RESOLUTION 2026 -09

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY TO ADOPT THE 2026 LOCAL HAZARD MITIGATION PLAN

WHEREAS, the Victor Valley Wastewater Reclamation Authority ("Authority") is a Joint Powers Authority and Public Agency of the State of California established in 1978 that provides regional wastewater treatment to a designated Service Area;

WHEREAS, the member entities of the Authority consist of the Town of Apple Valley, the City of Victorville, the City of Hesperia and County of San Bernardino Service Areas of Spring Valley Lake and Oro Grande (collectively, the "Member Entities");

WHEREAS, the Authority provides wastewater treatment service to the Member Entities and operates facilities including without limitation wastewater treatment plants, interceptor sewer lines, pumping facilities; waste digesting facilities, and other associated infrastructure;

WHEREAS, the Authority is committed to protect the persons, property, environment and resources within its service area;

WHEREAS, the preservation of life, property, environment and resources is an inherent responsibility of local, state and federal government;

WHEREAS, The Federal Disaster Mitigation Act of 2000, codified in Title 44 of the Code of Federal Regulations Section 201.6 (44 CFR § 201.6), requires local governments to adopt and maintain a Federal Emergency Management Agency (FEMA) approved Local Hazard Mitigation Plan in order to remain eligible for future mitigation grant funding, both before and after disaster events;

WHEREAS, the State of California Governor's Office of Emergency Service ("OES") also requires that all government entities within the state have a Local Hazard Mitigation Plan;

WHEREAS, the Authority, working cooperatively with its Member Entities, has developed and prepared an updated Local Hard Mitigation Plan, hereby known as the VVWRA 2026 Local Hazard Mitigation Plan ("2026 LHMP") in accordance with federal and state laws, including without limitation the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended;

WHEREAS, the 2026 LHMP establishes a comprehensive, strategic framework for identifying, evaluating, and mitigating risks from natural hazards across the Authority's service area. It also incorporates updated community profiles, risk and vulnerability assessments, mitigation goals and actions, and considers the impacts of climate change

WHEREAS, the adoption of the 2026 LHMP demonstrates the Authority's commitment to hazard mitigation and achieving the goals outlined in the 2026 LHMP;

WHEREAS, adoption of the 2026 LHMP by the Authority's governing body is required for FEMA to issue its final approval;

WHEREAS, following adoption of the 2026 LHMP, minor revisions may be made to incorporate technical enhancements. Any such changes occurring after adoption, but prior to the expiration of the approval period, will not require the Authority to re-adopt subsequent iterations of the 2026 LHMP.;

WHEREAS, adoption of the 2026 LHMP substitutes all previous hazard mitigation plans of the Authority;

WHEREAS, a true and accurate copy of the Local Hazard Mitigation Plan is attached hereto as Exhibit "A" and is incorporated herein by this reference;

NOW, THEREFORE, BE IT RESOLVED, by the Board of Commissioners of the Victor Valley Wastewater Reclamation Authority that:

SECTION 1: the Victor Valley Wastewater Reclamation Authority hereby receive, approve and adopt the 2026 LHMP attached hereto as Exhibit "A".

SECTION 2: the Authority General Manager or his or her designee is directed to submit copies of this Resolution to CalOES as documentation of adoption, to enable final FEMA approval of the 2026 Local Hazard Mitigation Plan in accordance with the requirements of the Disaster Mitigation Act of 2000.

SECTION 3: the Authority Staff, whenever feasible and possible, incorporate mitigation measures in the Authority's planning, facilities and funding opportunities;

RECEIVED, APPROVED AND ADOPTED this 28th day of May, 2026.

Cameron Gregg, Chair
VVWRA Board of Commissioners

ATTEST:

Scott Nassif, Secretary
VVWRA Board of Commissioners

APPROVED AS TO FORM:

Piero Dallarda of
Best Best & Krieger LLP, Counsel VVWRA

CERTIFICATION:

I do hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the Board of Commissioners held on May 28, 2026.

_____

Kristi Casteel – Clerk of the Board

EXHIBIT A

2026 Local Hazard Mitigation Plan

Victor Valley Wastewater Reclamation Authority

Local Hazard Mitigation Plan

April 2026

Table of Contents

SECTION 1. INTRODUCTION 4
1.1 Purpose of the Plan 4
1.2 Authority 4
1.3 What's New 5
1.4 New Risk Assessment 6
1.5 Community Profile 7
Physical Setting 7
History 9
1.6 Climate 10
1.7 Demographics 11
1.8 Existing Land Use 12
1.9 Development Trends 13
SECTION 2. PLAN ADOPTION 14
2.1 Adoption by Local Governing Body 14
2.2 Promulgation Authority 14
2.3 Primary Point of Contact 14
SECTION 3. PLANNING PROCESS 15
3.1 Preparing for the Plan 15
3.2 Planning Team 17
3.3 Coordination with Other External Jurisdictions, Agencies, and Organizations 18
3.4 Public Involvement/Outreach 19
3.5 Assess the Hazard 19
3.6 Set Goals 20
3.7 Review and Propose Mitigation Measures 20
3.8 Draft the Hazard Mitigation Plan 22
3.9 Adopt the Plan 22
SECTION 4. RISK ASSESSMENT 23
4.1 Hazard Identification 23
4.2 Hazard Screening Criteria 23

4.3 Hazard Profiles 26
SECTION 5. COMMUNITY CAPABILITY ASSESSMENT 67
5.1 Introductions 67
5.3 Planning and Regulatory Capability 68
5.4 Existing Plans 69
5.5 Mitigation Programs 69
5.6 Fiscal Resources 69
5.7 Capabilities Assessment 70
SECTION 6. MITIGATION STRATEGIES 72
6.1 Overview 72
6.2 Mitigation Goals, Objectives, and Projects 72
6.3 Flooding 73
6.4 Climate Change – Induced Drought 75
6.5 Wildfire 76
6.6 Earthquake 78
6.7 Windstorm 79
6.8 Mitigation Priorities 81
6.9 Implementation Strategy 82
SECTION 7. PLAN MAINTENANCE 84
7.1 Monitoring, Evaluating, and Updating the Plan 84
7.2 Implementation through Existing Programs 84
7.3 Continued Public Involvement 85
APPENDIX A: PLANNING TEAM MEETING MATRIX 87
APPENDIX B: PUBLIC OUTREACH 89

SECTION 1. INTRODUCTION

The LHMP is a "living document" that should be reviewed, monitored, and updated to reflect changing conditions and new information. As required, the LHMP must be updated every five (5) years to comply with regulations and Federal mitigation grant conditions.

1.1 Purpose of the Plan

Hazard mitigation intends to reduce and/or eliminate loss of life and property. FEMA defines hazard mitigation as "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." A "hazard" is defined by FEMA as "any event or condition with the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, environmental damage, business interruption, or other loss."

The Local Hazard Mitigation Plan (LHMP) aims to demonstrate a plan for reducing and/or eliminating risk within Victor Valley Wastewater Reclamation Authority. The LHMP process encourages communities to develop goals and projects that will reduce risk and build a more disaster-resilient community by analyzing potential hazards.

After disasters, repairs, and reconstruction are often completed in such a way as to simply restore to pre-disaster conditions. Such efforts expedite a return to normalcy; however, restoring things to pre-disaster conditions sometimes results in feeding the disaster cycle: damage, reconstruction, and repeated damage. Mitigation is one of the primary phases of emergency management, specifically dedicated to breaking the cycle of damage. Hazard mitigation is distinguished from other disaster management functions by measures that make VVWRA infrastructure development and the natural environment safer and more disaster resilient. Mitigation generally involves altering physical environments, significantly reducing risks and vulnerability to hazards by altering the built environment to avoid or reduce life and property losses. Mitigation also makes responding to and recovering from disasters easier and less expensive.

With an approved (and adopted) LHMP, Victor Valley Wastewater Reclamation Authority is eligible for federal disaster mitigation funds/grants (Hazard Mitigation Grant Program, Pre-Disaster Mitigation) aimed to reduce and/or eliminate risk.

1.2 Authority

In 2000, Congress enacted the Disaster Mitigation Act (DMA 2000), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act to emphasize pre-disaster mitigation planning. The Federal Emergency Management Agency (FEMA)

implemented DMA 2000 through regulations codified in Title 44 of the Code of Federal Regulations (CFR), Part 201, Section 201.6 (Local Mitigation Plan Requirements). Under 44 CFR § 201.6, local jurisdictions must develop and adopt a Hazard Mitigation Plan as a condition of receiving certain types of federal disaster assistance and hazard mitigation funding. The regulation outlines requirements for hazard identification and risk assessment, mitigation strategy development, plan maintenance, and public and stakeholder participation.

Senate Bill No. 379 will, upon the next revision of a local hazard mitigation plan on or after January 1, 2023, or, if the local jurisdiction has not adopted a local hazard mitigation plan, beginning on or before January 1, 2028, require the safety element to be reviewed and updated as necessary to address climate adaptation and resiliency strategies applicable to that city or county.

As a critical utility serving more than 300,000 residents, VVWRA's mission to protect public health and the environment depends on resilient infrastructure and emergency preparedness. This LHMP identifies the Authority's greatest risks and strategies to minimize the impacts of natural and human-caused hazards.

Founded in 1978, the Victor Valley Wastewater Reclamation Authority (VVWRA) is a Joint Powers Authority serving approximately 279 square miles in the high desert region, including the communities of Apple Valley, Hesperia, Victorville, Spring Valley Lake, and Oro Grande. The Authority treats about 12 million gallons of wastewater per day. VVWRA is governed by a Board of Commissioners, with one representative from each member agency (Apple Valley, Hesperia, Victorville, and San Bernardino County), meeting monthly. The General Manager, currently Darron Poulsen, oversees day-to-day operations in accordance with Board-established policies. VVWRA employs 57 full-time staff. VVWRA also runs a municipal waste and food waste treatment in conjunction with Anaergia to produce and scrub methane gas, a renewable natural gas in the State of California.

VVWRA does not have legal authority for zoning, land use, new construction, planning, building inspections, or codes. VVWRA will have to issue a "Will Serve" letter for any new development requested. The County of San Bernardino and the Town Apple Valley, City of Hesperia, City of Victorville, Oro Grande and Spring Valley Lake have authority over building codes.

1.3 What's New

This section provides an overview of the approach to creating the plan and identifies new analyses, data, and information included in this Plan to reflect current service area

conditions. This includes a summary of new hazard and risk assessment data related to the service area and information on current and future development trends affecting infrastructure vulnerability and related issues.

Summary of Significant Impacts to Current Conditions and Hazard Mitigation Program Priorities. This section summarizes significant impacts on current conditions, changes in vulnerability, and any resulting modifications to the community's mitigation program priorities.

This *What's New* section provides documentation of the VVWRA service area's progress in their risk and vulnerability to hazards and their overall hazard mitigation program. Completing this 2024 LHMP further provides documentation of the continued commitment and engagement in the mitigation planning process.

1.4 New Risk Assessment

As part of the development of this new Hazard LHMP, the VVWRA conducted a comprehensive review and analysis of each plan section. The planning process incorporated the most recent and relevant data available to support the risk assessment and the formulation of a mitigation strategy. Data sources are cited throughout the plan and summarized within Section 4, Risk Assessment. The incorporation of updated information and new analyses provided valuable insights that informed the development of mitigation actions presented in Section 5 of this plan.

Highlights of new information and analyses included in this plan are as follows:

- A new assessment of hazards affecting the VVWRA service area, including emerging threats such as cybersecurity and climate-related impacts
- A complete risk assessment for each identified hazard, including updated hazard profiles, event histories, and a rebuilt vulnerability analysis based on current regional data.
- A refined flood hazard analysis incorporating updated hydrologic data, current 100-year and 500-year floodplain boundaries, and the latest Digital Flood Insurance Rate Maps (DFIRMs).
- An enhanced vulnerability assessment that integrates recent infrastructure, environmental, and community data to better identify critical assets and potential impacts.

Incorporation and analysis of the new 2020 Census data were utilized for this LHMP update. Census data was used in an intersect analysis to determine how much of the

population is exposed to floods, climate change induced drought, wildfire, earthquake, and windstorm hazards.

1.5 Community Profile

Physical Setting

The VVWRA service area is located in the high desert region of San Bernardino County, approximately 90 miles northeast of Los Angeles and 35 miles north of San Bernardino. The region lies within the upper Mojave River Basin and is bordered by the San Gabriel Mountains to the south and the Ord Mountains to the north.

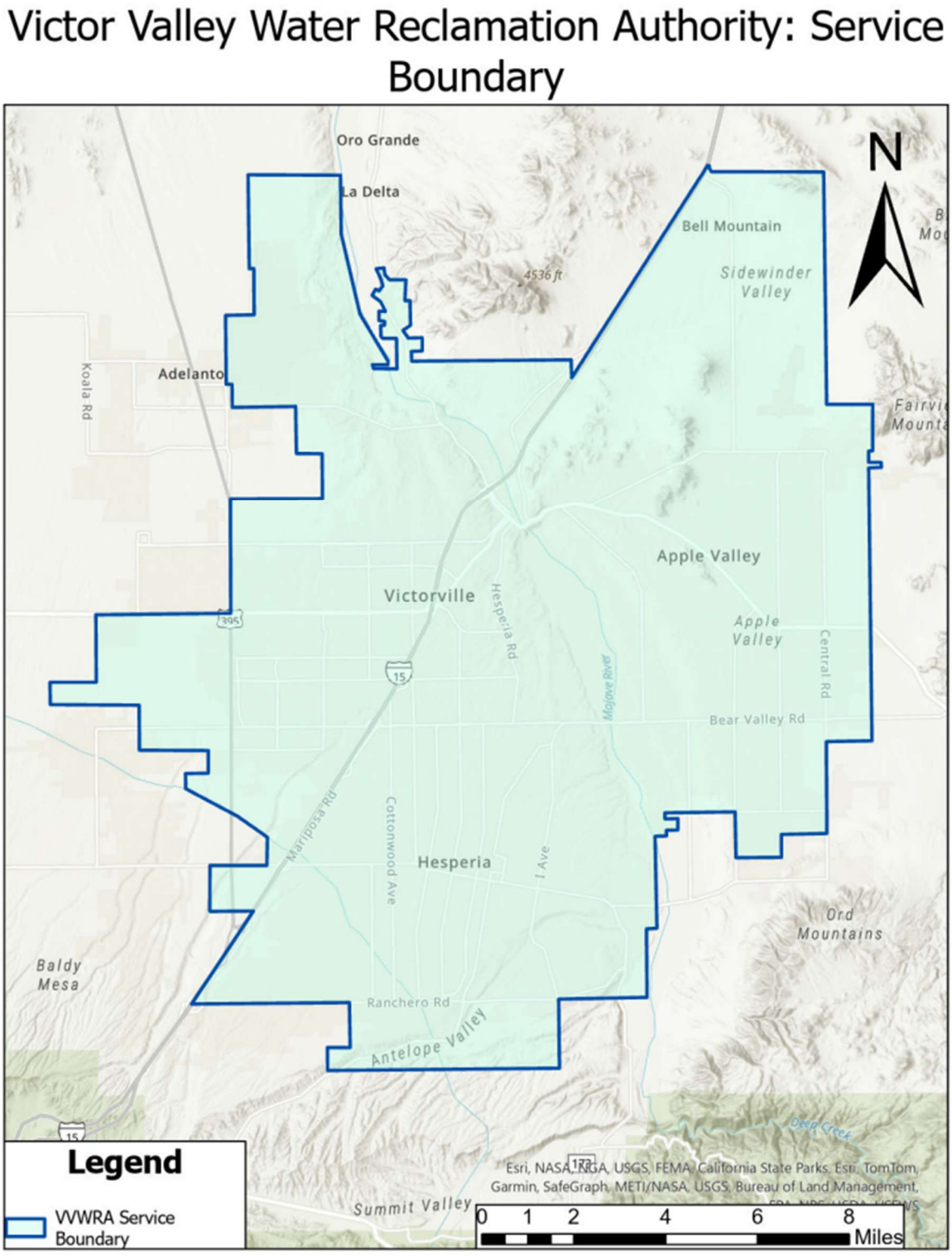
VVWRA's service area encompasses approximately 279 square miles and includes the incorporated cities of Victorville, Hesperia, and Apple Valley, as well as the communities of Oro Grande and Spring Valley Lake. The Authority's regional treatment plant and supporting facilities are located along the Mojave River, west of Interstate 15, and serve a population of roughly 300,000 residents.

The area is characterized by arid, desert terrain with elevations ranging from approximately 2,700 to 3,300 feet above sea level. The Mojave River—an intermittent watercourse that flows primarily during winter storms and spring snowmelt—forms the principal surface water feature in the service area. Soils are generally alluvial and sandy, with limited vegetation dominated by creosote bush, Joshua trees, and desert scrub.

The Victor Valley region experiences hot, dry summers and cool winters, with an average annual precipitation of less than 6 inches. The surrounding mountains influence localized weather patterns, occasionally producing flash flooding during intense storms. Groundwater in the Mojave River Basin serves as the area's primary water source for municipal, industrial, and agricultural use.

VVWRA's service area includes critical transportation routes such as Interstate 15 and U.S. Highway 395, which serve as major north-south corridors connecting the Inland Empire to the high desert and Las Vegas regions. The Southern California Logistics Airport and BNSF Railway provide regional freight and distribution access. The combination of desert climate, expanding development, and limited water resources underscores the importance of VVWRA's role in wastewater treatment, water recycling, and environmental stewardship across the Victor Valley region.

Figure 1. VVWRA Service Map



History

The VVWRA was established in 1978 as a Joint Powers Authority (JPA) under the laws of the State of California to provide regional wastewater treatment and water reclamation services for the rapidly developing Victor Valley region of San Bernardino County. The Authority was formed through an agreement between the cities of Victorville, Hesperia, and Apple Valley, the San Bernardino County Service Area 42 (Oro Grande), and later included the Spring Valley Lake Community Services District as a contracting partner.

VVWRA was created to consolidate and regionalize wastewater treatment facilities that had previously been operated independently by each city. The establishment of a single regional authority allowed for coordinated management, cost efficiencies, and improved environmental compliance for the Mojave River Basin. The original regional treatment plant, located west of Interstate 15 near the Mojave River, began operation in 1981 with a treatment capacity of approximately 4.5 million gallons per day (MGD). Since then, the facility has undergone multiple expansions and technology upgrades to meet the growing needs of the high-desert communities.

Today, VVWRA treats an average of 12 million gallons of wastewater per day, with an ultimate design capacity of over 22 MGD. The Authority's treatment process produces recycled water and renewable energy through an advanced biogas cogeneration system that reduces operational emissions and energy costs. VVWRA's Subregional Water Reclamation Facilities—developed in partnership with the cities of Hesperia and Apple Valley—further enhanced local wastewater reuse and groundwater recharge efforts, supporting sustainable growth in the Victor Valley.

The Authority is governed by a Board of Commissioners composed of representatives from each member agency and is administered by a General Manager responsible for day-to-day operations in accordance with Board policy. VVWRA employs approximately 53 full-time staff, including operations, maintenance, engineering, and administrative personnel.

VVWRA's regional wastewater system serves a population of approximately 300,000 residents within a service area of 279 square miles. Its facilities and infrastructure—such as the interceptor pipelines, lift stations, and reclamation facilities—are vital components of the region's public health and environmental protection network. All facilities are subject to the hazards identified and assessed in Section 4, Risk Assessment, including flood, climate change induced drought, wildfire, earthquake, and windstorm hazards.

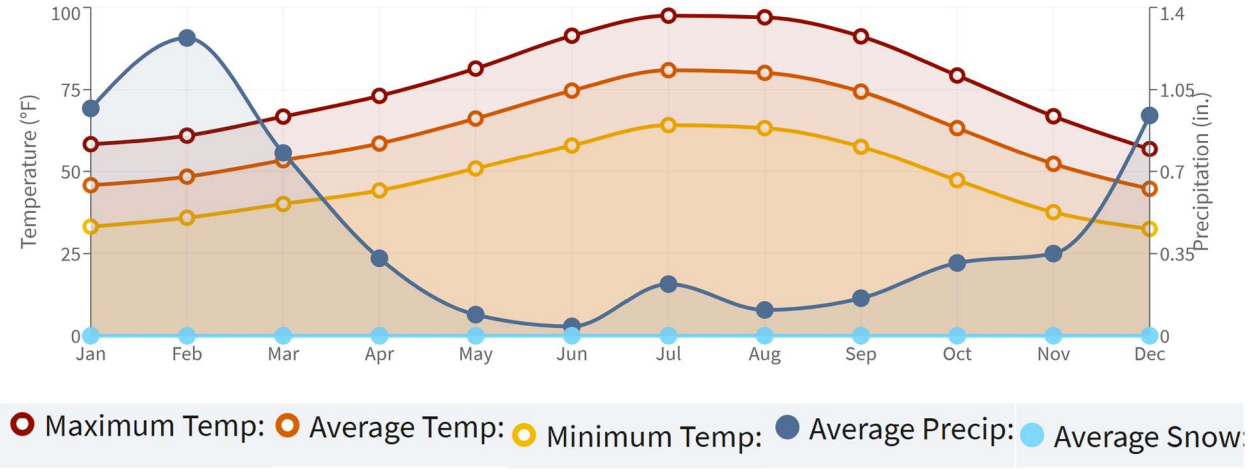
Table 1. VVWRD Critical Facilities

Critical Facilities	Hazard Vulnerability
Regional Plant (1)	Flood, Earthquake, Fire
Lift/Pump Stations (3)	Flood, Earthquake, Fire
Metering Stations (11)	Flood, Earthquake, Fire
Hesperia Sub Regional Plant (1)	Flood, Earthquake, Fire
Apple Valley Sub Regional Plant (1)	Flood, Earthquake, Fire
Sewer Pipelines (45 to 50 miles)	Flood, Earthquake

1.6 Climate

The Victor Valley region, where the VVWRA is located, experiences an arid high-desert climate characterized by hot, dry summers and cool winters. Average annual precipitation is approximately 5 to 6 inches, occurring mainly between December and March. Average temperatures range from about 35°F in winter to over 100°F in summer, with an annual mean temperature near 68°F. The region's low humidity, limited rainfall, and large daily temperature fluctuations are typical of inland desert environments. Occasional monsoonal storms in late summer can produce localized flash flooding, while extended drought periods remain a persistent hazard across the Mojave River Basin.

Figure 2. Average Temperature in VVWRA service area



1.7 Demographics

Demographic information for the VVWRA service area is based on data from the U.S. Census Bureau, 2020 Census. VVWRA provides regional wastewater treatment services to a population of approximately 300,000 residents across the Victor Valley region, which includes the cities of Victorville, Hesperia, and Apple Valley, as well as the communities of Oro Grande and Spring Valley Lake. The service area includes both urban and suburban development, with population growth continuing along the Interstate 15 corridor.

According to the California Department of Water Resources and U.S. Census socioeconomic indicators, portions of the VVWRA service area are designated as severely economically disadvantaged communities (SDACs), where median household income is less than 60 percent of the state average. During emergencies or disasters, the San Bernardino County Office of Emergency Services, in coordination with local jurisdictions and community-based organizations, assists in outreach and support for underserved and socially vulnerable populations within the Victor Valley region.

Table 2. Population within Service Area

	City of Hesperia	City of Victorville	Town of Apple Valley	Oro Grande	Spring Valley Lake	Population Total
Population	99,820	142,200	75,790	895	9,600	327,485

Table 3. Percentage of the Population at Risk from Identified Hazards within VVWRA

% of Population at Risk from Identified Hazards	City of Hesperia	City of Victorville	Town of Apple Valley	Oro Grande	Spring Valley Lake	Population Total
Population within Service Area	99,820	142,200	75,790	895	9,600	327,485
Flood	50% 49910	25% 35550	65% 49264	10% 90	15% 1440	136,254
Climate Change Induced Drought	5% 4991	5% 7110	5% 3790	5% 45	5% 480	16,416
Wildfire	0%	0%	0%	0%	0%	0
Earthquake	100%	100%	100%	100%	100%	327,485
Windstorm	5% 4991	5% 7110	5% 3790	5% 45	5% 480	16,416

1.8 Existing Land Use

VVWRA does not regulate land use within its service area. However, the Authority's Planning and Engineering departments work together with city staff on decisions that will have an effect on Authority treatment facilities and its sewer collection pipelines.

1.9 Development Trends

Development within the Victor Valley region slowed significantly following the 2008 housing market downturn but has shown steady recovery since 2020, with new residential and commercial projects increasing across the cities of Victorville, Hesperia, and Apple Valley. Between 2023 and 2025, several large-scale housing and logistics developments have been approved or are under construction, primarily along the Interstate 15 corridor and within the Southern California Logistics Airport (SCLA) area.

While this renewed growth has expanded the demand for wastewater collection and treatment infrastructure—including pipelines, lift stations, and flow monitoring systems, it has not substantially increased the overall vulnerability of the wastewater system to natural hazards. However, the northern and western portions of the service area remain susceptible to floods, climate change induced drought, wildfire, earthquake, and windstorm events.

All future development within the VVWRA service area is planned and permitted in accordance with each member agency's General Plan and Land Use Element, which incorporate applicable state and county building codes for fire, flood, and seismic safety. VVWRA continues to coordinate closely with its member agencies to ensure that new projects are evaluated for potential hazard exposure and that wastewater infrastructure improvements are designed to maintain system reliability under changing growth and climate conditions.

SECTION 2. PLAN ADOPTION

2.1 Adoption by Local Governing Body

According to the mitigation planning regulations, VVWRA LHMP will be submitted to the California Office of Emergency Services (Cal OES) for review and approval. Cal OES will conduct a review of the Plan in accordance with the Code of Federal Regulations; once this review is complete and any revisions are made, CalOES will forward the plan to FEMA for another review and revisions, as FEMA requires. CalOES will notify VVWRA when FEMA has approved the final LHMP. The final approval letter will be mailed to VVWRA.

2.2 Promulgation Authority

The Local Hazard Mitigation Plan was reviewed and approved by the Board of Commissioners:

Paul Cook – San Bernardino County Service Area 42 and 64

Tiffany Gaudin – City of Victorville

Scott Nassif – Town of Apple Valley

Cameron Gregg – City of Hesperia

2.3 Primary Point of Contact

The Point of Contact for information regarding this LHMP is:
Latif Laari – Director of Engineering & Environmental Compliance
Victor Valley Wastewater Reclamation Authority
PO Box 370
Adelanto, CA 92301

Consultant Primary Contact:
Gary Sturdivan, Project Lead
Sturdivan Emergency Management Consulting, LLC.
(909) 658-5974
GSturdivan@semcllc.com

SECTION 3. PLANNING PROCESS

3.1 Preparing for the Plan

Internally, VVWRA has a wealth of experienced and resourceful employees who provide benefits to the program. The VVWRA team participated in regular discussions, staff meetings, and health and safety committee meetings supporting the plan development. The internal planning team was invited to the meeting through emails and Microsoft Outlook calendar invites. The Team invited San Bernardino County OES, Inland Empire American Red Cross Chapter, Victor Valley College, the Salvation Army, and representatives from the City of Hesperia, the City of Victorville, Town of Apple Valley, Oro Grande, and Spring Valley Lake.

Representatives from the City of Hesperia, the City of Victorville, Town of Apple Valley, Oro Grande, and Spring Valley Lake were the only ones that attended the meeting with the LHMP team. All the others never showed up at any meetings including Salvation Amy, Victor Valley College and American Red Cross.

Members from local government agencies were asked to be a part of the VVWRA LHMP Planning team to assist in document review, including staff from the City of Victorville, City of Hesperia, Town of Apple Valley, San Bernardino County Water, Spring Valley Lake, and Oro Grande. This team also participated in community outreach with local businesses, including community-based organizations, that work directly with and/or provide support to underserved communities, socially vulnerable populations, and members of the public. Organizations within the service boundaries that conduct outreach and assistance for vulnerable populations include the Inland Empire American Red Cross Chapter and the Salvation Army. VVWRA also has collaborative conservation messages with the Cities and towns that they serve. Underserved and vulnerable populations they serve include socioeconomically disadvantaged people; people with limited English proficiency; geographically isolated or educationally disenfranchised people; people of color, as well as those of ethnic and national origin minorities; women and children; individuals with disabilities and others with access and functional needs; and seniors.

VVWRA's approach to developing the plan consisted of:

- Establishing Outreach
- Coordination with outside agencies, organizations, jurisdictions
- Documenting past events
- Posting the meeting agendas, and draft LHMP onto their website and asking for public input and comments on the planning process

- Conducting public outreach
- Reviewing and updating the hazards
- Reviewing and updating mitigation measures
- Plan Adoption

During the planning process, the Planning Team utilized the following plans to gain information on the service area's hazards and mitigation goals for VVWRA. Relevant information from each of the following plans, including local City and County Government priorities, was included when aligned with VVWRA strategies and projects and incorporated into this LHMP. The following plans were used:

Table 4. Plans Used

Study Plan	Key Information
LHMP from supporting Agencies	Hazards within the service area
Sewer Master Plan 2026	Sewer Systems
San Bernardino County LHMP 2022	Hazard Identification, Mitigation Measures
2023 California HMP	Goals For the State of California
San Bernardino County Flood Control for the High Desert	Gain Information On Future Flood Control Projects
FEMA Flood Insurance Study for S.B. County (surrounding cities)	Flood History

The planning process consisted of:

3.2 Planning Team

As identified in **Section 3.1**, several planning team members were associated with preparing the plan. The Hazard Mitigation Plan was compiled and authored by members of the following Planning Team:

Internal Team:

Latif Laari – Director of Engineering & Environmental Compliance

David Wylie – Safety and Communications Officer

Daniel Enriqrez – Environmental Compliance Inspector

External Team:

City of Hesperia: Jacquelyn Castillo jmcastillo@hesperiaca.gov and Tammy Pelayes tpelayes@hesperiaca.gov

City of Apple Valley: Guy Eisenbrey geisenbrey@applevalley.org

City of Victorville: Doug Mathews dmathews@victorvilleca.gov

San Bernardino County: Snyder, Gregory gregory.snyder@sdd.sbcounty.gov

3.3 Coordination with Other External Jurisdictions, Agencies, and Organizations

The Internal and External Planning Teams include the City of Hesperia, Town of Apple Valley, and the City of Victorville, and three internal team members from VVWRA. The County of San Bernardino OES, Salvation Amy, Victor Valley College and American Red Cross were invited to be on the Planning Team, but Salvation Amy, Victor Valley College and American Red Cross were unable to attend. The meeting matrix outlining the subjects covered and the attendees is in Appendix A.

The Planning Team participated in monthly meetings to coordinate efforts, provide input, and receive support for the LHMP. The support included receiving technical expertise, resource materials, and tools. VVWRA facilitated the LHMP process and provided information that follows FEMA requirements for the program. The tools, resource materials, and other project-related information are maintained on a project portal on VVWRA's website which allows access to the information by all participants and the public; screenshots are located under Appendix B.

Mr. Gary Sturdivan's contact information was on each document for questions and concerns. The Planning Team reviewed the document and made corrections or voiced concerns to the consultant. These comments were discussed at the next team meeting, and corrections were then made to the document. These meetings were not publicly held.

Accomplishing a shared goal for emergency preparedness and hazard mitigation requires the coordinated efforts of various jurisdictions, agencies, and organizations.

This team's objective consisted of:

- Assisting all participating jurisdictions with the Hazard Mitigation Plan planning process
- Guiding the CalOES and FEMA requirements
- Assisting in the development of regional maps and supporting information regarding hazards
- Providing a forum to all jurisdictions participating in the development for questions and issues to be discussed

VVWRA Planning Team participated in each of the scheduled Planning Team meetings and conference calls facilitated by SEMC related to the project. Meeting agendas discussing LHMP questions are in Appendix A.

3.4 Public Involvement/Outreach

In support of VVWRA LHMP, VVWRA solicited information from members of the public through various methods. VVWRA conducted their outreach through various social media, including Facebook and Instagram, to distribute a questionnaire, along with posting sections of the draft LHMP onto VVWRA website. Outreach to nonprofit organizations, including community-based organizations and the agencies listed in Section 3.1, was conducted to allow those representing vulnerable populations to be involved in the planning process. VVWRA outreach included a solicitation for comment through phone calls and emails to the organizations in Section 3.1 on numerous occasions.

These methods consist of:

- Community Outreach events
- Local Emergency Coordination meetings
- Plan/Project inclusion in VVWRA Programs includes mitigation actions that require public involvement and are open for public comment.

Any information and public feedback collected from the public outreach phase, and meetings will be documented in Appendix B, including outreach to representatives of the underserved and vulnerable populations who were provided the opportunity to be involved. There was no feedback provided at this time.

The Great ShakeOut - Annual

VVWRA participates annually in The Great ShakeOut. Through this plan, we provide information on disaster responses related to wastewater. This information includes steps VVWRA has taken to respond to earthquake emergencies that impact VVWRA and the surrounding community.

3.5 Assess the Hazard

A critical component of the LHMP process is assessing the likely hazards that may impact VVWRA facilities and operations. It is important to have a thorough understanding of these hazards without overanalyzing remote or highly unlikely hazards.

This LHMP has been developed through an extensive review of available information on hazards VVWRA has faced in the past and most likely will face in the future. The Planning Team reviewed and discussed items that have happened in the State of California and disasters that have happened in the service area and Southern California. The Team reviewed documents such as engineering drawings, photographs, and available

geotechnical and geologic data from the Internet and outside sources such as FEMA Hazard Mapping, San Bernardino County hazard maps, and documents.

Additionally, for each profiled hazard, the Planning Team then analyzed the community's exposure to each hazard (inventory of assets) and the potential impact under scenario events. The Planning Team used HAZUS, and hazards intersect analyses recently completed within San Bernardino County to produce this information. *See Section 4 for more information.*

3.6 Set Goals

The goal-setting process for the 2026 LHMP consisted of the Planning Team reviewing the hazard exposure and scenario impacts developed during the Risk Assessment portion of the process. With an understanding of the potential risk the community is facing, the Planning Team then evaluated the any previous hazard mitigation goals and objectives, assessed their status and effectiveness and identified Goals and Objectives.

3.7 Review and Propose Mitigation Measures

The planning team identified and analyzed mitigation measures for the hazards that influence VVWRA. This analysis assisted in developing an implementation strategy for prioritizing mitigation measures. Meetings (in-person and virtual) were held with the planning team as a group and through meetings within their departments to solicit input on the plan.

A wide variety of mitigation measures that can be identified to help reduce the impact or the severity of damage from hazards was examined. The projects were identified to help implement the Planning Team's goals and objectives. The following categories were used in the review of possible mitigation measures:

1. Public Information and Education - Outreach projects and technical assistance.
2. Preventive Activities - Zoning, building codes, stormwater ordinances
3. Structural Projects - Detention basins, reservoirs, road, and bridge improvements
4. Property Protection - Acquisition, retrofitting
5. Emergency Services - Warning, sandbagging, road signs/closures, evacuation
6. Natural Resource Protection - Wetlands, protection, best management practices.

In addition to the STAPLEE methodology, each Planning Team incorporated other criteria/factor questions into the process to help engage and solicit input from members. The STAPLEE method was applied to prioritizing the chosen mitigation actions.

Based on STAPLEE, the Planning Team addressed the following questions to determine mitigation options:

Does the Action:

1. Solve the problem
2. Address Vulnerability Assessment?
3. Reduce the exposure or vulnerability to the highest priority hazard
4. Address multiple hazards?
5. Address more than one (1) Goal/Objective?
6. Benefits equal or exceed costs?

Can the Action:

1. Be implemented with existing funds?
2. Be implemented by existing state or federal grant programs?
3. Be completed within the 5-year life cycle of the LHMP?
4. Be implemented with currently available technologies?

Will the Action:

1. Be accepted by the community?
2. Be supported by community leaders?
3. Adversely impact segments of the population or neighborhoods?
4. Result in legal action such as a lawsuit?
5. Positively or negatively impact the environment?

Is there:

1. Sufficient staffing to undertake the project?
2. Sufficient funds to complete the project?
3. Existing authority to undertake the project?

After going through this process for each project, the Planning Team had the ability to identify the higher priority projects.

3.8 Draft the Hazard Mitigation Plan

The LHMP was drafted by SEMC, the Project Lead, based on input and comments from the Planning Team. VVWRA consultant led the Planning Team and prepared the draft LHMP with input from the Planning Team, local agencies in the area, and the public. The Planning Team reviewed and commented on the draft LHMP, and subsequent changes were made before the LHMP was finalized and adopted by the Board of Commissioners. All draft documents were posted on the VVWRA website. Notices were sent to all water customers in the service area. All LHMP documents were posted on the website, and comments were asked for.

The LHMP was reviewed in comparison to the FEMA-designed Review Tool. The Review Tool links the federal requirements, identifies the sections in the LHMP where the information can be found, and provides a rating as to the level of compliance with the federal regulations.

Once the LHMP was drafted, the Planning Team finalized the plan and forwarded it to Cal/OES and FEMA for approval.

3.9 Adopt the Plan

According to the mitigation planning regulations, VVWRA LHMP will be submitted to the California Office of Emergency Services (Cal OES) for review and approval. Cal OES will conduct a review of the Plan in accordance with the Code of Federal Regulations; once this review is complete and any revisions are made, CalOES will forward the plan to FEMA for another review and revisions, as FEMA requires. CalOES will notify VVWRA when FEMA has approved the final LHMP. The final approval letter will be pending adoption by the Board of Commissioners. The Board of Commissioners Resolution will be sent to CalOES and FEMA. SEMC will send a copy of the LHMP and Resolution to the San Bernardino Office of Emergency Management.

SECTION 4. RISK ASSESSMENT

The goal of mitigation is to reduce the future impacts of a hazard, including property damage, disruption to operations, environmental impacts, and the amount of public funds spent on emergency response and recovery. Mitigation planning relies on a detailed risk assessment, in which the probability of a hazard event is evaluated against its anticipated severity and impacts to VVWRA infrastructure, staff, and the region served.

This section aims to understand the hazards and their risks within the VVWRA service area. The process includes four steps: 1) Hazard Identification, 2) Vulnerability Analysis, 3) Risk Analysis, and 4) Vulnerability Assessment & Loss estimation.

4.1 Hazard Identification

The Planning Team identified potential hazards and evaluated their likelihood of occurrence. The following sections summarize this process and its results.

VVWRA identified hazards through the following sources:

- Historical incidents affecting Victor Valley and San Bernardino County
- FEMA National Risk Index
- San Bernardino County HMP 2022
- Engineering reports & SCADA risk analysis
- NOAA Storm Events Database
- CalFire & USGS database
- Internal staff knowledge
- 2020 Census intersect analysis for population exposure

The Planning Team selected the following hazards, which were deemed most relevant to VVWRA based on past impacts and the region's geographic conditions.

1. Flooding
2. Climate Change Induced Drought
3. Wildfire
4. Earthquake
5. Windstorm

4.2 Hazard Screening Criteria

Screening the hazards aims to help prioritize which hazards create the greatest concern for VVWRA. A list of natural hazards to consider was obtained from the Federal

Emergency Management Agency's (FEMA) State and Local Mitigation Planning How-to Guide: Understanding Your Risks (FEMA 386-1).

The Planning Team applied criteria from the Stafford Act, California Emergency Services Act, and the STAPLEE framework (Social, Technical, Administrative, Political, Legal, Economic, and Environmental feasibility) to prioritize risks.

Hazards were then ranked using a probability scale of 1–4, consistent with FEMA's recommended methodology:

- **(1) Highly Likely (75–100%)** – Expected to occur within the next 5 years
- **(2) Likely (50–75%)** – Has occurred frequently in the past; probable within 5 years
- **(3) Somewhat Likely (25–50%)** – Occurs occasionally; possible within 5 years
- **(4) Least Likely (<25%)** – Rare occurrence; unlikely within 5 years

Impact severity was categorized as:

- **Catastrophic** – Large-scale system failure, major operational disruption, long-term environmental or public health consequences
- **Critical** – Facility damage or functional impairment requiring significant repair
- **Limited** – Minor or moderate operational disruption; manageable with routine response

Natural hazards determined not to pose a meaningful risk to VVWRA were assigned a ranking of 4 ("Least Likely") and were not carried forward for full hazard profiling. These include tsunami, hurricanes, tornadoes, and volcanic activity due to geographic location and lack of historical impact within the Victor Valley region.

Following the screening process, the Planning Team selected the hazards identified in Table 5 for full assessment based on their relevance to VVWRA's operational reliability, regional hazard history, and geographic exposure.

Table 5. Hazard Risk Rankings

Hazard	Risk Ranking (1-3)
Flooding	1
Climate Change Induced Drought	1
Wildfire	2
Earthquake	3
Windstorms	3

Natural hazards determined not to pose a meaningful risk to VVWRA were assigned a ranking of 4 ("Least Likely") and were not carried forward for full hazard profiling. These include tsunami, hurricanes, tornadoes, and volcanic activity due to geographic location and lack of historical impact within the Victor Valley region.

Following the screening process, the Planning Team selected the hazards identified in Table 5 for full assessment based on their relevance to VVWRA's operational reliability, regional hazard history, and geographic exposure.

Table 6. Screening Assessment Matrix

	Impact			
Probability	**Probability/Impact Rating**	**Catastrophic**	**Critical**	**Limited**
	Highly Likely (1) (75-100%)	Flooding, Earthquake	Wildfire	
	Likely (2) (50-75%)		Climate change induced drought, Windstorm	
	Somewhat Likely (3) (25-50%)			

4.3 Hazard Profiles

This section looks at all the hazards identified by the Planning Team that may impact VVWRA within its boundaries. This section gives an overview of each hazard, the definition of each hazard, the location of each hazard, and a description of how each hazard is expected to affect VVWRA's service and/or service area using observed hazards in VVWRA's service area, the hazards identified in the FEMA website, and the FEMA software program known as HAZUS (Hazards United States). HAZUS contains models of natural disasters and the effects the disasters can have on a region.

4.3.1 Flooding

Probability: (75–100%) Highly Likely — The Victor Valley experiences recurring flooding and flash flooding, with significant events recorded in 2010, 2017, 2023, and 2024. These storms produced river rises, washouts, and localized road closures, demonstrating frequent and impactful flood behavior in the region. Due to the area's low-absorption desert soils, proximity to the Mojave River, and increasing extreme rainfall associated with atmospheric river events, flooding within the VVWRA service area is considered highly likely, with impactful flood events occurring every few years.

Impact: Catastrophic

General Definition: Flooding occurs when normally dry land becomes inundated with water as a result of heavy rainfall, rapid runoff, or overflow from natural drainage systems. In the Victor Valley, flooding is most commonly associated with intense storm events that generate flash flooding, particularly due to the region's compacted desert soils, which absorb very little water and cause stormwater to accumulate and flow rapidly across the landscape. The Mojave River—an intermittent waterway that flows primarily during major winter storm events—also poses a flood risk when elevated river levels exceed the capacity of the channel and overflow onto adjacent lands. Post-fire debris flows from surrounding slopes can further amplify flooding by introducing sediment, mud, and vegetation into washes and drainage pathways.

VVWRA facilities located near the Mojave River or within natural drainage corridors face increased exposure to flooding. The Regional Plant, situated adjacent to the river, is vulnerable to high river flows and overbank flooding during severe storms. Interceptor pipelines that parallel the Mojave River or cross natural washes may be exposed or damaged by high-velocity flows. Metering stations in Victorville and Oro Grande, and the Hesperia and Apple Valley Subregional Plants located near drainage channels, are also at risk of inundation during heavy rainfall events. Flash flooding in the High Desert can develop quickly and may impact areas outside of mapped FEMA floodplains, reinforcing the need for ongoing monitoring, preparedness, and mitigation across all VVWRA facilities.

Flood extent within the VVWRA service area varies by storm intensity, watershed conditions, and the hydrologic behavior of the Mojave River. Flash flooding can occur rapidly due to the region's hard, compacted desert soils, which allow very little infiltration and produce high-velocity runoff during short, intense storm cells. Floodwaters along the Mojave River can rise several feet during strong winter storm events, and historically the river has overtopped banks and inundated adjacent facilities. In severe cases, storm flows may result in depths ranging from one to four feet in low-lying areas and greater than two

feet in areas near the river channel. Extent is further influenced by post-wildfire burn scars, which increase runoff and debris flow potential, and by narrow washes that can concentrate stormwater and amplify flow depth and speed.

Climate Change Probability: Climate change is expected to significantly increase the probability of flooding and flash flooding within the VVWRA service area. Warmer atmospheric temperatures allow storms to hold and release greater volumes of moisture, increasing the likelihood of intense rainfall events capable of producing rapid runoff and overwhelming local drainage systems. The frequency of atmospheric river events in California is also projected to rise, delivering larger and more concentrated precipitation bursts that can elevate Mojave River flows and inundate nearby facilities. Extended dry periods between storm systems further increase the likelihood of flash flood conditions by reducing soil infiltration capacity and creating hydrophobic desert surfaces. As a result, the probability of flooding affecting VVWRA facilities in the coming decades is expected to be **higher than historical averages**, with more frequent extreme rainfall and runoff events anticipated throughout the region.

Climate Change Impacts:
Climate change will increase both the severity and consequences of flooding for VVWRA infrastructure. More intense storm systems will generate higher peak flows in the Mojave River and adjoining washes, increasing the risk of overbank flooding near the Regional Plant and inundation of low-lying lift and metering stations. Flash flooding is expected to intensify as prolonged periods of drought produce hardened, low-infiltration soils that accelerate surface runoff. Post-wildfire debris flows—made more common by climate-driven increases in wildfire frequency—will further exacerbate flooding hazards by carrying sediment and debris that can block culverts, erode pipeline corridors, and damage access roads. Higher runoff volumes may expose buried pipelines, undermine structural foundations, and disrupt electrical and SCADA systems essential for treatment operations. Overall, climate change is projected to magnify both the physical and operational impacts of flooding on VVWRA, increasing risks to plant access, equipment reliability, and system continuity.

Population—Flooding poses varying levels of risk to the population within the VVWRA service area, particularly in communities located near natural drainage paths, low-lying roadways, and the Mojave River corridor. While VVWRA does not directly manage residential areas, flooding can disrupt transportation routes, impede emergency access, and affect residents who rely on wastewater services for public health and sanitation. Populations with limited mobility, limited English proficiency, or economic constraints may face greater challenges during flood events, particularly if road closures or infrastructure disruptions affect their ability to receive timely assistance.

Critical facilities—Flooding presents a more direct and significant threat to VVWRA's critical facilities and operational continuity. The Regional Plant is located adjacent to the Mojave River and is vulnerable to river overbank flooding, high groundwater conditions, and erosion along pipeline corridors. Lift stations, metering stations, and interceptor pipelines situated in drainage channels or flood-prone areas are also at risk of inundation, equipment failure, and structural undermining. Access routes to treatment facilities may become impassable during severe storm events, delaying emergency response and impairing operations. Flooding of electrical systems, mechanical equipment, and SCADA components may result in treatment interruptions, regulatory exceedances, or environmental releases. As a lifeline utility serving approximately 300,000 residents, the reliability of VVWRA's critical facilities is essential, and any flood-related disruption could have cascading impacts throughout the service population.

Vulnerability and Impact: VVWRA is highly vulnerable to flooding due to the location of key facilities near the Mojave River and within natural drainage pathways that concentrate stormwater flows. Flooding can damage or disable essential electrical and mechanical equipment, inundate pump stations, erode or expose buried pipelines, and compromise SCADA communication systems needed for real-time process control. Even moderate flood events can restrict operator access, slow emergency response, and impede routine maintenance activities. More severe events may interrupt influent or effluent flows, cause treatment process upsets, or force emergency bypass pumping to prevent system backup or structural damage. Inundation of sensitive infrastructure—such as motors, blowers, instrumentation, and electrical panels—could result in extended downtime, high repair costs, and potential regulatory violations if treatment performance is compromised. Because VVWRA provides essential wastewater treatment services to approximately 300,000 residents across the Victor Valley, any significant flood-related disruption could create cascading public health, environmental, and operational consequences, affecting both the Authority and the broader community it serves.

Table 7. Earthquake Asset Replacement Cost

VVWRA / Earthquake Magnitude	Replacement Value
Magnitude 7.0 or Above (Very High Impact)	
VVWRA – All Critical Assets	$ 100 million
Magnitude 5.0 or 6.9 (Moderate Impact)	

VVWRA – All Critical Assets	$75 Million
Magnitude 1.0 or 4.9 (Low Impact)	
VVWRA – All Critical Assets	$ 0

Description: Flooding is a significant hazard for the Victor Valley region and poses substantial risk to VVWRA facilities and operations. The High Desert is prone to flooding due to its unique hydrologic characteristics—intense, short-duration storm events, limited soil absorption, steep drainage channels, and the presence of the Mojave River, an intermittent waterway that flows primarily during strong winter storms or heavy rainfall. Flash flooding can occur rapidly with little warning, especially during monsoonal thunderstorms or atmospheric river events that deliver large volumes of rain over short periods. The limited capacity of local stormwater systems and the region's highly compacted desert soils increase the likelihood of water overtopping channels, crossing roadways, and inundating low-lying facilities.

VVWRA's Regional Plant is located adjacent to the Mojave River, which has a long history of overbank flows during severe storm events. Floodwaters can rise quickly and carry debris, sediment, and vegetation that may erode protective berms or damage exposed infrastructure. Subregional facilities, lift stations, and metering stations located near natural washes or drainage paths are also vulnerable to rapid inundation during heavy storms. In addition, roadways essential for responding to emergencies may become impassable, delaying operational staff, and potentially increasing service disruptions.

Flooding can significantly affect system reliability and public health. Inundated electrical systems, control panels, and SCADA components can interrupt wastewater treatment processes or cause pump failures. Floodwater intrusion into pipelines or facilities can increase inflow and infiltration, overwhelm system capacity, and lead to potential spills or bypass events. If access roads flood, emergency repairs may be delayed, prolonging outages or treatment interruptions. Severe flooding may also jeopardize compliance with regulatory permits and result in environmental impacts to the Mojave River and surrounding communities.

Figure 3. Flooding Map with VVWRA Boundaries

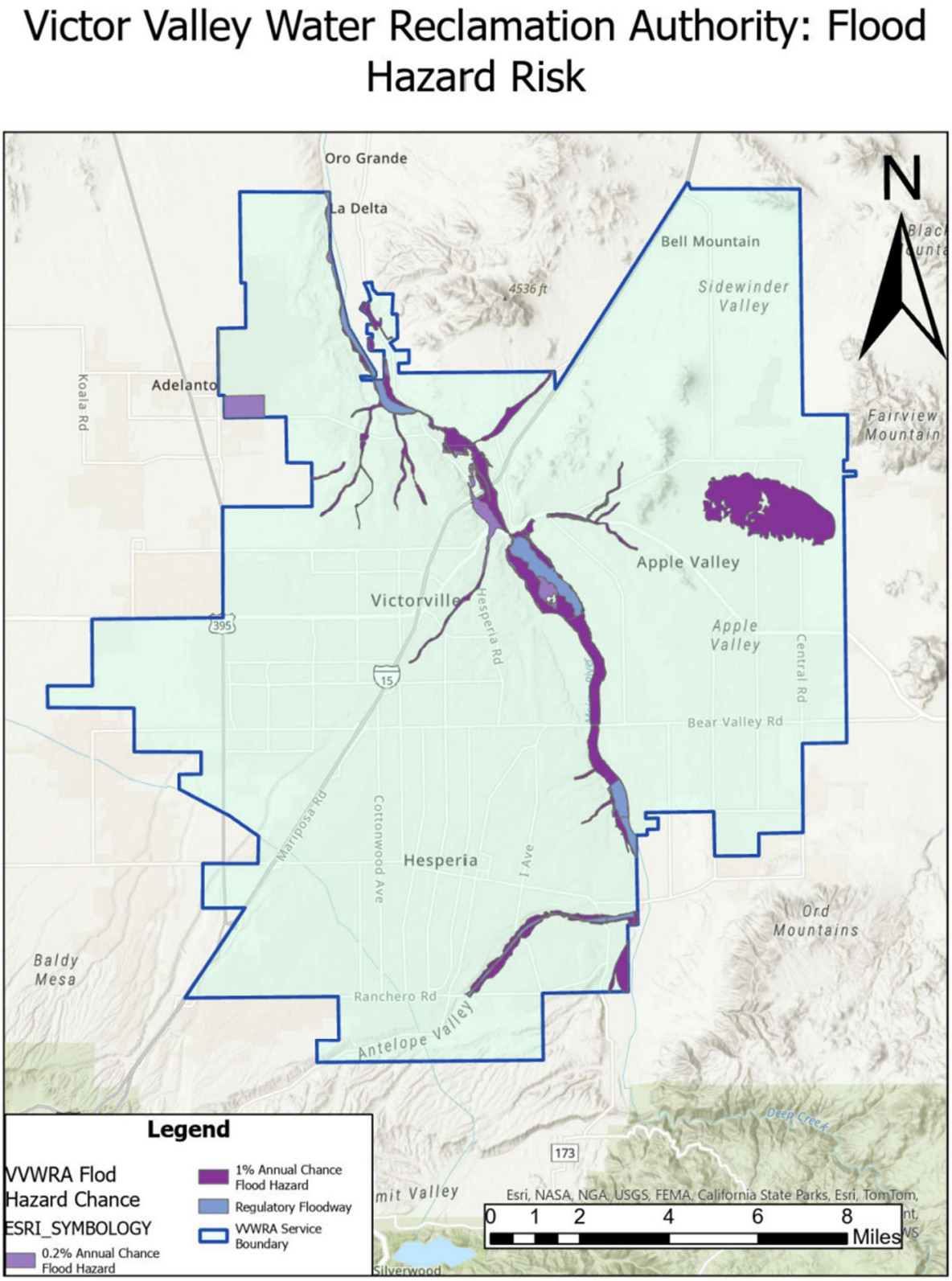


Table 8. Significant Flooding History in San Bernardino County

Flooding event	Details
1993 El Niño Storms	Widespread washouts and impaired access near VVWRA facilities.
2010 Christmas Flood	Flash flooding and I-15 closures with major regional impacts.
2017 Winter Storms	Highest Mojave River flows in more than two decades.
2023 Atmospheric River Events	Multiple county emergencies declared due to heavy rainfall and overwhelmed stormwater systems.
2024 Tropical Storm Hilary Remnants	Intense flash flooding affects Victorville, Hesperia, and Oro Grande, with debris flows and roadway closures.

Within the 2020 - 2025 timeframe, there was two federal and/or state declaration declared for California Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides within the VVWRA service area. Notice is hereby given that, in a letter dated April 3, 2023 (DR-4699-CA), and April 13, 2024 (DR-4769-CA) the President issued a major disaster declaration under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 *et seq*. (the "Stafford Act"), as follows:

> *"I have determined that the damage in certain areas of the State of California resulting from Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides beginning on [April 3, 2023 (DR-4699-CA) / April 13,2024 (DR-4769-CA)], and continuing, is of sufficient severity and magnitude to warrant a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 et seq. (the "Stafford Act"). Therefore, I declare that such a major disaster exists in the State of California."*

Impact Statement: Flooding events have the potential to cause significant and widespread impacts on VVWRA and its critical assets. Floodwaters can directly damage above-ground equipment, including pumps, motors, electrical panels, SCADA systems, and monitoring instruments that are susceptible to water intrusion or complete inundation. Flooding can also undermine foundations, erode access roads, and expose or wash out buried pipelines, leading to structural failures or service interruptions. Even moderate

flooding may cause sediment, debris, and high-velocity flows that clog, obstruct, or disable mechanical equipment, resulting in treatment process disruptions or emergency bypass operations. Additionally, treatment facilities, lift stations, and metering stations located near the Mojave River or within natural drainage pathways face elevated risk of repeated flooding during severe storm events. If facility access is cut off by flooded roadways or washed-out sections of pipeline corridors, maintenance crews may be unable to reach critical assets in time to prevent or mitigate system failures.

Flooding also has the potential to create indirect or cascading hazards that further impact VVWRA operations. If electrical infrastructure is damaged or substations serving VVWRA facilities are flooded, power outages can halt treatment processes and stop pump operations. VVWRA depends on continuous power to run aeration blowers, disinfection systems, SCADA communications, and other essential components required to maintain wastewater treatment. Although backup generators are available at many critical facilities, long-duration storms or large-scale outages may exhaust available fuel supplies or exceed generator capacity, leading to reduced treatment performance or service disruption. Flood events can also mobilize hazardous materials, introduce contaminants into the wastewater system, and overwhelm influent flows through inflow and infiltration, further complicating treatment operations. In extreme cases, the need for emergency bypass pumping or temporary flow diversions may lead to environmental impacts or regulatory exceedances.

In summary, the entire VVWRA service area—including all current and future facilities, pipelines, buildings, and personnel—is considered at risk from flooding events. Above-ground infrastructure, electrical and communication systems, and assets located near the Mojave River or in drainage-prone areas are at heightened risk of damage or loss of function. Flood-induced power outages and access limitations can compound system vulnerabilities, creating far-reaching operational, environmental, and public health impacts. VVWRA has no land-use authority over development patterns, zoning, wildfire recovery conditions, or watershed management within its service area, and therefore must manage flood risk through infrastructure hardening, planning, coordination with local jurisdictions, and improvements to operational resilience.

4.3.2 Climate Change – Induced Drought

Probability: (50-75%) Likely - Historical drought data for the Victor Valley and surrounding region indicate at least five multi-year significant droughts within the past 50 years, based on California drought records. This equates to an average drought occurring roughly every 10 years, or about a 10 percent chance of drought conditions developing in any given year. Due to the High Desert's arid climate, reliance on regional groundwater supplies, and the increasing likelihood of prolonged dry periods and reduced precipitation associated with climate change, VVWRA determined that future drought occurrence within its service area is likely. Drought conditions influence wastewater flows, influent strength, and treatment processes, and therefore remain a relevant hazard for VVWRA's long-term operational planning.

Impact: *Critical*

General Definition: A drought is a prolonged period of below-average precipitation that results in reduced surface water, groundwater recharge, and overall water availability in a region. Drought conditions in the High Desert are often accompanied by high temperatures, low humidity, and persistent winds, all of which accelerate evaporation and intensify water shortages. Although drought can occur in any climate, the frequency, duration, and severity of drought vary significantly by region. In Southern California, drought patterns are heavily influenced by long-term climate cycles such as El Niño and La Niña, which shift precipitation patterns across the state.

The severity of a drought depends on the extent of moisture deficiency, its duration, and the geographic area affected. Because drought's impacts accumulate slowly, it is difficult to determine precisely when a drought begins or ends. A few dry months typically do not constitute a drought in California, and even during extended drought periods, there may be isolated months of above-average precipitation. These short-term wet periods generally do not offset long-standing moisture deficits. Droughts in California often persist for several years before hydrologic conditions return to normal. While drought impacts are present year-round, they become most apparent during the summer months when temperatures are highest and natural water demands increase. For VVWRA, drought conditions can influence wastewater flows, influent characteristics, and treatment operations, making drought a relevant and recurring hazard to consider in long-term planning.

Climate Change Probability: The probability of drought impacts to VVWRA will increase as climate change continues to influence weather patterns in the southwestern United States. Climate projections consistently indicate that the region will experience longer, hotter periods with reduced precipitation, contributing to more frequent and prolonged

drought conditions. Research shows that rising temperatures accelerate evaporation rates and increase water loss from soil and vegetation, intensifying drought even in years when overall precipitation does not decline significantly. As soils dry, a greater portion of incoming solar energy heats the ground and surrounding air rather than being used for moisture evaporation, resulting in hotter temperatures and even drier conditions. These combined factors increase the likelihood that VVWRA and the greater Victor Valley region will experience more severe and more frequent drought events in the coming decades.

Measuring Droughts: Drought conditions in the United States are monitored using several quantitative tools and indices that measure precipitation deficits, soil moisture, streamflow, vegetation stress, and other hydrologic factors. One of the most widely used tools is the U.S. Drought Monitor, which provides weekly assessments of drought severity ranging from “Abnormally Dry” (D0) to “Exceptional Drought” (D4). This index combines multiple meteorological and hydrological indicators with expert input to create a comprehensive, region-by-region depiction of drought impacts.

In California, prolonged drought has prompted statewide policy and emergency actions intended to reduce water use and protect limited supplies. While these mandates primarily affect drinking water agencies, agricultural operations, and local jurisdictions, regional drought conditions also affect wastewater agencies such as VVWRA. Reduced water use during drought can result in lower wastewater flows, higher influent concentrations, elevated salinity, and increased operational demands on treatment processes. In addition, statewide drought declarations influence groundwater management practices, recharge activities, and watershed conditions that indirectly affect VVWRA’s infrastructure and service environment.

Although VVWRA is not an urban water supplier subject to Water Shortage Contingency Plans or related state conservation mandates, the Authority monitors statewide drought actions and regional water management responses because they can influence wastewater characteristics, regulatory requirements, and long-term resource planning. Understanding how drought is measured and tracked allows VVWRA to anticipate changes in treatment processes, influent quality, and operational needs as regional drought conditions evolve.

Climate Change Impacts:

The following summarizes how climate change is expected to influence exposure and vulnerability to drought for the VVWRA service area:

Population — Climate change is unlikely to significantly increase direct population exposure to drought within the VVWRA service area, as drought does not typically pose

immediate physical risks to residents. However, prolonged drought periods can indirectly affect the population by increasing wastewater strength, treatment challenges, and the potential for service impacts if extreme drought conditions begin to influence regional water availability, sanitation needs, or utility operations. Vulnerable populations may experience secondary impacts if wastewater costs or constraints increase during extended drought conditions.

Critical Facilities — Climate change is likely to increase the exposure and vulnerability of all VVWRA critical facilities to drought-related impacts. Higher temperatures and prolonged dry periods can reduce wastewater flows, increase influent concentrations, and elevate salinity levels, placing additional stress on treatment processes, equipment, and chemical systems. Drought-driven reductions in groundwater recharge and water supply can also influence recycled water availability and long-term planning for effluent management. In addition, higher temperatures during drought may require operational adjustments to protect biological treatment processes, odor control systems, and equipment sensitive to thermal stress. As drought frequency and intensity increase due to climate change, VVWRA's critical facilities will face greater operational and maintenance challenges.

Vulnerability and Impacts: Underserved and vulnerable populations within the VVWRA service area include socioeconomically disadvantaged residents; individuals with limited English proficiency; geographically isolated or educationally disenfranchised people; racial, ethnic, and national-origin minorities; women and children; individuals with disabilities and others with access and functional needs; seniors; and people experiencing homelessness, including those living near waterways or in informal encampments. These socially vulnerable populations are disproportionately affected by drought-related conditions due to factors such as limited financial resources, reduced access to cooling and hygiene facilities, and challenges in navigating emergency information or securing basic needs during prolonged dry periods.

During drought conditions, vulnerable populations may face increased risks related to sanitation, hygiene, and exposure to extreme heat, especially if regional water shortages lead to reduced availability of cooling centers, public facilities, or supportive services. Reduced water use during drought can alter wastewater flows and treatment dynamics, potentially limiting availability or reliability of community sanitation infrastructure. For unhoused individuals living along dry riverbeds, washes, or flood channels, drought can contribute to unsanitary conditions while simultaneously placing them at risk when sudden storm events end drought periods and produce flash flooding.

For VVWRA, drought creates operational challenges that may indirectly affect community resilience. Lower wastewater flows and higher influent concentrations can strain treatment processes, increase odors, elevate salinity levels, and accelerate wear on equipment. These operational impacts may increase maintenance costs and affect the reliability of essential wastewater services that support public health and environmental protection. As drought frequency and intensity increase due to climate change, the vulnerability of both VVWRA facilities and the populations they serve is expected to grow.

The following table is a replacement cost estimate for all VVWRA owned critical facilities.

Table 9. Drought Severity Replacement Costs

VVWRA / Drought D0-D4 Severity	Replacement Value
D4 (Exceptional Drought)	
VVWRA - All Critical Assets	$ 500,000
D3 (Extreme Drought)	
VVWRA - All Critical Assets	$100,000
D2 (Severe Drought)	
VVWRA - All Critical Assets	$100,00
D1 (Moderate Drought)	
VVWRA - All Critical Assets	$0
D0 (Abnormally Dry)	
VVWRA - All Critical Assets	$0

U.S. Drought Monitor: The U.S. Drought Monitor is designed to provide the general public, media, government officials, and others with an easily understandable overview of weekly drought conditions across a county throughout the United States. The U.S. Drought Monitor is unique because it assesses multiple numeric measures of drought, including the PDSI and three other indices, as well as experts' interpretations, to create a weekly map depicting drought conditions across the United States. The U.S. Drought Monitor uses five drought intensity categories, D0 through D4, to identify areas of drought.

The maps below are taken from https://droughtmonitor.unl.edu/Maps/MapArchive.aspx and show the drought differences between October 2020 and October 2025. Note the drastic difference between the two drought maps.

Figure 4. Drought Monitor October 2020

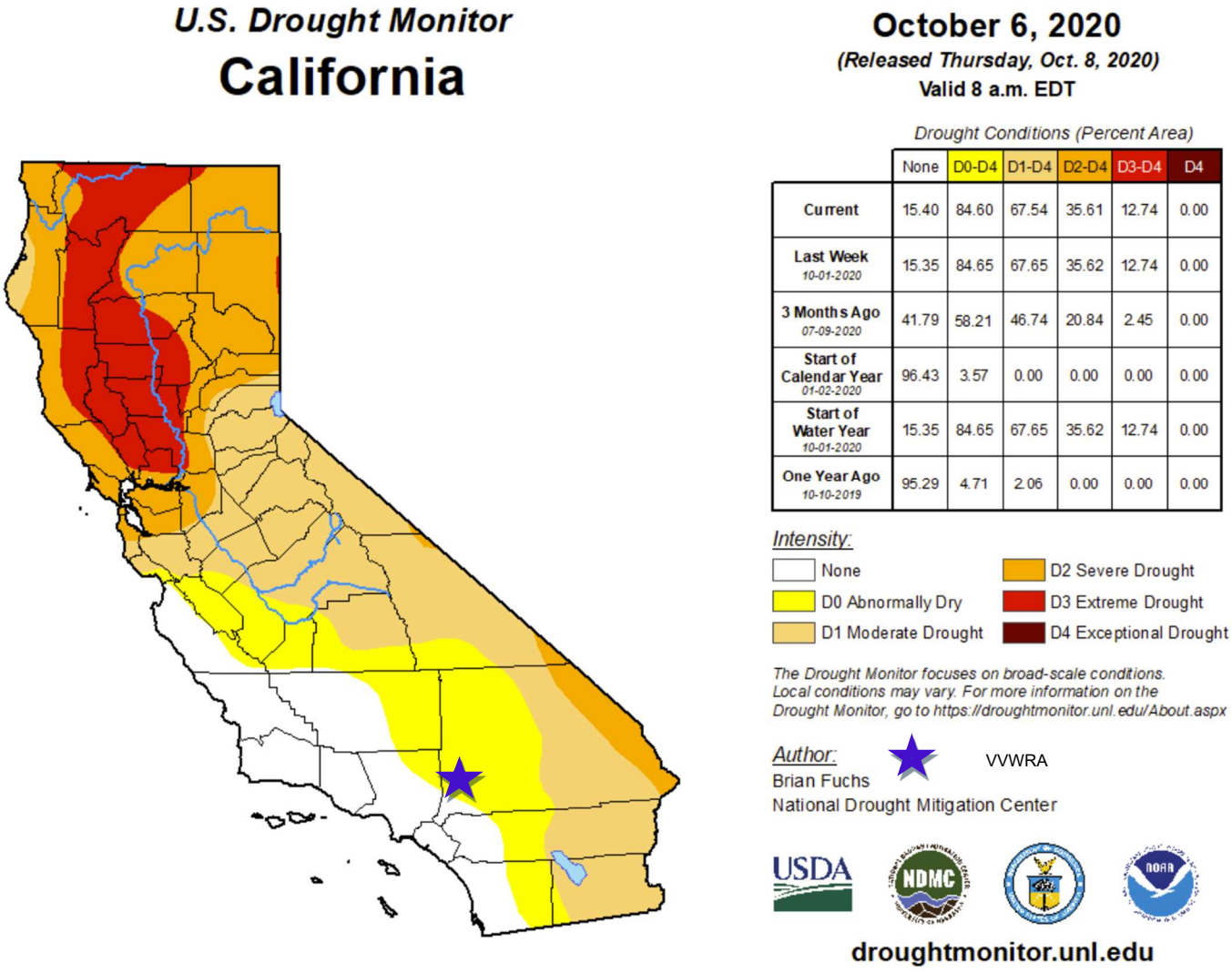


Figure 5. Drought Monitor October 2025

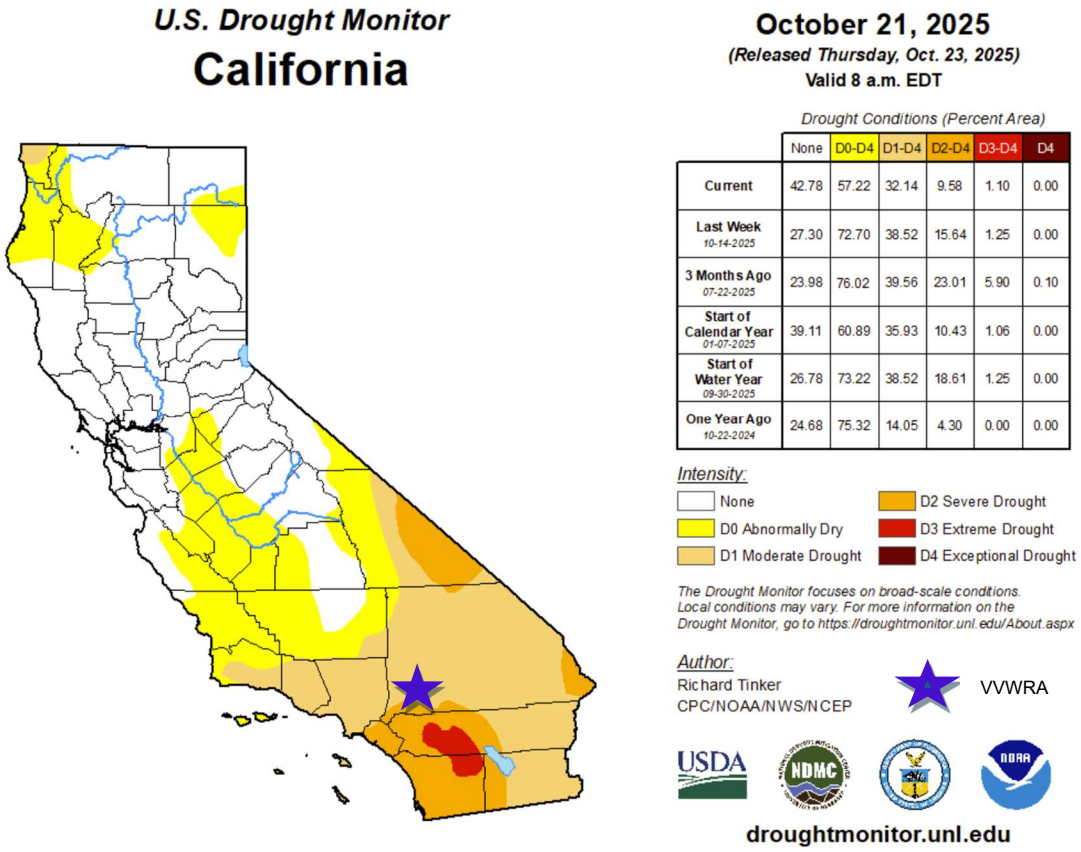


Table 10. U.S. Drought Monitor

D0	**Abnormally Dry**	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered
D1	**Moderate Drought**	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	**Severe Drought**	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3	**Extreme Drought**	Major crop/pasture losses; widespread water shortages or restrictions
D4	**Exceptional Drought**	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

Figure 6. Drought History (2000-2023)

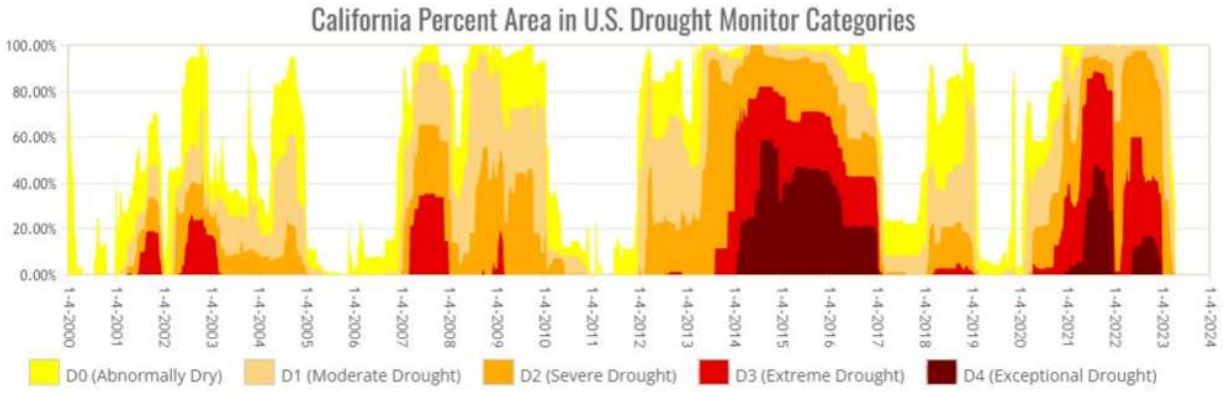


Table 11 Drought History in Southern California

Year	Drought History
1841	The drought was so bad that "a dry Sonoma was declared entirely unsuitable for agriculture."
1864	This drought was preceded by the torrential floods of 1861-1862, showing the fluctuation in climate back in the 1800s.
1924	This drought encouraged farmers to start using irrigation more regularly because of the fluctuation in California weather; the need for consistent water availability was crucial for farmers.
1929–1934	This drought was during the infamous Dust Bowl period that ripped across the plains of the United States in the 1920s and 1930s. The Central Valley Project was started in the 1930s in response to drought.
1950s	The 1950s drought contributed to the creation of the State Water Project.
1976–1977	1977 had been the driest year in state history to date. According to the *Los Angeles Times*, "Drought in the 1970s spurred efforts at urban conservation, and the state's Drought Emergency Water Bank came out of drought in the 1980s."
1986–1992	California endured one of the longest droughts ever observed from late 1986 through early 1992. Drought worsened in 1988 as much of the United States also suffered from severe drought. In California, the six-year drought ended in late 1992 as a significant El Niño event in the Pacific Ocean (and the eruption of Mount Pinatubo in June 1991) most likely caused unusually persistent heavy rains.
2007–2009	2007–2009 saw three years of drought conditions, the 12th worst drought period in the state's history, and the first drought for which a statewide proclamation of emergency was issued. The drought of 2007–2009 also saw greatly reduced water diversions from the State Water Project. The summer of 2007 saw some of the worst wildfires in Southern California history.

2011-2017	From December 2011 to March 2017, the state of California experienced one of the worst droughts to occur in the region on record. The period between late 2011 and 2014 was the driest in California history since record-keeping began.
2020 - 2022	January and February 2020 were dry to record dry in several areas (central CA and Northern CA-NV). The past three combined water years were California's driest on record.

Description: Climate change is expected to increase both the frequency and severity of drought in the VVWRA service area. Warmer temperatures reduce soil moisture, increase evapotranspiration, and contribute to diminished streamflow and groundwater recharge. Reduced snowpack in the Sierra Nevada—one of the most critical components of California's water supply—further intensifies drought conditions statewide. These climatic changes create longer dry periods and more persistent drought cycles that affect regional water availability and, in turn, influence wastewater treatment operations, influent characteristics, and long-term planning needs.

California experienced one of the driest periods in its recorded history between late 2011 and 2021, marking an extended multi-year drought that affected nearly every sector of the state. Predictions of El Niño conditions in 2015 raised public expectations that the drought would ease; however, rainfall did not materialize at levels needed to alleviate regional water scarcity. As part of statewide drought response efforts, numerous policy actions, conservation campaigns, and resource management strategies were implemented to address the impacts of prolonged drought on communities, ecosystems, and critical infrastructure.

The cumulative effects of the 2011–2016 drought were severe, contributing to the death of approximately 102 million trees across California and leaving large portions of the state in extreme or exceptional drought categories. While heavy rains in early 2017 temporarily improved conditions, drought conditions recurred in subsequent years. The winter of 2022–2023 became the wettest season in decades, ultimately prompting Governor Newsom to declare an official end to the statewide drought in April 2023. However, despite periodic relief, drought remains a recurring and increasingly likely hazard in California, with all 58 counties having experienced significant drought impacts in recent years.

Within the 2020–2025 timeframe, no federal or state disaster declarations were issued specifically for climate change–induced drought conditions in the VVWRA service area. However, statewide drought emergencies and regional responses affected local water

availability, water-use patterns, and wastewater inflow characteristics, underscoring the ongoing operational and planning challenges associated with prolonged drought conditions.

Impact Statement: Drought conditions can significantly affect VVWRA's operations even though the Authority does not provide potable water. During extended dry periods, reduced water use throughout the region decreases wastewater flows, increasing influent strength, salinity, and temperature. These changes place additional stress on treatment processes, biological systems, odor control, and chemical demands. Higher-strength wastewater may also increase wear on equipment and reduce operational efficiency. Prolonged drought can elevate energy demands, complicate solids processing, and reduce the availability of recycled water resources that are dependent on stable influent volumes.

Drought also has indirect impacts that can create vulnerabilities for VVWRA. Extended periods of heat and dryness increase the likelihood of wildfires and power outages, both of which can affect VVWRA facilities. Reduced groundwater recharge and lower regional water supplies can affect long-term planning for resource recovery, effluent management, and potential indirect potable reuse pathways. Additionally, drought-driven water conservation measures within surrounding communities may change inflow patterns and introduce operational variability within the collection system.

The entire VVWRA service area is exposed to drought-related effects, and all current and future assets—including treatment facilities, lift stations, pipelines, and administrative buildings—can be impacted by the operational and environmental conditions associated with prolonged drought. Although VVWRA does not control land use, development patterns, or regional water supply management, it must continually adapt its operations to maintain reliable wastewater services during extended dry periods. Drought can have fiscal implications through increased energy and chemical costs, changes in biosolids handling, and potential regulatory impacts related to treatment performance. Ensuring operational resilience during drought is essential to protecting public health and environmental quality throughout the Victor Valley.

4.3.3 Wildfire

Probability: (75–100%) Highly Likely — Historical wildfire data for the Victor Valley and surrounding region indicate recurring wildfires of varying size and intensity, including the 2011 Las Flores Fire, the 2016 Blue Cut Fire (37,000 acres), multiple Hesperia and Apple Valley brush fires in 2020, and numerous regional wildfires through 2023–2024. These events demonstrate that wildfires occur in or near the VVWRA service area approximately every two to four years, reflecting a strong likelihood of future occurrences. The High Desert's dry vegetation, prolonged summer heat, desert scrub fuels, and exposure to strong winds—including Santa Ana wind events—further contribute to wildfire ignition and rapid spread. Given these environmental conditions and increasing fire weather severity associated with climate change, future wildfire events impacting or threatening VVWRA facilities remain likely.

Impact: Critical

General Definition: A wildfire is an uncontrolled fire that burns in natural vegetation such as grasslands, brush, or woodlands. Wildfires may ignite from natural causes—most commonly lightning—but nationwide research shows that the majority are caused by human activities, including debris burning, equipment sparks, discarded cigarettes, and improperly extinguished campfires. In some cases, downed utility lines or electrical equipment failures can also trigger wildfires, particularly during periods of high wind. Wildfires vary significantly in behavior and intensity, with three primary fire types recognized: surface fires, which burn low-lying vegetation; ground fires, which smolder beneath the surface and can be difficult to extinguish; and crown fires, which move rapidly through the tops of trees and can spread quickly when driven by strong winds.

Wildfire occurrence is strongly influenced by local weather conditions, the amount and dryness of available vegetation, topography, and seasonal climate patterns. Extended drought, low humidity, high temperatures, and high winds all increase wildfire likelihood and intensity. Climate cycles such as El Niño and La Niña also affect fire behavior—wetter El Niño conditions generally suppress wildfire activity, while drier La Niña conditions can greatly increase the frequency and severity of fires.

California is one of the most wildfire-prone regions in the United States, and the Southern California High Desert is especially susceptible during the late summer and fall when hot, dry conditions prevail. The region is also impacted by Santa Ana winds, which are known for their high speeds and extreme drying effect. These winds can rapidly spread fire across desert scrublands and wildland–urban interface areas, and they are capable of toppling or damaging electrical infrastructure that can ignite new fires. Within the VVWRA service area, brush fires can move quickly across open desert terrain and jump across

sparse vegetation corridors, posing risks to pipelines, remote lift stations, and subregional facilities located near wildland areas. The combination of dry fuels, high heat, and strong winds makes wildfire an ongoing hazard for the Victor Valley region.

Climate Change Probability: The probability of increased wildfire activity due to climate change is significant for the Victor Valley region. Rising temperatures, prolonged drought conditions, and reduced soil and vegetation moisture all contribute to a longer and more intense fire season. Climate projections for Southern California indicate hotter, drier summers and more frequent extreme heat days, which dry out desert scrub and grasses and create highly combustible fuel conditions. These changes substantially elevate the likelihood of wildfire ignition and rapid spread within and around the VVWRA service area.

As wildfires become more frequent and severe, secondary hazards such as post-fire flooding and debris flows also become more likely. Burned vegetation and soil lose their ability to absorb stormwater, increasing flash-flood potential along washes and drainage paths near VVWRA facilities. Although these cascading impacts occur after a fire event, the increased probability of wildfire resulting from climate change directly heightens both fire and post-fire flood risks to VVWRA infrastructure.

Climate Change Impacts:

The following summarizes how climate change is expected to influence exposure and vulnerability to wildfire within the VVWRA service area:

Population— Climate change is likely to increase population vulnerability to wildfire as rising temperatures, prolonged drought conditions, and more frequent extreme heat events contribute to drier vegetation and a longer fire season. These factors increase the likelihood of evacuations, displacement, roadway closures, and reduced air quality during wildfire events. Vulnerable populations—such as individuals with limited mobility, limited English proficiency, or pre-existing respiratory conditions—may experience heightened impacts, and disruptions to essential services, including wastewater operations, can further affect community health and safety.

Critical facilities— Climate change is expected to increase the exposure and vulnerability of all VVWRA critical facilities to wildfire hazards. Hotter and drier conditions elevate ignition potential near pipelines, lift stations, and subregional plants located within or adjacent to wildland–urban interface areas. Increased wildfire frequency also raises the likelihood of power outages, which can disrupt pumping, treatment processes, and SCADA communications. Post-fire conditions may further expose VVWRA infrastructure to debris flows, erosion, and flooding due to vegetation loss. As wildfire behavior becomes

more extreme, VVWRA facilities will face greater operational challenges and increased risk of direct and indirect damage.

Vulnerability and Impact: Wildfire events can affect people throughout the VVWRA service area, but the impacts are often more severe for socially vulnerable populations, including people experiencing homelessness, individuals with respiratory conditions, outdoor workers, seniors, and low-income residents. Wildfires and associated smoke events can reduce air quality for extended periods, creating health risks for those who lack access to indoor climate control, clean air filtration, or stable housing. People living in makeshift shelters, encampments, or areas near washes and open land may also face increased danger from fast-moving brush fires or the need for sudden evacuation.

Wildfire can directly and indirectly impact VVWRA operations. Facilities located near open desert or wildland–urban interface areas are vulnerable to direct flame exposure, radiant heat, blowing embers, and smoke intrusion. Even in cases where flames do not reach VVWRA infrastructure, wildfire smoke and ash can affect sensitive equipment, HVAC systems, and process controls. Severe wildfires also increase the likelihood of power outages, which can disrupt pumping, aeration systems, SCADA communications, and other critical treatment processes. Additionally, post-fire conditions leave burned slopes destabilized, increasing the risk of debris flows during subsequent rainfall events, which may damage pipelines, access roads, and exposed infrastructure.

Lower-income and socially vulnerable populations may experience disproportionate hardship during wildfire events due to limited financial resources, reduced access to emergency communication, and constrained ability to relocate or shelter safely. Wildfire impacts on VVWRA facilities—such as reduced treatment capacity, operational disruptions, or extended power outages—can further affect public health and sanitation throughout the community. As wildfire frequency and intensity increase with climate change, both the population and VVWRA's operational systems face heightened vulnerability to direct fire damage, degraded air quality, service interruptions, and cascading post-fire hazards such as flooding and erosion.

Description: Local facility fires and regional wildfires are significant concerns for VVWRA. The Authority's treatment facilities, electrical systems, SCADA networks, lift stations, and administrative buildings are susceptible to damage from wildfire, smoke, and extreme heat. A fire occurring near or within a facility footprint can threaten structures, equipment, communication systems, and the safety of personnel. Consequences may include loss of buildings, damage to critical equipment, disruption of treatment processes, impaired access to facilities, and potential service interruptions.

California is highly susceptible to wildfires, particularly during late summer and fall when vegetation becomes extremely dry and temperatures peak. Southern California is also affected by Santa Ana winds, which develop seasonally and are known for their high speeds and intense drying effect. These winds can quickly turn grasses, brush, and desert vegetation into highly flammable fuel and are capable of knocking down or damaging utility infrastructure, which may spark additional fires. Under strong wind conditions, wildfires can grow rapidly, spreading across desert scrublands and into developed areas, causing widespread property damage, poor air quality, and significant threats to public safety.

Wildfires can affect VVWRA operations in multiple ways. Smoke and ash can infiltrate sensitive electrical and mechanical systems, potentially damaging equipment or impairing air filtration systems. Severe fires may damage power transmission lines serving VVWRA facilities, resulting in power outages that disrupt pumping, aeration, SCADA communication, and other essential treatment processes. Lift stations and remote sites located near wildland–urban interface areas are at heightened risk of direct flame exposure or radiant heat impacts. Even if VVWRA facilities are not directly damaged, limited visibility, road closures, and hazardous air quality conditions may hinder operator access and emergency response activities. As wildfires increase frequency and intensity, these operational vulnerabilities underscore the importance of fire preparedness and system resilience across all VVWRA facilities.

Figure 7. Wildfire Map with VVWRA Boundaries

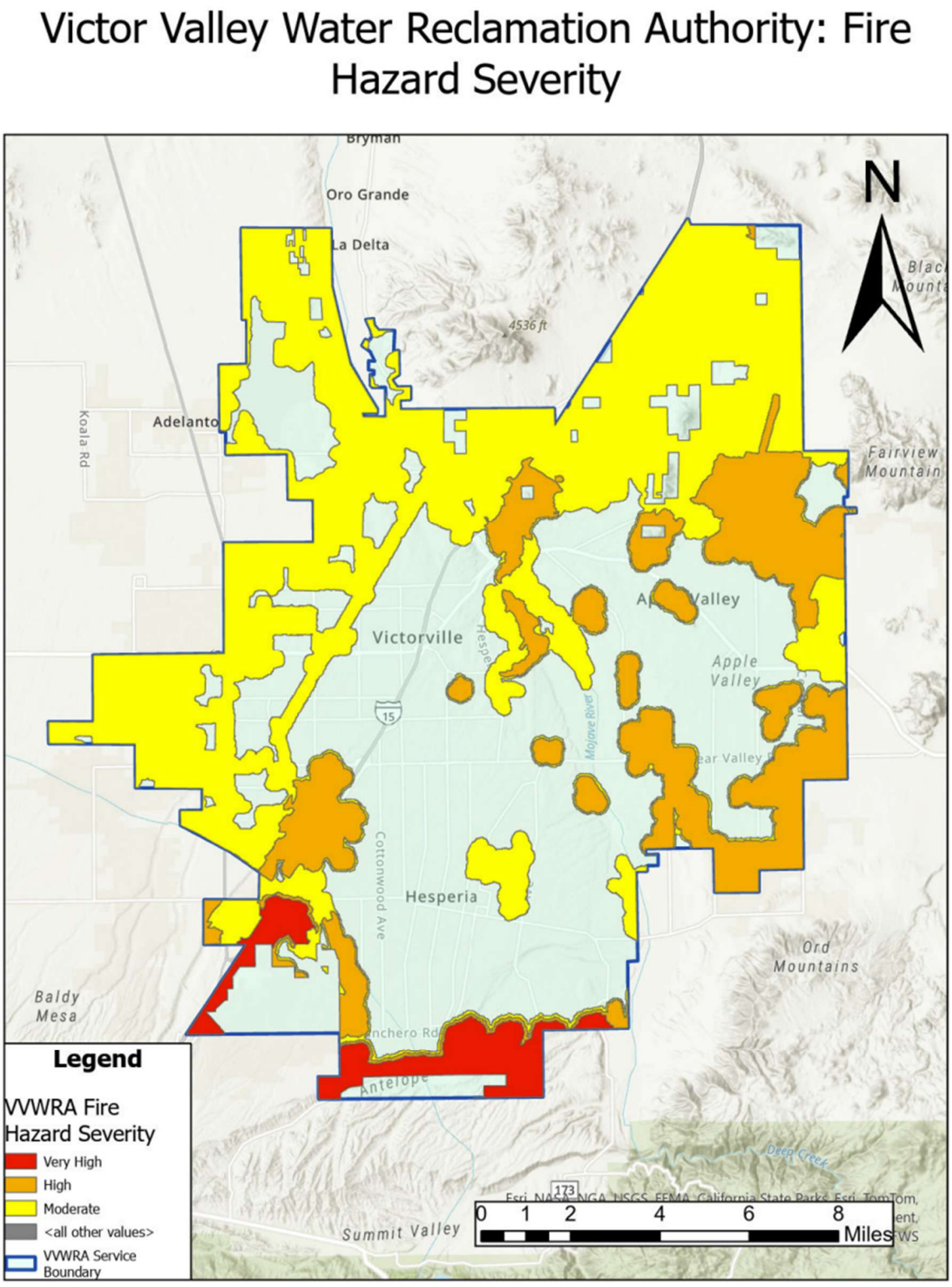


Table 12. 2020-2025 Significant Wildfires History in San Bernardino County

Fire Name	Date	Acres Burned
York Fire	8/1/2023	93,078
Line Fire	9/5/2024	43,978

*Wildfires burning ≥10,000 acres or destroying ≥1,000 structures, based on Cal Fire's criteria for major incidents

Within the 2020 - 2025 timeframe, there was two federal and/or state declaration declared for California wildfires within the VVWRA service area. Notice is hereby given that, in a letter dated October 16, 2020 (DR-4569-CA), and January 8, 2025 (DR-4856-CA) the President issued a major disaster declaration under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 *et seq*. (the "Stafford Act"), as follows:

> *"I have determined that the damage in certain areas of the State of California resulting from wildfires beginning on [September 4, 2020 (DR-4568-CA) / January 7,2025 (DR-4856-CA)], and continuing, is of sufficient severity and magnitude to warrant a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 et seq. (the "Stafford Act"). Therefore, I declare that such a major disaster exists in the State of California."*

Impact Statement: Wildfire events have the potential to cause a wide range of impacts on VVWRA and its assets. Wildfires can directly damage above-ground infrastructure such as electrical equipment, SCADA components, blowers, pumps, communications antennas, and buildings exposed to radiant heat, flames, or flying embers. Smoke and ash can also infiltrate sensitive systems, leading to equipment fouling, reduced air quality for operators, and impaired HVAC and filtration systems. In addition, wildfires may threaten remote lift stations, metering stations, and pipelines located near brushlands or wildland–urban interface areas, increasing the risk of asset damage and operational disruption. Access to these facilities may be impeded if fires cross roadways or if emergency personnel restrict movement during fire suppression activities, delaying maintenance or repair and posing life safety risks to VVWRA employees working in the field.

Wildfires also have the potential to generate significant indirect or cascading hazards. Large fires may burn through electrical transmission lines and substations, causing power

outages that can interrupt pumping, aeration, disinfection, and other critical treatment processes. Although VVWRA maintains backup generators at essential facilities, extended outages may exceed available fuel supplies or generator capacity, compromising the Authority's ability to maintain uninterrupted wastewater treatment. Additionally, burned areas become highly susceptible to post-fire flooding, erosion, and debris flows during subsequent storm events. These conditions can undermine or expose buried pipelines, damage access roads, overwhelm drainage systems, and increase sediment loads entering the collection system.

A loss of power, damage to communication networks, or physical impacts to treatment infrastructure could significantly impair VVWRA's ability to provide essential wastewater services. Such disruptions could lead to regulatory violations, public health concerns, environmental damage, increased operational costs, and reputational harm. In summary, the entire VVWRA service area—including all current and future facilities, infrastructure, and operational assets—is considered at risk from wildfire events. Above-ground assets, remote facilities, and field personnel face the greatest exposure. While VVWRA does not control land use, zoning, or vegetation management within its service area, the Authority must maintain robust operational preparedness, coordination with fire agencies, and infrastructure resilience to mitigate the growing wildfire threat.

4.3.4 Earthquake

Probability: (75–100%) Highly Likely — Historical earthquake data for the Victor Valley and surrounding region indicate frequent seismic activity, including multiple magnitude 4.0 or greater earthquakes recorded within San Bernardino County over the past five years. The region is influenced by several major fault systems, including the San Andreas, San Jacinto, and Helendale–Lockhart faults, all capable of producing significant ground shaking. Based on this recorded activity and the proximity of these active fault systems, future earthquakes within the VVWRA service area are considered highly likely. This frequency equates to notable regional seismic events occurring nearly every year, or approximately a 100 percent chance of experiencing significant ground shaking in any given year. VVWRA therefore determines that future earthquake occurrences within its boundaries continue to be highly likely.

Impact: Catastrophic

General Definition: An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the surface. This movement results from the constant forces of plate tectonics, which gradually push, pull, and deform the earth's crust. Although most tectonic motion occurs slowly, stress can accumulate when rock masses become locked along fault lines. When the accumulated energy exceeds the strength of the rock, the fault ruptures, releasing seismic waves that cause the ground to shake. Earthquakes most commonly occur along the boundaries of large tectonic plates; however, significant earthquakes can also occur within plate interiors where faults exist.

Ground shaking from earthquakes can damage or collapse structures; break pipelines; disrupt gas, water, electricity, and communication systems; and trigger secondary hazards such as landslides, surface fault rupture, liquefaction, fires, and—in coastal regions—tsunamis. Buildings or infrastructure located on unconsolidated soils, loose fill, or liquefaction-prone sediments are particularly vulnerable. Severe earthquakes in populated areas may result in injuries, loss of life, and extensive property and infrastructure damage.

Earthquakes strike without warning and can occur at any time of year. Worldwide, approximately 70 to 75 damaging earthquakes occur each year. In California, earthquake hazard is especially high due to the presence of multiple active fault systems. The southern section of the San Andreas Fault—located near the Victor Valley region—is among the five most likely faults in the United States to produce a major damaging earthquake, according to the U.S. Geological Survey (USGS). A scenario earthquake of magnitude 7.8 on this fault could cause more than $200 billion in damage statewide, based on the California Great Shakeouts and USGS modeling.

The Victor Valley region, including the VVWRA service area, is influenced by several nearby faults, including the San Andreas, San Jacinto, Helendale–Lockhart, and Lenwood–Lockhart–Barstow fault systems. These faults are capable of producing strong shaking that can impact wastewater treatment facilities, pipelines, lift stations, and SCADA and communication systems. The earthquake hazard profile for this plan draws from the 2007 Working Group on California Earthquake Probabilities (WGCEP 2007), the USGS National Seismic Hazard Maps, and regional seismic monitoring data.

Climate Change Impacts: The following summarizes how climate change may influence exposure and vulnerability to earthquake-related hazards within the VVWRA service area:

Population – Population vulnerability to earthquakes is unlikely to increase directly due to climate change, as earthquakes are not influenced by atmospheric conditions. However, climate-driven factors such as more frequent wildfires and extreme weather could degrade slopes and soils, potentially increasing susceptibility to earthquake-induced landslides or ground failure in certain areas.

Critical facilities – Exposure and vulnerability of VVWRA's critical facilities to earthquakes are also unlikely to increase directly as a result of climate change. Earthquake frequency and magnitude are not affected by climate patterns. However, climate change may indirectly influence secondary hazards associated with earthquakes—such as liquefaction potential from fluctuating groundwater levels, or post-wildfire debris flows triggered by seismic shaking—potentially increasing the overall impact of an earthquake event on infrastructure located near the Mojave River or adjacent slopes.

Vulnerability: The socially vulnerable population within the VVWRA service area includes individuals such as children, the elderly, people with disabilities, those with underlying medical or mental health conditions, individuals experiencing homelessness, and residents facing financial hardship or limited access to resources. Many vulnerable individuals may reside in unstable or unconventional living situations—such as tents, makeshift shelters, or encampments along riverbeds or under roadways—where they have limited ability to withstand or recover from major earthquake impacts. These populations are particularly susceptible due to financial constraints, reduced access to emergency information, limited transportation options, and challenges obtaining adequate food, medical care, or temporary shelter after a disaster.

During an earthquake, vulnerable populations may face significant barriers to securing safe shelter or essential services. Structural damage to buildings, disruptions to transportation corridors, and reduced availability of emergency shelters may delay response and recovery efforts. Individuals with disabilities, chronic illnesses, or mobility

limitations may require additional assistance to evacuate, access care, or obtain necessary supplies. People experiencing homelessness may be disproportionately affected, as they rely on public infrastructure, community facilities, and local service providers that may be damaged or inaccessible following a major seismic event.

For VVWRA, earthquakes pose additional risks to vulnerable populations through potential disruptions to wastewater collection and treatment systems. Damage to pipelines, lift stations, or treatment facilities could result in service outages or sanitary overflows, increasing public health risks, particularly for communities already struggling with access to sanitation, stable housing, and essential services. Ensuring the resilience of wastewater infrastructure is therefore critical not only to maintaining system operations but also to supporting the health and safety of vulnerable populations during and after an earthquake.

Table 8 below is a replacement cost estimate for all VVWRA critical facilities.

Table 13. Earthquake Replacement Costs

VVWRA / Earthquake Magnitude	Replacement Value
Magnitude 7.0 or Above (Very High Impact)	
VVWRA – All Critical Assets	$ 500 million
Magnitude 5.0 or 6.9 (Moderate Impact)	
VVWRA – All Critical Assets	$30 million
Magnitude 1.0 or 4.9 (Low Impact)	
VVWRA – All Critical Assets	$ 0

Description: The area surrounding VVWRA facilities is seismically active due to the presence of several major fault systems in the region. The Victor Valley is influenced by the San Andreas Fault, the San Jacinto Fault, the Helendale–Lockhart Fault System, and the Lenwood–Lockhart–Barstow Faults. These faults have produced significant earthquakes throughout Southern California and remain capable of generating strong ground shaking that could impact VVWRA's treatment facilities, pipelines, lift stations, and SCADA infrastructure. Numerous earthquakes have occurred in and around the service area, demonstrating the ongoing seismic activity characteristic of the region.

The greatest earthquake threats in the United States occur along tectonic plate boundaries and major seismic fault zones, primarily in the western states. California, located along the boundary between the Pacific and North American plates, experiences some of the most frequent and damaging earthquakes in the country. While the eastern United States experiences fewer and generally less intense earthquakes, the southwestern region—including the Victor Valley—faces a moderate to very high seismic risk. VVWRA's proximity to multiple active fault systems reinforces the need for ongoing preparedness and structural resilience across all Authority facilities.

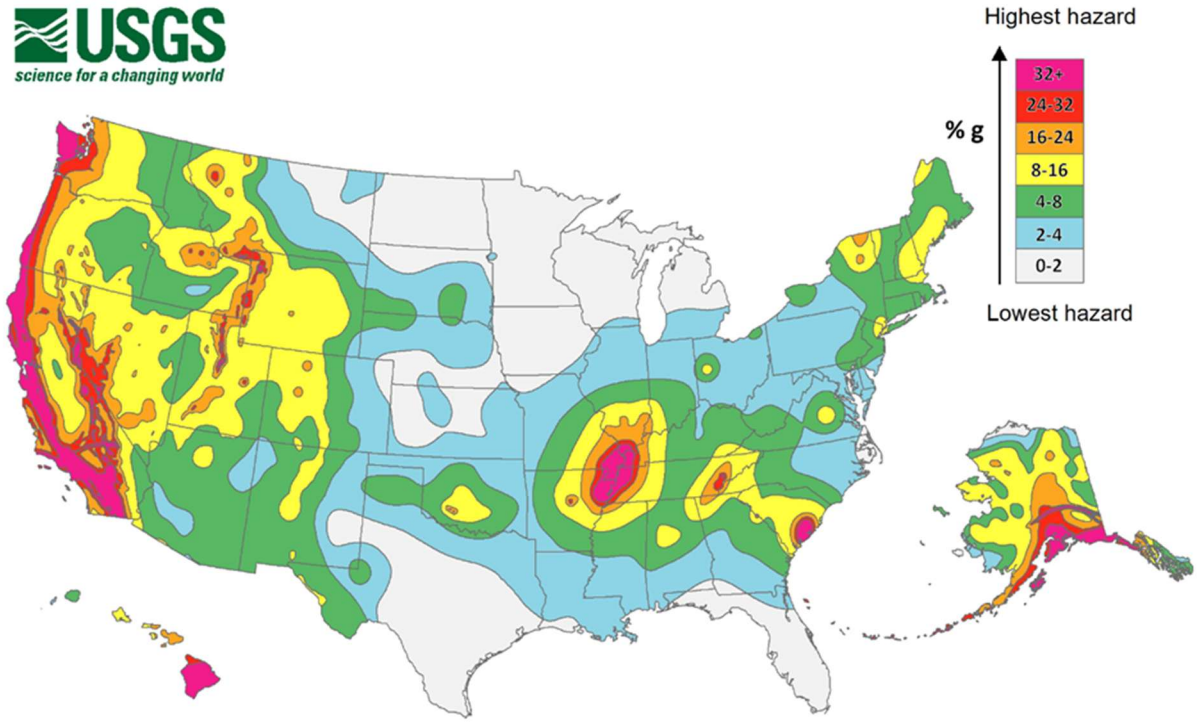


Figure 8. Earthquake Map with VVWRA Boundaries

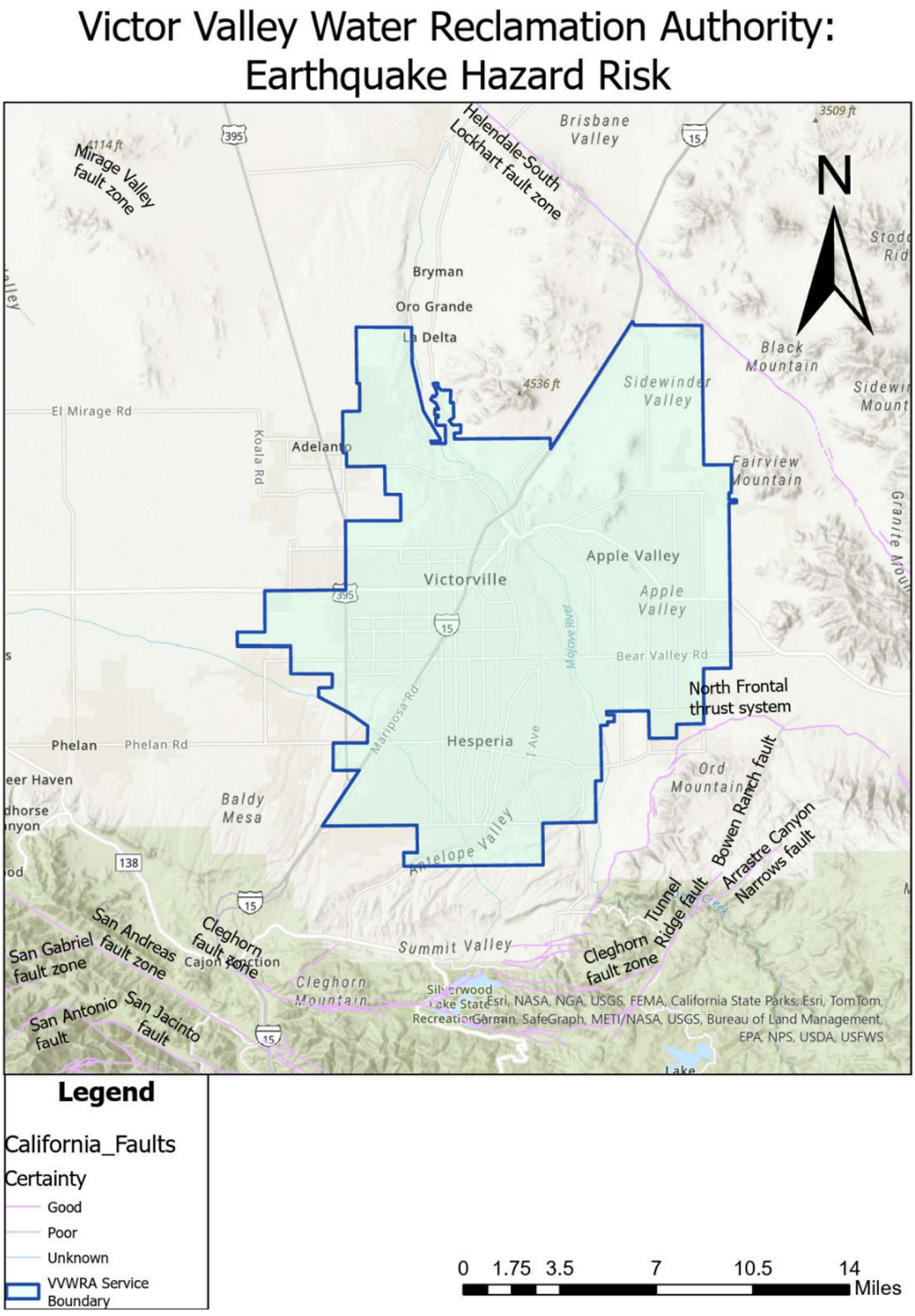


Table 14. Significant Earthquakes (4.0+ Mw) within San Bernardino County

Date	Area	Mag (M_w)
July 4, 2019	Ridgecrest Earthquake Sequence	6.4
July 5, 2019	Ridgecrest Earthquake Sequence	7.1
September 17, 2021	Barstow/Lenwood Quakes	4.6
March 4, 2022	Ludlow	4.0

Within the 2020 - 2025 timeframe, there were no federal and/or state declarations declared for earthquakes within the VVWRA service area.

Impact Statement: A significant earthquake could have severe and widespread impacts on VVWRA and its critical assets. Strong ground shaking can damage structural components of treatment facilities, including basins, clarifiers, digesters, and control buildings. Ground displacement, differential settlement, and liquefaction—particularly near the Mojave River—may cause pipelines to rupture, separate, or lose grade, interrupting the flow of wastewater to and from the Regional Plant and subregional facilities. Lift stations and metering stations located on unconsolidated soils are especially vulnerable to tilting, settlement, or complete loss of function during a major seismic event. Access to facilities may also be severely restricted if key roads, bridges, or crossings are damaged, delaying emergency repairs and hindering operational response.

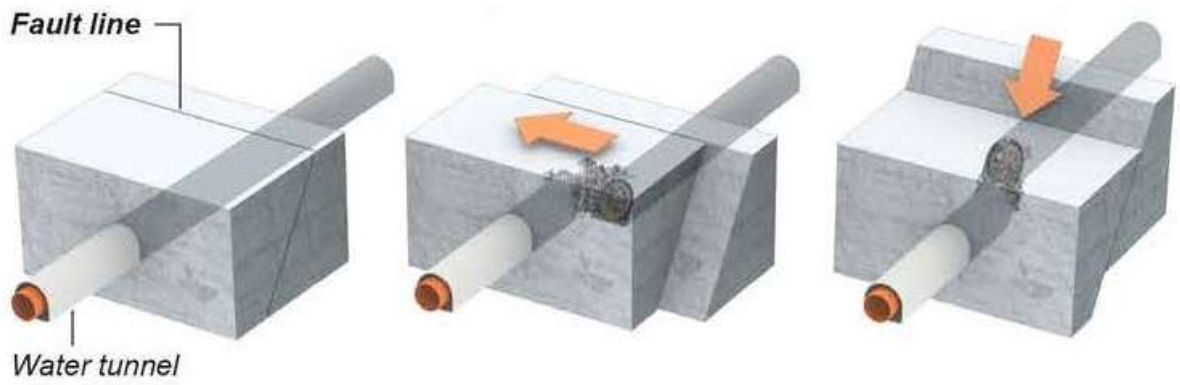
Earthquakes also create substantial indirect and cascading hazards for wastewater operations. Damage to regional electrical infrastructure or substations can cause extended power outages, which may interrupt pumping, aeration, disinfection, SCADA communication, and other essential treatment processes. Although VVWRA maintains backup generators at critical facilities, long-duration outages may exceed available fuel storage or generator capacity, reducing treatment reliability or causing regulatory violations. Fires ignited by damaged electrical systems, gas lines, or structural failures may further threaten facilities and personnel. Additionally, earthquake-induced damage to water distribution systems, stormwater systems, or private property may increase inflow and infiltration, overwhelming conveyance infrastructure and treatment processes.

Earthquake impacts may also affect vulnerable populations across the service area, including individuals experiencing homelessness, seniors, people with disabilities, and residents with limited resources or mobility. Damage to sanitation infrastructure and disruptions in wastewater service can pose significant public health risks, particularly for

populations already experiencing unstable housing, limited access to clean water, or inadequate shelter. VVWRA has no jurisdiction over land use, development practices, or the placement of socially vulnerable populations within its service area but is responsible for maintaining the resilience and continuity of wastewater services following a major seismic event.

In summary, a major earthquake could result in structural failures, widespread utility disruptions, restricted access, environmental impacts, and significant operational and financial consequences for VVWRA. Ensuring system redundancy, seismic resilience, and emergency response capacity remains essential to protecting public health and maintaining service continuity during and after an earthquake event.

Figure 9. How Ground Displacement Can Severe Pipes



Liquefaction can significantly impact VVWRA's wastewater collection and treatment systems during a major earthquake, particularly in areas with loose, saturated soils near the Mojave River. When liquefaction occurs, soils temporarily lose their strength and behave like a liquid, which may cause buried wastewater pipelines to settle unevenly, lose grade, or rupture. Gravity-fed sewer lines are especially vulnerable, as ground deformation can result in sags, offsets, or complete separations that disrupt flow and require extensive excavation and repair once soils re-solidify. Lateral spreading and ground displacement may also damage lift stations, access roads, manholes, and structures located on or near unconsolidated soils.

Regional water conveyance systems and utility corridors adjacent to VVWRA infrastructure may also experience damage from shaking, settlement, or liquefaction, potentially complicating repair access and interagency response efforts. Liquefaction-induced damage can impair the hydraulic function of sewer systems, contribute to inflow

and infiltration problems, and cause operational disruptions at treatment facilities if flows are altered or interrupted.

Although earthquakes themselves are not influenced by climate change, climate-driven shifts in precipitation and groundwater conditions may influence liquefaction susceptibility over time. Southern California is expected to experience more intense wet periods and more prolonged drought cycles. Extended drought may lower groundwater levels due to reduced recharge and increased extraction across the region, which could decrease liquefaction potential in some areas. Conversely, periods of heavy precipitation—such as those associated with atmospheric rivers—may temporarily raise groundwater levels, increasing the likelihood of liquefaction during seismic events. As groundwater conditions fluctuate more dramatically under future climate scenarios, certain areas within the VVWRA service region may see changes—either increases or decreases—in liquefaction vulnerability depending on local soil and hydrologic conditions.

Building Facilities: Shaking, ground displacement, and liquefaction during an earthquake can cause structural damage or failure in VVWRA's administrative buildings, control rooms, maintenance shops, and other occupied facilities. Even in less severe events, unanchored equipment, shelving, chemical storage, and office furnishings may fall or shift, posing safety hazards to employees working on-site. Structural failure or falling objects could result in injuries or fatalities if an earthquake occurs during operational hours. Field crews working at lift stations, manholes, pipelines, and treatment facilities may also face risks from collapsing structures, falling debris, shifting ground, or hazardous materials releases triggered by seismic activity. Ensuring the seismic resilience of VVWRA's buildings and securing interior components is essential to protecting staff and maintaining continuity of operations during and after a major earthquake.

Energy Storage and Power Failure: An adequate and reliable energy supply is critical for VVWRA to maintain its daily wastewater collection and treatment functions. Power failures can occur when an earthquake damages electrical transmission lines, substations, transformers, or on-site electrical systems, disrupting the continuous power needed to operate pumps, aeration systems, blowers, SCADA communications, disinfection processes, and other essential equipment. Even brief interruptions can impact treatment performance, while longer-duration outages may result in system overflows, process upsets, or violations of regulatory discharge requirements.

VVWRA maintains backup generators at critical facilities; however, extended outages may exceed available fuel supplies or surpass generator capacity, limiting the Authority's ability to sustain full treatment operations. In addition, access challenges following a major

earthquake may delay fuel deliveries or equipment repair. A simultaneous loss of external power and damage to on-site electrical or control infrastructure could significantly impair VVWRA's ability to manage flows, maintain treatment reliability, and preserve public health.

In summary, the entire VVWRA service area, including current and future facilities, infrastructure, and operational systems, is considered at risk from earthquake events. Ensuring redundancy in power systems, fuel supply, and SCADA resilience is essential to minimizing service disruptions and maintaining continuity of operations following a major seismic event.

4.3.5 Windstorms

Probability: (50-75%) Likely – Historical windstorm data for the Victor Valley and surrounding region indicate frequent high-wind events, with NOAA reporting dozens of significant windstorms annually across San Bernardino County. The High Desert routinely experiences gusts exceeding 40 to 60 miles per hour, with several events per year reaching damaging levels and causing blowing sand, reduced visibility, downed utility lines, and damage to exposed infrastructure. Based on this observed frequency—averaging multiple notable windstorms each year—future windstorm events within the VVWRA service area are considered likely. Strong winds driven by seasonal patterns and Santa Ana wind events are expected to continue affecting the region, presenting ongoing operational risks to VVWRA facilities.

Impact: Critical

General Definition: Several types of wind hazards affect the VVWRA service area, including strong pressure-gradient winds, Santa Ana winds, thunderstorm-generated winds, straight-line winds, and microbursts. High winds are generally defined as wind speeds that exceed normal seasonal averages and have the potential to cause property damage, disrupt utilities, reduce visibility, or threaten public safety. In the High Desert, strong winds are a common occurrence throughout the year, though the most severe events often coincide with seasonal Santa Ana winds, which typically occur between September and November. These winds originate inland and funnel through mountain passes, producing hot, dry, and fast-moving air capable of downing trees and power lines, blowing debris, and generating widespread blowing dust.

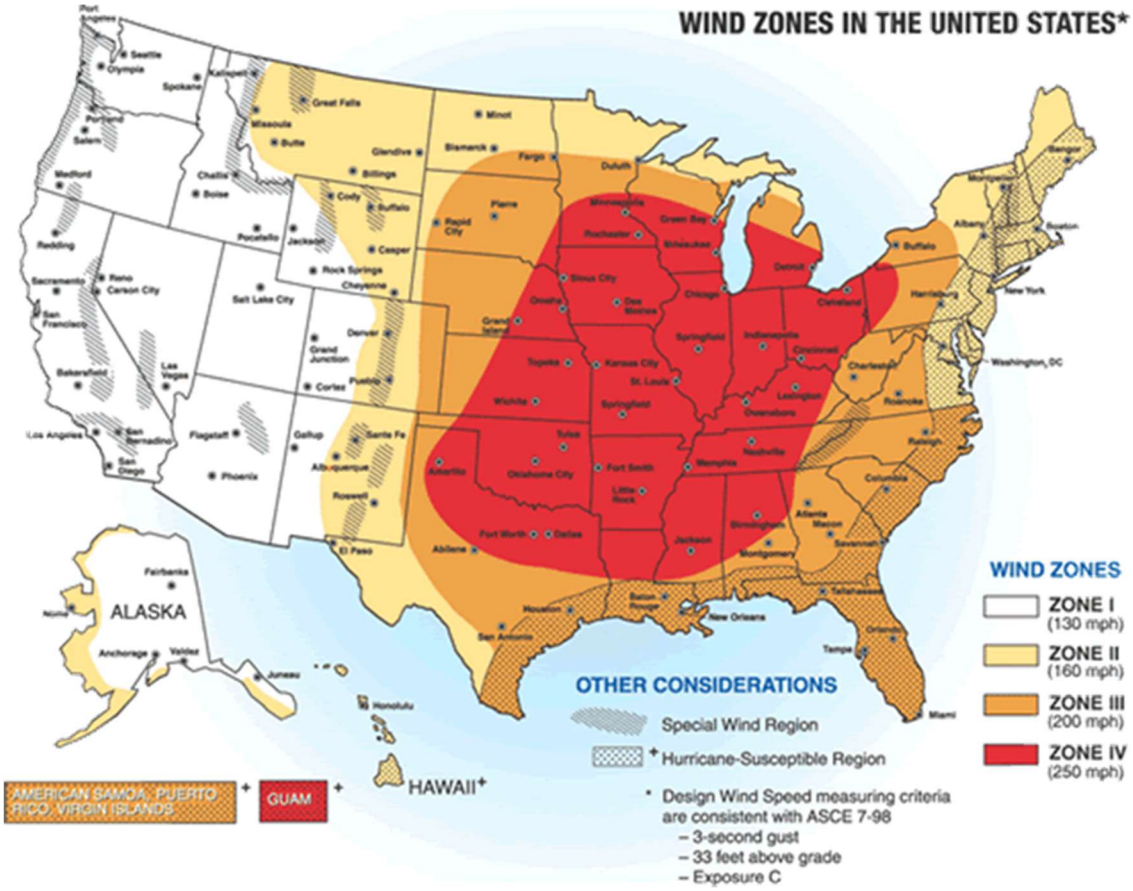
Wind hazards in the Victor Valley can be particularly disruptive due to the region's open terrain and sparse vegetation, which allow wind speeds to intensify across long distances. In addition to damaging buildings and equipment, windstorms may interfere with VVWRA's operations by impairing access to facilities, disrupting SCADA communication systems, damaging solar arrays or exposed mechanical components, and creating hazardous conditions for field staff. Because windstorms occur frequently and with varying levels of severity, they represent an ongoing hazard for VVWRA's service area.

Climate Change Probability: The probability that windstorm hazards will be affected by climate change is expected to increase moderately for the Victor Valley region. As climate change progresses, shifts in atmospheric pressure systems—particularly stronger high-pressure systems inland and low-pressure zones along the Southern California coast—may increase the frequency and intensity of Santa Ana wind events. These changes can elevate the likelihood of strong, damaging winds and may also contribute to a rise in

Public Safety Power Shutoff (PSPS) events and regional power outages initiated by utility providers during periods of elevated wildfire risk.

Although VVWRA has implemented mitigation measures such as backup generators and redundant communication systems, stronger or more frequent wind events could still impact facility operations, field activities, and critical infrastructure. For these reasons, the probability of windstorms affecting VVWRA is expected to remain likely, with climate trends suggesting a gradual increase in the potential for high-wind and extreme wind events over time.

Figure 10. Wind Zones in the United States



Climate Change Impacts

The following summarizes how climate change is expected to influence exposure and vulnerability to windstorm hazards within the VVWRA service area:

Population — Population exposure and vulnerability to windstorms are unlikely to significantly increase as a direct result of climate change. While stronger or more frequent

wind events may create temporary hazards such as blowing dust, debris, or reduced visibility, major life-safety impacts are generally limited. Vulnerable populations—such as individuals experiencing homelessness, outdoor workers, or those with respiratory illnesses—may face heightened short-term discomfort or breathing difficulties during severe wind events, but widespread population impacts are not expected to increase substantially.

Critical facilities – All VVWRA critical facilities may experience increased exposure and vulnerability to wind-related impacts as climate change contributes to stronger or more frequent high-wind events. Elevated wind speeds can damage exposed mechanical equipment, solar arrays, communication towers, shade structures, and SCADA antennas. High winds may also contribute to PSPS-related power outages, which can disrupt wastewater pumping, aeration, and treatment processes. More frequent extreme wind events may increase maintenance needs, accelerate equipment wear, and impair access to remote facilities. As a result, critical facility exposure is expected to increase as climate change amplifies regional wind hazards.

Vulnerability & Impact: Severe wind events can affect people throughout the VVWRA service area, but impacts are often more pronounced for vulnerable populations, including individuals experiencing homelessness, outdoor workers, seniors, and people with respiratory illnesses. High winds can generate blowing dust, sand, and debris, creating respiratory hazards and reducing visibility, which may jeopardize safety for pedestrians, motorists, and outdoor laborers. Lower-income residents, who may live in older housing or manufactured homes that are not designed to withstand strong winds, may also experience greater difficulty preparing for and recovering from wind-related damage.

The Victor Valley experiences frequent strong winds and seasonal Santa Ana wind events, and this pattern is expected to continue for the foreseeable future. Extreme winds can worsen other hazards, such as wildfires, by rapidly spreading flames or embers across open desert terrain. Strong winds may also disrupt transportation systems, including operations at nearby airports, and can worsen roadway hazards during dust storms.

Windstorms can significantly impact VVWRA operations. High winds can damage exposed equipment, solar power systems, SCADA antennas, chemical storage structures, shade canopies, and mechanical systems located outdoors. Blowing debris may strike or obstruct critical infrastructure, while airborne dust and sand can infiltrate sensitive electrical or mechanical equipment. Wind damage to utility poles or power lines can lead to localized or regional electrical outages, which may interrupt pumping, aeration, or other essential treatment functions. Although VVWRA maintains backup

generators at critical facilities, prolonged outages may strain fuel supplies or reduce operational redundancy.

The following table is a replacement cost estimate for all VVWRA-owned critical facilities.

Table 15. Windstorm Replacement Costs

VVWRA / Wind Severity based on Beaufort scale	Replacement Value
Very High Wind Speeds (Scale 12-10)	
VVWRA – All Critical Assets	$ 100,000
High Wind Speeds (Scale 9-7)	
VVWRA – All Critical Assets	$ 100,000
Moderate Wind Speeds (Scale 6-4)	
VVWRA – All Critical Assets	$0
Low Wind Speeds (3-0) 0%	
VVWRA – All Critical Assets	$0

Description: Santa Ana winds are a significant regional wind hazard affecting Southern California, including the Victor Valley and the VVWRA service area. These winds are known for their high speeds, low humidity, and intense drying effect, all of which increase the risk of damage to infrastructure and contribute to the rapid spread of wildfires. Santa Ana winds are typically warm, dry winds that blow from east to west, originating when high-pressure systems develop over the Great Basin and low-pressure systems form along the Southern California coast. The pressure gradient forces air downslope through mountain passes and canyons, compressing and warming it as it descends into the valleys and desert areas. This combination of complex topography and atmospheric conditions results in widespread or highly localized Santa Ana wind events that can occur primarily from late summer through early winter.

Santa Ana winds are particularly hazardous in the Victor Valley due to the region's open terrain and dry vegetation. These winds can rapidly spread wildfires, carry embers over long distances, and significantly increase the danger within the urban–wildland interface. Even in the absence of fires, strong windstorms can create blowing dust and debris, reduce visibility, disrupt transportation corridors, and damage exposed infrastructure. For

VVWRA, windstorms can affect outdoor mechanical equipment, solar installations, SCADA systems, chemical storage areas, and field operations at lift stations and metering sites.

The National Weather Service issues wind advisories and warnings based on forecasted wind speeds. A Wind Advisory is issued when sustained winds of 31 to 39 miles per hour and/or gusts of 46 to 57 miles per hour are possible. A High Wind Warning is issued when sustained winds of 40 mph or greater are expected for at least one hour, or when gusts of 58 mph or more are anticipated. Forecasters at the National Weather Service offices in Oxnard and San Diego often reserve the “Santa Ana” designation for winds exceeding approximately 29 mph (25 knots), as these speeds typically present elevated fire weather and public safety risks across Southern California.

Table 16. Beaufort Wind Scale

Beaufort grade	Kind of wind	Knots		km/h		Effects		Height of waves (metre)
		Min	Max	Min	Max	Earth	Sea	
0	Calm	<1		<1		Smoke rises vertical	Flat sea	-
1	Very light	1	3	1	5	The wind bends smoke	Small ripples with no white foamy crests.	0.1
2	Light breeze	4	6	6	11	It can be felt on face	Small wavelets, with unbroken crests.	0.2 - 0.3
3	Gentle breeze	7	10	12	19	It shakes leaves	Very small crests; crests begin to break.	0.6 - 1
4	Moderate breeze	11	16	20	28	It lifts dust and papers	Small waves that begin to grow longer; spuma più frequente e più evidente.	1 - 1.5
5	Fresh breeze	17	21	29	38	It shakes branches	Moderate waves that grow longer in shape; possible spray.	2 - 2.5
6	Strong breeze	22	27	39	49	It shakes big branches	Bigger waves; white foamy crests are longer everywhere.	3 - 4
7	Near gale	28	33	50	61	It impedes walking	The sea swells up; white foam forms when waves break up.	4 - 5.5
8	Gale	34	40	62	74	It shakes big trees	Medium-high, longer waves; crests start to break up in sprays.	5.5 - 7.5
9	Strong gale	41	47	75	88	Chimney pots and slated removed	High waves; tight strips of foam form in the direction of the wind.	7 - 10
10	Storm	48	55	89	102	It uproots trees	Very high waves with long crests; the sea looks completely white; waves fall down violently, visibility is reduced.	9 - 12.5
11	Violent storm	56	63	103	117	Serious devastation	Exceptionally high waves (small and medium tonnage ships disappear for a few seconds); visibility is still more reduced.	11.5 - 16
12	Hurricane	>64		>118		Very serious catastrophes	Air is filled with foam and sprays; sea is completely white because of foam; visibility is greatly reduced.	>14

Table 17. Windstorm History From NOAA 2020-2025 San Bernardino County

Year	Event Name / Description	Location (Primary Impact Area)	Begin Date	End Date
2020	Winter High Wind Event	Victorville–Hesperia–Apple Valley	Jan 18, 2020	Jan 19, 2020
	Santa Ana Windstorm	High Desert / Inland Empire	Dec 1, 2020	Dec 2, 2020
2021	Spring High Wind Event	Victorville / Adelanto / I-15 Corridor	Mar 15, 2021	Mar 16, 2021
	Santa Ana Wind Event	Hesperia / Apple Valley	Oct 11, 2021	Oct 12, 2021
2022	High Wind Warning Event	Victor Valley Region	Apr 9, 2022	Apr 10, 2022
	Winter Santa Ana Winds	High Desert Communities	Dec 8, 2022	Dec 9, 2022
2023	DR-4683 Severe Winter Storms (High Winds 50–70 mph)	Countywide / Victor Valley	Jan 4, 2023	Feb 3, 2023
	DR-4699 Severe Storms (Wind / Dust / Infrastructure Damage)	Victorville–Apple Valley	Feb 23, 2023	Mar 16, 2023
	Santa Ana Wind Event	Victor Valley	Nov 20, 2023	Nov 21, 2023
2024	DR-4769 High Wind / Winter Storm	Countywide / High Desert	Feb 4, 2024	Feb 9, 2024
	Late-Year Santa Ana Winds	Victorville / Hesperia / Oro Grande	Oct 27, 2024	Oct 28, 2024
2025	Santa Ana Wind Event	Victor Valley Region	Jan 7, 2025	Jan 8, 2025
	Strong Gradient Windstorm	Adelanto / Apple Valley / I-15 Corridor	Feb 12, 2025	Feb 13, 2025
	Early Spring Windstorm	Victorville / Hesperia	Mar 22, 2025	Mar 23, 2025

Within the 2020-2025 timeframe, two federal and/or state declarations were declared for California's severe winter storms, straight-line winds, flooding, landslides, and mudslides within the VVWRA service area. Notice is hereby given that, in a letter dated April 3, 2023 (DR-4699-CA), April 13,2024 (DR-4769-CA), the President issued a major disaster declaration under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 et seq. (the “Stafford Act”), as follows:

> *“I have determined that the damage in certain areas of the State of California resulting from severe winter storms, straight-line winds, flooding, landslides, and mudslides beginning on [February 21, 2023, and January 31, 2024] and continuing is of sufficient severity and magnitude to warrant a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency*

Assistance Act, 42 U.S.C. 5121 et seq. (the "Stafford Act"). Therefore, I declare that such a major disaster exists in California…."

Impact Statement: Windstorm events occur throughout the VVWRA service area, and all Authority facilities are equally exposed to this hazard. Severe winds have the potential to damage treatment plant structures, exposed mechanical equipment, solar arrays, SCADA antennas, communication towers, chemical storage areas, shade canopies, and other outdoor assets. High winds can tear off roofing materials, siding, and protective coverings; dislodge HVAC units; and damage smaller onsite buildings such as electrical sheds or control kiosks. Blowing debris, including tree limbs, construction materials, and windborne trash, can strike critical infrastructure, damage sensors or control panels, and obstruct access roads. Lift stations, metering stations, and remote pipeline facilities located in open desert terrain are particularly vulnerable due to limited shielding from high wind gusts.

Windstorms also pose risks to the electrical and communication systems that VVWRA relies on for continuous operations. Strong winds can topple utility poles, damage power lines, or disrupt communication networks, resulting in loss of power or SCADA connectivity. Such outages can interrupt pumping, aeration, disinfection, and monitoring processes, requiring reliance on backup generators or mobile equipment. In some cases, regional electric utilities may initiate Public Safety Power Shutoff (PSPS) events during periods of extreme wind to reduce wildfire risk. Although PSPS events in recent years have not caused major operational disruptions within the VVWRA service area, future events could impact the Authority by limiting power availability at critical facilities.

Because windstorms occur annually and are amplified by the region's topography and strong pressure gradients, all VVWRA assets, current and future, are vulnerable to severe wind impacts. Exposed, above-ground infrastructure is at greatest risk, including outdoor mechanical systems, control panels, solar installations, and communication equipment. Continued monitoring, maintenance, and reinforcement of vulnerable structures will be essential to maintaining service reliability under increasingly variable wind conditions.

SECTION 5. COMMUNITY CAPABILITY ASSESSMENT

5.1 Introductions

The purpose of conducting the capability assessment is to determine VVWRA's ability to implement a comprehensive mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects.

The capability assessment has two components:

1. An inventory of the existing relevant plans, ordinances, or programs already in place and
2. An analysis of VVWRA's capacity to bring them to fruition. A capability assessment highlights the positive mitigation activities within VVWRA and will detect the potential gaps.

To help mitigate the potential impacts of disasters, the VVWRA participates in CalWARN, a statewide mutual aid network that supports water and wastewater agencies throughout California. Through CalWARN, VVWRA has access to mutual aid agreements that facilitate the rapid sharing of personnel, equipment, and technical resources during emergency events.

As a government entity operating as a special district under California law, VVWRA is also eligible to request assistance through the Emergency Managers Mutual Aid (EMMA) system and the Emergency Management Assistance Compact (EMAC), which provides access to interstate mutual aid resources during large-scale or federally declared emergencies. In addition, national water and wastewater mutual aid coordination may be accessed through the American Water Works Association (AWWA) and the National WARN System.

CalWARN conducts workshops and training sessions for member agencies throughout the year, which focus on emergency response coordination, hazard mitigation strategies, and lessons learned from past disasters. These activities promote preparedness and resilience by helping utilities better understand vulnerabilities, mitigation opportunities, and effective response actions to protect critical infrastructure.

VVWRA currently employs approximately 51 full-time staff. Through participation in CalWARN, the Authority can request hundreds of trained water and wastewater professionals from across the state within hours of an emergency, significantly enhancing its response and recovery capacity. VVWRA's wastewater treatment, reclamation, and conveyance facilities are operated and maintained by appropriately certified operators

and technical staff, and mutual aid agreements enable VVWRA to both receive and provide labor, equipment, and technical support during emergency incidents.

The General Manager, Darron Poulsen, has over 39 years of experience in the water industry. He has been with VVWRA for 6 years. Throughout his career, he has been mitigating earthquakes, floods, and drought impacts that face the utility.

VVWRA maintains an Emergency Response Plan (ERP) that outlines roles, responsibilities, and procedures for responding to operational incidents, natural disasters, and other emergencies that may affect wastewater treatment and conveyance facilities. The ERP establishes protocols for emergency notification, resource coordination, operational continuity, and protection of public health and the environment.

The Authority's ERP addresses potential events including power outages, equipment failures, flooding, seismic activity, wildfire impacts, cyber incidents, and other disruptions that could affect wastewater operations. Emergency communication procedures include coordination with member agencies, regulatory agencies, utility providers, and public information channels as appropriate.

VVWRA operates in accordance with the Standardized Emergency Management System (SEMS), the National Incident Management System (NIMS), and the Incident Command System (ICS) during emergency response activities. The Authority's operations and maintenance facility may serve as an Emergency Operations Center (EOC) for coordinating response efforts when needed.

Staff receive ongoing safety and emergency preparedness training to support effective response and recovery actions. These existing emergency management capabilities strengthen VVWRA's overall mitigation and resilience framework.

5.3 Planning and Regulatory Capability

Planning and regulatory capability for the VVWRA is demonstrated through the implementation of plans, policies, and programs that guide system growth while protecting public health, safety, and the environment. These capabilities include emergency response and mitigation planning, wastewater facilities master planning, capital improvement planning, and the application and enforcement of design and construction standards within the VVWRA service area. Although VVWRA is not a city and does not exercise land use authority, its planning activities provide important opportunities to integrate hazard mitigation principles into decisions affecting wastewater collection, treatment, and reclamation system.

VVWRA is a regional wastewater agency and is not subject to the Urban Water Management Planning Act, which applies to potable water suppliers. Accordingly, VVWRA is not required to prepare an Urban Water Management Plan or Urban Water Master Plan. Instead, long-range planning for VVWRA focuses on maintaining system reliability, capacity, and resilience through wastewater and recycled water planning documents, capital improvement programs, and emergency preparedness efforts that address hazards such as flooding, climate change induced drought, wildfire, earthquake, and windstorm.

5.4 Existing Plans

The following emergency-related plans apply as appropriate:

- CalWARN Emergency Operations Plan – Updated every 10 years
- VVWRA's Illness Injury Prevention Plan (IIPP) – Updated annually
- VVWRA's Emergency Action Plan – Updated every 5 years
- San Bernardino County Hazard Mitigation Plan – Updated every 5 years

5.5 Mitigation Programs

VVWRA employees have experience with past hazard mitigation and hazard planning and can further enhance their hazard mitigation skills by participating in training offered by other agencies or regional governments.

To promote voluntary conservation, VVWRA has initiated a public awareness and education plan consisting of the following:

- VVWRA stores disaster supplies at its corporate yard and main office for employees during an emergency. The supplies are complete with cots, chairs, food bars, MREs, first aid kits, light sticks, batteries, blankets, personal sanitation kits, water, flashlights, etc.
- VVWRA develops and maintains safety manuals and emergency response manuals that are specific to the facility where each employee works.

5.6 Fiscal Resources

The ability of VVWRA to act is closely associated with the number of fiscal resources available to implement mitigation policies and projects. This may take the form of outside grant funding awards or VVWRA-based revenue and financing. The cost of mitigation policy and project implementation vary widely. In some cases, mitigation actions are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project, such

as installing backup power generators and sustainable energy resources, which can require substantial commitment from VVWRA and state and federal funding sources. VVWRA has made fiscal commitments to mitigate hazards through its Capital Improvement Plan (CIP).

The following is a summary of VVWRA's fiscal capabilities. A number of governmental funds and revenue-raising activities can be allocated for hazard mitigation activities. Included below are potential sources of discretionary general funding from local, state, and federal resources.

- Connection and capacity fees
- State and federal grant and loan programs
- Capital improvement and enterprise funds, as applicable

State grant and loan opportunities administered through the California Department of Water Resources and other agencies may be available for projects related to infrastructure resilience, system reliability, recycled water, groundwater protection, and climate adaptation, depending on program eligibility requirements. Project eligibility is dependent on the applicant type, project scope, and funding program criteria, and multiple funding sources may be leveraged for a single mitigation action where appropriate.

Completion and maintenance of an approved LHMP enhances VVWRA's eligibility for federal mitigation funding programs, including the Hazard Mitigation Grant Program (HMGP) and Flood Mitigation Assistance (FMA). Grant opportunities are reviewed on an ongoing basis to identify funding availability and alignment with identified mitigation actions and capital planning priorities.

5.7 Capabilities Assessment

A Capability Assessment examines the VVWRA to identify existing strengths, gaps, or weaknesses in current programs and activities that could affect the implementation of hazard mitigation actions or increase system vulnerability. The findings of both the Risk Assessment and Capability Assessment provide the foundation for developing an effective and achievable hazard mitigation strategy. The following actions outline key capabilities VVWRA will consider in the Mitigation Strategy:

1. Add funding for hazard mitigation actions to the Authority's Capital Improvement Plan planning efforts.
2. Incorporate projects from the Capital Improvement Plan into the mitigation strategy (and vice versa).
3. Expand Public outreach and education on emergency management. This allows VVWRA to form a plan to continually educate their customers regarding natural

hazards and the effects these hazards have on wastewater systems. They educate the residents on the importance of mitigating these hazards to build a more resilient community.

4. Broaden staff training: VVWRA employees have experience with past hazard mitigation and hazard planning and can improve their hazard mitigation skills by participating in training offered by other agencies or other regional governments. This plan should continue with the VVWRA website.

SECTION 6. MITIGATION STRATEGIES

6.1 Overview

VVWRA derived its mitigation strategy from an in-depth review of the vulnerabilities, risks, and existing capabilities identified in previous sections of this Plan, combined with a long-term vision of maintaining a resilient, reliable, and sustainable regional wastewater treatment system. This vision reflects informed assumptions regarding both mitigation challenges and opportunities unique to the high-desert environment and is expressed through the goals, objectives, and mitigation projects outlined in this section.

The mitigation strategy is designed to reduce the potential for loss of life, protect critical wastewater infrastructure, and minimize service disruptions that could impact public health, environmental compliance, and regional economic stability. Mitigation measures identified under each objective include an implementation framework that considers feasibility, cost, available funding mechanisms, and operational impacts. Each proposed mitigation measure was evaluated during Planning Team discussions of mitigation alternatives, and those evaluations informed the prioritization of actions. All mitigation priorities were established through consensus of the VVWRA Planning Team.

Mitigation measures are organized to address hazards that broadly affect all VVWRA facilities, as well as those hazards identified as high-risk through the Risk Assessment. These high-risk hazards include flooding, climate change induced drought, wildfire, earthquakes, and windstorms. Together, these hazards represent the greatest potential threats to VVWRA's treatment plants, lift stations, interceptor pipelines, reclaimed water facilities, and supporting operational systems.

6.2 Mitigation Goals, Objectives, and Projects

The process of identifying mitigation goals began with a review and validation of applicable FEMA hazard mapping and risk assessment data for the VVWRA service area and surrounding jurisdictions. The Planning Team evaluated the relevance and applicability of identified hazards to VVWRA facilities and operations and reviewed the continued validity of existing mitigation goals. These discussions informed the development of updated goals and objectives for this LHMP.

Overall, the primary objective of VVWRA's mitigation strategy is to protect life, safeguard public health, and prevent damage to critical wastewater treatment, conveyance, and reclamation infrastructure that could disrupt essential services or result in environmental compliance impacts. Global mitigation measures that apply across all hazards include:

- Continually improve understanding of potential hazard impacts affecting wastewater treatment, recycled water production, and conveyance systems, and identify actions necessary to protect life, public health, and critical infrastructure.
- Implement and maintain public outreach and communication efforts, in coordination with member agencies, to inform the public and partner jurisdictions about hazards that may affect wastewater services during emergencies, including system capacity limitations, service interruptions, and environmental protection measures.
- Provide state, county, and local agencies with updated information regarding hazards, vulnerabilities, and mitigation measures affecting VVWRA facilities, interceptor pipelines, lift stations, and treatment plants.
- Review and verify that VVWRA-owned and operated infrastructure meets applicable regulatory, safety, seismic, and operational standards.
- Evaluate VVWRA facilities and infrastructure located in high-risk areas to ensure appropriate protective measures are in place to reduce potential impacts from natural hazards and climate-related events.
- Identify and mitigate imminent threats to life safety, environmental protection, regulatory compliance, and the continuity of wastewater treatment operations.
- Prioritize and implement mitigation actions that address VVWRA's highest-risk hazards—including earthquakes, flooding and extreme storm events, wildfire, windstorms, and climate change–related impacts—while continuing to monitor and assess other identified hazards.

6.3 Flooding

Goal: To protect life, public health, and critical wastewater infrastructure within the Victor Valley Wastewater Reclamation Authority service area during flooding and extreme storm events.

Description: The goal of this mitigation strategy is to reduce the risk of injury, loss of life, environmental impacts, and damage to wastewater treatment and conveyance facilities resulting from flooding and extreme storm events. Flooding within the VVWRA service area is most often associated with intense precipitation, localized flash flooding, and elevated flows within the Mojave River and associated drainage systems.

Flood events can inundate low-lying facilities, interceptor pipelines, lift stations, and access roads, potentially disrupting wastewater operations, damaging electrical and communications systems, and increasing the risk of sanitary sewer overflows or environmental releases. VVWRA's mitigation approach emphasizes protecting critical

infrastructure, maintaining system operability, and supporting safe and coordinated emergency response during flood-related events.

Mitigation Projects: Mitigation projects identified below include the assigned priority level, the department responsible for implementation, and potential funding sources. Additional engineering, operational, and financial analysis will be required for each mitigation project to refine cost estimates and implementation schedules prior to execution.

The mitigation actions listed for each hazard represent the projects identified by the VVWRA Planning Team as appropriate and feasible for reducing risk to wastewater treatment, conveyance, and support facilities. As a public Joint Powers Authority, VVWRA must balance mitigation investments with operational, regulatory, and fiscal responsibilities. Accordingly, VVWRA will pursue cost-effective solutions and actively seek state and federal grant opportunities to support capital improvements and hazard mitigation initiatives. The identified mitigation projects and preliminary cost estimates include the following:

- New Hesperia Parallel Upper & Lower Interceptor**:** This project addresses insufficient capacity identified in the 2030 Peak Wet Weather Flow (PWWF) modeling scenario for the existing 21-inch and 27-inch interceptor serving the City of Hesperia and CSA-64. The project constructs a new 27-inch parallel interceptor to increase conveyance capacity and system reliability under wet weather and flood conditions. Improvements include dual gravity mains conveying flows from Hesperia, Victorville, and CSA-42, with sections constructed via microtunneling due to high groundwater near the Mojave River. CIP, FLA, BRIC and LHMP estimate 32.2 million
- The Ossum Wash project will ensure the protection of existing pipelines from future erosion and structural compromise due to intense storms. $1,899,635 High Priority, HMGP, FLA, LHMP, BRIC and CIP.
- The Oro Grande Lift Station and Force Main Replacement Project will replace the existing 40-year-old gravity sewer pipeline across the Mojave River before a pipe failure occurs due to large and intense storms. $4,300,000 High Priority, HMGP, FLA, LHMP, BRIC and CIP.
- Mojave Narrows Resource Recovery Facility/Hesperia Parallel Interceptor: this project enhances the resilience of VVWRA's wastewater collection system The parallel interceptor provides redundant, higher-capacity conveyance from Hesperia and surrounding areas, reducing the risk of sewer surcharging, overflows, and system failures during extreme storm events that are projected to become more intense and frequent. By relocating and reinforcing critical

interceptors away from the most vulnerable reaches of the river corridor, the project lessens the chance of wastewater releases into the floodplain during 100-year or larger storms. The resource recovery facility also helps manage flows by pre-treating and redistributing reclaimed water for reuse, thereby lowering peak effluent volumes to the river during wet-weather periods. $220,000,000 High Priority, HMGP, FLA, LHMP, BRIC and CIP.

6.4 Climate Change – Induced Drought

Goal: To protect life, public health, and critical wastewater infrastructure within the Victor Valley Wastewater Reclamation Authority service area during drought and climate change–related conditions.

Description: The goal of this mitigation strategy is to reduce risks to wastewater treatment, conveyance, and recycled water operations associated with prolonged dry periods, extreme heat, and climate variability. Drought conditions can affect wastewater influent characteristics, treatment efficiency, energy demand, odor control, and recycled water reliability, while also increasing operational stress on equipment and staff.

Climate change is expected to increase variability in regional weather patterns, including longer and more frequent droughts punctuated by extreme heat events and occasional intense storms. VVWRA's long-term mitigation approach focuses on maintaining operational continuity, protecting public health and environmental compliance, and supporting system resilience through adaptive planning, infrastructure protection, and coordination with member agencies.

Mitigation Projects: Mitigation projects identified below include the assigned priority level, the department responsible for implementation, and potential funding sources. Additional engineering, operational, and financial analysis will be required for each mitigation project to refine cost estimates and implementation schedules prior to execution.

The mitigation actions listed for each hazard represent the projects identified by the VVWRA Planning Team as appropriate and feasible for reducing risk to wastewater treatment, conveyance, and support facilities. As a public Joint Powers Authority, VVWRA must balance mitigation investments with operational, regulatory, and fiscal responsibilities. Accordingly, VVWRA will pursue cost-effective solutions and actively seek state and federal grant opportunities to support capital improvements and hazard mitigation initiatives. The identified mitigation projects and preliminary cost estimates include the following:

- The Ossum Wash project will ensure the protection of existing pipelines from future erosion and structural compromise due to intense storms. $1,899,635 High Priority, HMGP, LHMP, BRIC and CIP.
- The Oro Grande Lift Station and Force Main Replacement Project will replace the existing 40-year-old gravity sewer pipeline across the Mojave River before a pipe failure occurs due to large and intense storms. $4,300,000 High Priority, HMGP, LHMP, BRIC and CIP.
- Regional Plant Potable Connection to City of Victorville Diversifies water supply to the regional treatment plant, supporting operational continuity amid regional drought risks in Mojave Desert. $4,500,000, High Priority, HMGP, LHMP, BRIC and CIP.
- Rehabilitation of South Apple Valley Manholes HWY 18: The work focuses on structurally deteriorated manholes that connect local collector lines to the South Apple Valley Interceptor, which carries wastewater from Apple Valley to the VVWRA regional treatment plant in Victorville. Typical rehabilitation includes CCTV-based inspections, manhole lining or structural repair, and upgrades to access frames, covers, and surrounding appurtenances to reduce infiltration/inflow and improve long-term reliability. $2.500,000 High Priority, LHMP, BRIC and CIP.
- Anammox Nitrogen Removal: Identified via Black & Veatch's Side Stream Treatment Evaluation and Feasibility Study for VVWRA's regional plant. Prompted by nutrient surges from Anaergia food waste digestion (about 5 years ago), it addresses NPDES total nitrogen (TN) and ammonia compliance using advanced Anammox technology from Veolia. This initiative bolsters resilience and adaptability to heat or flow variability, supporting LHMP objectives. It stabilizes biological nutrient removal (BNR) processes while reducing O&M $ 4,475,000, LHMP, BRIC and CIP, High Priority.

6.5 Wildfire

Goal: To protect life, public health, and critical wastewater infrastructure within the Victor Valley Wastewater Reclamation Authority service area during wildfire events.

Description: The goal of this mitigation strategy is to minimize the risk of injury, loss of life, environmental impacts, and damage to wastewater treatment, conveyance, and support facilities during wildfire incidents. Wildfires within and adjacent to the VVWRA service area have the potential to damage treatment plants, lift stations, electrical systems, telemetry and SCADA equipment, and access routes critical for operations and emergency response.

Wildfire conditions may result in power outages, restricted site access, degraded air quality affecting staff safety, and increased inflow or contamination risks due to damaged infrastructure or post-fire runoff. The arid climate, seasonal high winds, dry vegetation, and expanding development within the Victor Valley region contribute to ongoing wildfire risk. VVWRA's mitigation approach focuses on maintaining operational continuity, protecting public health and environmental compliance, and supporting coordinated emergency response during wildfire events.

Mitigation Projects: Mitigation projects identified below include the assigned priority level, the department responsible for implementation, and potential funding sources. Additional engineering, operational, and financial analysis will be required for each mitigation project to refine cost estimates and implementation schedules prior to execution.

The mitigation actions listed for each hazard represent the projects identified by the VVWRA Planning Team as appropriate and feasible for reducing risk to wastewater treatment, conveyance, and support facilities. As a public Joint Powers Authority, VVWRA must balance mitigation investments with operational, regulatory, and fiscal responsibilities. Accordingly, VVWRA will pursue cost-effective solutions and actively seek state and federal grant opportunities to support capital improvements and hazard mitigation initiatives. The identified mitigation projects and preliminary cost estimates include the following:

- Regional Plant Emergency Power Project detailed in Carollo Engineers' November 2023 feasibility study, upgrades the aging 1979-era standby power system at the Regional Wastewater Reclamation Plant to enhance reliability during utility outages from SCE. Existing 450 kW and 900 kW natural gas generators require manual load shedding and inadequately support current (peak ~945 kW measured) or future loads like 400 hp blowers, RAS pumps, lab, and scrubbing systems (total design ~2,874 kVA).Recommendations include a centralized 2,250-2,750 kW diesel generator (open transition), new 4,000A main switchgear (100 kA SCCR), electrical building, 5-7 days fuel storage (36,000 gal double-wall tanks with polishing), and load bank for NFPA 110 testing. This ensures automated, no-shed operation for critical processes (e.g., two 400 hp blowers), maintainability without full plant de-energization, and wildfire mitigation via extended on-site power for LHMP compliance in high-risk Victor Valley. $18-36 Millions CIP, LHMP,BRIC, high priority.

6.6 Earthquake

Goal: To protect life, public health, and critical wastewater infrastructure within the Victor Valley Wastewater Reclamation Authority service area during seismic events.

Description: The goal of this mitigation strategy is to reduce the risk of injury, loss of life, environmental impacts, and damage to wastewater treatment, conveyance, and support facilities resulting from earthquakes. The VVWRA service area is located in a seismically active region of Southern California and is subject to ground shaking from multiple nearby fault systems.

Earthquake events may damage treatment plants, interceptor pipelines, lift stations, electrical and mechanical equipment, and communications and SCADA systems, potentially disrupting wastewater operations and increasing the risk of environmental releases. VVWRA's mitigation approach focuses on strengthening critical infrastructure, maintaining operational continuity, protecting public health and regulatory compliance, and supporting rapid post-event response and recovery.

Mitigation Projects: Mitigation projects identified below include the assigned priority level, the department responsible for implementation, and potential funding sources. Additional engineering, operational, and financial analysis will be required for each mitigation project to refine cost estimates and implementation schedules prior to execution.

The mitigation actions listed for each hazard represent the projects identified by the VVWRA Planning Team as appropriate and feasible for reducing risk to wastewater treatment, conveyance, and support facilities. As a public Joint Powers Authority, VVWRA must balance mitigation investments with operational, regulatory, and fiscal responsibilities. Accordingly, VVWRA will pursue cost-effective solutions and actively seek state and federal grant opportunities to support capital improvements and hazard mitigation initiatives. The identified mitigation projects and preliminary cost estimates include the following:

- Regional Plant Emergency Power Project detailed in Carollo Engineers' November 2023 feasibility study, upgrades the aging 1979-era standby power system at the Regional Wastewater Reclamation Plant to enhance reliability during utility outages from SCE. Existing 450 kW and 900 kW natural gas generators require manual load shedding and inadequately support current (peak ~945 kW measured) or future loads like 400 hp blowers, RAS pumps, lab, and scrubbing systems (total design ~2,874 kVA).Recommendations include a centralized 2,250-2,750 kW diesel generator (open transition), new 4,000A main switchgear (100 kA

SCCR), electrical building, 5-7 days fuel storage (36,000 gal double-wall tanks with polishing), and load bank for NFPA 110 testing. This ensures automated, no-shed operation for critical processes (e.g., two 400 hp blowers), maintainability without full plant de-energization, and wildfire mitigation via extended on-site power for LHMP compliance in high-risk Victor Valley. $18-36 Millions, CIP, LHMP, BRIC, high priority.

- The Ossum Wash project will ensure the protection of existing pipelines from future erosion and structural compromise due to intense storms. $1,899,635, High Priority, HMGP, BRIC, LHMP and CIP.
- The Oro Grande Lift Station and Force Main Replacement Project will replace the existing 40-year-old gravity sewer pipeline across the Mojave River before a pipe failure occurs due to large and intense storms. $4,300,000, High Priority, HMGP, LHMP, BRIC and CIP.
- New Lower Narrows Realignment, including a new Lift station: This project addresses the high-risk Lower Narrows sewer pipeline currently located within the Mojave River channel. The existing pipeline lacks sufficient capacity for future wet weather flows and is vulnerable to damage from river boulders, submerged conditions, and possible seismic activity due to its alignment in unstable ground. A failure in this location could cause catastrophic environmental impacts and service disruption. The proposed mitigation includes relocating the interceptor out of the river corridor and constructing a new 48-inch gravity pipeline, supported by a new 20 MGD lift station and dual forcemain within a decommissioned railroad spur. The project incorporates enhanced seismic resilience through elevated alignment, microtunneling in high groundwater areas, emergency power generation, overflow basin, and improved connections to nearby systems. Overall, the project will reduce earthquake and flood vulnerability, increase system reliability and capacity, and eliminate the potential for catastrophic sewer spills within the Mojave River channel. CIP, BRIC, and LHMP estimate 44.2 million.

6.7 Windstorm

Goal: To protect life, public health, and critical wastewater infrastructure within the Victor Valley Wastewater Reclamation Authority service area during severe wind events.

Description: The goal of this mitigation strategy is to reduce the risk of injury, loss of life, environmental impacts, and damage to wastewater treatment, conveyance, and support facilities resulting from severe windstorms. High wind events within the VVWRA service area can occur seasonally and are often associated with dry conditions, low humidity, and regional weather patterns that produce sustained high winds and strong gusts.

Severe winds can damage structures, electrical and mechanical equipment, overhead utilities, fencing, and communications systems, as well as obstruct access routes due to

downed trees or debris. Wind events may also contribute to wildfire risk and power outages, including Public Safety Power Shutoff (PSPS) events implemented by electric utilities to reduce wildfire ignition risk. These conditions can disrupt wastewater operations, affect staff safety, and increase reliance on backup power and emergency response procedures. VVWRA's mitigation efforts focus on protecting critical infrastructure, maintaining operational continuity, and supporting safe and coordinated response during windstorm-related events.

Mitigation Projects: Mitigation projects identified below include the assigned priority level, the department responsible for implementation, and potential funding sources. Additional engineering, operational, and financial analysis will be required for each mitigation project to refine cost estimates and implementation schedules prior to execution.

The mitigation actions listed for each hazard represent the projects identified by the VVWRA Planning Team as appropriate and feasible for reducing risk to wastewater treatment, conveyance, and support facilities. As a public Joint Powers Authority, VVWRA must balance mitigation investments with operational, regulatory, and fiscal responsibilities. Accordingly, VVWRA will pursue cost-effective solutions and actively seek state and federal grant opportunities to support capital improvements and hazard mitigation initiatives. The identified mitigation projects and preliminary cost estimates include the following:

- Regional Plant Emergency Power Project detailed in Carollo Engineers' November 2023 feasibility study, upgrades the aging 1979-era standby power system at the Regional Wastewater Reclamation Plant to enhance reliability during utility outages from SCE. Existing 450 kW and 900 kW natural gas generators require manual load shedding and inadequately support current (peak ~945 kW measured) or future loads like 400 hp blowers, RAS pumps, lab, and scrubbing systems (total design ~2,874 kVA).Recommendations include a centralized 2,250-2,750 kW diesel generator (open transition), new 4,000A main switchgear (100 kA SCCR), electrical building, 5-7 days fuel storage (36,000 gal double-wall tanks with polishing), and load bank for NFPA 110 testing. This ensures automated, no-shed operation for critical processes (e.g., two 400 hp blowers), maintainability without full plant de-energization, and wildfire mitigation via extended on-site power for LHMP compliance in high-risk Victor Valley. $18-36 Millions, CIP, LHMP, BRIC, high priority.

6.8 Mitigation Priorities

During the development of the risk assessment and mitigation strategy for VVWRA, the Planning Team proposed and evaluated alternative mitigation goals, objectives, and specific mitigation measures intended to reduce risks associated with the Authority's highest risk hazards. This plan represents VVWRA's initial LHMP, and mitigation priorities were established based on current risk conditions, facility vulnerabilities, and operational considerations rather than continuation of prior plans.

The Planning Team considered multiple factors in establishing mitigation priorities, with the highest priority assigned to mitigation measures that best met the following criteria:

- Greatest potential to protect life, public health, and staff safety
- Greatest potential to maintain critical wastewater treatment, conveyance, and support functions following a disaster
- Feasibility and achievability, including cost-effectiveness, regulatory alignment, and anticipated stakeholder and agency support

All mitigation priority rankings were determined through consensus of the VVWRA Planning Team.

As identified in the hazard and risk assessment, flooding and extreme storm events present the highest potential risk to VVWRA facilities due to the potential for rapid onset impacts, damage to low-lying infrastructure, access limitations, and increased risk of environmental releases. Drought and climate change–related impacts represent the next highest level of concern, given their long-term effects on treatment operations, influent characteristics, energy demand, and system reliability. Wildfire, earthquakes, and windstorms also pose significant risks to VVWRA facilities and operations, with the potential to disrupt wastewater treatment, damage critical infrastructure, and impact staff safety and emergency response.

Mitigation actions addressing flooding and extreme storm events, drought and climate change–related impacts, wildfire, earthquakes, windstorms, and landslides were evaluated and prioritized based on their relative risk level, potential consequences to public health and environmental compliance, estimated cost, funding availability, level of project development, and anticipated timeframe for implementation.

Using this prioritization framework, each mitigation measure is assigned one of the following priority rankings:

- High Priority – Projects that will be the primary focus of implementation within the next five years

- Medium Priority – Projects that may be implemented within the next five years as funding, staffing, or opportunities become available
- Low Priority – Projects that are not anticipated to be implemented within the next five years unless conditions change, such as the availability of new funding sources or regulatory requirements

6.9 Implementation Strategy

The mitigation implementation strategy is intended to guide the timely and effective execution of mitigation actions identified in this Plan. VVWRA will implement mitigation measures in a manner that is consistent with operational priorities, regulatory requirements, and available financial and staffing resources.

VVWRA operates within an annually adopted budget and multi-year Capital Improvement Program (CIP). The Planning Team will review the Local Hazard Mitigation Plan on an annual basis as part of the budget development process to identify mitigation actions that may be incorporated into upcoming fiscal year budgets or future CIP cycles. The Board of Commissioners will review recommended mitigation-related projects for potential inclusion in budgetary and capital planning decisions.

VVWRA will actively pursue state and federal hazard mitigation funding opportunities, including grants administered through the California Office of Emergency Services and FEMA, to support implementation of mitigation projects and reduce the financial impact on the Authority's operating and capital budgets. Grant opportunities will be evaluated annually, and mitigation projects may be advanced as funding becomes available.

Mitigation Project Funding Sources

VVWRA does not maintain a dedicated hazard mitigation fund. Mitigation activities are funded through a combination of operating funds, capital improvement funding, and external grant opportunities as available. Mitigation considerations will be integrated into the budgeting and capital planning process to identify projects that can be implemented as standalone mitigation actions or incorporated into planned infrastructure improvements.

Cost-Benefit Considerations

When required for grant-funded mitigation projects, VVWRA will complete cost-benefit analyses in accordance with FEMA guidelines to evaluate the relationship between project costs and anticipated benefits, including reduced damage, avoided service disruptions, and protection of public health and environmental compliance. FEMA's

electronic cost-benefit analysis tools will be used as applicable to support funding applications.

Timeframe

Over the next five years, VVWRA will integrate hazard mitigation considerations into capital improvement projects, facility upgrades, and system planning efforts where feasible. Mitigation projects will be reviewed during development of the Five-Year CIP and during annual budget workshops to assess readiness, funding availability, and implementation timing. As opportunities arise, VVWRA will apply for mitigation grants and advance priority projects consistent with this Plan.

SECTION 7. PLAN MAINTENANCE

7.1 Monitoring, Evaluating, and Updating the Plan

VVWRA will monitor, evaluate, and update this LHMP on an ongoing basis to ensure it remains relevant and effective. The General Manager, or designee, will be responsible for overseeing annual reviews of the LHMP to determine whether hazard conditions, facility vulnerabilities, regulatory requirements, or operational priorities have changed and whether the mitigation goals and actions remain appropriate.

Progress will be tracked by reviewing the status of mitigation actions identified in this Plan, documenting completed or ongoing projects, and identifying new mitigation measures as needed. The LHMP will be reviewed annually as part of VVWRA's budget development and CIP planning process, as well as when significant infrastructure upgrades, system expansions, or operational changes occur. Findings from these reviews will be used to inform funding decisions and future capital planning.

The General Manager will ensure that relevant staff and the Board of Commissioners are informed of LHMP progress and will present mitigation-related considerations during annual budget workshops and CIP reviews. Mitigation actions that have been completed will be documented within the LHMP, and priorities may be adjusted based on updated risk conditions, funding availability, and implementation feasibility.

In addition to annual reviews, VVWRA will conduct a comprehensive evaluation of the LHMP approximately midway through the five-year planning cycle to assess progress toward mitigation goals, review changes in hazard risk or vulnerability, and evaluate the need for plan updates. This review will consider updated FEMA guidance, applicable county and regional hazard information, and lessons learned from any emergency or disaster events affecting VVWRA facilities.

Public and stakeholder participation will be incorporated into future plan updates through outreach efforts coordinated with member agencies and by providing opportunities for review and comment on proposed plan revisions. Input received during the update process will be documented and considered as part of the plan maintenance effort.

7.2 Implementation through Existing Programs

Following approval by the California Office of Emergency Services and FEMA, the VVWRA will integrate the LHMP into existing operational, capital planning, and infrastructure management programs. Mitigation actions identified in this Plan will be considered during the planning, design, construction, and rehabilitation of wastewater

treatment facilities, interceptor pipelines, lift stations, electrical and mechanical systems, and supporting infrastructure.

Information developed through the hazard and risk assessment—including hazard maps, vulnerability analyses, and facility-specific risk considerations—will be used as reference materials to inform capital improvement projects, system upgrades, emergency preparedness planning, and operational decision-making. These resources will support efforts to reduce risk, enhance system resilience, and maintain regulatory compliance across VVWRA facilities.

VVWRA will pursue state and federal hazard mitigation funding opportunities as they become available, including programs administered by FEMA and the State of California. Where required, VVWRA will submit the appropriate documentation or notices of intent to support eligibility for mitigation funding related to wastewater infrastructure and operations.

The General Manager, or designee, will be responsible for overseeing implementation of the LHMP and advancing mitigation goals and objectives consistent with available resources and Authority priorities. The LHMP will be incorporated into annual budget development and CIP planning discussions and made available to the public through VVWRA's website.

VVWRA will maintain and update the LHMP in accordance with FEMA requirements on a five-year cycle. Preparation for the next plan update will begin well in advance of plan expiration to ensure continuity of eligibility for hazard mitigation funding and alignment with evolving risk conditions, regulatory guidance, and operational needs.

7.3 Continued Public Involvement

The approved LHMP will be made publicly available on the VVWRA website and will include contact information for submitting questions or comments. The General Manager, or designee, will ensure the LHMP is presented to the Board of Commissioners as part of the annual budget planning process and when significant updates or revisions are proposed.

Public participation will be incorporated into future LHMP updates in accordance with FEMA requirements. Opportunities for public review and comment will be provided during plan updates and major revisions, including prior to adoption of the next plan update. Input received from the public will be considered when identifying mitigation priorities, evaluating proposed projects, and determining actions that may be incorporated into future budgets or CIP cycles.

VVWRA will also coordinate outreach with member agencies and community-based organizations to support inclusive participation and ensure that perspectives related to public health, environmental protection, and emergency preparedness are considered during plan updates. As new facilities are constructed, existing facilities are modified, or new hazards are identified, the LHMP will be updated as appropriate to reflect changes in infrastructure, operations, and risk conditions.

The LHMP will be reviewed annually by VVWRA staff to track progress on mitigation actions and assess the need for updates. A comprehensive update of the Plan will be completed at least once every five years, consistent with FEMA requirements, with public involvement incorporated throughout the update process.

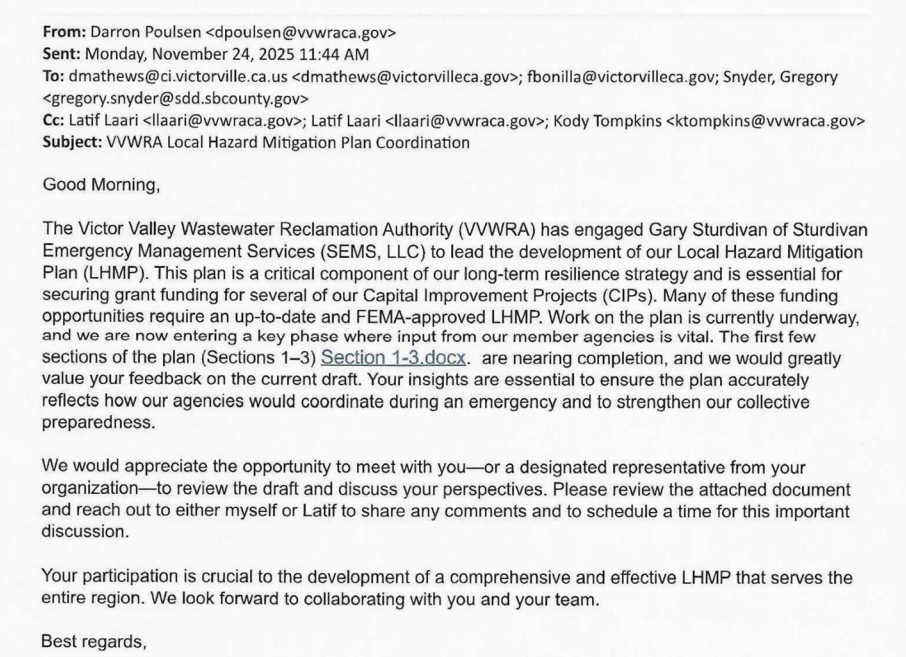
APPENDIX A: PLANNING TEAM MEETING MATRIX

Meeting Matrix / Attendees	10/07/25 Kickoff Meeting (In-Person)	11/17/25 Working Session (Zoom)	12/11/25 Working Session (Zoom)	2/4/26 Working Session (In-Person)	3/5/26 Final Planning Meeting (In-Person)
Latif Laari	x	x	x	x	x
Gary Sturdivan	x	x	x	x	x
Kody Tompkins	x	x	x	x	x
David Wylie	x	x	x	x	x
Kalin Westover	x	x	x	x	x
Daniel Enriqrez	x	x	x	x	x
Xiwei Wang	x	x	x	x	x
Darron Poulsen	x	x	x	x	x
Jacquelyn Castillo	x	x	x	x	x
Tammy Pelayes	x	x	x	x	x
Guy Eisenbrey	x	x	x	x	x
Doug Mathews	x	x	x	x	x
Gregory Snyder		x			

APPENDIX B: PUBLIC OUTREACH

No public comments were received during the public outreach period for the preparation of this Local Hazard Mitigation Plan. VVWRA conducted outreach efforts consistent with FEMA requirements, including posting draft materials and soliciting feedback from stakeholders, community organizations, and the general public. Despite these efforts, no comments were submitted for consideration.

Below are screenshots of email threads that were made for public outreach.



From: Darron Poulsen <dpoulsen@vvwraca.gov>
Sent: Monday, November 24, 2025 11:44 AM
To: dmathews@ci.victorville.ca.us <dmathews@victorvilleca.gov>; fbonilla@victorvilleca.gov; Snyder, Gregory <gregory.snyder@sdd.sbcounty.gov>
Cc: Latif Laari <llaari@vvwraca.gov>; Latif Laari <llaari@vvwraca.gov>; Kody Tompkins <ktompkins@vvwraca.gov>
Subject: VVWRA Local Hazard Mitigation Plan Coordination

Good Morning,

The Victor Valley Wastewater Reclamation Authority (VVWRA) has engaged Gary Sturdivan of Sturdivan Emergency Management Services (SEMS, LLC) to lead the development of our Local Hazard Mitigation Plan (LHMP). This plan is a critical component of our long-term resilience strategy and is essential for securing grant funding for several of our Capital Improvement Projects (CIPs). Many of these funding opportunities require an up-to-date and FEMA-approved LHMP. Work on the plan is currently underway, and we are now entering a key phase where input from our member agencies is vital. The first few sections of the plan (Sections 1–3) Section 1-3.docx. are nearing completion, and we would greatly value your feedback on the current draft. Your insights are essential to ensure the plan accurately reflects how our agencies would coordinate during an emergency and to strengthen our collective preparedness.

We would appreciate the opportunity to meet with you—or a designated representative from your organization—to review the draft and discuss your perspectives. Please review the attached document and reach out to either myself or Latif to share any comments and to schedule a time for this important discussion.

Your participation is crucial to the development of a comprehensive and effective LHMP that serves the entire region. We look forward to collaborating with you and your team.

Best regards,

VVWRA Local Hazards Mitigation Plan Proposed Stakeholders Meeting

From Latif Laari <llaari@vvwraca.gov>
Date Thu 12/11/2025 6:57 PM
To Doug Mathews <DMathews@victorvilleca.gov>; Snyder, Gregory <gregory.snyder@sdd.sbcounty.gov>; Jacquelyn Castillo <jmcastillo@hesperiaca.gov>; Tammy Pelayes <tpelayes@hesperiaca.gov>; Guy Eisenbrey <geisenbrey@applevalley.org>
Cc Cassandra Sanchez <csanchez@hesperiaca.gov>; fbonilla@victorvilleca.gov <fbonilla@victorvilleca.gov>; Gary Sturdivan <gsturdivan@semcllc.com>; Gary Sturdivan <gsturdivan@me.com>; Darron Poulsen <dpoulsen@vvwraca.gov>; Kody Tompkins <ktompkins@vvwraca.gov>; Kristi Casteel <kcasteel@vvwraca.gov>; David Wylie <dwylie@vvwraca.gov>

Good morning,
The Victor Valley Wastewater Reclamation Authority (VVWRA) has engaged **Gary Sturdivan of Sturdivan Emergency Management Services (SEMS, LLC)** to lead the development of our **Local Hazard Mitigation Plan (LHMP).** This plan is a key element of our long-term resilience strategy and an important requirement for securing grant funding for several of our Capital Improvement Projects (CIPs). Many of these funding sources require a current, **FEMA-approved LHMP**.
Work on the plan is well underway, and we are now entering a critical phase where input from our member agencies is essential. The first three sections of the plan (Sections 1–5 Draft) are nearing completion, and we would greatly appreciate your feedback .
Your insights will help ensure the plan accurately reflects how our agencies coordinate during emergencies and strengthens our collective preparedness.

We would like to schedule a meeting with you—or a designated representative from your organization—to review the draft and discuss your perspectives. **Please select one of the two available dates to attend: https://forms.office.com/g/abahgnZKB4**

The meeting will be held at the VVWRA Regional Plant, 20111 Shay Rd, Victorville, CA 92394, and will also be available online Via Teams Meeting for your convenience.

Your participation is essential to developing a comprehensive and effective LHMP that benefits the entire region. We look forward to collaborating with you and your team.
Thank you

Latif Laari