Past Occurrences

Since drought is a regional phenomenon, past occurrences of drought for the District are the same as those for the County and includes 5 multi-year droughts over an 85-year period. Details on past drought occurrences can be found in Section 4.2.11 of the Base Plan.

The District did note that there were large impacts during the 2014 drought event. Information provided from a study on drought impacts to the Amador Water Agency and JVID are discussed below:

In January 2014, the California Department of Public Health (CDPH) announced 17 water agencies and towns in California that were at severe risk of drinking water shortages due to the drought. Based on surveying the State’s community water systems, CDPH compiled the list of communities that could face severe impacts within 60 to 100 days of the announcement if no actions were taken to supplement supplies. JVID, which serves 1,800 acres along Jackson Creek owned by farmers and ranchers in Amador County, was included on the list.
JVID provides wholesale water supply; distributes raw water for agricultural irrigation and fish farms, as well as industrial and domestic uses; distributes bottled water to domestic users; and generates hydropower in southwestern Amador County. It serves primarily agricultural and rural customers in the area between Lake Amador and Lake Camanche. JVID provides irrigation water to the farms and ranches in Jackson Valley and is the only source of water for dozens of homes, including those in the Oaks Mobile Home Park in Buena Vista, a severely disadvantaged community with a median household income (MHI) just 52% of California’s statewide MHI. The primary agricultural activity in JVID includes alfalfa, walnuts, vineyards, and pasture, and most of the water JVID supplies is used for irrigation. The 2008 Municipal Service Review (MSR) for Amador County states that JVID’s surface water use averages 2 acre-feet (AF) per acre, per year. Given this estimation, JVID provides about 8,382 AF per year for irrigation uses.

JVID receives most of its water from surface water sources, such as Jackson Creek and the Mokelumne River. JVID has rights to store up to 36,000 AF of flows from Jackson Creek and divert 3,850 AF of flows from the Mokelumne River (but no storage is currently in place). JVID’s water rights on the Mokelumne River are subject to reversion and substitution with recycled water, and the flows from Jackson Creek contain 5% wastewater effluent about 30% of the time. The lack of diversity and the unpredictable nature of its water rights leaves JVID’s water supply highly vulnerable, especially in light of the current drought.

According to the 2014 MSR for Amador County, JVID is not meeting existing drinking water or agricultural demands for the areas it serves. On January 27, 2014 JVID made a formal request to purchase water from AWA to help offset the shortfall as a result of the severe drought impacts. AWA staff and its Drought Ad Hoc committee met several times and agreed to provide JVID up to 5,000 acre-feet of water this summer and fall to get them through this challenging time and allow the farmers and ranchers to save their growing season.

Farms were affected by the drought some fellowed fields and took several years to go back into production. There was financial damage to the District for lost revenue and the District had to implement emergency rates, purchase water and pull from reserve funds to survive the impacts of the drought.

Vulnerability to and Impacts from Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including the District, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. All JVID customers are vulnerable to droughts and the impacts.

Assets at Risk

The powerhouse and lack of water during a drought impacts the District’s budget. The Water Treatment Plant is affected by droughts due to lack of water and having to purchase or pump water from different sources. Also the administration of the District is impacted due to lack of revenue.

Future Development

There is no way to plan for future developments and droughts besides being conservative and efficient with the water and putting in place agreements to purchase more water or increase storage.
Earthquake (large damaging/small)

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. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. The degree of damage depends on many interrelated factors. Among these are: the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction.

Location and Extent

Since earthquakes are regional events, the whole of the District is at risk to earthquake. JVID and the surrounding area are at limited risk from significant seismic and geologic hazards. There are no known or inferred active faults within the District. However, should an earthquake occur, impacts to JVID facilities, such as the dam and water systems could be significant.

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake’s magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales, as discussed in Section 4.2.12 of the Base Plan. The closest known source of large earthquakes is the Sierra Frontal Fault System along the eastern margin of the Sierra Nevada, which includes the Carson Valley Fault. This fault is located within a few miles of the eastern border to the County and has been evaluated as being able to generate earthquakes that produce levels of damage up to VII on the Mercalli Scale (equivalent to 5.5 to 6.5 on the Richter Scale). During a Mercalli VII, most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. The District is located in an area where few earthquakes of significant magnitude occur, so both magnitude and intensity of earthquakes are expected to remain low. Seismic shaking maps for the area show Amador County and the District fall within a low to moderate shake risk.

Past Occurrences

The District noted no past occurrences of earthquakes or that affected the District in any meaningful way.
Vulnerability to and Impacts from Earthquake

The combination of plate tectonics and associated California coastal mountain range building geology generates earthquake as a result of the periodic release of tectonic stresses. Amador County’s mountainous terrain lies in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the California north coastal mountain region. Both the San Andreas Fault and the Sierra Frontal System faults poses possibly significant impacts to Amador County and the District as they have the capabilities of producing a quake.

Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault; however, liquefaction can occur further from the source of the earthquake. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. Manufactured housing is very susceptible to damage because their foundation systems are rarely braced for earthquake motions. Locally generated earthquake motions and associated liquefaction, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry (URM) and soft story buildings. There are no URM or soft story buildings owned by the District.

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

Impacts from earthquake in the District will vary depending on the fault that the earthquake occurs on, the depth of the earthquake strike, and the intensity of shaking. Large events could cause damages to infrastructure, critical facilities, residential and commercial properties, and possible injuries or loss of life. Lake Amador Dam is vulnerable to an earthquake but according to the District the earthquake must be very large and direct to cause any failure of the dam. There have been engineering studies and reports on this subject and all analysis concludes that the facility is at minimal risk for earthquake.

Assets at Risk

Due to the regional effects of an earthquake, a Hazus earthquake analysis was performed on a countywide basis. This can be found in Section 4.3.9 of the Base Plan. While these runs were not done specific to the District, maps showing damage in the County show greater areas of damage near the District in the County. The deterministic 6.7 Hayward Fault run showed minimal damage to the County. The probabilistic 6.7 scenario showed significant damages, many of which would occur in or near the District service territory.

Earthquakes are a large concern for any dam owner, this is one hazard that could compromise the dam. The dam and transmission system could be impacted by an earthquake by compromising or breaking the structures. The administrative part of the district would also be impacted because if a dam failure or large break happened to the water transmission system it would be hard for the district to finically to recover.
Future Development

Future development within the inundation area of a dam failure could be impacted or mitigation measure would have to be in place to ensure the safety to the downstream public.

**Flood: 100-/500-Year**

**Likelihood of Future Occurrence**–Occasional/Unlikely  
**Vulnerability**–Medium

Hazard Profile and Problem Description

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

As previously described in Section 4.2.13 of the Base Plan, the Amador County Planning Area and the JVID have been subject to historical flooding. JVID is traversed by several stream systems and is at risk to the 1% annual chance flood.

**Location and Extent**

The JVID has areas located in the 1% annual chance floodplain. This is seen in Figure I-4.
Figure I-4 JVID – FEMA DFIRM Flood Zones
Table I-4 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District.

**Table I-4 JVID– DFIRM Flood Hazard Zones**

<table>
<thead>
<tr>
<th>Flood Zone</th>
<th>Description</th>
<th>Flood Zone Present in the District</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100-year Flood: No base flood elevations provided</td>
<td></td>
</tr>
<tr>
<td>AE</td>
<td>100-year Flood: Base flood elevations provided</td>
<td>X</td>
</tr>
<tr>
<td>AE Floodway</td>
<td>1% annual chance flood: Regulatory floodway; Base flood elevations provided</td>
<td></td>
</tr>
<tr>
<td>Shaded X</td>
<td>500-year Flood: The areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood</td>
<td>X (unshaded)</td>
</tr>
<tr>
<td>X (unshaded)</td>
<td>No flood hazard</td>
<td>X</td>
</tr>
</tbody>
</table>

Source: FEMA

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

**Past Occurrences**

A list of state and federal disaster declarations for Amador County from flooding is shown on Table I-5. These events also likely affected the District to some degree.

**Table I-5 Amador County – State and Federal Disaster Declarations from Flood 1950-2019**

<table>
<thead>
<tr>
<th>Disaster Type</th>
<th>Federal Declarations</th>
<th>State Declarations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>Years</td>
<td>Count</td>
</tr>
</tbody>
</table>

Source: Cal OES, FEMA

JVID noted that it seems to be once in every 20 -30-year event where flows over 5,000 cfs occur. The last occurrence was 1997. It will most likely happen again the same if not worse in the future.

In January and February of 2017, Lake Amador Dam suffered erosion in the spillway. 5,000 cfs plus flowed over the Lake Amador Spillway and heavy stormwater runoff on dam face. Considerable erosion took place in our downstream spillway area due to high spill flows from the Jackson Creek. There was also some residual damage to the concrete sill and apron that this event contributed to where some additional concrete reinforcement had to be done to protect the sill from future damage. There was also some superficial erosion to the dam face from stormwater runoff. JVID received Approximately $225,000 of FEMA funding to repair and mitigate the eroded areas that were damage from the large storm event.
During the same event, a creek bank/levee failed next to a farmer’s field and the creek jumped its banks and damaged a creek pumping station operated by JVID due to high stream flows. The District had to remove debris regrade and replant irrigated pasture field. Impacted farmer but minimal for the irrigation district beside having to clean out debris, mud and sand from heavy flows around pump station. JVID received approximately $75,000 of FEMA funding to repair and mitigate the damaged Levee due to damage from the large storm event.

**Vulnerability to and Impacts from Flood**

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

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

JVID deals with high flows over spillway that can create hillside erosion downstream. During the 2017 storm events the District experienced considerable erosion to the downstream area below the spillway. JVID applied for FEMA funding to add protection to these areas using concrete. During high flows we also deal with debris such as downed trees and vegetation flowing in the creek channel that plug up culverts and can cause damage to roads. During the stormwater even we experienced damage to the face of Lake Amador Dam an earth fill structure were the flows eroded channels in the dam itself. Although primarily superficial FEMA funded a project to mitigate this damage by installing large rip-rap in the eroded areas to slow down the stormwater runoff and protect the dam face.
Assets at Risk

The spillway structure is a concern for flooding and the ability to function correctly under large flooding conditions.

Future Development

JVID can only construct and build mitigation such as reinforcing spillway structure with additional concrete and or rip-rap.

Levee Failure

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Hazard Profile and Problem Description

A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower stream channel, levees can also increase the speed of the water. Levees can be natural or man-made. A natural levee is formed when sediment settles on the stream bank, raising the level of the land around the stream.

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, not eliminate, the risk to individuals and structures located behind them. A levee system failure or overtopping can create severe flooding and high water velocities. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation and root systems and other factors that compromise the integrity of the levee. No levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

JVID does have a small section of levee that it maintains as part of pumping station operation on the Jackson Creek. This is used to control the flow of water down the Jackson Creek and protect nearby farmers’ fields. JVID in 2017 completed some mitigation by installing rip rap and rebuilding a portion of the levee with compacted soils due to a failure in the 2017 storm events.

Location and Extent

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District are not known. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of levee failure risk times can be hours to weeks, depending on the river flows that the levee holds back. The HMPC noted that when northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees.
Past Occurrences

The District Planning Team noted levee failure at the District’s Jackson Creek Pumping Station has failed twice once in 1997 and again in 2017 due to heavy stream flows.

Vulnerability to and Impacts from Levee Failure

A levee failure can range from a small, uncontrolled release to a catastrophic failure. Levee failure flooding can occur as the result of prolonged rainfall and flooding. The primary danger associated with levee failure is the high velocity flooding of those properties outside and downstream of the breach.

Should a levee fail, some or all of the area protected by the levees would be at risk to flooding. Impacts from a levee failure include property damage, critical facility damage, and life safety issues. Business and economic losses could be large as facilities could be flooded and services interrupted. School and road closures could occur. Road closures would impede both evacuation routes and ability of first responders to quickly respond to calls for aid. Other problems connected with levee failure flooding include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

The Districts pumping station would be impacted and inoperable in the event of a levee failure. It could be estimated that about 700 acres of irrigated land would be affected if the pump station was out of operation. This could have major negative impacts to the irrigation revenue of the District.

Assets at Risk

The Jackson Creek Pumping Station is reliant to the Jackson Creek levees to function properly.

Future Development

Future development is not impacted by this levee because in the event of failure it is mostly irrigated pasture and fields that are impacted.

Severe Weather: Winter Storms and Freeze

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

Hazard Profile and Problem Description

According to the National Weather Service), extreme cold often accompanies a winter storm or is left in its wake. Winter snowstorms can include heavy snow, ice, blizzard conditions, and cold temperatures. Freezing temperatures can also occur without the accompanying winter storm.

The District noted no snow events, but hard freezes are concern because temperature below 20°F are uncommon and in such of an event, we do not have mitigation in place to protect for hard freezes. This could impact pumps, pipes, generators and the general functionality of moving water because of freezing.
Location and Extent

Winter storms and freeze are regional issues, meaning the entire District is at risk to freeze and winter storm. While there is no scale (i.e. Richter, Enhanced Fujita) to measure the effects of freeze, temperature data from the County from the WRCC indicates that there are 21.8 days that fall below 32°F in western Amador County. Freeze has a slow onset and can be generally be predicted in advance for the County. Freeze events can last for hours (in a cold overnight), or for days to weeks at a time. Snowfall often accompanies storms in the upper elevations of the County is measured in snow depths. It is rare for snow to fall in the District, and even rarer that snow accumulates in the District. Snowfall has an onset that is similar to freeze.

Past Occurrences

The District noted that freeze and winter storm is a regional phenomenon; events that affected the lower elevations of the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.2.5.

JVID has experienced a few hard freezes where exposed pipes, pumps, etc. have been destroyed by cracking or freezing no specific storm or event.

Vulnerability to and Impacts from Severe Weather: Freeze and Winter Storms

The District experiences temperatures below 32 degrees during the winter months. The temperature moves to the teens in rather extreme situations. Freeze can cause injury or loss of life to residents of the District. While it is rare for buildings to be affected directly by freeze, damages to pipes that feed building can be damaged during periods of extreme cold. Extreme cold and freeze can affect critical facilities and infrastructure, down trees, break pipes, and can be a life safety issue. When extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption of utilities and critical services. Occasionally, winter storms with snow and ice can affect the District. Transportation networks, communications, and utilities infrastructure are the most vulnerable physical assets in the District. The ability for the District to continue to operate during periods of winter storm and freeze is paramount.

Assets at Risk

Transmission system in the District and anything that moves water that is exposed to the freezing can be at risk.

Future Development

In preparation to heavy freezing conditions JVID can only temporarily mitigated the problem by installing insulation, heat tape, or heaters in pump station buildings and powerhouse to ensure the freezing does not occur.
Wildfire

Likelihood of Future Occurrence – Occasional
Vulnerability – Medium

Hazard Profile and Problem Description

Wildland fire is an ongoing concern for the JVID. Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of the ecosystem. Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Historically, the fire season extends from early spring through late fall of each year during the hotter, dryer months; however, in recent years, the risk of wildfire has become a year around concern. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. While wildfire risk has predominantly been associated with more remote forested areas and wildland urban interface (WUI) areas, significant wildfires can also occur in more populated, urban areas.

Location and Extent

Wildfire can affect all areas of the District. CAL FIRE has estimated that the risk varies across the District and has created maps showing risk variance. Following the methodology described in Section 4.3.16 of the Base Plan, wildfire maps for the JVID were created. Figure I-5 shows the CAL FIRE FHSZ in the District. As shown on the maps, FHSZs within the District range from mostly moderate to areas of high and very high.
Figure I-5 JVID – FHSZs
Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on acres burned. Fires can have a quick speed of onset, especially during periods of drought or during hot dry summer months. Fires can burn for a short period of time, or may have durations lasting for a week or more.

**Past Occurrences**

A list of state and federal disaster declarations for Amador County from wildfire is shown on Table I-5. These events also likely affected the District to some degree.

**Table I-6 Amador County – State and Federal Disaster Declarations from Wildfire 1950-2019**

<table>
<thead>
<tr>
<th>Disaster Type</th>
<th>Federal Declarations</th>
<th>State Declarations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Years</td>
</tr>
<tr>
<td>Fire</td>
<td>1</td>
<td>2015</td>
</tr>
</tbody>
</table>

Source: Cal OES, FEMA

**Vulnerability to Wildfire**

The wildfire hazard is one of the highest priority hazards in the County and District, and is the hazard with the greatest potential for catastrophic loss. High fuel loads in the County and Cities, 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. The more urbanized areas within the County are not immune from fire. 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 County and District, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

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

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

Impacts of wildfire would be potential crops or land taken out of production or facilities damaged during the event.

**Assets at Risk**

The District noted that the powerhouse, water treatment plant, and any exposed water transmission plumbing that could be damaged by fire.

**Future Development**

JVID is an asset to fire protection by providing fire hydrants throughout the District for fighting local fires. There are 20 hydrants throughout the service area that the local fire department has the ability to access to fight fires.

### I.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.

#### I.6.1. Regulatory Mitigation Capabilities

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

<table>
<thead>
<tr>
<th>Plans</th>
<th>Y/N</th>
<th>Year</th>
<th>Does the plan/program address hazards?</th>
<th>Does the plan identify projects to include in the mitigation strategy?</th>
<th>Can the plan be used to implement mitigation actions?</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Plan</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Improvements Plan</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Development Plan</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Emergency Operations Plan</td>
<td>Y</td>
<td></td>
<td></td>
<td>JVID has an Emergency Action Plan for Dam Failure</td>
<td></td>
</tr>
<tr>
<td>Continuity of Operations Plan</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Plan</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stormwater Management Plan/Program</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Studies for Streams</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### I.6.2. Administrative/Technical Mitigation Capabilities

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

#### Table I-8 JVID’s Administrative and Technical Mitigation Capabilities

<table>
<thead>
<tr>
<th>Administration</th>
<th>Y/N</th>
<th>Describe capability</th>
<th>Is coordination effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Commission</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mitigation Planning Committee</td>
<td>N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)  N
Mutual aid agreements  N
Other  N

<table>
<thead>
<tr>
<th>Staff</th>
<th>Y/N</th>
<th>FT/PT</th>
<th>Is staffing adequate to enforce regulations?</th>
<th>Is staff trained on hazards and mitigation?</th>
<th>Is coordination between agencies and staff effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Building Official</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floodplain Administrator</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Manager</td>
<td>Y</td>
<td></td>
<td>General Manager, trained in hazard mitigation and between agencies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Planner</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Engineer</td>
<td>Y</td>
<td></td>
<td>JVID uses a total of 3 different engineering firms for different purposes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIS Coordinator</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Technical

| Warning systems/services (Reverse 911, outdoor warning signals) | Y   | JVID uses the Sheriff’s office Code Red phone system. |
| Hazard data and information                                       | N   |                                                   |
| Grant writing                                                    | Y   | JVID General Manager has written and applied for several grants and JVID has used outside help to grant write. |
| Hazus analysis                                                   | N   |                                                   |
| Other                                                             |     |                                                   |

How can these capabilities be expanded and improved to reduce risk?

Public outreach would reduce risk.

Source: JVID

I.6.3. Fiscal Mitigation Capabilities

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

**Table I-9 JVID’s Fiscal Mitigation Capabilities**

<table>
<thead>
<tr>
<th>Funding Resource</th>
<th>Access/Eligibility (Y/N)</th>
<th>Has the funding resource been used in past and for what type of activities?</th>
<th>Could the resource be used to fund future mitigation actions?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital improvements project funding</td>
<td>Y</td>
<td>Small budget to incorporate improvement projects annually</td>
<td></td>
</tr>
<tr>
<td>Authority to levy taxes for specific purposes</td>
<td>Y</td>
<td>We have the ability to assess JVID members</td>
<td></td>
</tr>
<tr>
<td>Fees for water, sewer, gas, or electric services</td>
<td>Y</td>
<td>Water fees are collected by the District</td>
<td></td>
</tr>
</tbody>
</table>
### 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?

<table>
<thead>
<tr>
<th>Funding Resource</th>
<th>Access/Eligibility</th>
<th>Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact fees for new development</td>
<td>N</td>
<td>JVID has used FEMA and USDA Grants in past.</td>
</tr>
<tr>
<td>Storm water utility fee</td>
<td>N</td>
<td>JVID has used Prop. 50 and Prop. 1 water bond grants for projects.</td>
</tr>
<tr>
<td>Incur debt through general obligation bonds and/or special tax bonds</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Incur debt through private activities</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Community Development Block Grant</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Other federal funding programs</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>State funding programs</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Impact fees for new development</strong></td>
<td><strong>N</strong></td>
<td><strong>JVID has used FEMA and USDA Grants in past.</strong></td>
</tr>
<tr>
<td><strong>Storm water utility fee</strong></td>
<td><strong>N</strong></td>
<td><strong>JVID has used Prop. 50 and Prop. 1 water bond grants for projects.</strong></td>
</tr>
<tr>
<td><strong>Incur debt through general obligation bonds and/or special tax bonds</strong></td>
<td><strong>N</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Incur debt through private activities</strong></td>
<td><strong>N</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Community Development Block Grant</strong></td>
<td><strong>N</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Other federal funding programs</strong></td>
<td><strong>Y</strong></td>
<td><strong>JVID has used FEMA and USDA Grants in past.</strong></td>
</tr>
<tr>
<td><strong>State funding programs</strong></td>
<td><strong>Y</strong></td>
<td><strong>JVID has used Prop. 50 and Prop. 1 water bond grants for projects.</strong></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**How can these capabilities be expanded and improved to reduce risk?**

Using additional grant funds once a project is identified as beneficial could reduce risk.

Source: JVID

### I.6.4. Mitigation Education, Outreach, and Partnerships

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

**Table I-10 JVID’s Mitigation Education, Outreach, and Partnerships**

<table>
<thead>
<tr>
<th>Program/Organization</th>
<th>Yes/No</th>
<th>Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Natural disaster or safety related school programs</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>StormReady certification</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Firewise Communities certification</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Public-private partnership initiatives addressing disaster-related issues</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**How can these capabilities be expanded and improved to reduce risk?**
I.6.5. Other Mitigation Efforts

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

➢ JVID is always mitigating for hazards by removing trees, vegetation and debris etc. around facilities and infrastructure to ensure that it is working properly and the way it was designed.

I.7 Mitigation Strategy

I.7.1. Mitigation Goals and Objectives

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

I.7.2. Mitigation Actions

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

➢ Agricultural Hazards: Severe Weather/Insect - Pests
➢ Aquatic Invasive Species
➢ Climate Change
➢ Dam Failure
➢ Drought & Water shortage
➢ Earthquake (large damaging/small)
➢ Floods: 1%/0.2% annual chance
➢ Levee Failure
➢ Severe Weather: Winter Storms and Freeze
➢ Wildfire

NEED MITIGATION ACTIONS FOR EACH

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

**Multi-Hazard Actions**

**Action 1.**

<table>
<thead>
<tr>
<th>Hazards Addressed:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals Addressed:</td>
<td></td>
</tr>
<tr>
<td>Issue/Background:</td>
<td></td>
</tr>
<tr>
<td>Other Alternatives:</td>
<td></td>
</tr>
<tr>
<td>Existing Planning Mechanisms through which Action will be Implemented:</td>
<td></td>
</tr>
<tr>
<td>Responsible Office:</td>
<td></td>
</tr>
<tr>
<td>Priority (H, M, L):</td>
<td></td>
</tr>
<tr>
<td>Cost Estimate:</td>
<td></td>
</tr>
<tr>
<td>Potential Funding:</td>
<td></td>
</tr>
<tr>
<td>Benefits (avoided Losses):</td>
<td></td>
</tr>
<tr>
<td>Schedule:</td>
<td></td>
</tr>
</tbody>
</table>