Hazen
Hazen and Sawyer
800 West Sixth Street, Suite 1400
Los Angeles, CA 90017 • 213.234.1080

Water Replenishment District Climate Resiliency Plan

August 2026

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List of Acronyms

Abbreviation	Definition
AOP	Advanced Oxidation Processes
AR	Adjudicated rights
AR4	Fourth Assessment Report
AR5	Fifth Assessment Report
AR6	Sixth Assessment Report
ARC	Albert Robles Center
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
AWT	Advanced Water Treatment

Abbreviation	Definition
BFE	base flood elevations
CA	California
CBO	Community-based organizations
CCR	California Code of Regulations
CCTAG	California Department of Water Resources Climate Technical Advisory Group
CO_2-eq	carbon dioxide equivalent
COST	California Ocean Science Trust
CPUC	California Public Utilities Commission
CREAT	Climate Resilience Evaluation and Awareness Tool
DAC	Disadvantaged Communities
EAP	Emergency Action Plan
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	flood insurance rate map
GCM	global circulation models
GRIP	Groundwater Reliability Improvement Project
HQ	Headquarters
HVAC	Heating, Ventilation, and Air Conditioning
ISMS	Integrated Stormwater Management System
IPCC	Intergovernmental Panel on Climate Change
LACFCD	Los Angeles County Flood Control District
LACPW	Los Angeles County Public Works
LACSD	Los Angeles County Sanitation District
LAFPP	Los Angeles Forebay Perchlorate Project
LAX	Los Angeles International Airport
LEED	Leadership in Energy and Environmental Design
LVL	Leo J. Vander Lans Advanced Water Treatment Facility
MFSG	Montebello Forebay Spreading Grounds
MGD	Million Gallons per Day
MWD	Metropolitan Water District of Southern California
N/A	Not Applicable
NCEI	National Centers for Environmental Information
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NSHFAs	Non-Special Flood Hazard Areas
OSHA	Occupational Safety and Health Administration
PFAS	Per- and polyfluoroalkyl substances
PLC	Programmable Logic Controller
PSPS	Public Safety Power Shutoff

Abbreviation	Definition
RCP	Representative Concentration Pathways
RO	Reverse Osmosis
RWGD	Robert W. Goldsworthy Desalter
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SDWP	Safe Drinking Water Program
SHFA	Special Flood Hazard Areas
SLR	Sea Level Rise
SOP	Standard Operating Procedure
USACE	United States Army Corps of Engineers
UV	Ultraviolet
VOC	Volatile Organic Chemicals
WIN	Water Independence Now
WRD	Water Replenishment District

Executive Summary

The Water Replenishment District (WRD) Climate Resiliency Plan evaluates how climate change may affect WRD's facilities, programs, and affiliated infrastructure that support groundwater replenishment, water recycling, remediation, and seawater intrusion protection in southern Los Angeles County. The assessment evaluates six climate-related hazards: flood, extreme heat, wildfire, wind, sea level rise, and drought. The facilities and projects covered within this study are:

- Owned by WRD with Contracted Operations
    - Leo J. Vander Lans Advanced Water Treatment Facility
    - Robert W. Goldsworthy Desalter
    - Albert Robles Center for Water Recycling & Environmental Learning
    - District Headquarters
    - Los Angeles Forebay Perchlorate Project
- WRD is affiliated with facilities owned and operated by Los Angeles County Public Works
    - Montebello Forebay Spreading Grounds
        - Rio Hondo
        - San Gabriel
    - Sea Water Barriers
        - West Coast
        - Dominguez Gap
        - Alamitos

The assessment identifies flood potential, extreme heat, drought, and operational continuity during severe weather as WRD's most significant climate risks. Wildfire, wind, and sea level rise are lower in relative magnitude but remain important because of their indirect effects on air quality, power reliability, and long-term freshwater demand for seawater intrusion protection.

The plan confirms that WRD has established a strong resilience foundation. Existing measures include site grading and drainage systems, emergency action plans and standard operating procedures, equipment protection, HVAC and SCADA upgrades, groundwater flow modeling, and real-time monitoring, as well as broader investments through collaborative programs and support efforts. Stakeholder outreach with groundwater pumpers and community-based organizations further reinforced priorities related to water supply reliability, water quality, infrastructure needs, affordability, and funding.

Priority actions include targeted flood hardening and drainage improvements, continued electrical and HVAC upgrades, heat-resilient design criteria at treatment facilities, implementation of nature-based solutions where applicable, wildfire air-quality response procedures, ongoing monitoring of groundwater and barrier demands related to sea level rise, and continued partnership and funding strategies to strengthen drought resilience. Overall, the plan concludes that WRD is well positioned to build on its current strengths, with proactive investment, coordination, and phased implementation essential to maintaining long-term groundwater reliability and water quality protection. **Table ES-1** summarizes the principal vulnerabilities, existing resilience measures, and additional measures for consideration across WRD facilities and hazards.

Table ES-1: Summary of Vulnerabilities and Resilience Measures

Hazard	Facility	Vulnerability/Consequence	Existing Resilience Measures	Additional Resilience Measures to Consider
Flood Potential	Leo J. Vander Lans Advanced Water Treatment Facility	• Localized flooding, water entering vault, process basins, chemical trenches • Difficulty diverting facility flows during storms • Equipment failures due to heavy rain	• Surface grading and drainage to offsite area • Most equipment designed for rain exposure • Leo J. Vander Lans Facility Emergency Action Plan with Standard Operating Procedures including when to shut down the plant • Communication with neighboring facilities • Shade and canopies over membrane units and Ultraviolet Advanced Oxidation Process reactors	• Seal any cracks in vaults, i.e. installing waterstops at joints • Implement proper gutter system at Control Building • Extend canopy over existing equipment • Maintain communication with neighboring facilities • Stay informed on recent flood map updates[1] • Maintain and monitor efficiency of existing drainage channels • Feasibility study for the addition of a bioswale
	Robert W. Goldsworthy Desalter	• Power failure due to heavy rain • No way to actively divert flows on site	• Emergency Action Plan with Standard Operating Procedures including when to shut down the plant • Planned expansion design will upgrade the storm drainage system • Site grading to direct stormwater to on-site storm drains • Equipment located indoors or weather-rated • Chemical containment areas retain chemical spills and localized stormwater	• Seal any cracks in vaults, i.e. installing waterstops at joints • Stay informed on recent flood map updates[1] • Monitor nearby flood-prone areas • Nature-based green infrastructure to reduce runoff and promote infiltration
	Albert Robles Center for Water Recycling and Environmental Learning	• Potential flooding at diversion structure due to 100-year flood runoff • Water damage to facility's assets	• Integrated Stormwater Management System with nature-based landscape features including a stormwater infiltration system, porous concrete, bioswales, and a rooftop garden – Leadership in Energy and Environmental Design Platinum Certified • Concrete berm around Albert Robles Center; only on-site runoff during storm events • Emergency Action Plan	• Stay informed on recent flood map updates[1]
	WRD Headquarters	• Minimal flooding concern – historically, no flooding issues experienced	• Surface grading and drainage to offsite area	• Stay informed on recent flood map updates[1]
	Los Angeles Forebay Perchlorate Project	• Minimal flooding concern – historically, no flooding issues experienced regarding Los Angeles Forebay Perchlorate Project	• Pumps are in elevated containers to protect from water damage • Containment pad captures contaminated feedwater from large tanks and, during heavy rain, pumps it through the treatment system	• Stay informed on recent flood map updates[1]
	Montebello Forebay Spreading Grounds (Rio Hondo and San Gabriel Spreading Grounds)	• Frequent/heavy storms can fill spreading basins, resulting in subsequent stormwater not being captured and infiltrated into the basins • Minimal flooding concern for the spreading grounds under current levee protection	• Turnout structures help spread water more efficiently • A pipeline was installed connecting the Rio Hondo and San Gabriel Spreading Grounds • Communicate with LA County Sanitation Districts and LA County Flood Control District	• Stay informed on recent flood map updates[1] • Continue ongoing communication with LA County Sanitation Districts and LA County Flood Control District if flooding occurs
	Seawater Barriers (West Coast, Dominguez Gap, and Alamitos)	• Not Applicable	• Not Applicable	• Not Applicable
Extreme Temperature	Leo J. Vander Lans Advanced Water Treatment Facility	• Equipment overheating and subsequent failures • Process operation disruptions • Potential electrical shutdowns • Potential chemical degradation • Product limitations • Worker safety • Degradation of vulnerable chemicals	• 2025 Supervisory Control and Data Acquisition project upgrade with cooling for Ultraviolet system and Programmable Logic Controller panels • Replacement of all air conditioning units for the Leo J. Vander Lans Facility control building and electrical room • Fire suppression systems and fire hydrants in place throughout site • Monitoring of facility shutoffs	• Perform inspections of electrical equipment • Installation of fans or portable cooling devices to ensure airflow through electrical room • Temperature monitoring study • Monitor effectiveness of ultraviolet system and programmable logic controller panel cooling • Replacement of air compressors • Hold regular Heating, Ventilation, and Air Conditioning system inspections • Develop heat resiliency design criteria • Maintain communication with neighboring facilities • Add shade covers over chemical tanks

Hazard	Facility	Vulnerability/Consequence	Existing Resilience Measures	Additional Resilience Measures to Consider
				• Conduct feasibility study for nature-based heat resiliency solutions
	Robert W. Goldsworthy Desalter	• Electrical room Heating, Ventilation, and Air Conditioning system overheats and needs to be supplemented with temporary units • Degradation of vulnerable chemicals, particularly after prolonged shutdown	• Overheating Heating, Ventilation, and Air Conditioning system to be addressed in expansion design • Fire extinguishers on-site • Temperature monitors for select equipment • Monitoring of facility shutoffs	• Perform inspections of electrical equipment • Monitor effectiveness of replacements • Develop heat resiliency design criteria • Conduct feasibility study for nature-based heat resiliency solutions to work in tandem with the HVAC upgrades (e.g. rooftop garden)
	Albert Robles Center for Water Recycling and Environmental Learning	• Worker safety and productivity concerns • Degradation of vulnerable chemicals, particularly after prolonged shutdown • Equipment or treatment process impacts including equipment shut down • Impacts to chemical usage • Increased risk of temperatures exceeding electrical design capacities • Risk of heat-related illness • Limited National Pollutant Discharge Elimination System discharge during the warm weather	• Shade canopies over chemical tanks • Ventilated process building • Monitoring of water quality and temperature • LEED Platinum Certified in part from energy-efficient air conditioning system and building envelope • Drought-tolerant landscape	• Incorporate a facility temperature compliance schedule monitoring plan • Evaluate upgrades to Reverse Osmosis pump motors • High-temperature design standard for electrical and pumping equipment • Development of Heat Illness Prevention Plan • Develop heat resiliency design criteria
	WRD Headquarters	• Loss of power or loss of Heating, Ventilation, and Air Conditioning system functionality	• Occupational Safety and Health Administration safety protocols for temperature • Developed continuity plan for remote operations • New Heating, Ventilation, and Air Conditioning system	• Develop heat resiliency design criteria • Develop continuity plan for remote operations • Conduct feasibility study for nature-based heat resiliency solutions (e.g. rooftop garden)
	Los Angeles Forebay Perchlorate Project	• Potential Equipment Failure	• Backup pumps • Available replacement pumps • Containers that have air conditioning	• Develop heat resiliency design criteria
	Montebello Forebay Spreading Grounds (Rio Hondo and San Gabriel Spreading Grounds)	• Potential decrease in water supply from ARC • Field crew worker safety	• Not Applicable	• Maintain communication with agencies should any issues arise
	Seawater Barriers (West Coast, Dominguz Gap, and Alamitos)	• Potential decrease in water supply from LVL to Alamitos Barrier	• Not Applicable	• Not Applicable
Wildfire	Leo J. Vander Lans Advanced Water Treatment Facility	• Air quality concerns from fires north of Leo J. Vander Lans Facility	• Fire-resistant building materials • Real-time air quality monitoring	• Include a response procedure specific to air quality concerns within Emergency Action Plans • Maintain communication with agencies during wildfire events
	Robert W. Goldsworthy Desalter	• Wildfires have not been a significant risk – no incidents have been previously reported		
	Albert Robles Center for Water Recycling and Environmental Learning	• Respiratory health impacts to staff from nearby wildfires • Water quality impacts from ash • Power disruptions, Public Safety Power Shutoffs	• Fireproof building materials • Defensible space around facility • Emergency Action Plan • Real-time air quality monitoring	• Monitor wildfire projections • Renewable energy resources and battery energy storage systems • Conduct a risk assessment on stormwater contamination
	WRD Headquarters	• Wildfires have not been a significant risk – no incidents have been previously reported	• Fire-resistant building materials	• Include a response procedure specific to air quality concerns within Emergency Action Plans • Maintain communication with agencies during wildfire events
	Los Angeles Forebay Perchlorate Project	• Compromised water quality from ash		
	Montebello Forebay Spreading Grounds (Rio Hondo and San Gabriel Spreading Grounds)	• Compromised water quality from ash and firefighting chemicals		• Consider including a response procedure specific to air quality concerns within Emergency Action Plans • Conduct a risk assessment on stormwater contamination • Maintain communication with agencies during wildfire events
	Seawater Barriers (West Coast, Dominguez Gap, and Alamitos)	• Not Applicable	• Not Applicable	• Not Applicable
Wind	All facilities	• Electrical feed interruptions	• Not Applicable	• Not Applicable

Hazard	Facility	Vulnerability/Consequence	Existing Resilience Measures	Additional Resilience Measures to Consider
		• Reduced electrical redundancy during Public Safety Power Shutoffs • Structural damage • Health risks to vulnerable staff caused by elevated dust levels in the air		
Sea Level Rise	Leo J. Vander Lans Advanced Water Treatment Facility	• Providing for Alamitos Barrier increasing demand	• Utilize groundwater flow models to project higher sea levels and determine if increased injection is required • Factor of safety in barrier system • Communication with LA County Public Works on barrier contributions	• Continue to monitor groundwater levels and utilize projections
	Seawater Barriers (West Coast, Dominguez Gap, and Alamitos)	• Increasing freshwater demand		
Drought	Leo J. Vander Lans Advanced Water Treatment Facility	• Alamitos Barrier historically used up to 100% imported water, but has decreased over the recent years due to the increasing production of the advanced recycled water from the Leo J. Vander Lans Facility • Reduced feed water supply • Competition with other recycled water customers. Reuse water demand exceeds available reuse water supply.	• Water Independence Now and WIN4All, Safe Drinking Water Program and Disadvantaged Communities Program, groundwater remediation, and contributions to barriers • Maintain communication with LA County Public Works	• Assess the contribution of the on-site injection well to future recharge capacity and system operations
	Robert W. Goldsworthy Desalter	• Historically no drought issues at this site		• Continue to promote funding opportunities for pumpers and support programs that benefit disadvantaged communities • Continue to support projects that align with funding opportunities and provide multiple benefits
	Albert Robles Center for Water Recycling and Environmental Learning	• Reduced feed water supply • Water conservation can result in higher contaminant concentrations, adversely affecting influent water quality • Competition with other recycled water customers. Reuse water demand exceeds available reuse water supply • Reduced recharge capabilities due to potential impacts to water quality	• Water Independence Now and WIN4All, Safe Drinking Water Program and Disadvantaged Communities Program, groundwater remediation, and contributions to barriers • Maintain communication with LA County Public Works • Drought-tolerant landscaping	
	WRD Headquarters	• Historically no drought issues at this site	• Water Independence Now and WIN4All, Safe Drinking Water Program and Disadvantaged Communities Program, groundwater remediation, and contributions to barriers • Maintain communication with LA County Public Works	
	Los Angeles Forebay Perchlorate Project			• Develop partnerships to maximize recharge capabilities (Pure Water SoCal and Pure Water LA, pumpers, water agencies)
	Montebello Forebay Spreading Grounds (Rio Hondo and San Gabriel Spreading Grounds)	• Drought periods impact stormwater capture volumes • Increased reliance on Spreading Grounds during drought conditions due to increased basin demand • Potential impact to ARC's water quality may result in reduced recharge		
	Seawater Barriers (West Coast, Dominguez Gap, and Alamitos)	• Historically no drought issues experienced • Reduced availability of recycled water during drought conditions may require an increased reliance on imported water		

High Priority   Medium Priority   Low Priority

[(1)] *FEMA National Flood Hazard Layer: [Flood Data Viewers and Geospatial Data | FEMA.gov]*

1. Background

WRD has serviced the Los Angeles Basin region by managing and protecting local groundwater resources for more than 60 years. WRD was first formed to replenish the Los Angeles freshwater aquifers and protect them from seawater intrusion. Through the use of recycled water and stormwater capture, WRD provides water replenishment to the Montebello Forebay Spreading Grounds and the seawater barrier injection wells. Since 2019, WRD has eliminated the use of imported water at the spreading grounds, reflecting its continued commitment to achieving long-term water supply self-sufficiency. WRD has initiated and is participating in multiple programs that advance groundwater reliance, replenishment, and storage. WRD has also shown commitment to environmental sustainability, as shown by their Platinum Certification by the Leadership in Energy and Environmental Design (LEED) program for the Albert Robles Center, as well as their LEED Silver Certification for their Headquarters. To deliver consistent and long-term success, this study was performed to evaluate climate change vulnerabilities for facilities, shown in **Figure 1-1**, owned and/or affiliated with WRD and its mission.

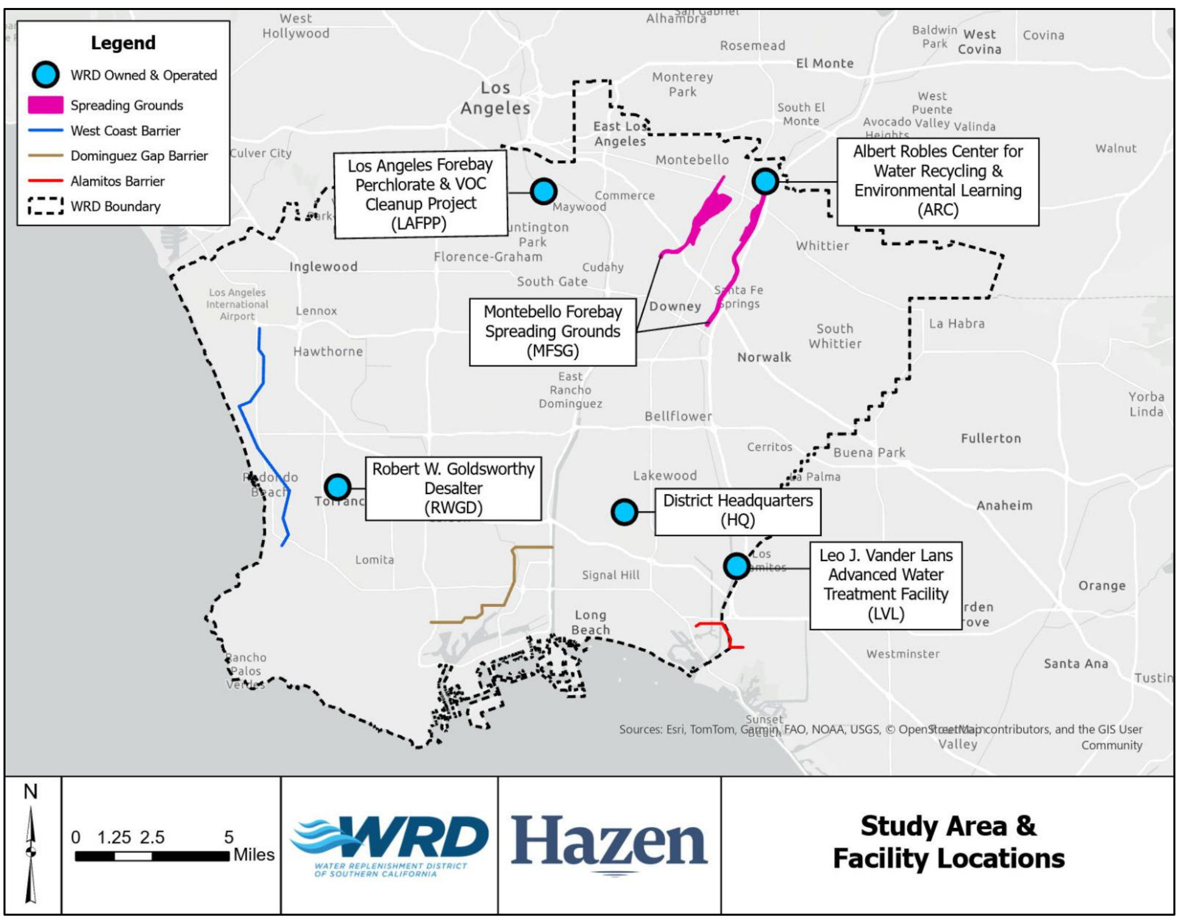

Figure 1-1: Facilities in Study

A brief summary of each facility is provided as follows:

WRD's Leo J. Vander Lans Advanced Water Treatment Facility (LVL) was constructed in 2003 and expanded in 2014. It is in the City of Long Beach in Los Angeles County, California, and is located directly east of the San Gabriel River, and directly west of the Interstate 605 (San Gabriel River Freeway). LVL can produce up to 8 million gallons per day (MGD) of purified recycled water. Its main purpose is to protect the Central Groundwater Basin from seawater intrusion by injecting advanced treated recycled water into the Los Angeles County Public Works (LACPW) Alamitos Seawater Barrier located in Long Beach, CA. A new injection well was also installed on-site at LVL in 2025 and is commissioned through 2026, contributing an additional 2 MGD of advanced treated recycled water to the Central Groundwater Basin. The contract operator for the facility is PERC Water.

WRD's Robert W. Goldsworthy Desalter (RWGD) was first commissioned in 2001 and expanded in 2018 to provide up to 5 MGD of drinking water for the City of Torrance by treating brackish water through reverse osmosis. As an effort to further remediate the brackish groundwater plume in the West Coast Basin, WRD has undertaken another expansion that is in active development to further increase RWGD's treatment capacity to 7 MGD. RWGD is in the City of Torrance in Los Angeles County, California. RWGD is located to the east of the 107 Freeway (Hawthorne Blvd) along Madrona Avenue. The contract operator for the facility is the City of Torrance.

The Albert Robles Center (ARC) for Water Recycling & Environmental Learning is WRD's newest advanced water treatment facility. ARC is in the City of Pico Rivera in Los Angeles County, California. ARC is located directly to the west of the San Gabriel River and to the west of Interstate 605 (San Gabriel River Freeway). ARC treats up to 14.8 MGD creating a locally sustainable water supply for groundwater recharge in the Montebello Forebay Spreading Grounds. The contract operator for the facility is PERC Water.

WRD's Headquarters (HQ) is located in the City of Lakewood, California to the north of Interstate 405 and east of Interstate 710. Although the HQ is not a facility or project that directly treats water, WRD is dedicated to protecting employees and the surrounding environment from climate change vulnerabilities.

The Los Angeles Forebay Perchlorate Project (LAFPP) is located within the Los Angeles Forebay and is part of WRD's Groundwater Contamination Prevention Program where efforts and planning started in 2015. The goal is to remove contaminant mass, protect drinking water supply wells, and prevent further migration into the Central Basin.

The Montebello Forebay Spreading Grounds (MFSG) is an area of the basin where managed aquifer recharge occurs within facilities owned and operated by LACPW, and is one of the main recharge basins in the Central Basin. WRD plays a vital role in purchasing and/or producing recharge water used in the MFSG. To support ongoing operations, WRD actively fosters a collaborative relationship with LACPW to facilitate communication and ensure reliable water delivery.

The three seawater barriers include the West Coast Barrier, Dominguez Gap Barrier, and the Alamitos Barrier. These barriers consist of freshwater injection wells that protect groundwater basins from ocean water intrusion and replenish the West Coast Groundwater Basin. Although they are all owned and operated by LACPW, WRD is responsible for supplying water for injection and monitoring groundwater quality. The West Coast Barrier consists of 153 wells that stretch from Los Angeles International Airport (LAX) to Palo Verdes Hills, and was completed in 1969. The Alamitos Barrier was built in 1965 in Seal Beach, and the Dominguez Gap Barrier was built in 1971 and is located near Long Beach.

WRD holds an essential role within each facility and project to ensure sustainable water availability for southern Los Angeles County. This study serves to aid WRD in monitoring potential climate change vulnerabilities to prepare and establish mitigation measures that will support long-term success. For each facility, information was gathered from staff and operators through online workshops and surveys. Permits, facility drawings, previous reports and studies, and Emergency Action Plans (EAPs) were also reviewed.

1.1 Climate Science

WRD's facilities have not faced climate threats due to natural phenomena such as floods, extreme temperatures, wildfires, wind, and droughts. However, many of the vulnerabilities posed by these natural phenomena are predicted to be exacerbated by climate change (Hall et al., 2018). In this report, the most up-to-date climate science is used to assess the impacts of climate change on the evaluated WRD facilities, drawing from California's Fourth Climate Change Assessment (Bedsworth et al., 2018), hereafter referred to as California's Fourth Assessment. This climate science is largely based upon the work contained in the Intergovernmental Panel on Climate Change's (IPCC's) Fifth Assessment Report (AR5) Climate Change 2013: The Physical Science Basis (IPCC, 2013), which informs the national, statewide, and regional reports that cover Los Angeles County, as shown in **Figure 1-2**. It is important to note that the development of California's Fifth Climate Change Assessment is currently underway and is expected to be completed in mid-2026.

Figure 1-2: Climate Data and Projections Used in This Climate Vulnerability Study

For the 2014 AR5 Synthesis Report, the IPCC adopted a set of greenhouse gas concentration trajectories known as "representative concentration pathways," or RCPs (IPCC, 2014). These RCPs represent four alternative futures of emissions, atmospheric concentrations, and land use. They are named for the associated radiative forcing level (or, in simple terms, the heating effect) in 2100 compared to pre-industrial values: RCPs 2.6, 4.5, 6.0, and 8.5.

Figure 1-3 shows the carbon dioxide equivalent (CO_2-eq) concentrations from AR5 (IPCC, 2014). CO_2-eq is a measure used as a conversion factor of greenhouse gases in terms of warming potential relative to that of carbon dioxide. RCP 8.5 is consistent with a future in which there are no significant global efforts to limit or reduce emissions. At the opposite end of the range, RCP 2.6 represents a future scenario where stringent emissions reductions are being achieved, and global greenhouse gas emissions are significantly limited. RCP 2.6 most closely corresponds to the aspirational goals of the United Nations Framework Convention on Climate Changes 2015 Paris Agreement. The RCP 4.5 scenario represents an intermediate point between RCP 2.6 and 8.5, where CO_2-eq emissions peak by 2040. The results of RCP 6.0 were found to be close to RCP 4.5 until late in the century and are typically not considered or presented in climate change works that have followed IPCC's AR5. In this report, the focus is on the intermediate RCP 4.5 and higher RCP 8.5 scenarios, as there is increasing scientific consensus that the lowest emission RCP 2.6 scenario is probably unachievable without global political will to immediately deliver sustained emissions reductions.

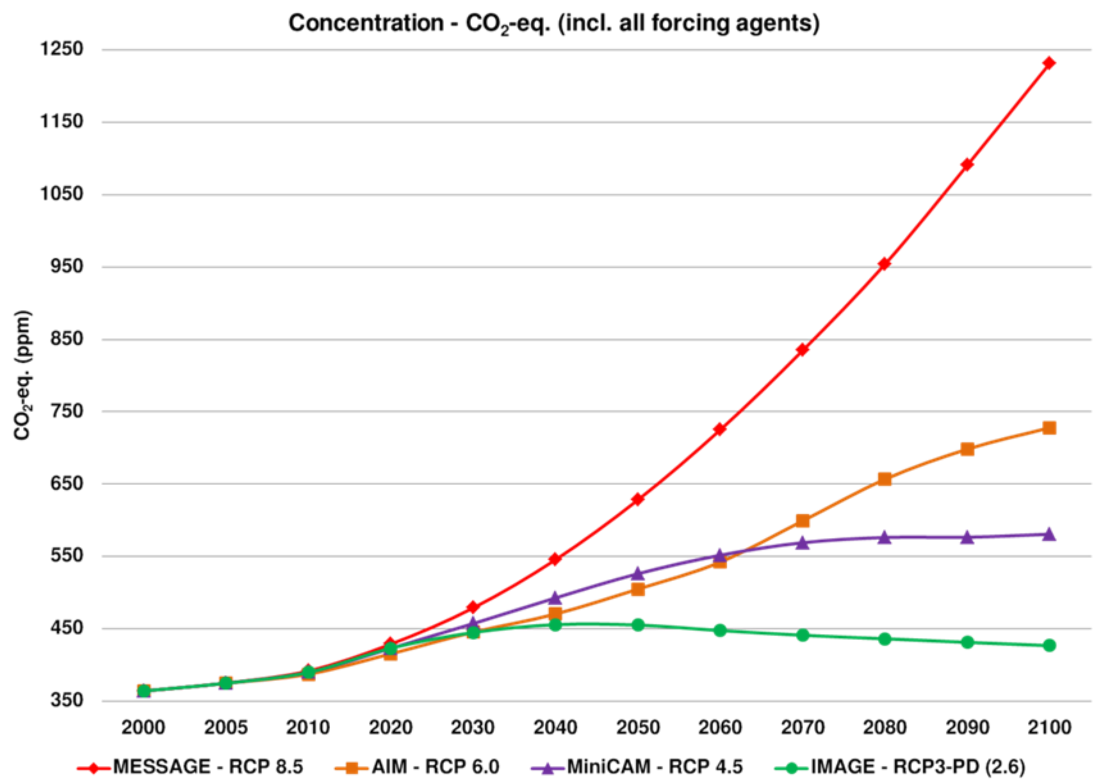

Figure 1-3: IPCC AR5 Representative Concentration Pathways (RCPs) (IPCC, 2014)

The projections from California's Fourth Assessment are derived from ten of thirty-two global circulation models (GCMs), which were found to best simulate important aspects of California's climate by the California Department of Water Resources Climate Technical Advisory Group (CCTAG, 2015). The "Los Angeles Region Report" of California's Fourth Assessment (Hall, 2018) downscales climate change projections and impacts specific to the Los Angeles area.

The initial report of the IPCC's Sixth Assessment Report (AR6) was released in August 2021. This report covered the current state of climate science and projections. The findings of the AR6 only cover continental projections (e.g. North America) and therefore, were not used in this study. California's Fifth Climate Change Assessment is underway and is anticipated to be published in late-2026.

1.2 Climate Vulnerabilities

Potential climate change vulnerabilities evaluated at the WRD facilities can be grouped into the categories of flood, extreme temperatures, wildfire, winds, sea level rise, and drought, as shown in **Figure 1-4.** Specific vulnerabilities have been identified for each of the facilities. Many climate vulnerabilities are currently mitigated by existing resilience measures integral to the design and operation of the facilities. Additional resilience measures are presented and recommended to reduce the risk associated with current climate conditions and future climate change.

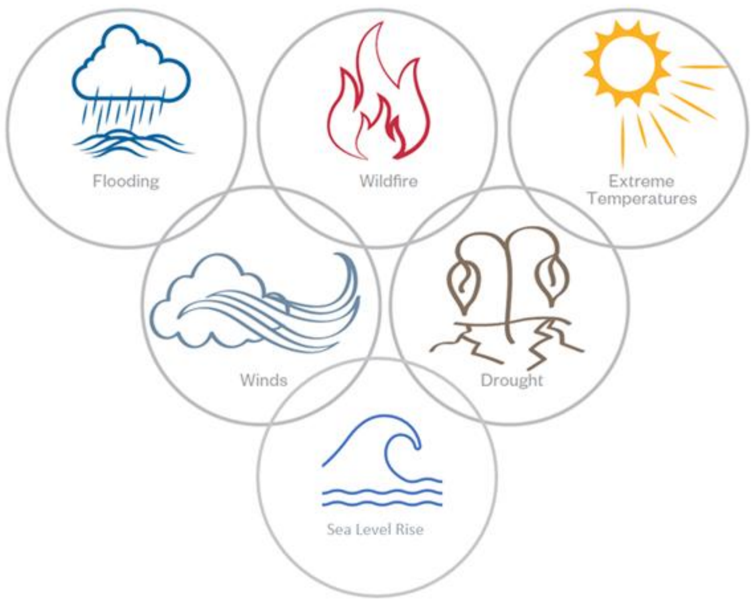

Figure 1-4: Natural Hazards Considered in the Climate Change Vulnerability Assessment

1.3 Relevant Definitions

The climate resiliency definitions used throughout this report are defined in **Table 1-1.** These definitions are derived from the U.S. Climate Resilience Toolkit. **Table 1-2** defines the metric of risk to the climate change vulnerabilities presented in the following sections.

Table 1-1: Climate Resiliency Definitions

Term	Definition
Hazard (Threat)	An event or condition that may cause injury, illness, or death to people or damage to assets
Impact	Effect on natural and human systems that result from hazards. Evaluating potential impacts is a critical step in assessing vulnerability.
Consequence	A subsequent result (usually negative) that follows from damage to or loss of an asset. Quantifying potential consequences is an important part of determining risk.
Vulnerability	The propensity or predisposition of assets to be adversely affected by hazards. Vulnerability encompasses exposure, sensitivity, potential impacts, and adaptive capacity.

Term	Definition
Resilience	The capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption.
Adaptation	The process of adjusting to new (climate) conditions in order to reduce risks to valued assets.

Table 1-2: Climate Risk Level Definitions

Risk Level	Definition
Low	The facility or asset is relatively resilient to changes. It is marginally impacted by climate change impacts or is less likely to experience significant changes.
Medium	The facility or asset has some vulnerabilities, but there are mitigation measures or adaptive strategies in place to cope with these impacts.
High	The facility or asset is highly vulnerable and lacks sufficient adaptive capacity or resilience. There is a lack of resilient infrastructure in place to mitigate any consequences.

2. Flooding Vulnerability

Los Angeles County is expected to see flood risk impacts due to changes in precipitation patterns brought by Climate Change. Average precipitation patterns in Los Angeles County may vary by location as the region has different projection patterns. To both the north and the south, the area is expected to have an increase in its precipitation. Precipitation is difficult to predict due to natural variability, which also includes the phenomenon known as El Nino-Southern Oscillation, for which there are no trends to predict its occurrence. Even with no clear trends to predict precipitation patterns, there are projections to show that the amount of rainfall for the wettest day of the year is projected to increase in the near future as presented in **Figure 2-1.** The two graphics in the figure depict the average historical/projected wettest day of the year measured in inches of precipitation from 1976 to 2100, and the historical percent change in the wettest day of the year from the period 1960-2005 respectively.

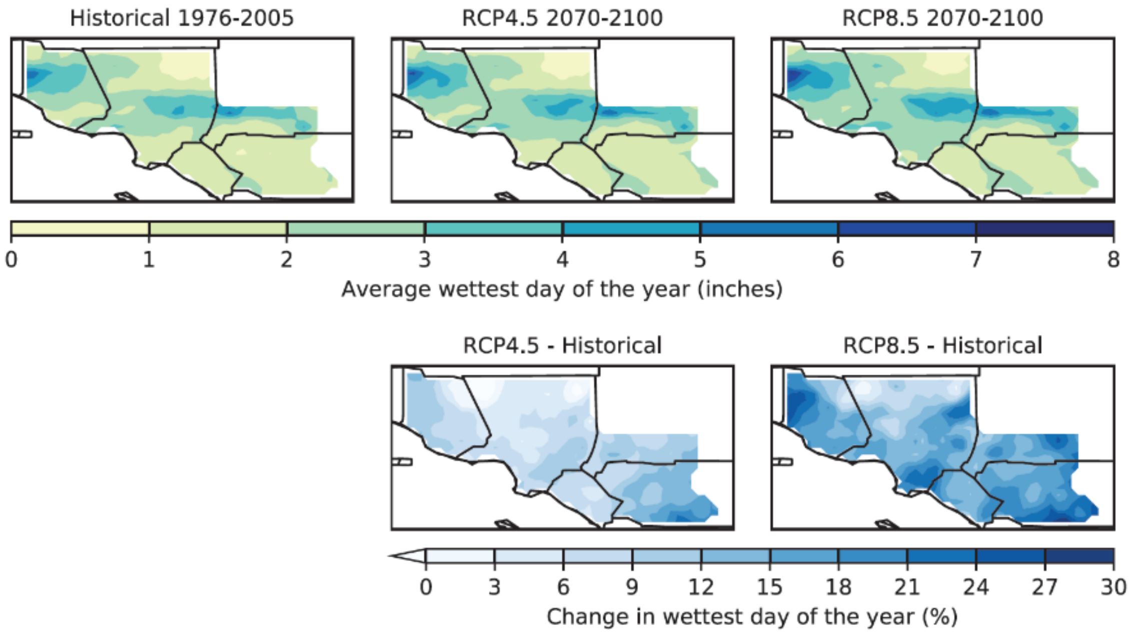

Figure 2-1: Projected Impacts to Wettest Day of the Year in Los Angeles Region (Hall, 2018)

Climate change is projected to impact the frequency and severity of atmospheric events in Southern California (Hall, 2018). Atmospheric rivers are streams of high-water vapor transport that, in California's case, originate in the tropics and can extend to the Pacific Coast of the United States. When these atmospheric rivers encounter the coastal mountain ranges of Southern California, the air containing large quantities of water vapor is pushed upward, causing the water vapor to condense and rainfall to occur. Due to the high-water vapor content of this air, the associated precipitation events that occur upon reaching the coastal mountain ranges of Southern California can range from sustained, but beneficial, lower intensity rain events, to more extreme events that can cause devastating floods and mudslides.

California's Fourth Climate Assessment indicates that in Southern California, the frequency of atmospheric river events is expected to increase and precipitation depths during atmospheric river events are expected to increase 40% by the end of century (Bedsworth et al., 2018). Despite projected increases in precipitation during atmospheric river events in Southern California, the Cal-Adapt data show that the 100-year return period of precipitation events in Los Angeles, California, have mixed future projections with a large degree of uncertainty, as shown in **Figure 2-2** (Cal-Adapt, 2026). Cal-Adapt is a California-supported climate information platform that provides localized climate projections, historical observations, and derived indicators to support climate change assessment, planning, and adaptation efforts. Some projections are lower, and some are higher than those based on the historic data period (1960-1990). This trend is also true for 50-year and 20-year return period precipitation event projections.

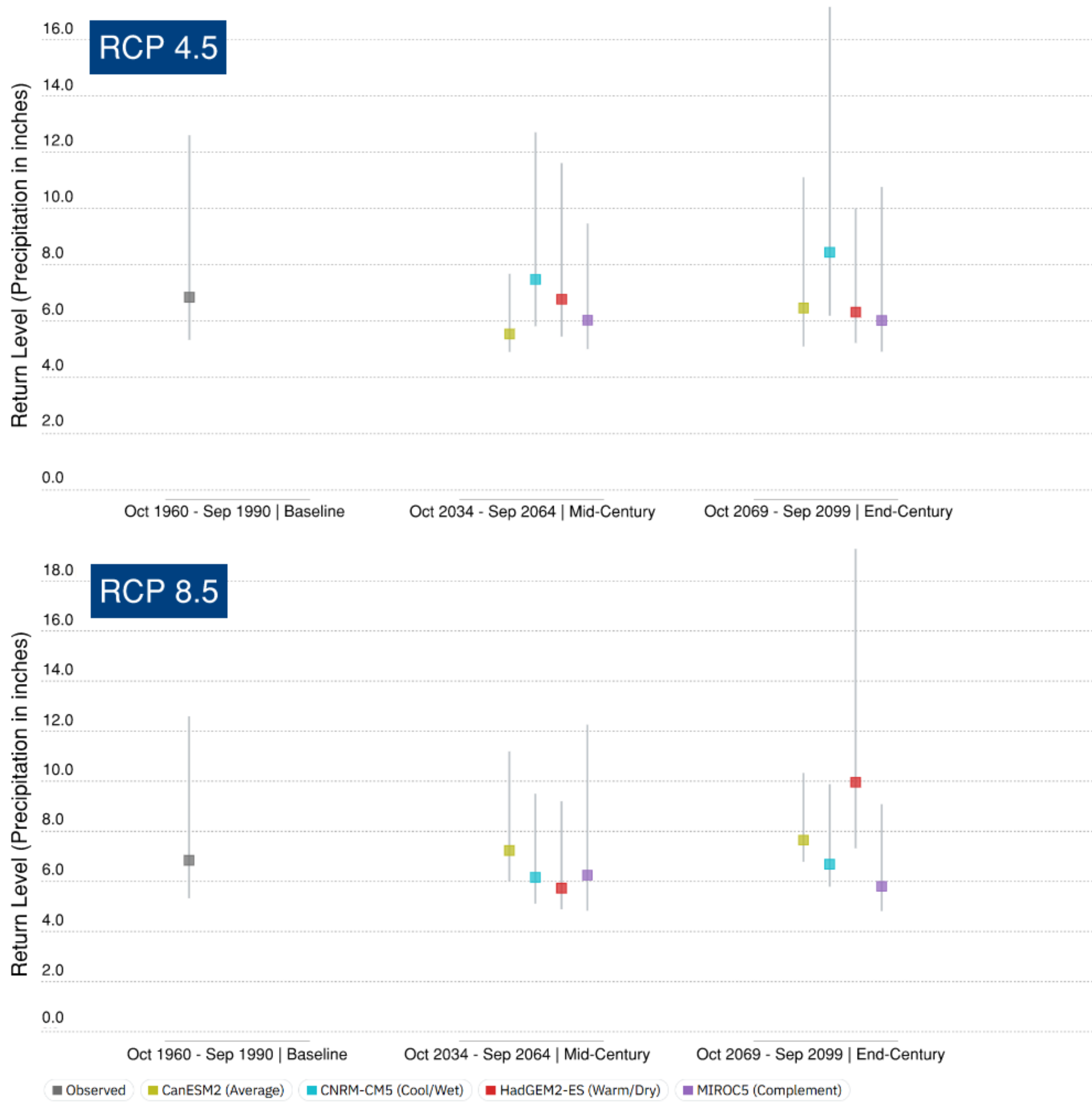

Figure 2-2: Historical and Projected Precipitation in Los Angeles County During 100-year Event (Cal-Adapt, 2026)

This study conducted a flooding vulnerability assessment of the identified facilities. **Figure 2-3** presents an aerial flood insurance rate map (FIRM) from the Federal Emergency Management Agency (FEMA) of the overall flood plain and indicates the locations of the facilities.

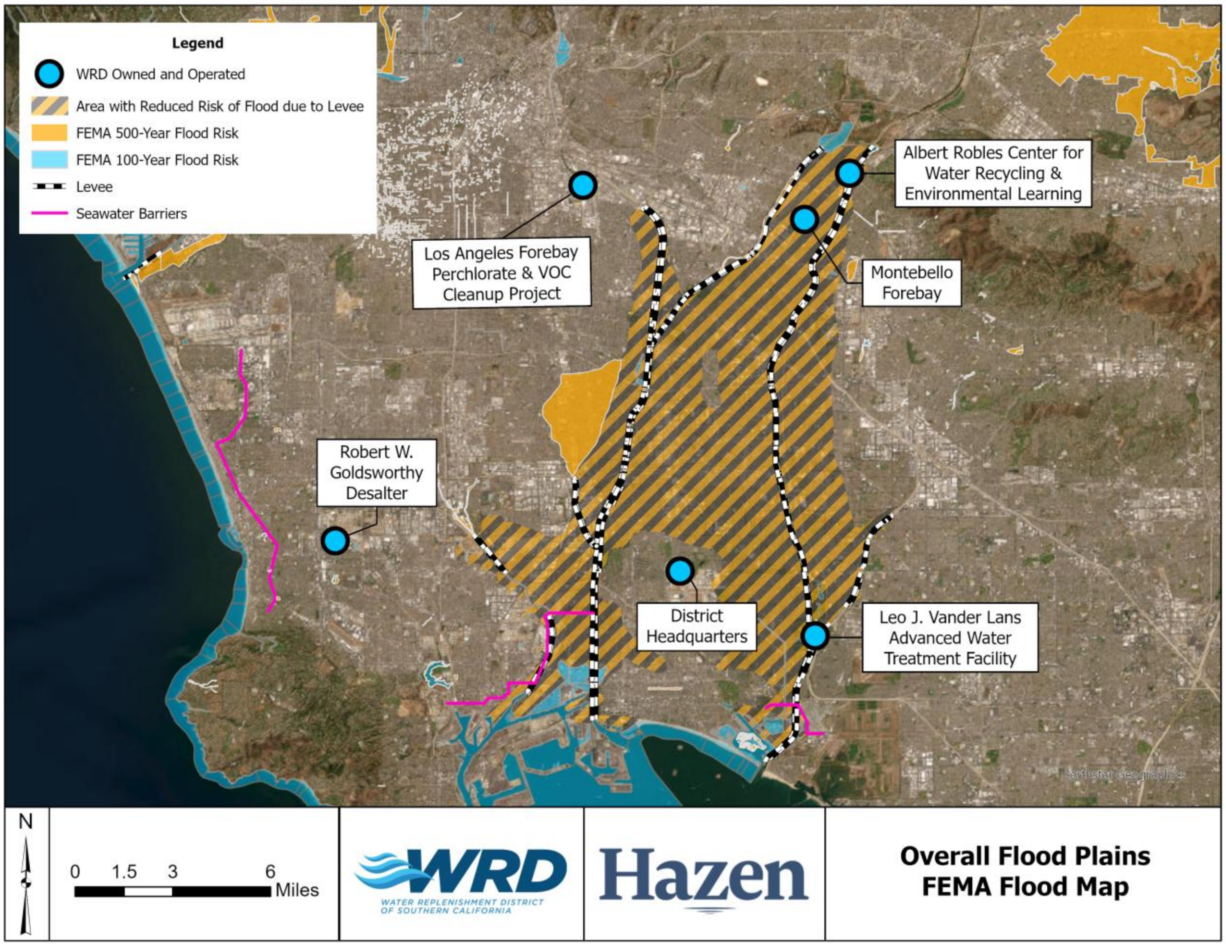

Figure 2-3: Overall Flood Plains

The levees shown in the figure are engineered to convey stormwater flows to the ocean, thereby reducing the risk of inland flooding as shown by the striped area in **Figure 2-3**. These levee systems have historically performed effectively and have provided sufficient flood protection for many years. However, it is important to note that most FEMA maps in this study were made effective in 2008 and have not been updated since then, besides the area to the east of LVL which was made effective in 2009, and the region of the Los Angeles Forebay encompassing the City of Los Angeles which was made effective in 2018. Consequently, the current maps do not account for changes in climate, land use, or development that may have altered the hydrologic and hydraulic conditions in the region. Additionally, methods for simulating flooding with hydraulic models have advanced significantly in the intervening years; however, if the maps were to be updated, the tools and approach used would be very similar to those used in 2008, 2009, and 2018. It is important to note that FEMA flood maps do not capture localized flooding that may be due to undersized pipe conveyance infrastructure. FEMA flood maps in this report show the 0.2 % Annual Exceedance Probability (500-year) and the 1% Annual Exceedance Probability (100-year) flood extents. Analysis for such designation is sometimes approximate in nature, with localized detailed assessments providing a better understanding of levee condition and flood vulnerability.

2.1 Special Flood Hazard Area and Non-Special Flood Hazard Area Definitions

Special Flood Hazard Areas (SHFAs) are high-risk areas shown on the flood map as shaded zones beginning with the letters A or V. Non-Special Flood Hazard Areas (NSHFAs) are moderate to low-risk areas shown on the flood map as zones beginning with the letters B, C, or X (including shaded or unshaded). For this study, the applicable zones include the following:

- Zone A: Area subject to inundation by the 100-year flood where no base flood elevation is provided. This is typically used in areas where detailed modeling has not been undertaken, or where the flood zone was delineated before more modern techniques were available and has been carried forward unchanged in successive flood insurance rate map updates.
- Zone AE: Area subjected to inundation by the 100-year flood, with base flood elevations (BFEs) provided. Wave heights are less than 3 feet. Flooding in Zone AE can result in significant water depths, and detailed analyses have been conducted to estimate these depths.
- Zone AH: Area subjected to inundation by the 100-year flood, with BFEs provided. Average flood depths are less than 3 feet. Flooding in Zone AE can result in shallow water depths, and detailed analyses have been conducted to estimate these depths.
- Zone X (Shaded): Areas of minimal flooding. Flooding in these areas is a result of severe storm activity and local drainage problems. Because detailed analyses have not been performed, no flood depths are shown in areas within Zone X (Shaded), although FEMA indicates that Zone X areas typically have average floodwater depth less than 1 foot or drainage areas of less than 1 square mile. These areas are also protected from the 100-year flood by levees.
- Zone X (Unshaded): Areas outside of the 1% annual chance (100-year) and 0.2% annual chance (500-year) floodplains, representing minimal flood risk. These areas are generally higher in elevation or further from major flood sources. Flooding in Zone X (Unshaded) is rare, and no flood depths or elevations are provided. These areas are considered to have less than 0.2% annual chance of flooding in any given year and are not regulated as flood hazard areas.

2.2 Flood Potential at Leo J. Vander Lans Advanced Water Treatment Facility

An aerial view of LVL is shown in **Figure 2-4,** shows that a substantial portion of the site consists of porous gravel. Still, large areas of the site are covered by impervious surfaces.

Figure 2-4: WRD LVL Site Layout

The current effective FEMA FIRM for the facility area is shown in **Figure 2-5**. The map shows LVL is in the area classified as FEMA Zone X (Shaded). Although the facility is near the San Gabriel River and Coyote Creek, both of which are potential flood sources, they are bordered by levee systems. Due to these levees, LVL is in an area of minimal flood hazard, as the levees are designed to protect surrounding infrastructure from a 100-year flood event.

Zone X typically experiences minimal flooding, with any potential flooding primarily resulting from severe storm activity or localized drainage problems. While no flood depths are provided in areas classified under Zone X, FEMA generally considers the risk of flooding in these areas to be significantly lower than in designated SFHAs.

As climate change progresses, more intense storm events and increased stormwater runoff could impact nearby flood zones, making ongoing flood risk assessments essential to maintaining the facility's long-term resilience.

Figure 2-5: LVL FEMA Flood Map

2.2.1 LVL Drainage Network

LVL is positioned at an elevation that ranges from 31 to 35 feet above mean sea level, with its highest elevation around the center of the site. It is elevated above the surrounding undeveloped area and has a concrete berm/curb along the perimeter of the site's impervious surfaces, which allows for surface drainage offsite and prevents run-off from offsite properties from flowing into the site. As a result, the facility only receives on-site runoff during storm events.

In general, surface grading directs runoff to the existing drainage system. A system of gutters, v-ditches, and catch basins direct flow to the surrounding undeveloped area. Most areas associated with industrial operations at the site are contained within structures that are surrounded by pervious gravel, preventing any contact with stormwater before it infiltrates the ground surface or is discharged off-site. **Figure 2-6** highlights LVL's drainage network.

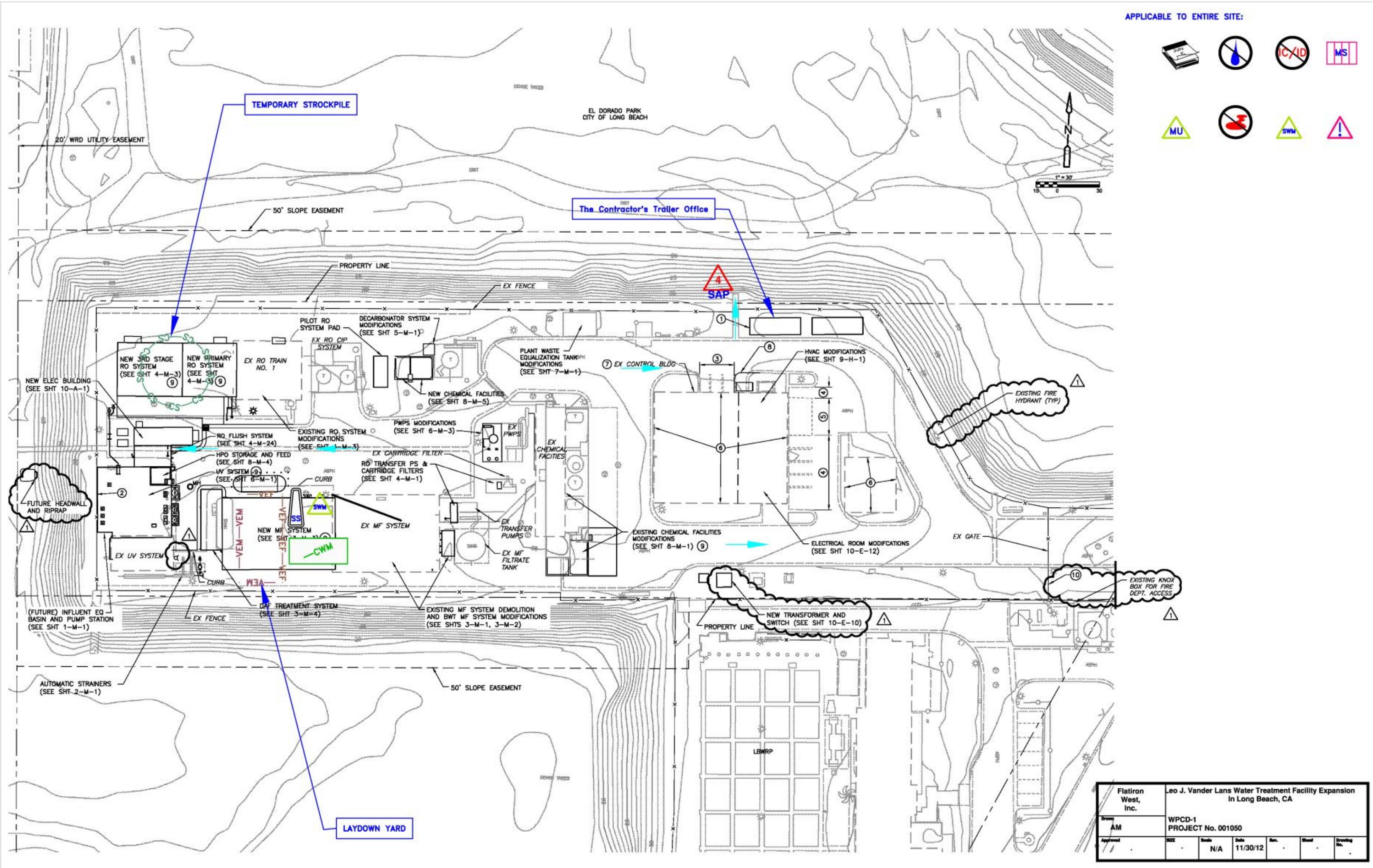

Figure 2-6: LVL Drainage Network from LVL SWPPP

2.3 Flood Potential at Robert W. Goldsworthy Desalter

An aerial view of the RWGD site is shown in **Figure 2-7**, which shows that most of the site consists of impervious surfaces.

Figure 2-7: WRD RWGD Site Layout

The current effective FEMA FIRM floodplain delineation for RWGD is shown in **Figure 2-8**. The map shows the 0.2% Annual Exceedance Probability (500-year) and the 1% Annual Exceedance Probability (100-year) flood extents. RWGD is in FEMA Zone X (Unshaded) but is located within one mile of an area classified as Zone A to the east of the facility.

The FEMA map in **Figure 2-8** suggests that RWGD is in an area of minimal flood hazard, as it is not located within either the 100-year or 500-year floodplain, meaning it has less than a 0.2% annual chance of flooding in any given year. This classification reflects that RWGD is located at a relatively higher elevation than the surrounding area at approximately 105-109 ft above mean sea level and is not near major flood sources such as rivers or coastal zones.

Figure 2-8: WRD RWGD FEMA Flood Map

It should be noted that RWGD is within one mile of a Zone A area to the east, which could be exacerbated in the event of drainage infrastructure failure. However, this area is at a lower elevation than RWGD (approximately 75 feet above mean sea level, as shown in **Figure 2-9**), and it is highly unlikely that drainage infrastructure failure would result in flooding at RWGD. Nevertheless, it is important to stay informed on recent flood map updates and monitor this nearby flood-prone area to maximize the facility's resilience to flooding.

Figure 2-9: Elevation of 100-year Flood Zone Area Near RWGD

2.3.1 RWGD Drainage Network

RWGD lies at an elevation ranging from 105 to 109 feet above mean sea level. Existing vegetation lines the site's western and southern boundaries, and the property is surrounded by roads and industrial buildings that divert and contain run-off from offsite properties from flowing onto the site. The vegetation along the southern border of the site also slopes away from the site, with RWGD sitting at a raised elevation from its southerly neighbor. As a result, the facility only receives on-site runoff during storm events.

In general, the surface runoff sheet flows to the southwest and is collected by the facility's robust drainage system, including a series of onsite catch basins and storm drain inlets. The catch basins and inlets capture runoff and convey stormwater through an existing storm drain system. Refer to **Figure 2-10** for the facility's existing drainage network. Areas of pervious gravel also prevent flooding and facilitate infiltration near outdoor equipment. The west side of the site includes a sloped containment area that may be at risk of localized flooding during a significant storm event.

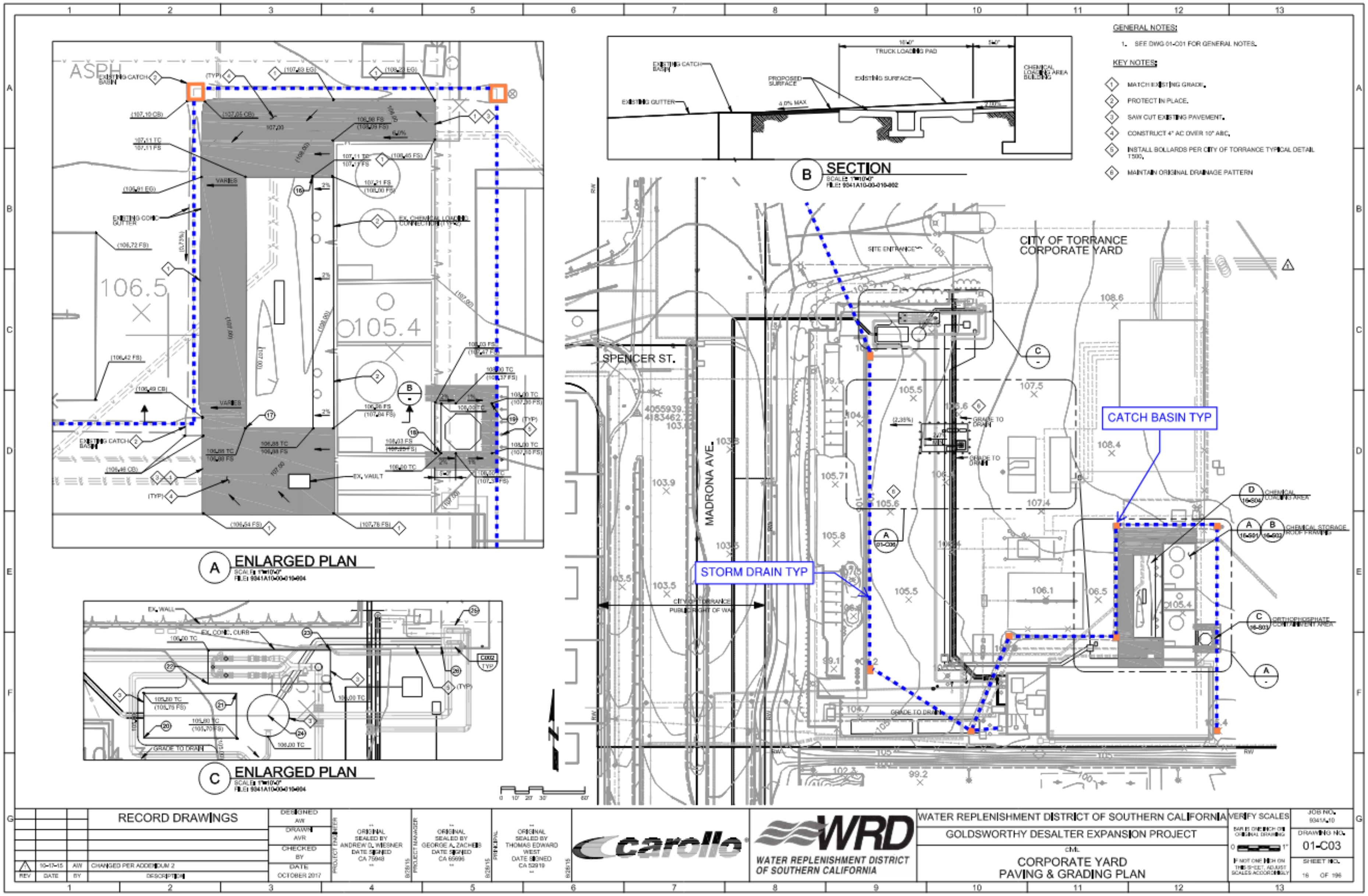

Figure 2-10: RWGD Drainage Network from Expansion Project Plans

2.4 Flood Potential at Albert Robles Center

An aerial view of the ARC site is shown in **Figure 2-11,** which shows a large amount of the site as pervious surfaces.

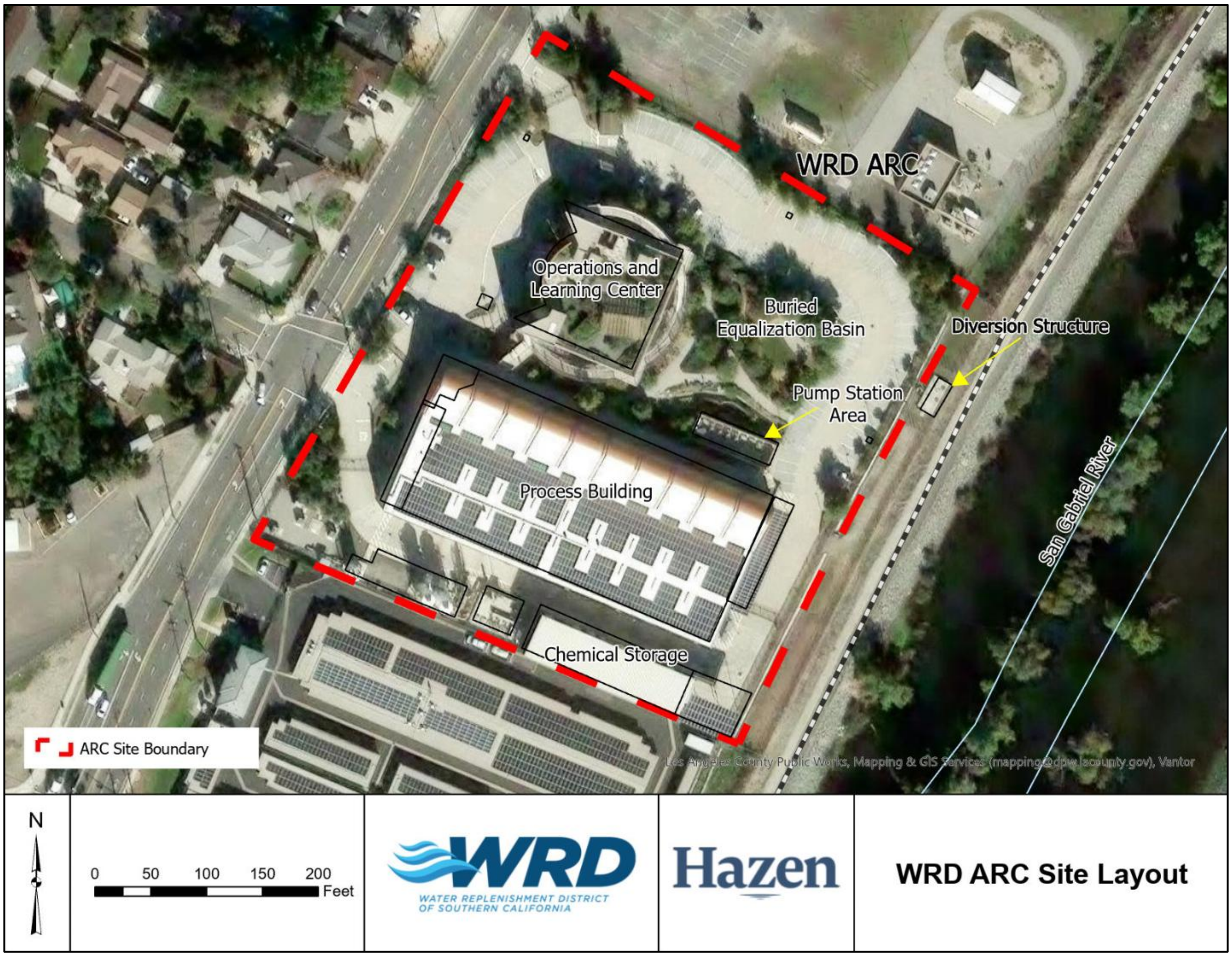

Figure 2-11: WRD ARC Site Layout

The current effective FEMA FIRM floodplain delineation for the area surrounding ARC is shown in **Figure 2-12**.

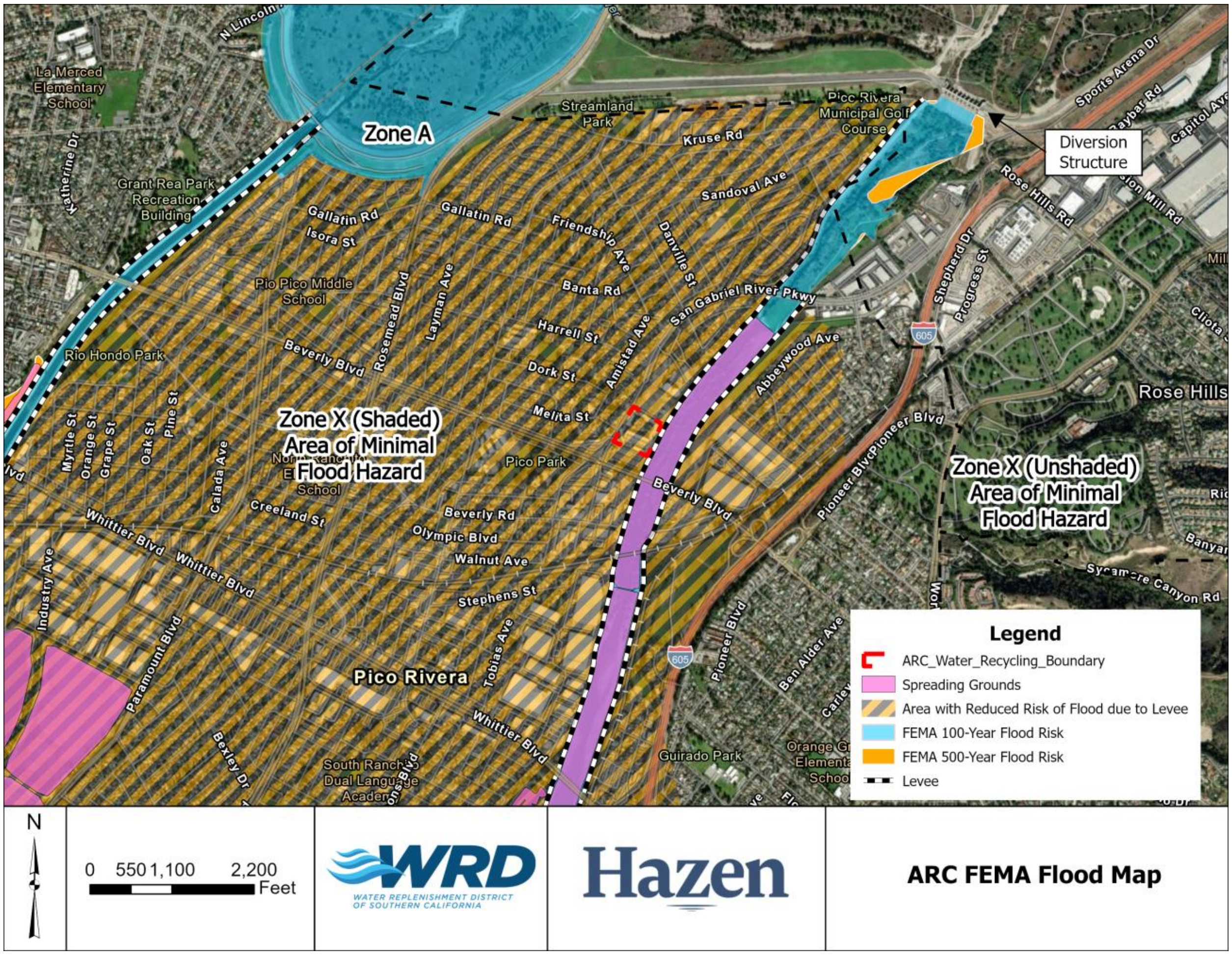

Figure 2-12: WRD ARC Flood Map

The current FEMA map in **Figure 2-12** suggests that the levees will protect ARC from flooding during the 100-year flood event, as it is located in Zone X (Shaded). Notably, the diversion structure that diverts source water flow into the equalization basin will likely not be impacted by inundation.

The Whittier Narrows Dam, shown in **Figure 2-12,** is located upstream of the Rio Hondo and approximately 1 mile northwest of ARC. The Whittier Narrows Dam is a flood control and water conservation project constructed and operated by the United States Army Corps of Engineers (USACE). This dam provides temporary runoff storage and can cause flooding of the upstream area during large storm events.

The dam has been classified as a very high urgency flood risk. Although mitigation measures have been taken, significant flood risk remains due to erosion throughout the dam's foundation and potential overtopping during extreme floods. The Whittier Narrows Dam Safety Project was initiated in response, which is currently under construction with an anticipated completion timeline of five years. The purpose of the Safety Project is to substantially mitigate flood risk and the potential for structural failure.

ARC is not located upstream of the Whittier Narrows Dam or in proximity to the Rio Hondo. Because sheet flow is limited to short travel distances before transitioning to concentrated flow within defined drainage systems, the separation between ARC and these features precludes runoff from reaching the site as sheet flow. Therefore, localized sheet flow is not anticipated, and flood impacts associated with the Whittier Narrows Dam are anticipated to be negligible.

2.4.1 ARC Drainage Network

ARC is elevated above the adjacent properties and is surrounded by a perimeter berm/curb that prevents offsite run-off from flowing into the site. As a result, the facility only receives on-site runoff during storm events.

In general, surface runoff sheet flows from the center of the site to the four corners. ARC's elevation ranges from 187 to 192 feet above mean sea level. There is a concrete berm/curb surrounding the perimeter of the site. ARC's Integrated Stormwater Management System allows for surface runoff to be collected by a series of onsite storm drain inlets that direct water through a hydrodynamic separator before entering an infiltration basin. Other features include pervious pavement, bioretention basins, and a rooftop garden. The pervious pavement in the parking stalls collects stormwater and flows into a bioretention basin with overflow outlets, with both the pervious pavement and bioretention basins providing water quality treatment. Despite high levels of precipitation experienced at ARC, with peaks of 3.02 inches and 3.97 inches during 2023 and 2024 respectively, the pervious pavement has been able to consistently facilitate stormwater infiltration, with no observed offsite stormwater discharge (NOAA). The surface runoff in other areas is collected by a series of storm drain inlets that flows to a hydrodynamic separator and then to an underground infiltration basin with an overflow outlet that leads to the San Gabriel River. **Figure 2-13** highlights the facility's extensive drainage network.

ARC discharges treated water into the MFSG for groundwater recharge or into the San Gabriel River through a National Pollutant Discharge Elimination System (NPDES) permit.

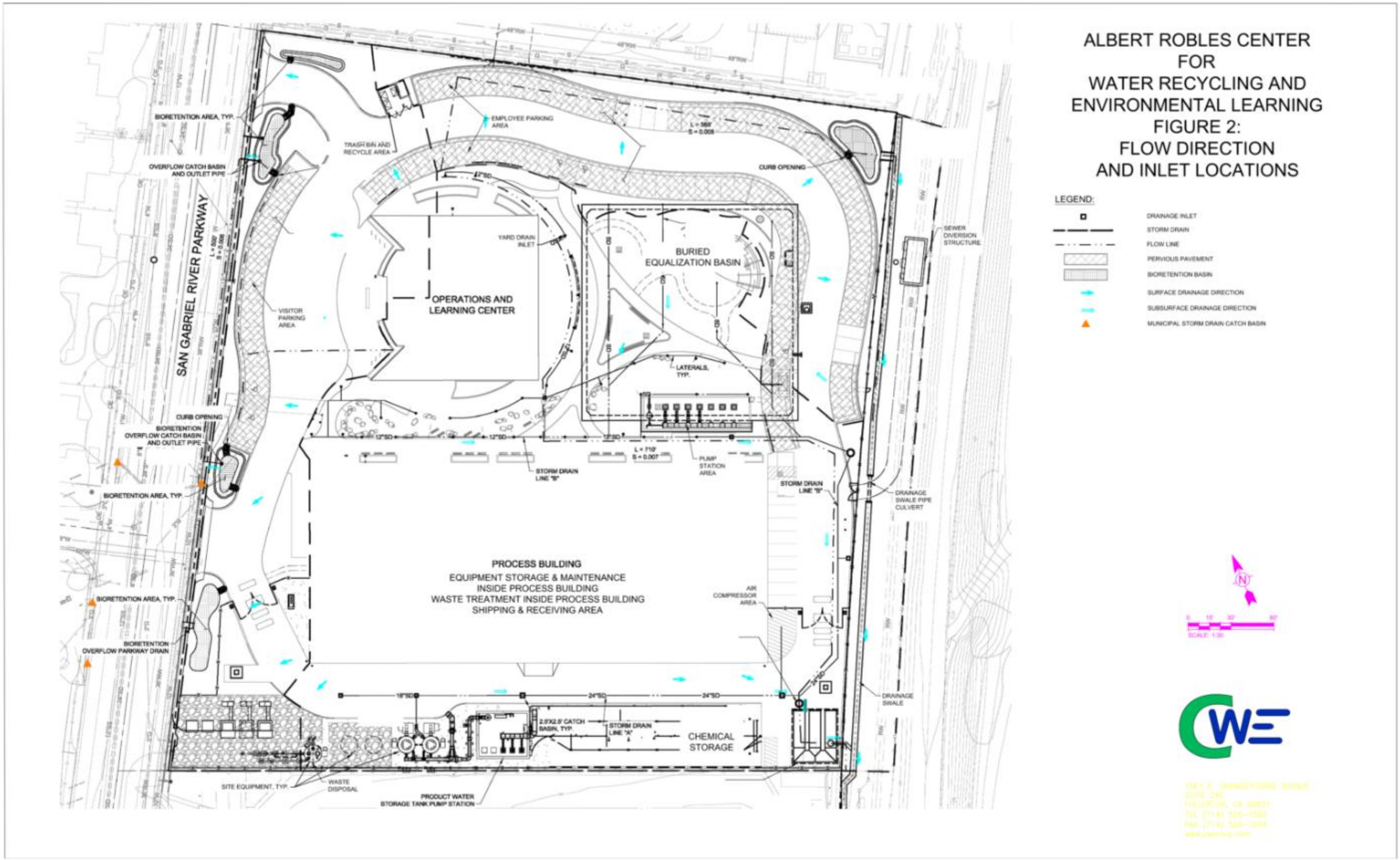

Figure 2-13: ARC Drainage Network from ARC SWPPP

2.4.2 Flood Potential at ARC Discharge Locations

Advanced treated water from ARC is discharged either to MFSG, or into the San Gabriel River through a NPDES permit for groundwater recharge, as indicated in **Figure 2-14**. The Spreading Grounds are in an area of reduced flood risk due to the protection provided by the levees along the Rio Hondo and San Gabriel River. Operators' ability to actively control the flow into the two basins also acts as a measure to ensure optimal infiltration and minimize flood risk.

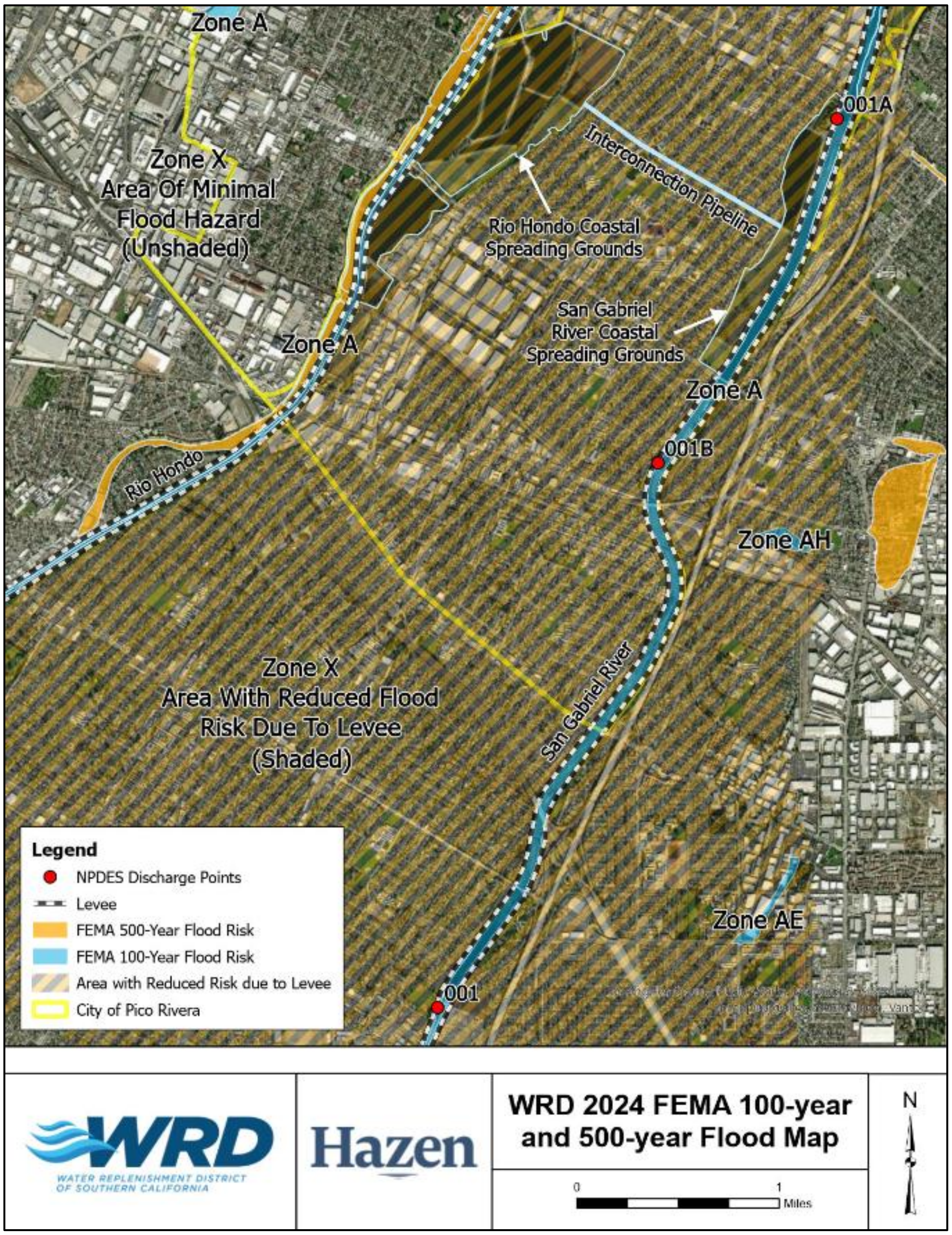

Figure 2-14: ARC Discharge Points Flood Map

2.5 Flood Potential at District Headquarters

Figure 2-15 is an aerial view of the HQ site, which highlights the majority of the site consists of impervious surfaces.

Figure 2-15: WRD Headquarters Site Map

The current FEMA FIRM map for the headquarters in **Figure 2-16** identifies the WRD HQ as being within Zone X (Unshaded), which corresponds to an area with less than a 0.2% annual chance of flooding. This designation reflects that the facility is not near significant flood sources such as rivers or coastal zones. As such, the facility stands at a low flood risk under FEMA-defined conditions. The site slopes to the west, with elevations ranging from 62 ft to 65 ft. Sheet flow is generally directed toward the northern swale along the boundary, and southern swale, where stormwater then flows to the west offsite to the street stormwater drain.

While flooding within Zone X (Unshaded) is uncommon, the facility is in a low-lying urbanized area where localized drainage issues could occur during extreme storm events. Evolving climate patterns and more frequent extreme rainfall events could elevate the potential for localized flooding. As such, it remains important to regularly evaluate local stormwater and drainage conditions.

Figure 2-16: WRD HQ FEMA Flood Map

2.6 Flood Potential in the Los Angeles Forebay

WRD is conducting the LAFPP to investigate and remediate groundwater throughout the Los Angeles Forebay by removing perchlorate and accompanying VOCs using a groundwater extraction and treatment system. The Los Angeles Forebay is comprised of multiple cities in California: Vernon, Los Angeles, Inglewood, Florence, Huntington Park, Walnut Park, and South Gate. The current effective FEMA FIRM floodplain delineation for the Los Angeles Forebay is shown in **Figure 2-17**.

The entire Los Angeles Forebay is in FEMA Zone X (Unshaded) does not contain any 100-year and 500-year flood risk zones. This indicates that the Los Angeles Forebay has less than a 0.2% annual chance of flooding in any given year. This classification reflects that the Los Angeles Forebay does not contain major flood sources such as rivers or coastal zones.

Flooding in Zone X (Unshaded) is generally rare and typically results from localized drainage issues or severe storm activity. No detailed flood depths or base flood elevations are provided for areas in Zone X, since it is not considered a significant flood risk zone. However, as storm patterns become more unpredictable due to climate change, localized flooding from heavy rainfall or drainage system failures could still pose a potential risk. Additionally, the Los Angeles Forebay encompasses a large area, so there are more locations for potential flooding to occur.

While the current flood hazard for the Los Angeles Forebay and WRD's LAFPP is minimal, it is important to stay informed on flood map updates for areas near and within the Los Angeles Forebay. As climate change progresses, more intense storm events and increased stormwater runoff could extend nearby flood zones closer to the boundary of the Los Angeles Forebay. For this reason, ongoing flood risk assessments are an important aspect of ensuring the LAFPP is not impacted by flooding.

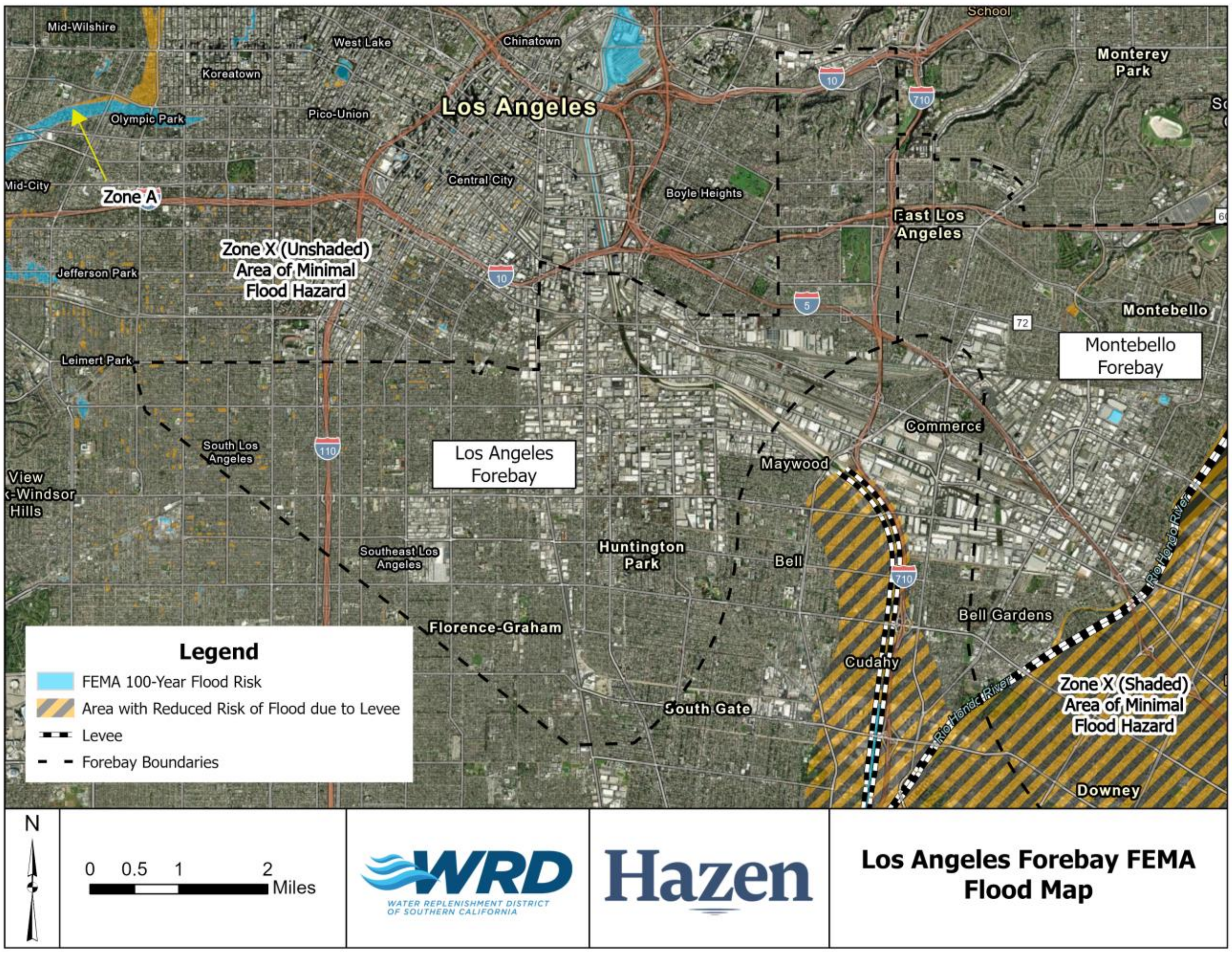

Figure 2-17: Los Angeles Forebay FEMA Flood Map

2.7 Flood Potential at Montebello Forebay Spreading Grounds

An aerial view of the MFSG site is shown in **Figure 2-18** highlighting that the pervious surface of the Spreading Grounds takes up the entire site, although there are narrow walkways throughout the MFSG.

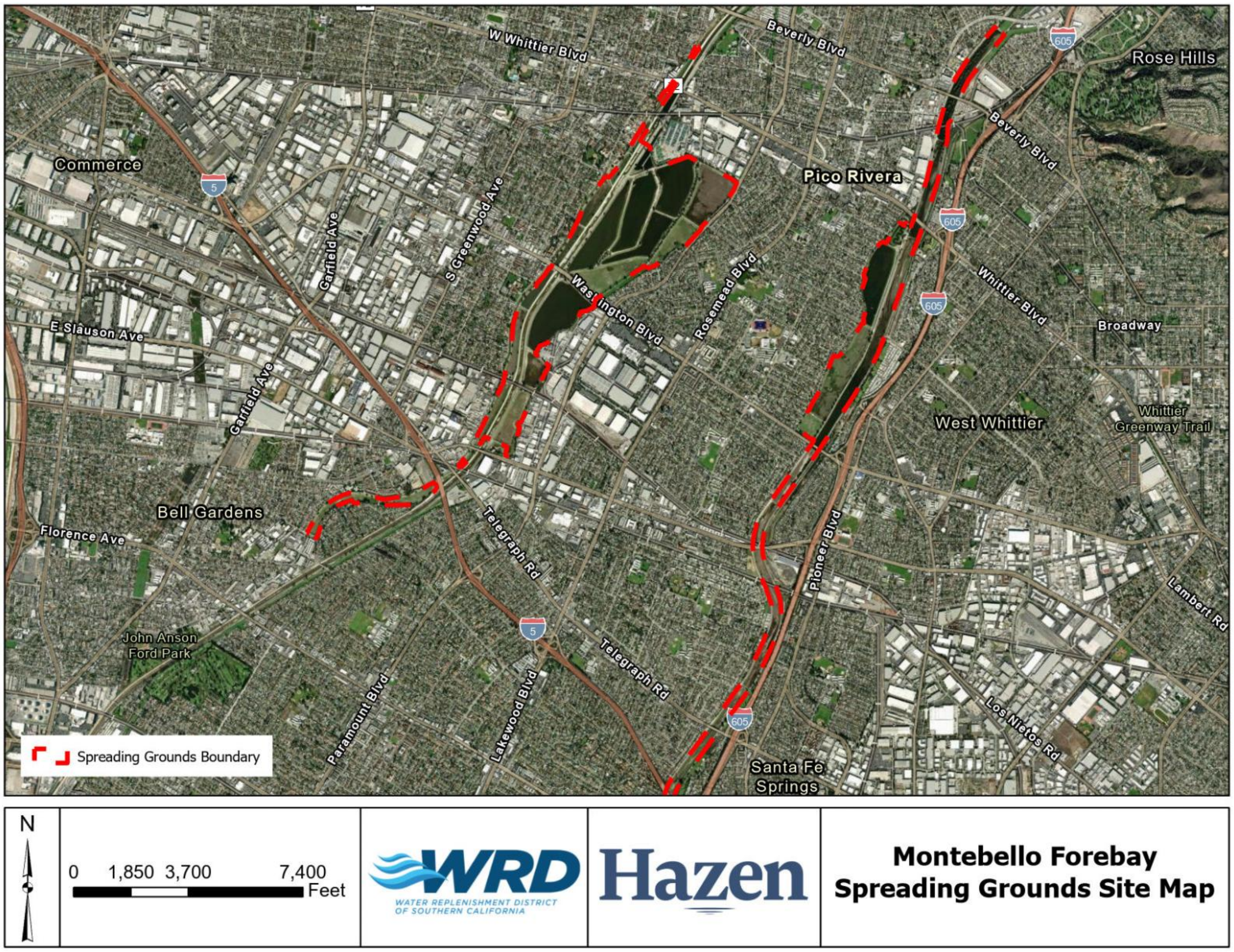

Figure 2-18: MFSG Site

The MFSG receives stormwater, tertiary treated effluent from the Los Angeles County Sanitation District (LACSD), and ARC effluent for groundwater recharge downstream of the facility. Flows into the spreading grounds are controlled by various turnout structures, rubber dams, and an Interconnection Pipeline. The rubber dams and pipeline provide operational flexibility, allowing ARC staff in coordination with LACPW to control flow into each of the basins. More flow is typically sent to the San Gabriel River Coastal Spreading Grounds due to its higher permeability.

The current effective FEMA FIRM in **Figure 2-19** shows that the spreading grounds are in an area classified as Zone X (Shaded). In addition to being protected from flooding by the levees along the Rio Hondo and San Gabriel River, the function of the Spreading Grounds is to facilitate surface water infiltration into the Central Basin. As such, flooding will only occur over the Spreading Grounds if the basins are filled. If this occurs, water is expected to flow offsite where it eventually reaches the ocean, and it is not expected that the infrastructure of the Spreading Grounds would sustain damage. This low degree of flood risk is reflected in the FEMA FIRM classification of Zone X (Shaded).

This map also suggests that the levees will protect the spreading grounds from flooding during the 100-year and 500-year flood events. The Rio Hondo and San Gabriel River are reported to normally be dry, and are classified as Zone A. Notably, inundation will only temporarily impact the Spreading Grounds' ability to function for the duration that the basins are filled with stormwater. This would result in water draining to the ocean rather than being stored in the basin.

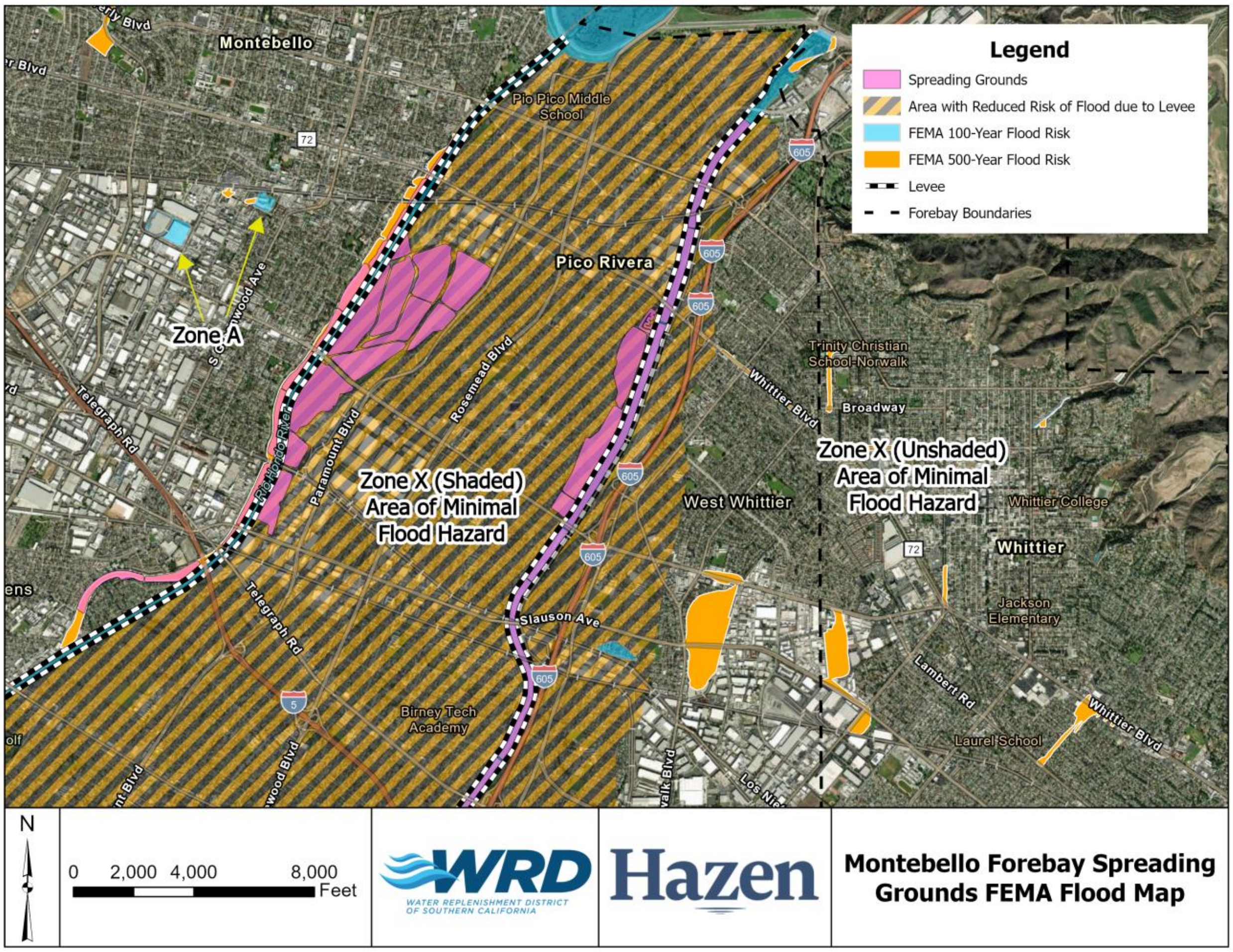

Figure 2-19: MFSG FEMA Flood Map

2.8 Flooding Vulnerability Summary

Table 2-1 provides a summary of the flooding vulnerabilities for LVL, RWGD, ARC, WRD HQ, the Los Angeles Forebay, and MFSG.

LVL and RWGD have suffered rain-related equipment failures and experience limitations in the ability to divert flows. Heavy rain is the primary cause of equipment failure at RWGD, due to the rain-rated equipment having corroded overtime. RWGD is also at an increased risk of flooding due to its proximity to a nearby flood zone, though this area exists at a lower elevation than RWGD.

Equipment failure due to rain impact has also been observed at LVL, in addition to localized flooding. Vaults and chemical trenches have also been impacted by stormwater intrusion. These vulnerabilities can lead to substantial operational disruptions, including multiday or even multi-month shutdowns. ARC also faces the potential for flooding at its diversion structure during a 100-year storm event, though it has no history of significant flooding events which highlights the existing drainage system's ability to handle even intense storm events.

The LA Forebay, WRD HQ, and MFSG have minimal flood-related concerns. The MFSG are designed to manage stormwater and have no history of damaging flood events, though capacity exceedance causes stormwater to drain to the ocean rather than infiltrate the basin.

Although none of the facilities discussed have experienced major flooding on-site, they are subject to varying degrees of flood risk, as shown in **Table 2-1**. Mitigation measures such as staying informed on recent flood map updates can be taken at all facilities to bolster flood preparedness.

Table 2-1: Flooding Vulnerabilities for WRD Facilities

Facility	Vulnerabilities	Risk Level
LVL	• Localized flooding, water entering vault, process basins, chemical trenches • Difficulty diverting facility flows during storms • Equipment failures due to heavy rain	Medium
RWGD	• Power failure due to heavy rain • No way to actively divert flows on site	Medium
ARC	• Potential flooding due to 100-year flood runoff • Water damage to facility's assets	Low
HQ	• Minimal flooding concern – historically, no flooding issues experienced within proximity of the site	Low
Los Angeles Forebay	• Minimal flooding concern – historically, no flooding issues experienced regarding LAFPP	Low
MFSG	• Frequent/heavy storms can fill spreading basins, resulting subsequent stormwater not being captured and infiltrated into the basins • Minimal flooding concern for the spreading grounds under current levee protection	Low
Seawater Barriers	• N/A (Not Applicable)	Low

3. Extreme Temperatures Vulnerability

California's Fourth Assessment (2018) provides a review of the historical trends and future projections for temperatures in Southern California. **Figure 3-1** shows the trends in historical and projected future annual average maximum temperatures under the RCP 4.5 and 8.5 emissions scenarios for the Los Angeles Region. Historical data shows a trend of increasing annual average maximum temperature, and the projected future annual average maximum temperature is also expected to increase over time under both emissions scenarios. Historical data for the South Coast Region of California has shown a 0.16 °F per decade increase in annual average temperature, annual average maximum temperature, and annual average minimum temperature. Additionally, the top five warmest years on record were 2016, 2019, 2015, 2017, and 2018 (descending order). According to NASA, the top five global warmest years ranked from highest to lowest are now 2024, 2025, 2023, 2015, 2020. 2024 is now the hottest year with 2.3 °F above the agency's 20th century baseline. **Figure 3-2** shows historical and projected values of average hottest day of the year and change in average hottest day of the year. Under the RCP 4.5 emissions scenario, the average hottest day of the year is expected to be between 100 and 105 °F. In an RCP 8.5 emissions scenario, the average hottest day of the year is expected to be between 115 and 120 °F. In general, intensity and frequency of extreme temperature events are expected to increase. An extreme heat event is defined as a day in a year when the daily maximum/minimum temperature exceeds the 98th historical percentile of daily maximum/minimum temperatures based on observed historical data from 1961 to 1990 between April and October.

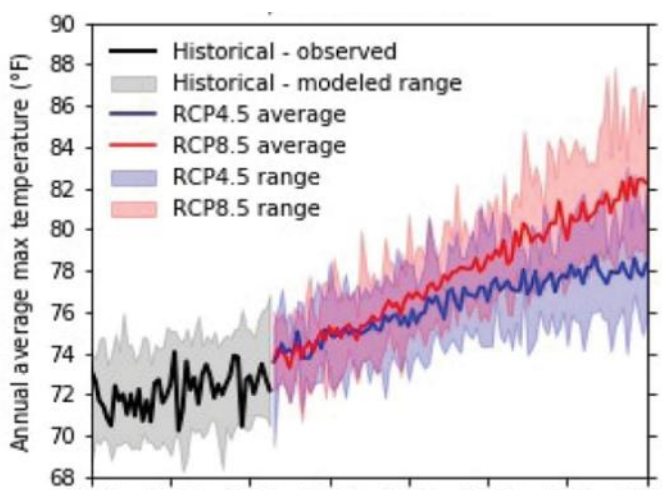

Figure 3-1: Historical and Projected Future Annual Average Maximum Temperature in the Los Angeles Region (Hall, 2018)

Cal-Adapt provides data for the extreme temperature threshold and projected average number of extreme temperature days per year under the RCP 4.5 and 8.5 emissions scenarios which are discussed in each facility's respective sections below. For this climate mitigation plan, both RCP 4.5 and 8.5 scenarios were evaluated. Observations from 1960 to 1990 were used to establish an extreme temperature threshold and list the number of days that exceed that threshold. This data generally shows a significant projected increase in the number of extreme temperature days. **Table 3-1** summarizes RCP values for each facility's respective cities.

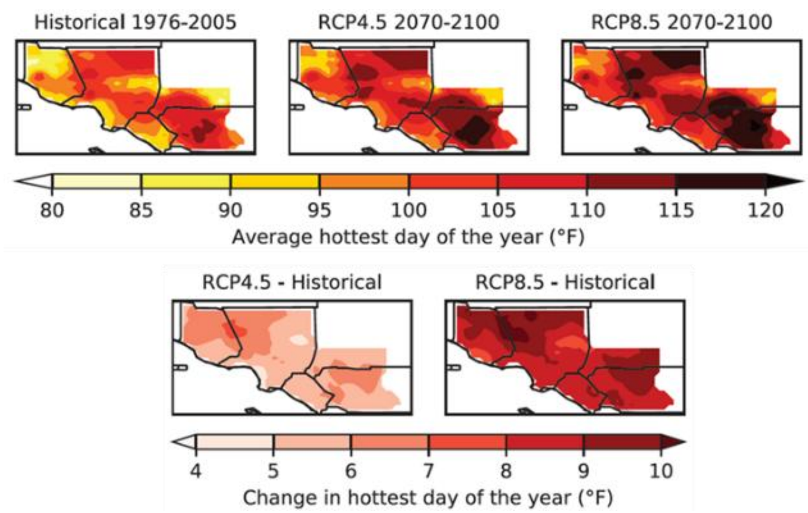

Figure 3-2: Average Hottest Day of the Year in Southern California (Hall, 2018)

Table 3-1: Average Number of Extreme Temperature Days per Year (Cal-Adapt, 2024)

Facility	City	Extreme Heat Threshold	Modeled Historical Projections	Mid-Century Model Projections		End-Century Model Projections	
				RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
LVL	Long Beach	95.6	2	7	9	10	20
RWGD	Torrance	91.8	2	5	7	7	16
ARC	Pico Rivera	100.5	3	13	18	19	35
LA Forebay	Vernon	98.3	3	9	14	15	28
MFSG	Pico Rivera	100.5	3	13	18	19	35

Extreme temperatures can impact facility assets and chemical systems, as well as operators and staff. Electrical system reliability is a concern, since an increase in heating is causing an increase in usage of Heating, Ventilation, and Air Conditioning (HVAC) systems in the region, resulting in higher potential for brownouts or rolling blackouts. This risk has motivated the California Independent System Operator to issue Flex Alerts in the past, requesting power conservation at public water/wastewater systems during times of extreme heat. The performance of electrical equipment can be negatively impacted if ambient temperatures increase beyond equipment design capacities. When high temperatures combine with extreme winds and extreme dryness, Southern California Edison (SCE) may shut down power by implementing Public Safety Power Shutoffs (PSPS). PSPS are effective by temporarily shutting off electrical power in times of increased risk due to severe weather which may include low humidity, high winds, National Weather Service warnings, high fire risk and extreme heat, in order to protect surrounding areas and residents.

Chemical degradation can occur in chemical tanks that are exposed to high temperatures. This can lead to increasing chemical feed volume, greater chemical volatilization, and possible clumping of chemicals inside of tanks. As average ambient temperatures increase over time, operators may need to consider increasing the dosage of lower concentration chemicals during higher temperatures. If extreme temperatures significantly impact operations or chemical costs in the future, then climate-controlled buildings may be considered to mitigate extreme temperature impacts.

Prolonged periods of elevated temperatures can result in decreased productivity of employees and inability to complete work in a timely manner, along with a chance of more serious health concerns. Plant operators follow the Occupational Safety and Health Administration's (OSHA) recommendations for hot weather conditions to prevent heat-related illnesses.

3.1 Extreme Temperature at LVL

Although LVL equipment was designed to accommodate the higher temperatures that can occur in the City of Long Beach, operational staff at LVL have reported that overheating air compressors have shut down the facility on multiple occasions. Additionally, the facility has experienced a full shutdown due to the HVAC system's insufficient cooling for the Ultraviolet (UV) System's control cabinets. During these shutdowns, heat-sensitive chemicals have been reportedly subject to degradation. Additionally, the shutdowns halted the production of advanced treated recycled water. In response, new panel cooling equipment has since been installed for the UV System and Programmable Logic Controller (PLC) panels, and all HVAC units for the control building and electrical room have been replaced. Temperature monitors were also installed in the electrical room, which recorded the room reaching over 100 ˚F. Although there have been no notable reports of water quality issues related to extreme weather conditions, WRD has limited the water that can be injected into the Alamitos Seawater Barrier as a safety measure.

3.2 Extreme Temperature at RWGD

The primary challenge regarding equipment failure due to extreme temperatures at RWGD is the overheating electrical room. The electrical room has reportedly overheated on multiple occasions due to an outdated HVAC system. When this occurs, the temporary cooling units are used to assist and maintain proper temperature control. This HVAC system will be updated during a planned future expansion. The projections data show that the number of extreme heat days over 91 ˚F is expected to double by late century as seen **in Table 3-1**. RWGD is also vulnerable to chemical degradation during periods of extreme heat.

3.3 Extreme Temperature at ARC

At ARC, product water is generally warmer than the ambient temperature during warming seasons, as indicated by data in **Appendix A**. Ambient air temperature does not impact the product water temperature, but it does impact the temperature of influent source water from LACSD's San Jose Creek Water Reclamation Plant. The NPDES Permit states an effluent temperature limitation of 80°F. Data and discussions with WRD staff revealed exceedances in product water temperature above this limitation, which can reduce the opportunity of river discharge and impact the overall MFSG operations. Staff noted that the Advanced Water Treatment (AWT) process adds heat to the water, likely during reverse osmosis (RO), UV, and advanced oxidation processes (AOP) treatment trains. During 2023, WRD began monitoring influent that showed influent temperatures may be warmer than product water and ambient temperatures. More influent temperature data collection and internal temperature studies will help WRD toward site specific temperature objectives and permit compliance. It has also been reported that chemicals vulnerable to heat have degraded and become less effective, especially after prolonged shutdown periods.

Extreme temperatures may result in impacts on current and future equipment at the AWT process building. During summer months, large fans draw outdoor air into the AWT process building, and the ventilation system is insufficient for maintaining optimal temperature. Concurrently, the RO pumps and motors operate at full capacity and add additional heat to the room. ARC operators report taking RO high pressure pumps offline for maintenance and replacement due to the increase in temperature. Furthermore, the RO resource recovery pumps have not been working effectively to reduce operational pressures of the RO pumps. The current temperature rating of this equipment is 104°F. The projected data show that the number of extreme heat days over 100°F is expected to double by mid-century and triple by late century. WRD may want to consider a higher rating for their equipment that will meet the requirements for their system as the heat inside the process building may exceed the current temperature rating.

3.4 Facilities Currently Minimally Impacted by Extreme Temperature

Extreme temperature conditions have not affected workers or the performance of equipment for the LAFPP or WRD HQ. The LAFPP operators have a backup pump if equipment failure does occur, and replacement pumps are easily obtained. On-site containers are also reported to have air conditioning (A/C) systems to maintain an acceptable temperature range for operation. WRD's HQ has recently installed a new HVAC system, as the previous system operated near maximum capacity and was vulnerable to PSPS. The MFSG is indirectly impacted by ARC's extreme temperature vulnerability. Since ARC has consistently provided sufficient water, vulnerability at MFSG remains low. Still, field crew at MFSG may be vulnerable to heat-related illnesses during hotter months, and precautions should be taken to ensure worker safety.

3.5 Extreme Heat Vulnerability Summary

Across WRD facilities, the most common heat-related impacts are insufficient cooling for facility equipment and systems, and operator safety. Although operator staff have not reported chemical degradation issues, the facilities will continue to monitor the chemical systems as a precaution. Overall mitigation measures have been implemented and will be discussed in the following sections of this report; however, power outages, equipment failures, water restrictions, and worker safety remain ongoing concerns.

Table 3-2: Summary of Extreme Temperature Vulnerabilities

Facility	Vulnerabilities	Risk Level
LVL	• Equipment overheating and subsequent failures • Process operation disruptions • Potential electrical shutdowns • Potential chemical degradation • Product limitations • Worker safety • Degradation of vulnerable chemicals	High
RWGD	• Outdated HVAC system • Equipment overheating and subsequent failures • Process operation disruptions • Potential electrical shutdowns • Degradation of vulnerable chemicals	High
ARC	• Historically exceeded NPDES effluent temperature limits • Equipment overheating and subsequent failures • Process operation disruptions • Potential electrical shutdowns • Product limitations • Worker safety • Degradation of vulnerable chemicals	High
WRD HQ	• HVAC system strain during warmer seasons including loss of power	Low
LA Forebay	• Potential equipment failure	Low
MFSG	• Potential decrease in water supply from ARC • Field crew worker safety	Low
Seawater Barriers	• Potential decrease in water supply from LVL to Alamitos Barrier	Low

4. Wildfire Vulnerability

The threat of wildfires to communities and critical facilities has been the focus of attention by local and state agencies in California. This study considered several sources of information including historical wildfire, current wildland areas, and future wildfire projections. Wildfire projections are widely uncertain, though the likelihood of wildfires is increased by several climate change parameters including, but not limited to, extreme temperatures, drought, and wind. A practical approach is to note the locations identified in zones at risk, rather than the magnitude and direction of any changes in burn area for future scenarios.

4.1 Cal-Adapt Projected Burn Area

Cal-Adapt provides projections of burn areas, but these projections carry significant uncertainty and are dependent on several factors such as climate, land use and development, and changes in vegetation. Fires that begin in dry areas can spread rapidly, often carried by extreme Santa Ana winds. Changes in weather patterns may impact the frequency of rainfall events, decreasing soil moisture, increasing vegetation mortality, and increasing fuel sources in the watershed, which in turn increases the risk and spread of fires.

The facilities in this study are outside the combined state and federal fire protection responsibility areas and are excluded from wildfire projections. **Figure 4-1** demonstrates Cal-Adapt's Wildfire RCP 8.5 2070 data and location of each facility. LVL and the Alamitos Seawater Barrier are located within an area classified as low vulnerability. ARC and MFSG are the only facilities near areas classified as low vulnerability. The other facilities are not located within or near Cal-Adapt classified areas. Observing Cal-Adapt data for the years 2035, 2050, and 2070, all facilities remain part of regions designated as low vulnerability to wildfire.

Indirect wildfire risks may exist due to wildfire potential in nearby areas. These indirect risks may impact electrical feed to facilities through PSPS, which may require facilities to shut down if these are not available. ARC and LVL do not have a source of backup power and would shut down for the duration of the PSPS. Staff at ARC and LVL have reported wildfire smoke and ash impacts that raise respiratory health concerns and possible impacts to water quality during wildfire events. Firefighting activities and efforts for wildfire prevention using firefighting chemicals could potentially impact the quality of stormwater that percolates into the groundwater Basin through the MFSG, as these can introduce contaminants into the Basin. PFAS is known to be one of the most widespread groundwater contaminants throughout the world, and it is used in firefighting foams and protective coatings. It is a known carcinogen with a variety of potential negative health effects, and it should be confirmed that wells pumping contaminated groundwater are connected to a treatment system capable of removing PFAS from the product water. WRD should continue to monitor wildfire projections as they may change over time due to new data, changes in land use, and surrounding vegetation.

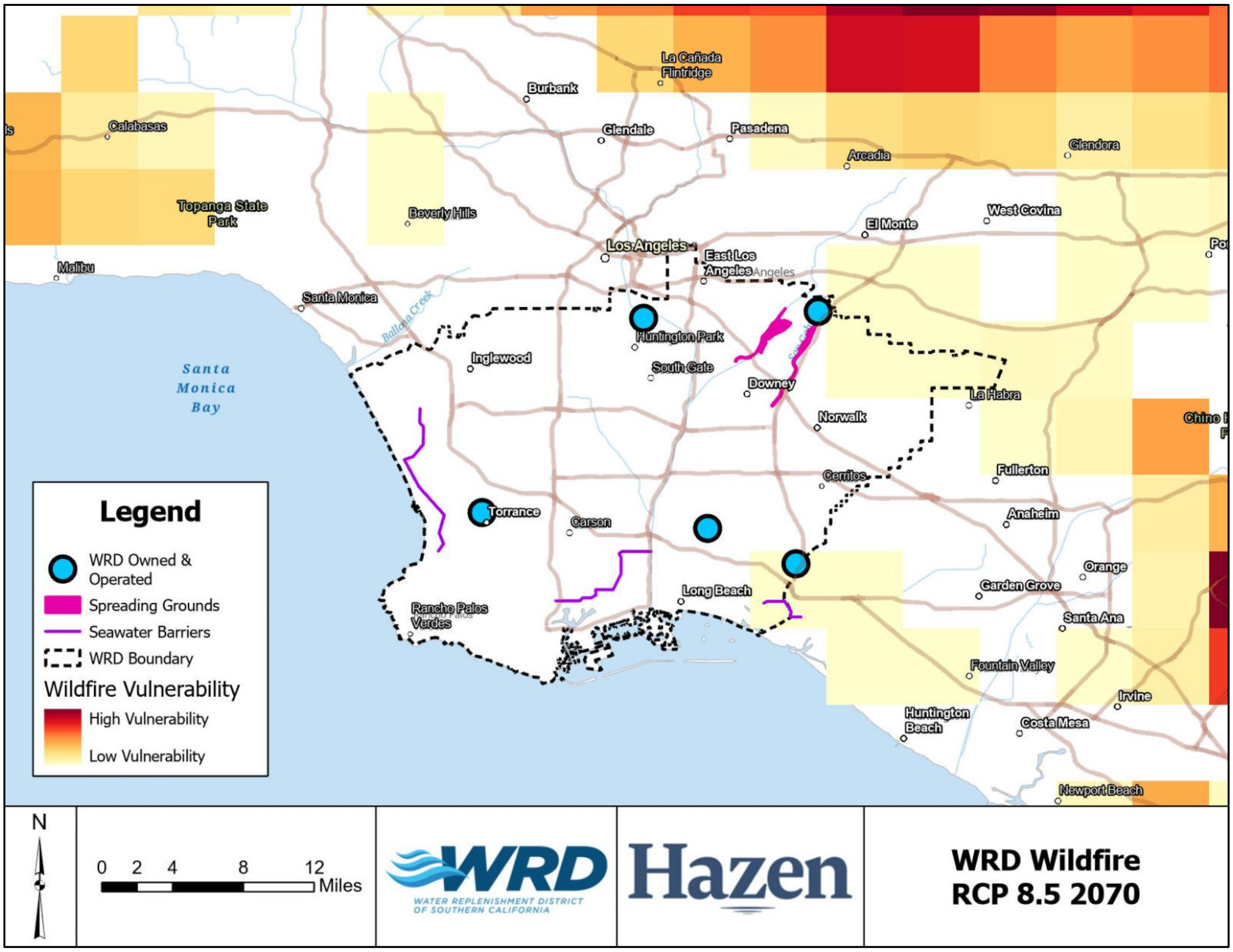

Figure 4-1: Cal-Adapt Wildfire Vulnerability (2070, RCP 8.5)

4.2 California Public Utilities Commission Wildfire Risk Estimate

The California Public Utilities Commission (CPUC) provides its own estimates of risk for utility-associated wildfires. The CPUC fire threat levels are dependent on the likelihood and potential impacts on people and property. To classify between Tier 2 (elevated) and Tier 3 (extreme), a threat index is used which assesses three main elements: (1) ignition likelihood, (2) fire growth potential, and (3) resource or asset vulnerability. The index also incorporates local knowledge of fuel, weather, terrain, and residential and commercial development vulnerability. **Figure 4-2** illustrates CPUC-defined utility associated wildfire risk in California in relation to each facility. WRD's facilities are not located within any designated wildfire risk area. ARC and MFSG are near a wildfire risk zone.

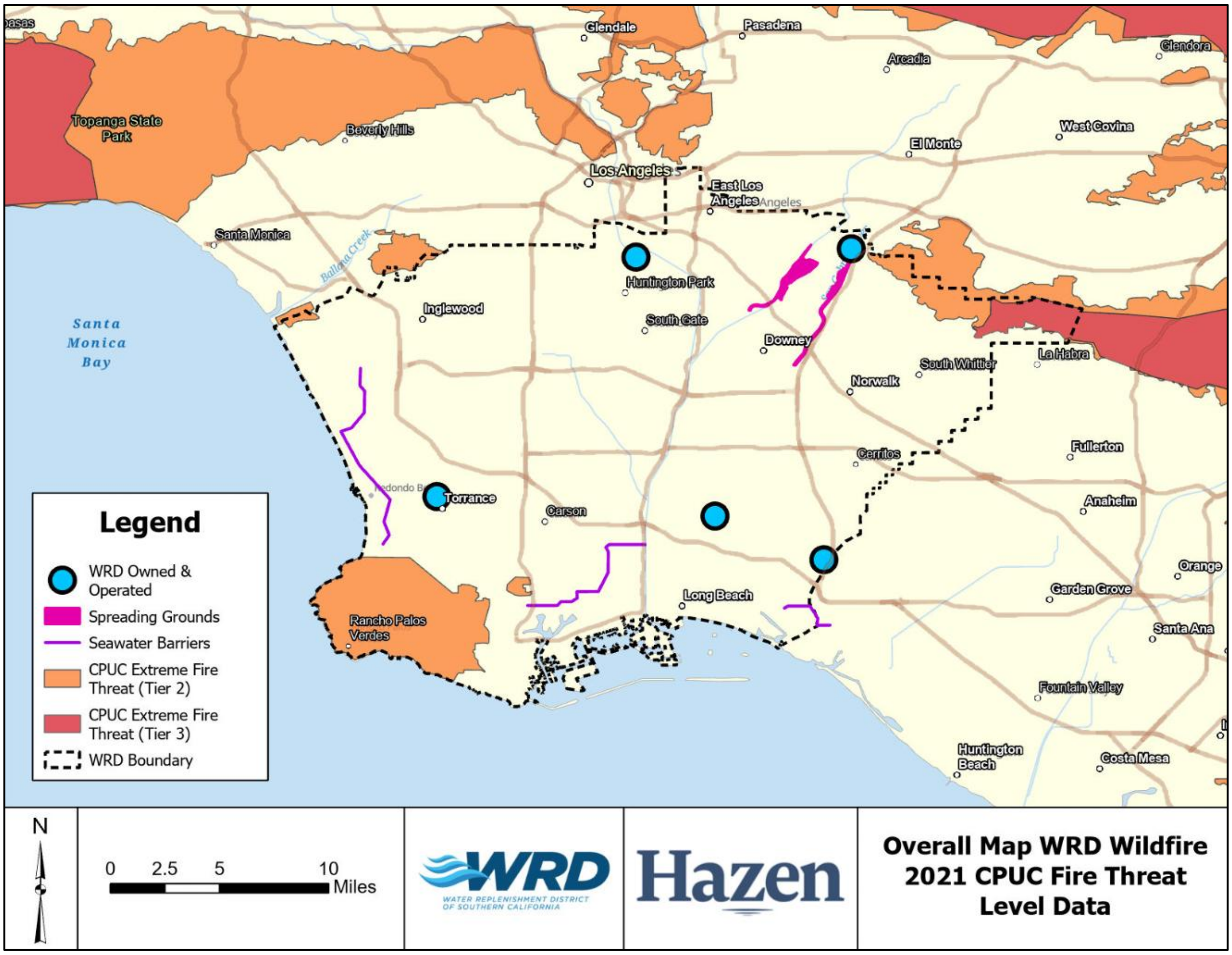

Figure 4-2: California Public Utilities Commission Overall Fire Threat Map

4.3 Historical Wildfire and Wildfire Projections at WRD Facilities

Based on the surrounding data available, WRD's facilities are at a low risk to wildfire threats. **Figure 4-3** shows one small wildfire, the Sycamore Fire, occurred in Whittier in 2022 to the north of ARC and the MFSG. During this wildfire, no direct or indirect impacts were reported by operators. ARC is surrounded by minimal vegetation and largely impervious surfaces. There is a road around the perimeter of the plant that provides defensible space, in addition to larger open spaces in some areas of the plant inside the fence. The combination of these conditions greatly reduces the risk of direct wildfire impacts to ARC. Additionally, smaller wildfires have been reported directly north of LVL. The perimeter of LVL is surrounded by the San Gabriel River, Coyote Creek, and East Willow Street, which provide defensible space against wildfire. There has been no history of major wildfires near any of WRD's other facilities.

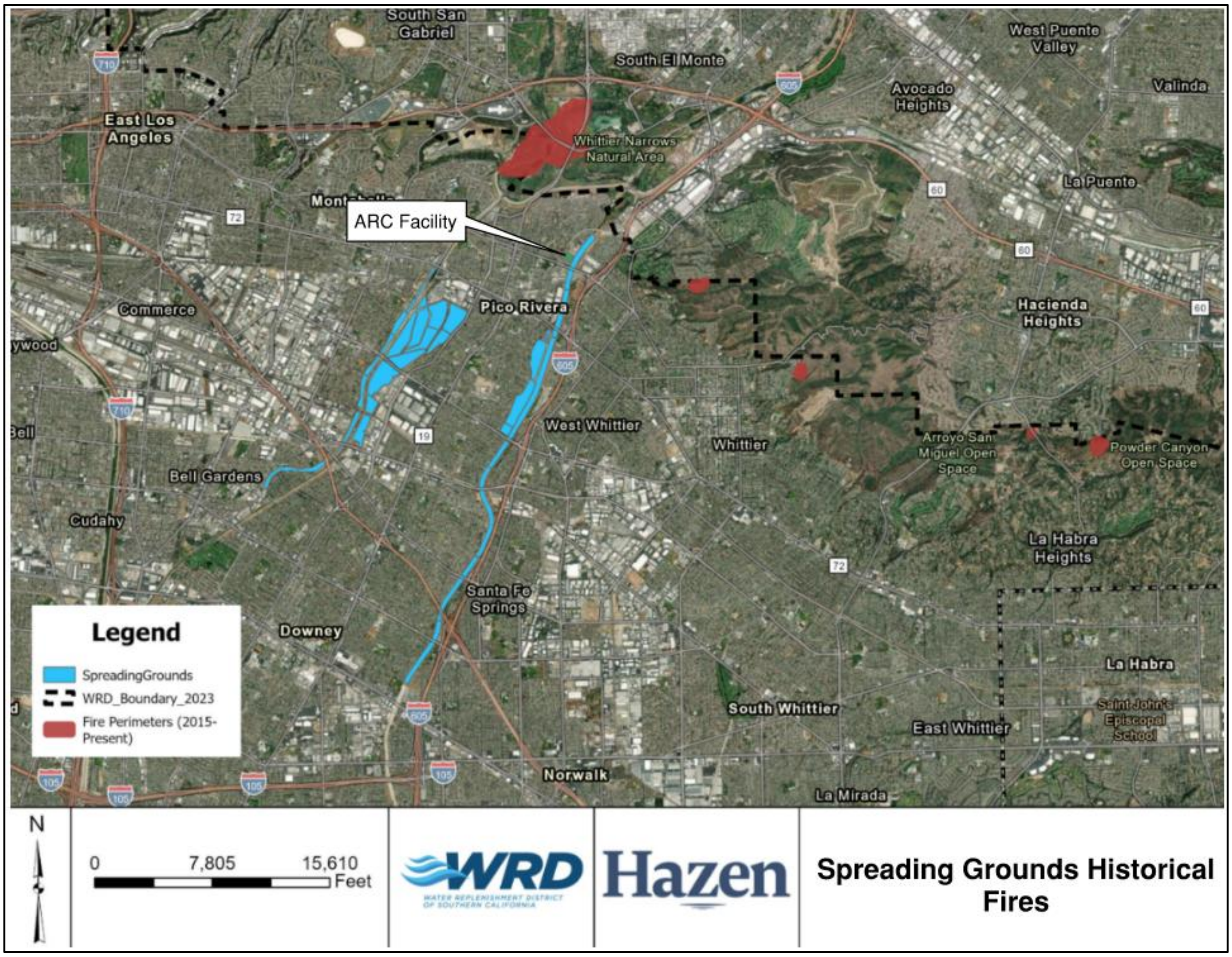

Figure 4-3: Spreading Grounds Historical Fires

4.4 Wildfire Vulnerability Summary

There have been no significant historical wildfires near WRD's facilities, and no direct impacts reported by operators. A summary table of the wildfire-related vulnerabilities and risk levels for WRD's facilities is shown in **Table 4-1**.

Table 4-1: Summary of Wildfire Vulnerabilities

Facility	Vulnerabilities	Risk
LVL	• Air quality concerns	Medium
RWGD	• Historically no wildfire issues reported	Low
ARC	• Respiratory health concerns • Water quality, ash contamination • Power disruptions, PSPS	Medium
WRD HQ	• Historically no wildfire issues reported	Low

Facility	Vulnerabilities	Risk
LA Forebay	• Water quality, ash contamination	Low
MFSG	• Water quality, ash contamination	Medium
Seawater Barriers	• N/A	Low

5. Wind Vulnerability

California's Fourth Assessment (2018) provides a brief review of information on wind risks in Southern California. The major concern regarding wind risk in Southern California is the Santa Ana winds, that have a strong northeasterly downslope and offshore flow. These winds are a unique climatic feature of Southern California that typically occur between October and April and are often a catalyst for wildfires. No discernable trends in the Santa Ana winds have been observed in historical data. Although one study has shown a projected increase in Santa Ana winds with two GCMs, other studies have shown a decrease of around 20%. Due to limited and conflicting results, projections of future Santa Ana wind risk in Southern California are currently inconclusive and are an aspect that is noted in California's Fourth Assessment as requiring further research.

Although the effect of climate change on risk posed by extreme winds to facilities in Southern California is currently inconclusive, the WRD facilities in this study may be vulnerable to the existing level of risk posed by extreme wind events. Extreme winds can damage infrastructure including powerlines, windows, and canopies. High winds also pose a safety risk to staff by causing unexpected doors or cabinet slamming.

The contribution of extreme winds to wildfire risk has motivated the development of PSPS practiced by California electric utilities. These PSPS result in electric power being shut off during times of high wind, high temperature, and extreme dryness as a means of preventing utility-associated wildfires in vulnerable regions. When this occurs, these facilities are more vulnerable to power system failure because they are operating without redundant power during the PSPS.

5.1 Wind Vulnerability Summary

The wind vulnerabilities for WRD's facilities are listed in **Table 5-1**. Although the vulnerabilities listed are expected to be encountered every year, they are only expected to be significant for a portion of the year. The greatest wind impacts for WRD's facilities are the contribution to power outages and PSPS, and the effect of Santa Ana winds in exacerbating wildfire-related power outages.

Table 5-1: Summary of Wind Vulnerabilities for WRD Facilities

Facility	Vulnerabilities	Risk
All facilities	• Electrical feed interruptions • Reduced electrical redundancy during Public Safety Power Shutoffs • Structural damage • Health risks to vulnerable staff caused by elevated dust levels in the air	Low

6. Sea Level Rise Vulnerability

Global sea level rise (SLR) is the result of thermal expansions caused by warming oceans and melting of land ice as temperatures rise due to climate change (California Ocean Science Trust (COST), 2017). There are also other localized factors affecting the rate of SLR, including vertical land motion and elevation change from subsidence or tectonic and geological processes. Coastal California is already experiencing SLR impacts, which over time will exacerbate coastal flooding during storms, cause periodic tidal flooding, increase coastal erosion, and affect groundwater hydrology.

6.1 Regional Factors Affecting Sea Level Rise

There are three tide gauges along the Southern California Coast as shown in **Figure 6-1.** A National Oceanic and Atmospheric Administration (NOAA) gauge is located at the Port of Los Angeles with a period of record from November 1923 to the present day. This gauge will be used for this study due to its proximity to Los Angeles County. Long-term linear sea level trends have been calculated by NOAA for this gauge as follows:

- Los Angeles: 0.98 mm/year +/- 0.23 mm/year (equivalent to 0.32 feet in 100 years)

Santa Barbara Buoy

RCP	2050	2070
4.5	1.23 ft	2.65 ft
8.5	1.63 ft	3.72 ft

Los Angeles Buoy

RCP	2050	2070
4.5	1.30 ft	1.54 ft
8.5*	**2.67 ft**	**3.7 ft**

La Jolla Buoy

RCP	2050	2070
4.5	1.70 ft	1.88 ft
8.5	2.95 ft	4.16 ft

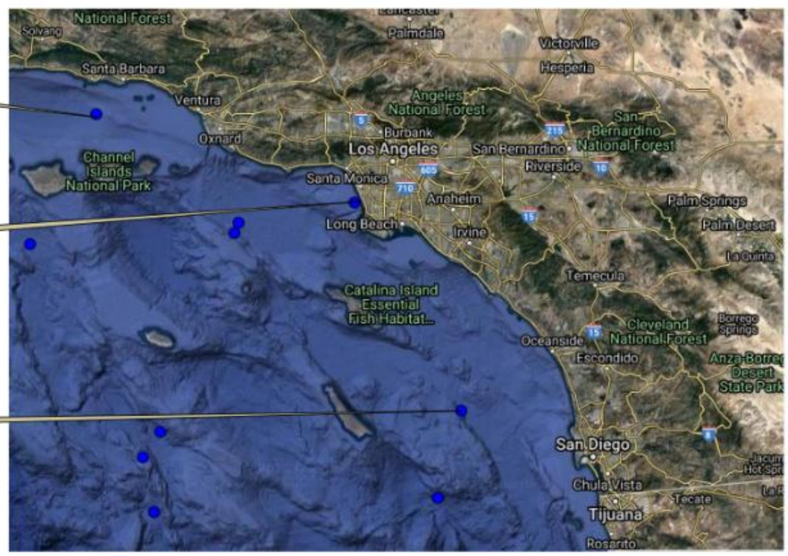

Figure 6-1: 2050 and 2070 Sea Level Rise Projections along the California Coast (99%tile values)

Many of the climate resilience and hazard mitigation plans that have been reviewed for this report refer to the influential National Research Council report, "Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future" (NRC, 2012). This document in turn refers back to the earlier Fourth Assessment Report (AR4) by the IPCC. Also reviewed was the Environmental Protection Agency (EPA) Climate Resilience Evaluation and Awareness Tool (CREAT), which draws upon the projections from the more recent IPCC AR5 report. While the NRC 2012 report provides a very robust foundation for SLR projections, the underlying science has been superseded by the IPCC AR5 work as well as even more recent research and guidance produced by the State of California's own agencies, culminating in the more recent "Rising Seas in California - An Update on Sea-Level Rise Science" report, referred to here as the Rising Seas Report (COST, 2017). Additionally, California's Fourth Assessment built on this work, incorporating projections for different California coastal regions, such as the Los Angeles region. Consequently, the SLR projections recommended in this report are based on the work of the Rising Seas Report and California's Fourth Assessment (Hall, 2018) as representing "state of the science" for the Los Angeles County area. California's Fourth Assessment projections incorporate the research findings of new ice sheet dynamics and processes within Antarctica, capturing the potential that Antarctic ice loss could contribute more significantly to global SLR than had been previously thought (DeConto and Pollard, 2016).

SLR projections for the Los Angeles region from California's Fourth Assessment are shown below. The figure shows a comparison between RCP 4.5 and RCP 8.5 scenarios. The figure also highlights projected SLR for the years 2050 and 2070, which are recommended for use within this resilience study. This would allow WRD additional needs into future resilience adaptation planning.

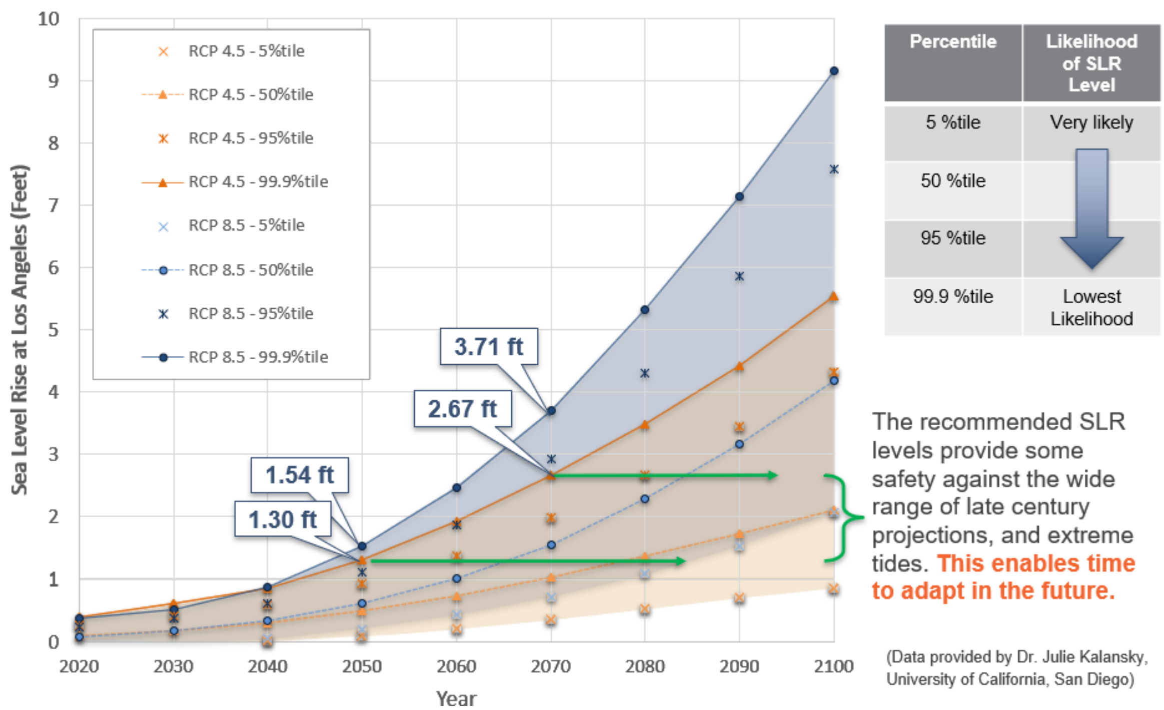

Figure 6-2: SLR Projections for Los Angeles Region, From California's Fourth Assessment (data provided by Dr. Julie Kalansky, University of California, San Diego)

6.2 Sea Level Rise at WRD Facilities

Historically, SLR has not been reported to impact the operations at WRD's facilities. SLR only poses a vulnerability for the Barriers and LVL, and since the other facilities are not near the coast, the SLR vulnerability is extremely low. LACPW is currently meeting protective elevations but if sea levels continue to rise, additional water may be needed to maintain the protective levels. Although LVL could purchase imported water from Metropolitan Water District of Southern California (MWD), the goal is to provide for the Alamitos Barrier's increasing demand.

6.3 Sea Level Rise Vulnerability Summary

SLR decreases the gradient between sea level protective heads at the injection barrier and the ocean pushing the injected water landward. SLR will lead to increased risk of sea water intrusion and as a result require an increase in injection pumping.

Table 6-1: Summary of Sea Level Rise Vulnerabilities

Facility	Vulnerabilities	Risk
LVL	• Providing for Alamitos Barrier increasing demand	Low
Seawater Barriers	• Increasing freshwater demand	Low

7. Drought Vulnerability

California's Fourth Assessment (2018) provides a review of the drought risk for the Southern California Region. These projections indicate that significantly drier soils are expected in the Southwest and anthropogenic warming has already increased the likelihood of low precipitation during warm years, increasing the risk and severity of droughts. Quantitative projections indicate that there is a greater than 80% chance of multidecadal drought expected for the 2050-2099 period under the RCP 8.5 emissions scenario and greater than 75% chance under the RCP 4.5 scenario.

California's long-term water conservation framework (e.g. Assembly Bill 1668) requires urban water suppliers to meet progressively lower per capita water use targets. Implementation of these requirements is expected to reduce potable water demand and associated wastewater generation, which may reduce recycled water supply. However, reduced demand also lowers overall recycled water needs. Accordingly, these effects are anticipated to be partially offset and are not expected to materially affect regional supply reliability but remain an important consideration for long-term drought planning.

7.1 Drought at WRD Facilities

Drought conditions inherently increase groundwater basin demands while decreasing replenishment supplies and could have a significant impact on WRD's groundwater replenishment activities. WRD has focused on combating drought effects by creating a sustainable local water supply for groundwater replenishment using recycled water and stormwater capture. Water conservation efforts during periods of drought may result in lower volumes of treated wastewater. This could lead to less water availability for replenishing groundwater basins. If the flow of treated wastewater decreases, the concentration of contaminants in the water may increase; however, this is not expected to affect treated effluent quality nor the quality of the water being used for replenishment. As water demand increases due to population growth and water sources are depleted, groundwater will be used at faster rates, increasing the potential for impacted production wells.

The main impact for the three water treatment facilities is the increase in water demand these facilities may be requested to provide. Insufficient water production may lead to an increase in purchasing imported water. If running at full capacity, LVL is able to provide 100% of the water needed for the Alamitos Seawater Intrusion Barrier regardless of impacts to the imported supply. Overall, purchase of imported water for the Alamitos Barrier has decreased over the past few years. RWGD provides 20% of the alternative water supply to offset demand for imported water during drought conditions for the City of Torrance and is consistently producing water to meet this goal. ARC serves as a supplementary source of water for the MFSG and has eliminated the need for imported water.

The MFSG is currently using stormwater, tertiary treated, and advanced treated recycled water for groundwater replenishment. The Barriers are permitted to take 100% of advanced treated recycled water, however a lack of recycled water availability leads to purchasing imported water. There are also current agreements in place to secure water for the barriers long-term if needed. The LAFPP is a remediation project and may potentially be impacted by drought if the water table drops and the project is not able to pump and treat as much water; however, drought has not historically impacted treatment. The WRD HQ does not treat or store water and would not be affected by drought.

7.2 Drought Vulnerability Summary

Overall, drought conditions decrease both the volume and quality of influent entering WRD's water recycling plants. This degradation carries through to the effluent, reducing the groundwater recharge and increasing the potential for purchasing supplemental water.

Table 7-1: Summary of Drought Vulnerabilities

Facility	Vulnerabilities	Risk
LVL	• Has decreased the amount of imported water for Alamitos Barriers over the recent years • Reduced feed water supply • Competition with other recycled water customers. Reuse water demand exceeds available reuse water supply.	Low
RWGD	• Historically no drought issues experienced	Low
ARC	• Reduced feed water supply • Water conservation can result in higher contaminant concentrations, adversely affecting influent water quality • Competition with other recycled water customers. Reuse water demand exceeds available reuse water supply. • Reuse water demand exceeds available reuse water supply • Recharging capabilities are reduced due to potential impacts to water quality	Medium
WRD HQ	• Historically no drought issues experienced	Low
LA Forebay	• Historically no drought issues experienced	Low
MFSG	• Drought periods impact stormwater capture volumes • Increased reliance on groundwater; higher pumping rates from prolonged drought conditions	Low

Facility	Vulnerabilities	Risk
	• Potential impact to ARC's water quality may result in reduced recharge	
Seawater Barriers	• Historically no drought issues experienced • Reduced availability of recycled water during drought conditions may require an increased reliance on imported water	Low

8. Public Outreach and Stakeholder Engagement

Engagement with stakeholders is a critical component of WRD's Climate Resiliency Plan, ensuring that the identified vulnerabilities and proposed strategies reflect local priorities, operational considerations, and community needs. WRD convened two stakeholder workshops on January 28, 2026 – one with groundwater pumpers, both private and public entities that extract groundwater under pumping rights in the Central Basin and West Coast Basin, and one with community-based organizations (CBOs) and other stakeholders. The objectives of the workshops were to share updates and preliminary findings on the draft Climate Resiliency Plan and solicit feedback on climate resiliency strategies. The workshops convened by WRD included a welcome and introductions portion, a presentation on the Climate Resiliency Plan preliminary findings, a Q&A session, and breakout group discussions. The Outreach and Engagement Plan is attached in **Appendix B**.

Participants at both stakeholder workshops provided feedback on climate resiliency strategies, noting potential challenges and impacts due to climate change and suggestions for how WRD can support them. The feedback obtained through these engagement efforts provides valuable context for understanding potential impacts to water supply, infrastructure, and water quality, and guides the development of mitigation measures presented in this plan. WRD has considered ways to incorporate stakeholder input within its purview, including its authority over groundwater replenishment, basin management, water quality protection, and administration of programs that support sustainable groundwater supplies. While WRD does not have direct control over all regional water supply, land use, or wastewater management decisions, stakeholder feedback was evaluated to identify opportunities where WRD can support outcomes through coordination, funding programs, operational strategies, and partnerships with regional agencies.

At both stakeholder workshops, participants identified potential challenges anticipated with climate change including:

- Ensuring an adequate water supply during periods of drought
- Maintaining and improving infrastructure and equipment for water storage, treatment, and pumping
- The need to address costs and ensure adequate funding so that costs and customer bills can be kept affordable
- Rising costs of water
- Ensuring a diversified water supply

Pumpers noted that current and future programs are focused on diversifying the water supply and increasing the local supply. CBOs and other external stakeholders expressed concerns around water quality and noted that new technologies should be utilized to improve water quality, ensure good quality water is captured effectively, and address issues related to stormwater capture.

8.1 Workshop with Pumpers

The first workshop, conducted virtually with groundwater pumpers, included 15 participants representing public and private entities operating within the Central and West Coast Basins. Participants engaged in facilitated breakout discussions focused on key questions related to anticipated climate impacts, operational challenges, and resiliency priorities. The following summarizes the themes identified through these discussions.

1. **What challenges in pumping operations are you anticipating due to climate change?**
    - Key challenges in pumping operations identified by participants included impacts on storage levels, increased pumping demands, drought, financial constraints, the need for a diversified water supply, facilities maintenance, loss of production, flooding, and a lack of reliable predictability.
2. **What changes in your pumping operations do you foresee due to climate change?**
    - Participants noted several potential changes in pumping operations due to climate change including increased pumping demands, a reduced water supply, the need for a diversified water supply, the need for additional monitoring, wildfire risk, and water quality impacts.
3. **What climate resiliency projects and programs are you working on?**
    - Climate resiliency projects participants are working on include increasing and diversifying the local water supply, reducing wildfire risk, water treatment, water distribution, and updating infrastructure.
4. **How can WRD support pumping/pumper stakeholder climate resiliency projects and programs?**
    - Participants noted that WRD can support their projects and programs by securing funding, ensuring that water rights account for increased recycled water injection and production wells, increasing capacity, and increasing coordination.

8.2 Workshop with CBOs

The second workshop, held in person at the WRD HQ in Lakewood, CA, had 13 participants, including representatives from CBOs and chambers of commerce. Participants at the in-person workshop asked questions about the spreading grounds, partnerships with other water agencies, water rights, and any potential areas for collaboration across the state. Below are themes from the breakout discussion groups organized by question.

1. **What concerns does your organization and your communities have about water supply for the future?**
    - Key concerns identified by participants included affordability, water quality, effectiveness of water capture, dependency on imported water, increased water demand, and environmental impacts.
2. **What programs related to water are your organization involved in?**
    - Programs related to water participants' organizations are involved in include partnerships and collaborations with water districts and other water-related organizations, outreach and education programs, and grants and funding for green infrastructure and nature-based solutions.
3. **What do you see as a top resiliency priority for WRD? What is a top equity priority?**
    - Resiliency and equity priorities identified by participants included infrastructure improvements and water quality, increasing the local water supply, affordability, green infrastructure, and reducing water demand.
4. **What else should WRD be considering right now?**
    - Participants suggested WRD focus on improving water quality, ensuring water affordability, blue technology and energy recovery, and managing the water supply to enhance resiliency.

Stakeholder input collected through the workshops informed the development and refinement of the mitigation measures presented in this plan. Key themes were evaluated in conjunction with the vulnerability assessment to identify practical strategies where applicable. The following sections present existing and recommended mitigation measures implemented by WRD, reflecting both current practices and stakeholder-informed priorities to enhance long-term climate resilience.

9. Existing Mitigation Measures

9.1 Flood Potential

LVL, RWGD, ARC, and the WRD HQ utilize surface grading and drainage systems. LVL is positioned at a higher elevation than the surrounding undeveloped area, and stormwater is discharged to this area through a drainage system. Loose, porous gravel also surrounds much of the on-site equipment as shown in **Figure 9-1,** which acts as an infiltration feature**.** These areas facilitate stormwater percolation through the pervious surface and into the basin below, which helps manage stormwater and reduces runoff. The RWGD grading and drainage system conveys stormwater offsite to an existing storm drain network. Some catch basins and swales that are part of this drainage system are shown in **Figure 9-2**. At the WRD HQ, sheet flow is directed offsite to the west with a swale.

Concerns were raised regarding the presence of trash, debris, and contaminants in stormwater entering the spreading grounds during stakeholder workshops. Stormwater inflows to MFSG may contain these materials as part of urban runoff. While upstream stormwater management is primarily under the jurisdiction of local municipalities and stormwater agencies, WRD coordinates with LACPW to support groundwater quality protection and to reduce impacts to the spreading grounds, when and where feasible.

Figure 9-1: LVL Gravel Surrounding On-Site Equipment

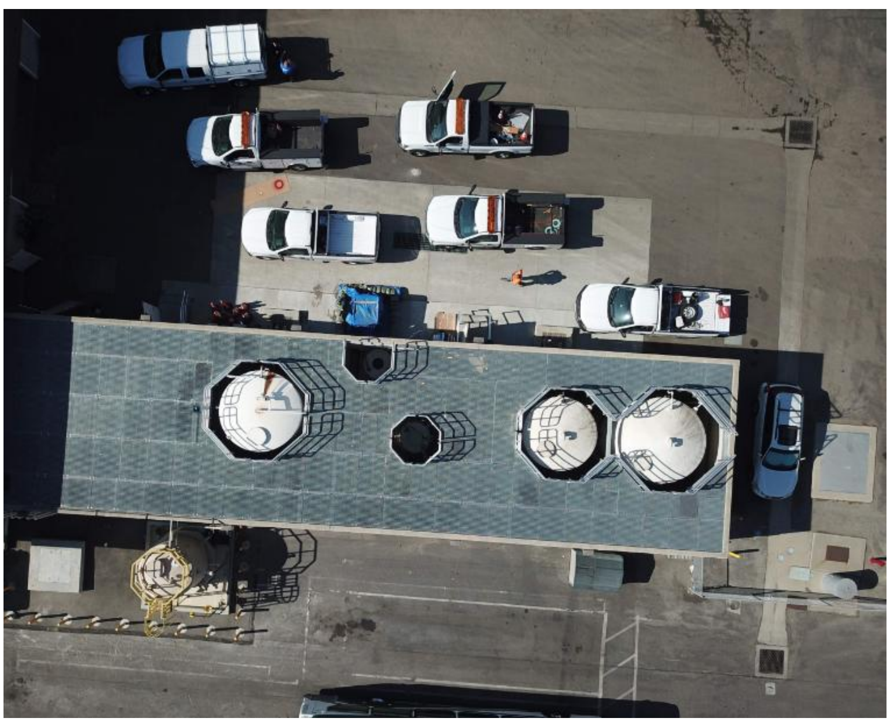

Figure 9-2: RWGD Swale and Catch Basins

Additionally, LVL, RWGD, and ARC have EAPs with Standard Operating Procedures (SOPs) detailing instructions for operators during heavy rain events, including when to shut down the plant.

Facilities also employ various methods of protecting equipment. Most equipment at LVL is designed for rain exposure. At RWGD, equipment is located indoors or is weather rated. For example, RWGD's reverse osmosis equipment is shown indoors in **Figure 9-3**.

Figure 9-3: RWGD Reverse Osmosis Equipment Indoors

Equipment that is currently vulnerable to heavy rain and susceptible to causing power outages is scheduled to be protected in the upcoming expansion design for RWGD. On-site chemical containment areas are also designed to retain chemical spills and can retain localized stormwater, as shown in **Figure 9-4**.

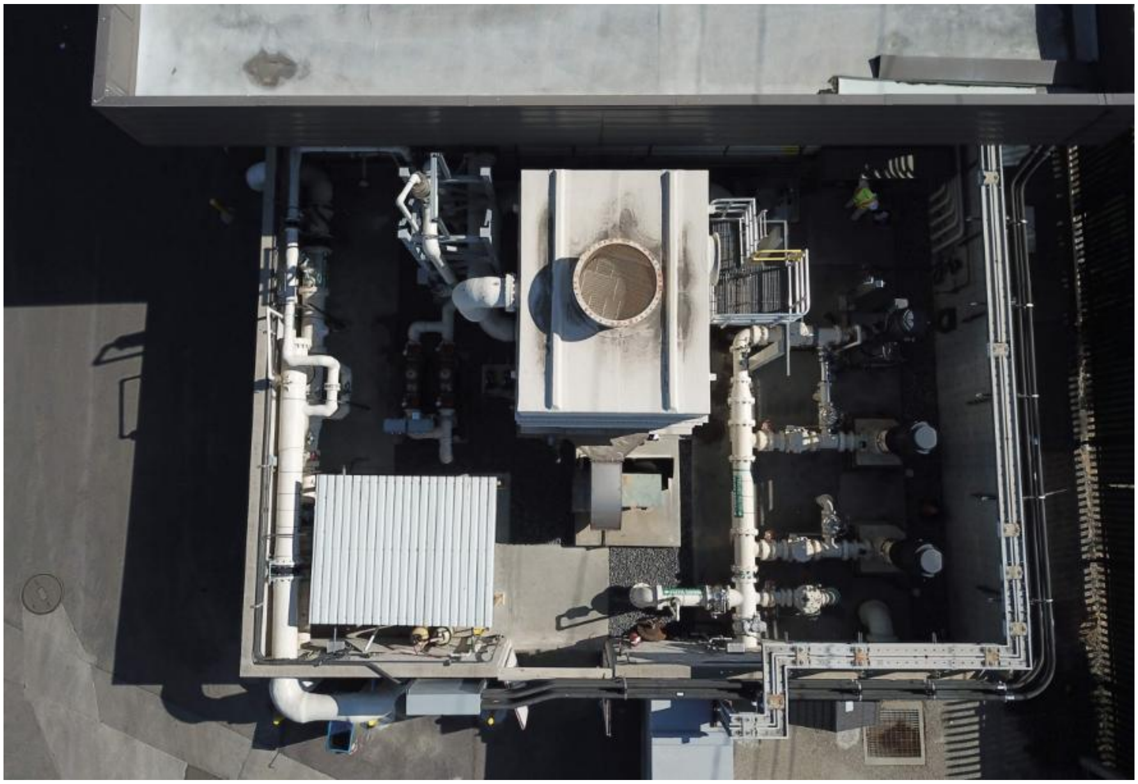

Figure 9-4: RWGD Chemical Containment Area

For the LAFPP, pumps are positioned in elevated containers to prevent water damage during a flooding event. The project's containment pad is reported to have the capacity to contain a large volume of contaminated feedwater. During a storm event, stormwater captured by the containment pad is pumped through the treatment system.

At the MFSG, turnout structures are used to spread water more efficiently. Operators control flows into the Spreading Grounds using seven rubber dams along the San Gabriel River. This allows stormwater to be distributed for optimal infiltration, which minimizes flood risk. More flow is typically sent to the San Gabriel Spreading Grounds due to its higher permeability. Secondly, a pipeline connecting the Rio Hondo and San Gabriel Spreading Grounds exists to allow either basin to use the other's available storage capacity when one reaches its limit.

ARC has a robust drainage system, including a concrete berm shown in **Figure 9-5** surrounding the perimeter of the site, as well as the Integrated Stormwater Management System (ISMS). ARC's ISMS includes porous concrete, permeable pavement, biofiltration basins, and stormwater treatment and an infiltration system. Stormwater collected through the infiltration basin, flows to a drainage swale that discharges into the San Gabriel River.

Figure 9-5: ARC Perimeter Berm

9.2 Extreme Heat

WRD promotes safety and protection for operators from overheating as well as preventing equipment failure. Extreme Heat measures found in WRD's water treatment plants include HVAC monitoring systems, fire suppression systems containing fire extinguishers and fire hydrants throughout the plant, placement of equipment under shaded structures, and EAPs. At ARC, WRD has conducted a pollution prevention plan for temperature to identify areas where heat is added during the treatment process, and to monitor influent and effluent temperature. Due to concerns with LVL's overheating electrical room and control building, all A/C units in these areas have been replaced. Additionally, a 2025 Supervisory Control and Data Acquisition (SCADA) project took place at LVL involving a cooling upgrade for the facility's UV System and PLC panels. For RWGD, there are plans to upgrade the HVAC system for the electrical room in an upcoming expansion. Equipment vulnerable to overheating is also equipped with temperature monitoring systems, and facility shutoffs are closely monitored at RWGD.

WRD's LAFPP currently uses A/C and has backup pumps as mitigation measures to protect from extreme heat. These pumps are also reportedly easily replaced, so reliance on backup pumps is not expected to last for an extended period. Loss of power to HVAC systems has been reported at WRD's HQ. However, new HVAC systems were recently installed. HQ has also implemented OSHA safety protocols for extreme temperature situations.

WRD has made a concerted effort to incorporate nature-based solutions to heat-related hazards, particularly at ARC. Several nature-based features have been integrated into ARC's design, including the San Gabriel River Water Feature, a California Native Butterfly Habitat, a Drip-Line Recycled Water Irrigation System, and a California Native Demonstration Gardens. ARC also has greenery on the roof of the Education Center, and tree canopies in outdoor spaces which can regulate the ambient temperature. Drought-tolerant landscaping can also be found at LVL and HQ.

9.3 Wildfire

ARC, LVL, and RWGD have emergency procedures and safety precautions detailed in their respective EAPs. All building materials for facilities under this scope are composed of fire-resistant material. WRD also has access to real-time air quality monitoring at LVL, RWGD, and ARC, allowing for detailed analysis and risk assessment of air quality impacts from wildfire ash. Additionally, stormwater runoff following wildfire events may contain elevated levels of ash, debris, and contaminants, including metals, nutrients, and organic compounds mobilized from burned areas. This contaminated runoff has the potential to bypass MSFG.

9.4 Wind

Wind has not been found to be a significant threat to the facilities in this study. As such, there are no existing recommendations to mitigate wind-related risks to WRD's facilities.

9.5 Sea Level Rise

Of the facilities involved in this study, only LVL and the three seawater barriers are impacted by SLR. LVL is impacted because it supplies purified recycled water for injection at the Alamitos Barrier, and SLR would increase recycled water demand. Current mitigation measures at the Barriers consist of the use of groundwater flow models that can simulate increased sea levels, that aid in determining whether increased injection is required to protect against sea water intrusion. A safety factor against seawater intrusion is also incorporated, which adds an additional level of protection for the Basin. WRD also maintains communication with LACPW for their barrier contributions, which informs WRD and LVL staff of current and projected recycled water demand at the barriers. If LVL cannot meet the demand required by the Alamitos Barrier, imported water must be relied upon to supplement the demand.

9.6 Drought

WRD is involved in multiple programs to mitigate drought vulnerabilities. Some of the programs include the Groundwater Reliability Improvement Project (GRIP), Water Independence Now (WIN) and WIN 4 ALL, Safe Drinking Water Program (SDWP), and Disadvantaged Communities (DAC).

GRIP, completed in 2019, was an initiative created by WRD to develop a local and sustainable water supply for groundwater replenishment in the MFSG leading to the construction and operation of ARC. It created drought resiliency and strengthened water security in the region for future generations by replacing the need for imported water with recycled water. It also included the construction of turnout structures at the MFSG. WRD has also implemented other programs to mitigate the effects of drought with similar goals to GRIP. ARC, LVL's expansion, and RWGD's first expansion are a part of the WIN program. The goal of this program is to create a locally sustainable groundwater supply in southern Los Angeles County by maximizing the use of stormwater, recycled water, and purified water sources for replenishment.

The WIN 4 ALL program is an expansion of WIN to build partnerships with regional water stakeholders with the goal of decreasing the Los Angeles Basin's dependence on imported water by 2040. WIN 4 All uses a two-prong approach that includes exercising unused groundwater pumping rights to increase groundwater pumping, and facilitating the development of augmentation and storage projects to increase the region's use of sustainable local supplies. To fully utilize unused groundwater rights, WRD is encouraging groundwater pumpers to replace their imported water with their adjudicated rights (AR). This could replace up to 38% of imported water for the Central Basin and up to 20% for the West Coast Basin. WRD conducts outreach to the listed pumpers and coordinates projects to either add new or rehabilitate existing infrastructure. The development of augmentation projects will use WRD's current empty storage space that can hold approximately one year of water supply for four million people in WRD's service area. In 2014, the available groundwater storage space was increased, and the use of available space will reduce the need for imported water. WRD will participate in projects for the Central Basin to maximize the use of available storage and store wet-water year excess or new water that can later be used for drier years or extended drought. Additionally, this provides operational flexibility and resilience for groundwater users. WRD is exploring partnership opportunities with local water agencies and other rights holders in developing potential collaboration augmentation projects.

Since 1991, SDWP has remediated over 20 groundwater wells in WRD's service area. WRD collaborates with water providers and well owners to promote the cleanup of ground water resources at a low cost to improve the quality and appearance of tap water. SDWP has played a critical role in preventing the unnecessary closure of wells which has increased the local water supply by approximately 5.5 billion gallons each year. The DAC Program was developed to supplement SDWP with external funding from state and federal grants for economically disadvantaged communities. Through DAC, WRD has provided technical assistance in identifying appropriate funding opportunities and submitting applications for communities with small to medium-size water systems that typically do not qualify for federal funding programs. WRD also supports post-grant award requirements such as reporting.

These existing mitigation measures also reflect key themes identified from the stakeholder workshops, particularly the need to maintain a reliable and diversified local water supply during periods of drought. Stakeholders noted increased pumping demands, reduced supply availability, and constraints related to infrastructure capacity, funding, and system reliability as key challenges. WRD has implemented programs that support groundwater replenishment, expansion of local supplies, and use of available storage to improve long-term drought resilience. WRD also coordinates with regional partners, including local pumpers and water agencies, to advance augmentation projects and support integrated water management efforts.

9.7 LEED Certification

WRD's ARC has been awarded LEED Platinum Certification, representing the highest level of recognition for sustainable buildings, due to its highly efficient use of water and energy resources, extensive solar energy integration, sustainable native landscaping, and its integrated stormwater management system. WRD's HQ has also been awarded LEED Silver Certification. These certifications highlight WRD's commitment to environmental sustainability.

9.8 Existing Measures Summary

The vulnerabilities identified throughout this study vary in scale, impact, and technical requirements. **Table 9-1** summarizes the existing measures under the categories of Facility, Building, Asset and Operational levels.

WRD organizes and hosts educational tours at ARC, a LEED Platinum Certified building, showcasing their learning center and green infrastructure. These tours serve as a learning experience for local families and the community, that highlights how sustainable systems are integrated to lower carbon footprint and to create a healthier experience for the surrounding area. As WRD continues to expand its philosophy from ARC to the remaining facilities, additional educational tours will continue to teach visitors about WRD's pivotal role in Southern California's groundwater recharge.

Table 9-1: Existing Resilience Measures

Facility	Facility-Level	Building-Level	Asset-Level	Operational-Level
LVL	• Surface grading and drainage to offsite area • Real-time air quality monitoring	• 2025 SCADA project upgrade with cooling for UV system and PLC panels • Replacement of all A/C units for the LVL control building and electrical room • Fire-resistant building materials	• Most equipment designed for rain exposure • Shade and canopies over membrane units • Fire suppression systems and fire hydrants in place throughout site	• EAP • Communication with neighboring facilities • Monitoring of facility shutoffs • Utilize groundwater flow models to project higher sea levels at Alamitos Barrier and determine if increased injection is required • Communication with LACPW on barrier contributions • WIN, WIN4All, SDWP, and DAC Program, groundwater remediation, and contributions to barriers
RWGD	• Planned expansion design will upgrade the storm drainage system • Site grading to direct stormwater to on-site storm drains • Chemical containment areas retain chemical spills and	• Overheating HVAC system to be addressed in expansion design • Fire-resistant building materials	• Equipment located indoors or weather-rated • Fire extinguishers on-site • Temperature monitors for select equipment	• EAP • Monitoring of facility shutoffs • WIN, WIN4All, SDWP, and DAC Program, groundwater remediation, and contributions to barriers • Communication with LACPW on drought conditions

Facility	Facility-Level	Building-Level	Asset-Level	Operational-Level
	localized stormwater • Real-time air quality monitoring			
ARC	• Integrated Stormwater Management System • Concrete berm around ARC • Fireproof building materials • Defensible space against wildfire around facility • Efficient A/C and building envelope (LEED Platinum Certified) • Real-time air quality monitoring • Drought-tolerant landscaping	• Ventilated process building • Fireproof building materials	• Shade canopies over chemical tanks	• EAP • Monitoring of water quality and temperature • WIN, WIN4All, SDWP, and DAC Program, groundwater remediation, and contributions to barriers • Communication with LACPW on drought conditions
WRD HQ	• Surface grading and drainage to offsite area	• Fire-resistant building materials • New HVAC system	• N/A	• OSHA safety protocols for temperature • Continuity plan for remote operations • WIN, WIN4All, SDWP, and DAC Program, groundwater remediation, and contributions to barriers • Communication with LACPW on drought conditions
LAFPP	• Pumps are in elevated containers to protect from water damage • Containment pad captures contaminated feedwater from large tanks and pumps it through the treatment system	• Fire-resistant building materials	• Backup pump • Available replacement pumps • Containers that have A/C	• WIN, WIN4All, SDWP, and DAC Program, groundwater remediation, and contributions to barriers • Communication with LACPW on drought conditions
MFSG	• Turnout structures help spread water more efficiently • A pipeline was installed connecting the Rio Hondo and	• Fire-resistant building materials	• N/A	• Communicate with LA County Sanitation Districts and LA County Flood Control District

Facility	Facility-Level	Building-Level	Asset-Level	Operational-Level
	San Gabriel Spreading Grounds			• WIN, WIN4All, SDWP, and DAC Program, groundwater remediation, and contributions to barriers • Communication with LACPW on drought conditions
Seawater Barriers	• N/A	• Fire-resistant building materials	• N/A	• Utilize groundwater flow models to project higher sea levels at Barriers and determine if increased injection is required • Factor of safety in barrier system • Communication with LACPW on barrier contributions • WIN, WIN4All, SDWP, and DAC Program, groundwater remediation, and contributions to barriers

10. Recommended Mitigation Measures for Consideration

10.1 Flood Potential

Among the facilities evaluated, LVL and RWGD exhibit the highest susceptibility to flood-related impacts. LVL has reportedly experienced localized flooding, stormwater intrusion into process equipment, and equipment failure due to heavy rain. As such, suggested mitigation measures include the expansion of the existing gutter system, sealing of vault cracks where necessary, and extending overhead coverage of the equipment. Additionally, LVL may consider incorporating permeable pavement and given the constricted area can perform a feasibility study of adding a bioswale to improve drainage near the chemical area or the electrical room.

RWGD has also experienced rain-induced power outages and is located in proximity to a 100-year flood zone. While it’s unlikely this flood zone will affect RWGD, monitoring adjacent flood-prone areas during extreme storm events is recommended. Although the remaining facilities in this study are categorized as Low Priority, staying informed on recent flood map updates is advised to strengthen flood preparedness. WRD may also consider green infrastructure such as bioswales and nature-based infiltration features to enhance stormwater runoff management. Additional benefits would include an increase in soil moisture retention, percolation, and recharge.

10.2 Extreme Heat

Extreme heat is classified as a medium-priority risk at LVL and ARC, affecting worker safety, chemical degradation, and equipment impacts including temperature-related shutdowns. In response, WRD has taken measures to protect against these impacts. At LVL, a 2025 SCADA upgrade included UV and PLC panel cooling, and all A/C units in the control building and electrical room have been replaced. Facility shutoffs are also closely monitored at LVL. Additionally, ARC utilizes shade canopies, process building ventilation, and water temperature tracking to manage heat impacts. Still, further measures can be taken to foster resilience; A temperature monitoring study and regular inspections of electrical equipment, UV and PLC panel cooling, and HVAC systems are recommended at LVL. Consideration of providing fans, cooling devices, and increased ventilation in the electrical room is also advised, and overheating equipment such as air compressors should be evaluated for replacement. At ARC, vulnerable equipment should be evaluated for upgrade, and adoption of high-temperature design standards are recommended. To protect worker safety, a Heat Illness Prevention Plan should be implemented.

RWGD faces similar heat-related risks, such as an overheating electrical room and HVAC system, and chemical degradation. However, HVAC improvements are planned in the upcoming expansion design, and temperature monitoring activities are in-place. As such, heat at RWGD is classified as a low-priority risk, although regular inspections and performance monitoring are recommended.

WRD HQ, LAFPP, MFSG, and the Seawater Barriers also have low-priority heat concerns. Still, continued communication with field personnel, particularly at MFSG, should be maintained to prevent heat sickness.

Additionally, for future capital projects, WRD can consider developing heat resiliency design criteria exceeding the minimum required in accordance with the Title 24 California Code of Regulations (CCR). The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) has developed the ASHRAE Climatic Design Conditions tool, through which the climate and temperature conditions of a given area can be utilized to inform HVAC engineers of heat-related design criteria. For example, climatic design conditions for ARC can be determined from the nearest weather station in Fullerton, CA, which lists the normal design criteria as 95.4°F. This is the minimum required design temperature. However, according to ASHRAE, the climate near ARC has an extreme mean of 104°F and a 5-year extreme temperature of 107.4°F, which falls under the Title 24 CCR medium design temperature range. This 5-year extreme temperature should be used as the design temperature to reduce the risk of failure over the course of the equipment's life. If existing HVAC units begin to show an inability to operate effectively under elevated temperature conditions, WRD can consider using a higher temperature rating for their HVAC units in future projects.

Nature-based methods are an effective solution to extreme heat in tandem with HVAC upgrades. These include climate-appropriate landscaping and vegetated buffers, tree canopies, and vegetation-supported shade structures, all of which provide cover that reduces the ambient temperature of the surrounding area. This would reduce the HVAC energy required to maintain acceptable and safe working conditions at WRD facilities and may reduce the risk of overheating equipment. WRD can conduct a feasibility study to evaluate the potential benefits of additional tree canopies to provide additional shade. Similar to ARC, WRD should consider incorporating vegetation on the rooftops of the HQ and the RWGD RO building, which would provide thermal regulation and improve air quality. These nature-oriented solutions can also prove beneficial for the local native habitat.

10.3 Wildfire

Across all facilities in this study, wildfire risk is classified as low priority, as they are constructed of fire-resistant or fireproof building materials and are not located in wildfire zones. However, many facilities, including LVL, ARC, LAFPP, and MFSG have reported air quality impacts and/or compromised water quality from ash. To address these concerns, it is recommended that a response procedure related to air quality concerns is added to the EAPs, and communication is maintained with relevant agencies during wildfire events.

Reports at ARC have also been made concerning power disruptions associated with wildfire. Renewable energy resources and battery energy storage systems can abate the impact of these disruptions. Additionally, given ARC's proximity to the 2022 Sycamore Fire, wildfire projections should be monitored. WRD can also consider a risk assessment on stormwater contamination at both ARC and MFSG.

10.4 Wind

Wind has not been found to be a significant threat to the facilities in this study. As such, there are currently no additional recommendations to mitigate wind-related risks to WRD's facilities.

10.5 Sea Level Rise

The West Coast, Dominguez Gap, and Alamitos Seawater Barriers are directly impacted by SLR, as increasing ocean levels drive higher freshwater demand for barrier operations. Since LVL supplies advanced treated water to the Alamitos Seawater Barrier, it will also experience increased demand. It is recommended that WRD continue to monitor groundwater flow models and leverage projections to support informed projection of future freshwater demand.

SLR has not been found to be a significant threat to the remaining facilities. As such, there are currently no additional recommendations to further mitigate risks pertaining to SLR for these facilities.

10.6 Drought

With respect to drought, WRD's mission is to improve California's resilience by developing a sustainable, local water source for groundwater replenishment through programs such as WIN and WIN4All. All WRD facilities contribute to these efforts. During periods of drought, reuse water demand often exceeds supply, resulting in competition among users. Concurrently, increased groundwater pumping and reduced recharge capacity further stress regional water resources.

WRD recognizes the potential role of advanced water reuse programs, such as Pure Water Los Angeles and Pure Water Southern California, as a long-term component of regional water supply resilience. These programs will produce highly treated recycled water that can supplement local supplies and reduce reliance on climate-vulnerable imported sources. While WRD's primary role focuses on groundwater management and replenishment, developments in potable reuse may influence groundwater recharge, basin sustainability, and overall supply reliability; integration of purified water into regional systems could enhance drought resilience and provide a consistent, locally controlled supply. WRD will continue to coordinate with regional partners to monitor Pure Water LA and Pure Water SoCal and similar initiatives and assess their implications for future replenishment and resiliency planning.

10.7 Recommended Mitigation Measures Summary

Based on the vulnerability assessments and the analysis of existing resilience measures, a list of recommended resilience measures for consideration was developed for WRD's facilities. In **Table 10-1**, N/A indicates no resilience measures were needed and/or that existing measures are sufficient.

WRD can also consider conducting tours at RWGD to educate the public on treatment and reuse, as is currently done at ARC. Additionally, tours at LVL will raise awareness and provide insight into how recycled water supports local water reliability.

10.8 Workshop Themes and Mitigation Measures Matrix

Stakeholder input was incorporated where applicable to help validate and refine key vulnerabilities. As a result, stakeholder feedback informed the identification of actions already underway such as groundwater replenishment and supply diversification programs and the development of targeted recommended measures that address water supply reliability, water quality protection, infrastructure resilience, and funding and coordination needs. **Table 10-2** provides a summary linking stakeholder-identified priorities in Section 8 to the vulnerabilities assessed in Sections 3–7, the existing mitigation measures described in Section 9, and the recommended strategies presented in this section, demonstrating how stakeholder input is integrated throughout the plan. While some identified concerns relate to areas within WRD's purview, others extend beyond WRD's primary authority; in these instances, WRD will, where appropriate, continue to support coordination efforts, share information, and help raise awareness in collaboration with relevant agencies and stakeholders to contribute to broader regional resiliency objectives.

Table 10-1: Additional Recommended Short- and Long-term Resilience Measures for Consideration

Hazard	Facility	Short-Term	Long-Term
Flood Potential	LVL	• Extend canopy existing equipment	• Seal cracks in vault, i.e. installing water stops at joints • Implement proper gutter system at Control Building • Maintain communication with neighboring facilities • Stay informed on recent flood map updates[1] • Maintain and monitor efficiency of existing drainage channels • Feasibility study for the addition of a bioswale
	RWGD	• N/A	• Seal cracks in vault, i.e. installing water stops at joints • Stay informed on recent flood map updates[1] • Monitor nearby flood-prone areas • Nature-based green infrastructure to reduce runoff and promote infiltration
	ARC	• N/A	• Stay informed on recent flood map updates[1]
	WRD HQ	• N/A	• Stay informed on recent flood map updates[1]
	LAFPP	• N/A	• Stay informed on recent flood map updates[1]
	Montebello Forebay Spreading Grounds	• N/A	• Stay informed on recent flood map updates[1] • Continue ongoing communication with LACSDs and Los Angeles County Flood Control District (LACFCD) if flooding occurs
	Seawater Barriers	• N/A	
Extreme Heat	LVL	• Hold inspections of electrical equipment • Installation of fans or portable cooling devices to ensure airflow through electrical room • Temperature monitoring study	• Monitor effectiveness of UV system and PLC Panel cooling • Replacement of air compressors • Hold regular HVAC inspections • Develop heat resiliency design criteria • Conduct feasibility study for nature-based heat resiliency solutions
		• Maintain communication with neighboring facilities	
	RWGD	• Hold inspections of electrical equipment	• Monitor effectiveness of replacements • Develop heat resiliency design criteria • Conduct feasibility study for nature-based heat resiliency solutions to work in tandem with the HVAC upgrades (e.g.rooftop garden)
	ARC	• Development of Heat Illness Prevention Plan	• Incorporate the temperature compliance monitoring plan • Evaluate upgrades to RO pump motors

Hazard	Facility	Short-Term	Long-Term
			• High-temperature design standard for electrical and pumping equipment • Develop heat resiliency design criteria
	WRD HQ	• Develop heat resiliency design criteria • Develop continuity plan for remote operations • Conduct feasibility study for nature-based heat resiliency solutions (e.g.rooftop garden)	
	LAFPP	• Consider developing heat resiliency design criteria	
	Montebello Forebay Spreading Grounds	• Maintain communication with agencies	
	Seawater Barriers	• N/A	
Wildfire	LVL	• Include a response procedure specific to air quality concerns within EAPs	• Maintain communication with agencies during wildfire events
	RWGD		
	ARC	• Conduct a risk assessment on stormwater contamination	• Monitor wildfire projections • Renewable energy resources and battery energy storage systems
	WRD HQ	• Include a response procedure specific to air quality concerns within EAPs	• Maintain communication with agencies during wildfire events
	LAFPP		
	MFSG	• Include a response procedure specific to air quality concerns within EAPs • Conduct a risk assessment on stormwater contamination	• Maintain communication with agencies during wildfire events
	Seawater Barriers	• N/A	• N/A
Wind	All facilities	• N/A	• N/A
Sea Level Rise	LVL	• N/A	• Continue to monitor groundwater levels and utilize projections
	Seawater Barriers		
Drought	All facilities	• Form partnerships to maximize recharge capabilities (Pure Water SoCal and LA, pumpers, water agencies)	
		• Continue to promote funding opportunities for pumpers and support programs that benefit disadvantaged communities • Continue to support projects that align with funding opportunities and provide multiple benefits	

High Priority Medium Priority Low Priority

[(1)] *FEMA National Flood Hazard Layer: [Flood Data Viewers and Geospatial Data | FEMA.gov]*

Table 10-2: Workshop Themes and Measures Matrix

	Workshop Themes				
	Water Quality	**Water Affordability**	**Green Infrastructure/Infrastructure Improvements**	**Local Water Supply Resiliency**	**Project Funding**
Existing Measures and Activities	• Water quality and temperature monitoring • Groundwater level monitoring and flow modeling	• WIN4All program and groundwater remediation activities	• Integrated Stormwater Management System with bioswales and rooftop garden - LEED Platinum (Albert Robles Center) • Energy-efficient AC and building envelope - LEED Platinum (Albert Robles Center) • SCADA upgrade with UV system and PLC panel cooling (Leo J. Vander Lans)	• Groundwater monitoring and flow modeling for sea level rise • Communication with LA County Public Works on barrier contributions and recharge activities • WIN4All, groundwater remediation, and barrier contributions (Leo J. Vander Lans)	• Supports pumpers' access to funding through targeted outreach and coordination
Recommended Measures	• Stormwater contamination risk assessment (Albert Robles Center, Spreading Grounds)	• Continue to support programs that benefit disadvantaged communities	• Heat resiliency design criteria (Leo J. Vander Lans, Goldsworthy Desalter, Albert Robles Center, WRD Headquarters, LA Forebay Cleanup Project) • Renewable energy and battery storage systems (Albert Robles Center) • Feasibility studies for nature-based flood and heat resiliency solutions (Leo J. Vander Lans, Goldsworthy Desalter, WRD Headquarterss)	• Partnerships to maximize recharge capabilities - Pure Water SoCal/LA	• Promote funding opportunities for pumpers • Support projects that align with funding opportunities and provide multiple benefits

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Appendix A: Additional Figures

A-1: Flood Potential Appendix Figures

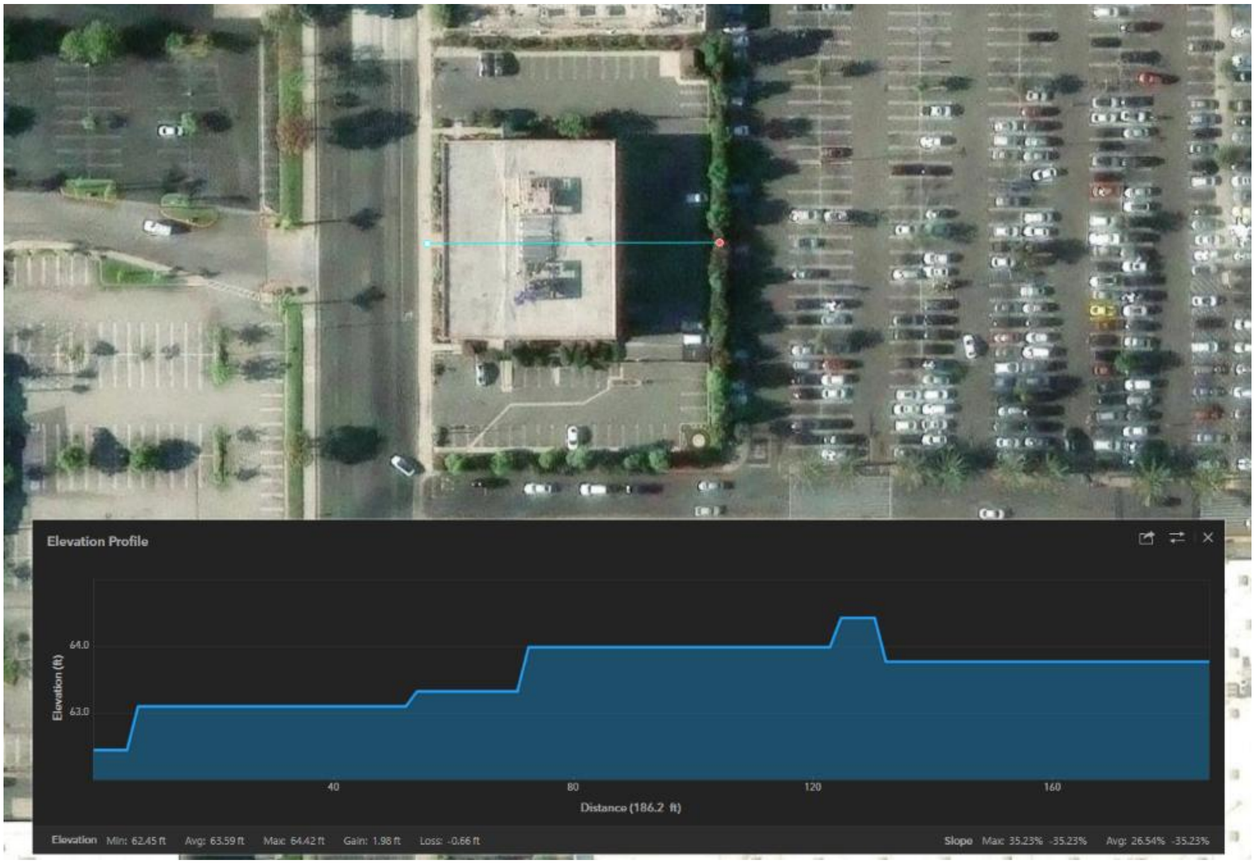

Figure A-11-1: WRD HQ Elevation Profile Sloped West

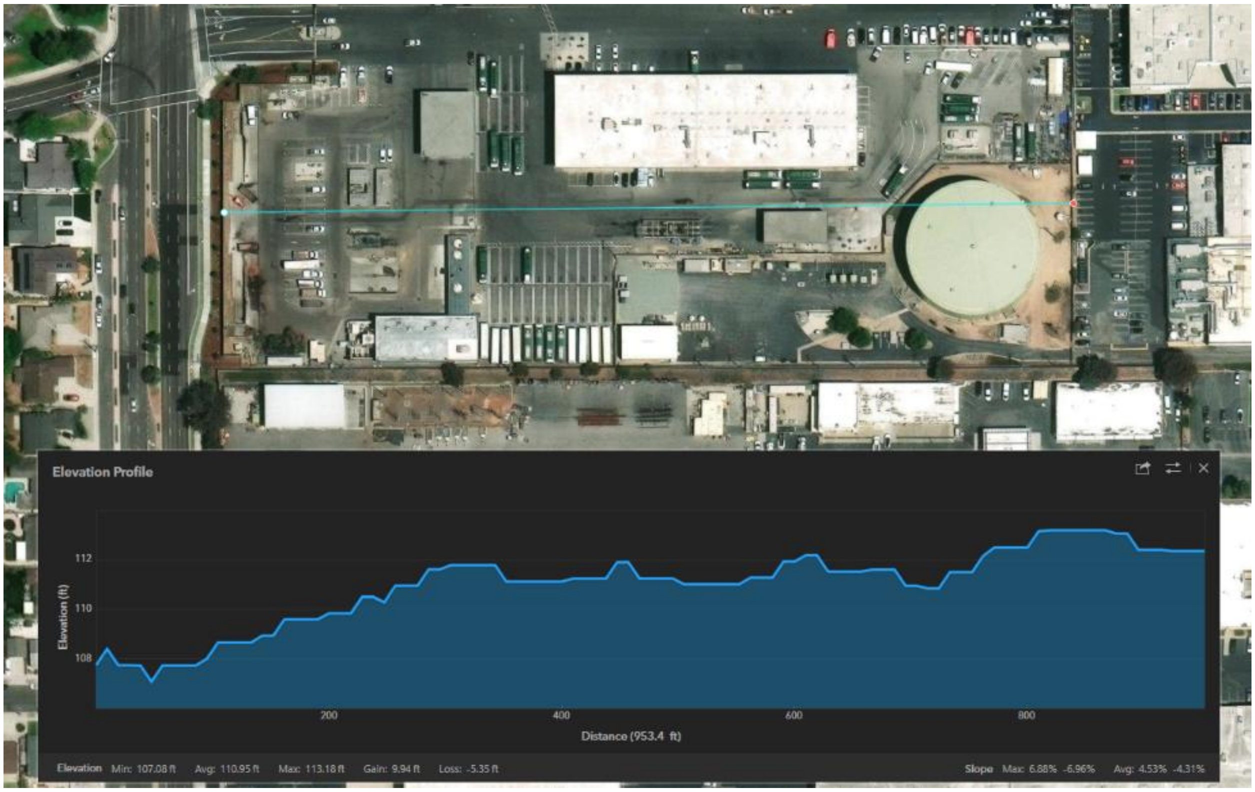

Figure A-11-2: RWGD Elevation Profile Sloped West

A-2: Extreme Temperatures Appendix Figures

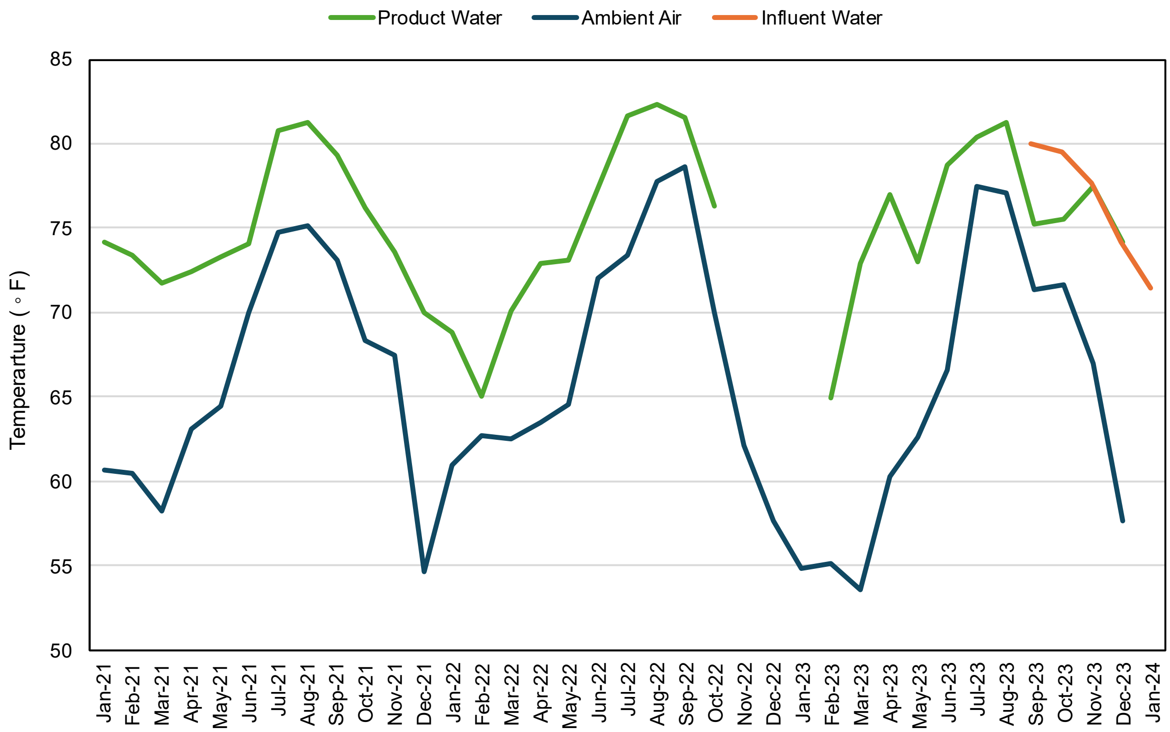

Figure A-3: Effluent, Influent, and Ambient Monthly Average Temperature at ARC

A-3: Wildfire Appendix Figures

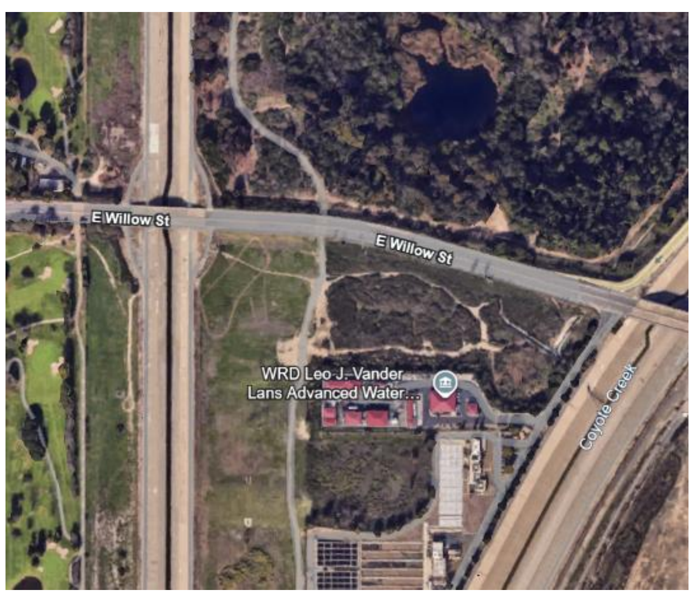

Figure A-11-3: LVL Surroundings Aerial View

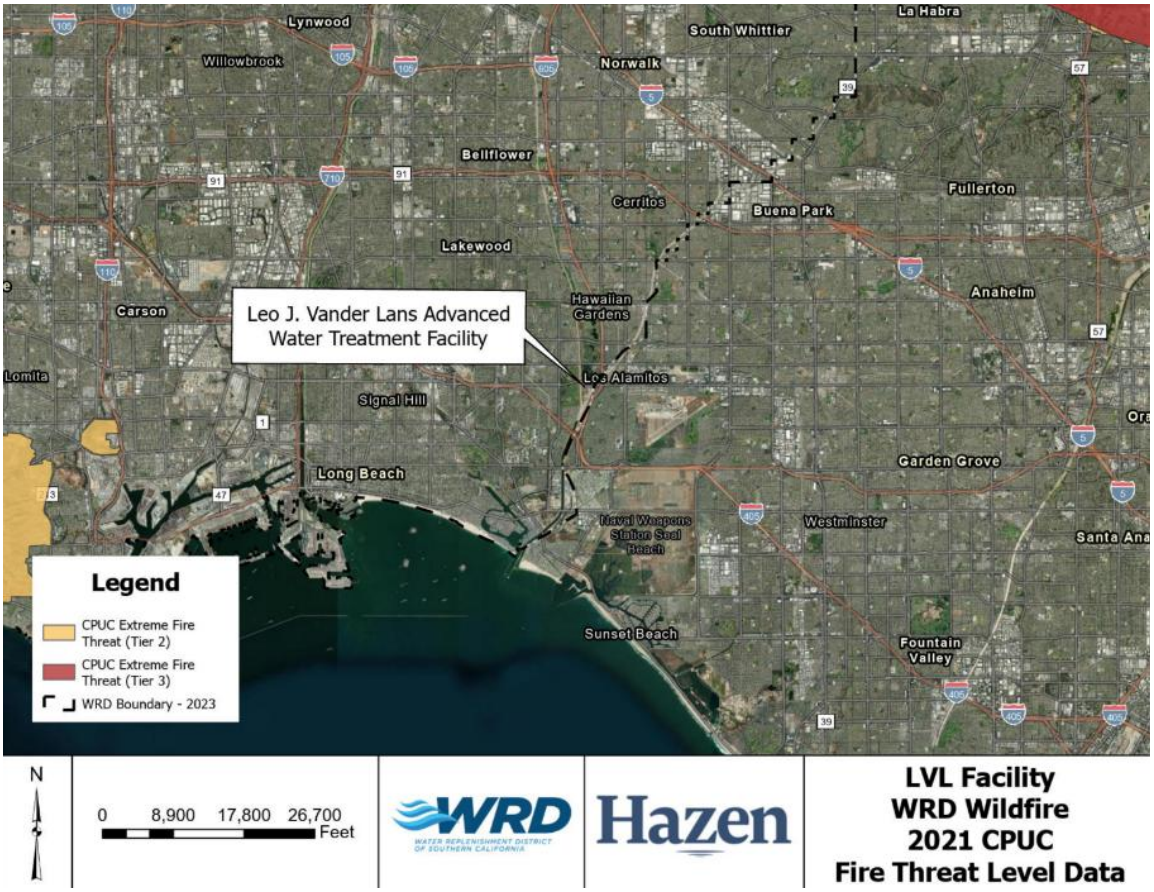

Figure A-11-4: CPUC Elevated and Extreme Fire Threat near LVL

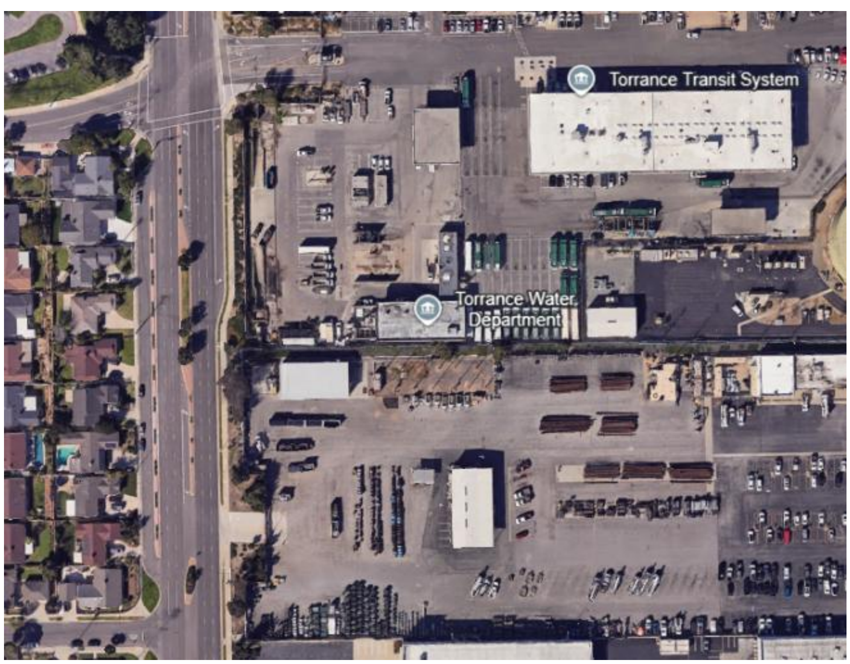

Figure A-11-5: RWGD Aerial View

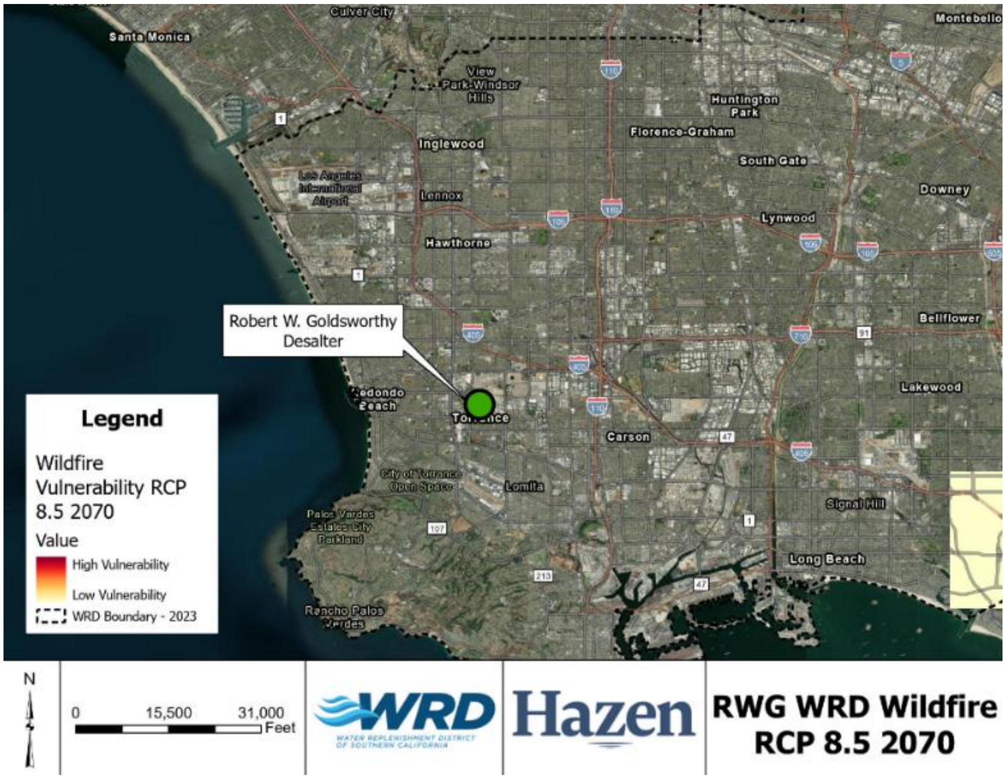

Figure A-11-6: Cal-Adapt RWGD Wildfire Vulnerability (2070, RCP 8.5)

Figure A-11-7: CPUC Elevated and Extreme Fire Threat near RWGD

Figure A-11-8: Surroundings Along ARC Property Line

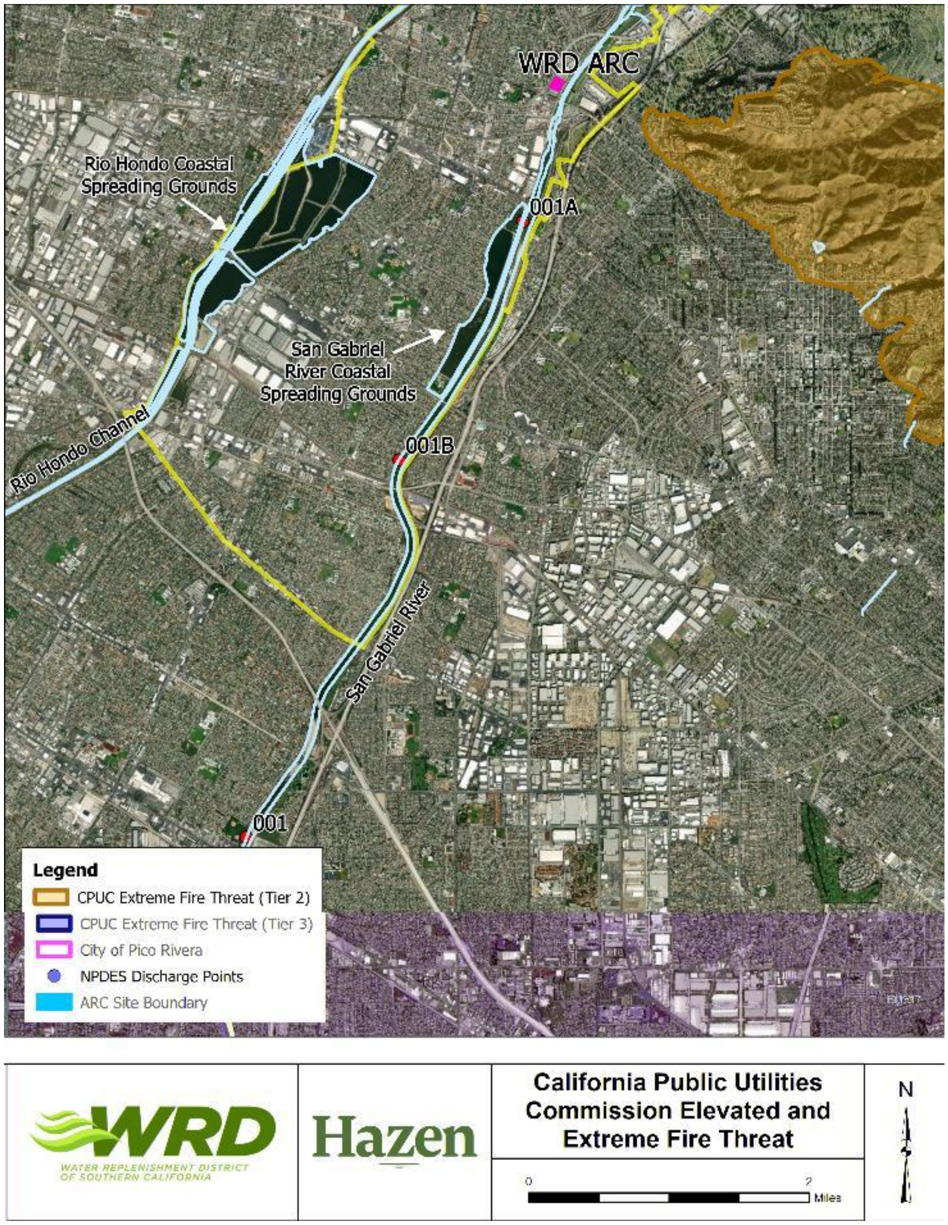

Figure A-11-9: CPUC Elevated and Extreme Fire Threat near ARC and Discharge Points

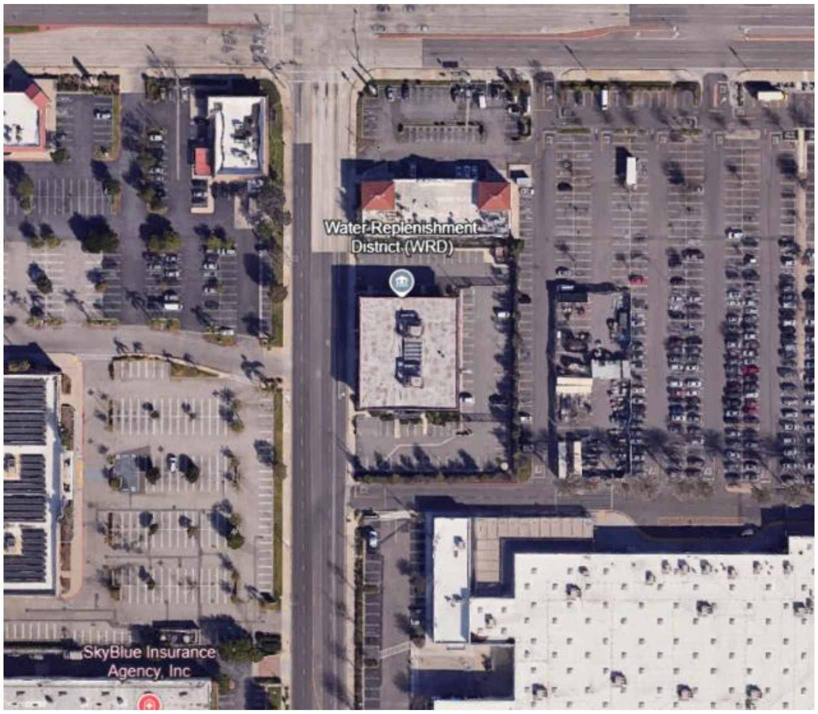

Figure A-11-10: HQ Surroundings

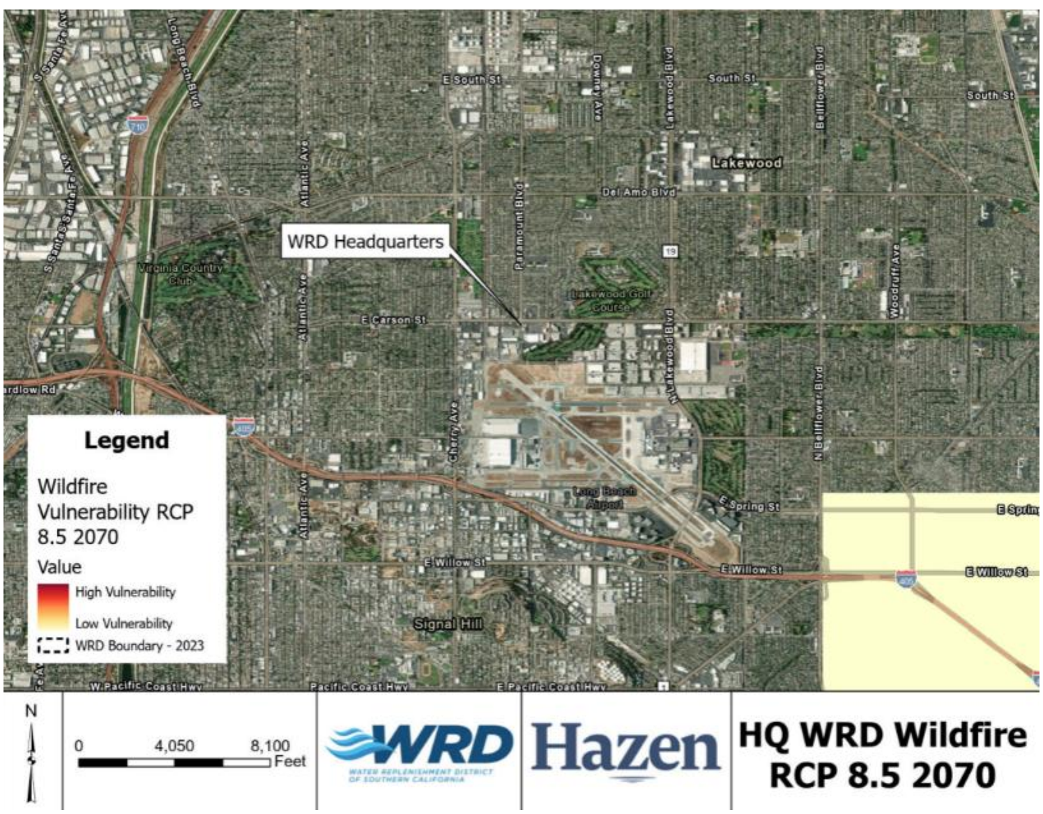

Figure A-11-11: Cal-Adapt HQ Wildfire Vulnerability (2070, RCP 8.5)

Figure A-11-12: Cal-Adapt Montebello Forebay Spreading Grounds and ARC Wildfire Vulnerability (2070, RCP 8.5)

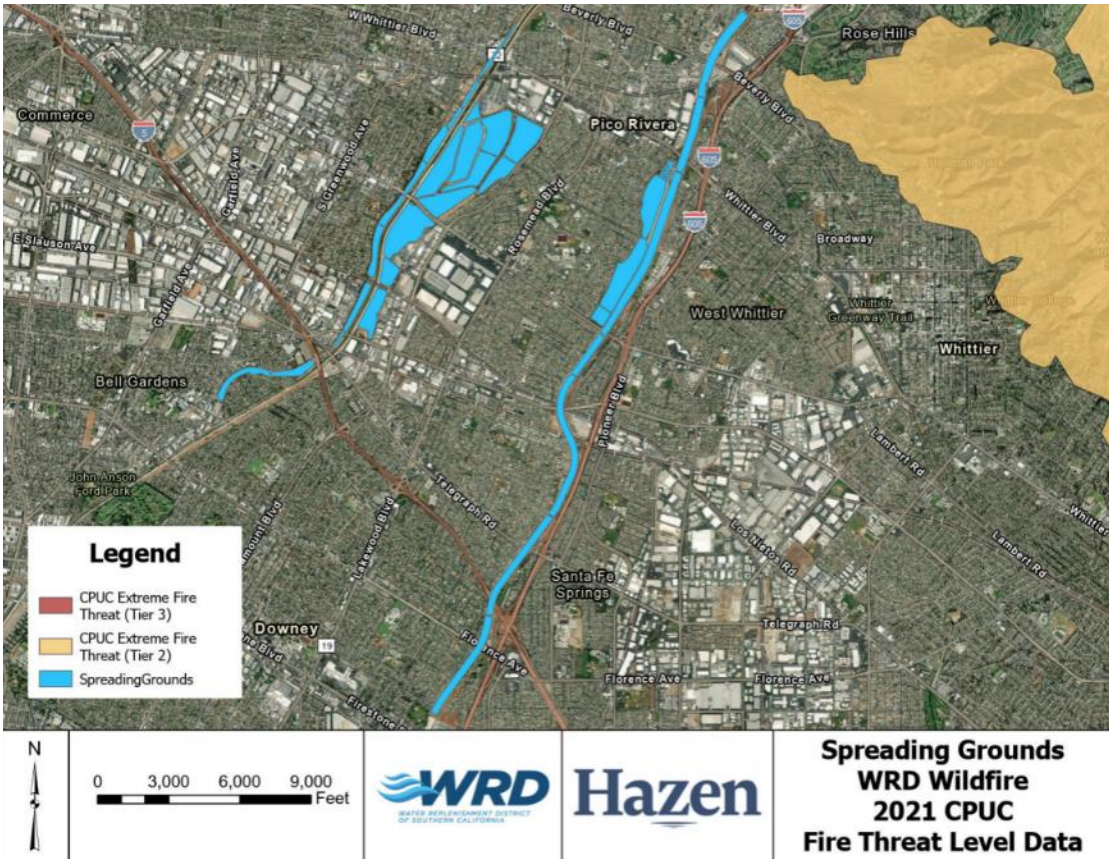

Figure A-11-13: CPUC Elevated and Extreme Fire Threat near Montebello Forebay Spreading Grounds

Appendix B: Outreach and Engagement Plan